

## CHAPTER -2

### BIOTECHNOLOGY RESEARCH AND THE PATENT PARADOX

#### 2.1 INTRODUCTION

The intellectual property law is a powerful tool for protecting the scientific innovations. The patent is the commonly used intellectual property right to protect biotechnology innovation, which confers a monopoly right to the inventor to exploit the invention for a limited period of time. Justifications of patent rights are based on historically evolved concepts, philosophies and theories of property rights on innovations. The protection granted for scientific inventions are based on thorough socio-economic justifications. These theories have been subjected to constant evaluations, modifications and revisions from time to time. Historically the concepts of patent have been subjected to many changes and all these changes are made in order to accommodate the changing scenarios in scientific advancements.

Patent philosophy comprises of multi dimensional arguments. The justifications for granting an exclusive right over the innovation itself have many different points of views. The traditional patent system views patent right as an incentive for innovation. Where as various other philosophers support the system of patent on the ground that the owner of an invention must have a natural right over what he has invented and must be allowed to recoup the time and money he has expended. However, we can see that, the patent regime is granting this monopoly right to the inventor not merely as a personal right but as an incentive for disclosing the invention.<sup>1</sup> Disclosure is a central pre requisite for the grant of patent.<sup>2</sup> Hence, we can see that the justifying a patent right itself has many conceptual and philosophical divergences which are dealt in detail later in this chapter.

The concept of patent system stimulates technical progress in four ways; first, it encourages research and invention; second, it induces the inventor to disclose his discoveries instead of keeping them a trade secret; third, it offers a reward for the

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<sup>1</sup> Claude Barfield and John E. Calfee, *Biotechnology and the Patent System Balancing Innovation and Property Rights*, ( Washington, D.C., The AEI Press, 2007), p.25.

<sup>2</sup> Ibid. at, p.75.

expenses on developing inventions to the stage at which they are commercially practicable and fourth, it provides an inducement to invest capital in new lines of research. Unless the research results are protected, it might not be profitable if many competing producers embark on them simultaneously.<sup>3</sup>

Biotechnology today is a fast growing special branch of science which has both social and commercial significance. Intellectual property right has a very crucial role to play in the pace in which biotechnology is growing. The advent and growth of biotechnology over the past few years have triggered many controversies over the issues relating to intellectual property rights in basic biological research, especially that related to patenting of biotechnology research. The controversies are not just controversies but rather some harsh realities relating to property right. This is evident by the arguments of the research community that the patent rights over the basic research tools are acting as a stumbling block against ongoing research.<sup>4</sup> One of the major arguments by a faction of biotechnology researchers is that the patenting of basic research tools will stifle growth in biotechnology research.<sup>5</sup>

This chapter analyses the traditional patent regime, its socio economic justifications of traditional patent system and its inconsistencies in handling the fast growing area of biotechnology research. The problems are analysed from the historical perspective and a thorough examination of social, moral and economic justification of the traditional patent regime is made, so as to understand the contemporary problems relating to biotechnology research sector. Various theories and concepts of the patent regime are dealt in detail so as to understand the real problems and challenges in handling this relatively new area. The chapter highlights major issues with the traditional patent system while applying to the area of biotechnology research. The issues like as patent proliferation, anticommons, patent thickets and research bottlenecks are some of the contemporary problems faced by biotechnology research sector.

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<sup>3</sup> Justice Rajagopala Ayyangar's report on the revision of the patents law (1959). The Patents Act 1970 was based on the recommendations made by Ayyangar's report.

<sup>4</sup> Rebecca S. Eisenberg, *Patents and the Progress of Science: Exclusive Rights and Experimental Use*, 56 U. Chi. L. Rev. 1017, p.1045 (1989).

<sup>5</sup> Ibid.

## 2.2 A BRIEF HISTORICAL PERSPECTIVE OF PATENT REGIME

Tracing its origin to Greek antiquity, intellectual property has become an institution in modern legal systems worldwide.<sup>6</sup> England played an important role in the development of intellectual property regime and set the mould for patent rights internationally. England is the country where the first major steps towards an industrial society were taken and the property rights were termed as industrial property.<sup>7</sup> Industrial society in England is believed to be a direct result of the patent system. However the patent law can be seen emerging from medieval times. Earlier *Letters of patents* were granted to weavers and craftsman allowing them to practice their trades in order to overcome the guild regulations.<sup>8</sup> These were open letters carrying the King's Great seal on the bottom, granted exclusive right to practice the trade. One of the earliest recorded instances of letter of patents was the one granted to John Kempe, a Flemish weaver in 1311.<sup>9</sup>

In this early form of letters, there was no need to comply with any patentability criteria of inventiveness; however some letters were granted to new inventions. For example John of Utyman was granted patent for his new method of making stained glass. These developments took place as a result of the strong need for preventing unfair competition. It was realised when an effective system of protection was evolved in the form of patents. Patent prevents the invention from being copied by others; this in turn confers a monopoly right to the inventor. A system of monopoly was developed during the time of the Queen Elizabeth-I and many letters of patents were granted during the sixteenth and seventeenth centuries.<sup>10</sup>

Initially these monopolies were offered by the state as rewards to the entrepreneurs for carrying out some corresponding duty. Letters of patents were open letters from the Crown to the subjects stipulating the terms of the grant. Unlike patents, there was no formal check and balance on the privileges granted by the Crown. A famous example of letters of patent was for playing cards which granted

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<sup>6</sup> Pamela O. Long, *Invention, Authorship, 'Intellectual Property', and the Origin of Patents*, 32 *Tech. and Culture* 846, p.846 (1991).

<sup>7</sup> Ann Hironaka, *Changing Meanings, Changing Institutions: An Institutional Analysis of Patent Legislation*, 72 *Sociological Inquiry* 108, p.114 (2002).

<sup>8</sup> David Bainbridge, *Intellectual property*, 4th ed, (London, Pitman Publishing, 1999), p.320.

<sup>9</sup> *Ibid.*

<sup>10</sup> *Ibid.*

monopoly over the sale of playing cards. These types of monopoly were proved to be detrimental any one who was already in the selling of playing cards<sup>11</sup>. Eventually even the crown's right of granting monopoly itself was challenged before the court of law<sup>12</sup>. It was also subjected to parliamentary intervention and led to the enactment of the statute of Monopolies. Statute of monopoly imposed a general prohibition on the grant of patent by the crown. However these prohibitions were imposed with an exemption to patents on the process of new manufactures. The statute also limited the duration of patent to fourteen years.<sup>13</sup>

The concept of novelty and written description (specification) was developed in the eighteenth century. Patent, as it exists today, is a nineteenth century development. However the patent amendment act of 1852 made an overhauling of the patent system. It established the patent office and the patent office library. The patents, designs and trademark Act of 1883, gave protection to industrial property in compliance with provisions of the Paris Convention.<sup>14</sup> The legal concepts like registration and publication had been developed during this period. The concept of novelty and relevance of prior art search was developed during early nineteenth century.<sup>15</sup>

The various international conventions helped in shaping the intellectual property system as it exists today. The Trade related Intellectual Property Rights (TRIPs) was a major success in harmonising the intellectual property legislation across the world. However the TRIPS provided only general guidelines to the shaping of national legislations. The latest developments in biotechnology sector were not foreseen by these conventions. However, majority of the developments took place during the last 20 year period. Currently various initiatives are underway to find an appropriate policy development to handle the biotechnology sector.

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<sup>11</sup> David Bainbridge, *Intellectual property*, p.322.

<sup>12</sup> Ibid.

<sup>13</sup> Lionel Bently and Brad Sherman, *Intellectual property law*, 2<sup>nd</sup> ed.(London, Oxford University Press, 2004) p.324.

<sup>14</sup> David Bainbridge, *Intellectual property*, p. 320.

<sup>15</sup> Ibid.

## **2.3 THE CONCEPT AND PHILOSOPHY OF TRADITIONAL PATENT SYSTEM**

The patent regime, as it exists today has been subjected to many changes right from the development of the concept of intellectual property rights. The process is still continuing with the changes in circumstances, concept and subject matter of the patent. It is under constant reformation in order to accommodate the changes in technological progress. Developments of new technologies like 'biotechnologies' and 'nanotechnologies' have posed a greater challenge before the policy makers. Developing appropriate changes in the traditional system for accommodating these newly developing technological terrains is relatively tough. To frame suitable provisions, we need both conceptual and philosophical backing, so that the newly developed provisions are perfectly in line with social and moral justifications.

### **2.3.1 MORAL AND PHILOSOPHICAL RATIONALE OF PATENT MONOPOLY.**

#### **2.3.1.1 PATENT AS AN EXCLUSIVE RIGHT**

The patent system is usually justified on utilitarian grounds as a tool to stimulate innovation and development for the greater good of the society.<sup>16</sup> The inventor will get exclusivity over his intellectual product for a limited period of time for disclosing the invention to the public. There are varying philosophical justifications for granting an exclusive right or rather a limited monopoly right to the inventor. The primary objective of the patents system is to stimulate innovation by granting a monopoly right to the inventor, who will then have the means to recuperate the time and money he expended for bringing out the invention.<sup>17</sup> However the right granted to the inventor can be used to restrict others from working on the same area for use and perfecting of his invention. The patent system promotes the interests of the inventor by allowing to recover the financial investments made for his invention. It also serves the public interest by allowing the information to be disseminated to the

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<sup>16</sup> William W. Fisher, "Theories of Intellectual Property," in *New Essays in the Legal and Political Theory of Property*, Stephen Munzer, ed., (Cambridge, Cambridge University Press, 2001). p. 11

<sup>17</sup> Ibid. at p.12

public instead of being kept as a trade secret.<sup>18</sup> This is the general philosophy that has been put forward by the proponents of the traditional patent system.

There are many other arguments against the patent monopoly. One strong argument against patent monopoly is that it creates arbitrariness. The inventor may abuse the monopoly right granted to him by exorbitant pricing on the patented product. Another argument is that, some inventors may not be able to meet the supply and demand of the patented product. Which means that the monopoly some time cause shortage patented product due to the inability of the inventor to meet the demand. These two issues are the negative aspects of monopolies. But according to Thomas Jefferson, The first head of US Patent Office, have taken a positive view towards patent and copyright monopolies because, he believed that a limited monopoly would encourage the production of new scholarship and inventions.<sup>19</sup> The monopoly right granted to the patents and the copyright was with an objective of fostering creativity. The Intellectual property monopoly was recognised even by the US constitution as a means to greater good of the society. This was recognised by the intellectual property clause of the U.S. Constitution.<sup>20</sup>

This is again pointing towards a fundamental contradiction within the system. There is again a possibility that the monopoly granted to an inventor can be used as a means to restrict others from using the invention. The objective of granting monopoly to the inventor is for stimulating the innovation.<sup>21</sup> But then he can use it as a means to restrict others from working on the area of research itself. Economist Joan Robinson commented on the patent system stating that;

“Since it is rooted in contradiction, there can be no such thing as an ideally beneficial patent system, and it is bound to produce negative results in particular instances, impeding progress unnecessarily even if its general effect is favourable on the balance.”<sup>22</sup>

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<sup>18</sup> Edwin C. Hettinger, *Justifying Intellectual Property Rights*, 18 Phil. & Pub. Aff. 31., p. 48 (1989).

<sup>19</sup> Justin Hughes, *The Philosophy of Intellectual Property*, 77 Georgetown L.J. 287, p.303-304 (1988).

<sup>20</sup> U.S. Constitution. Art. I, Sec. 8, Cl. 8. reads as:

“To promote the Progress of Science and useful Arts, by securing for limited time to authors and inventors the exclusive right to their respective writings and discoveries”

<sup>21</sup> Edwin C. Hettinger, *Justifying Intellectual Property Rights*, p. 48.

<sup>22</sup> Ibid.

These issues have raised serious concerns among the researchers in modern biotechnology.

Biotechnology research has a different dimension when compared to the traditional technology innovation. The most important element in biotechnological research is the research data. The protection of research data is highly inevitable in biotechnology research. If adequate protection is not provided to these important data, it may be misappropriated by the free riders.<sup>23</sup> However, when a monopoly is granted to the inventor he may find it more beneficial to restrict the access rather than giving license, even for a reasonable amount of royalty.<sup>24</sup> These exclusive rights conferred by IPRs in the research database may enable them to prevent others from entering into the market.<sup>25</sup> This will lead to a situation wherein the database owners may enrich themselves by arbitrarily fixing excessive access price and threatening the competitors with infringement suits. This results in a near absolute monopoly in the primary research database as well as the corresponding downstream research which is highly dependent on the research database.<sup>26</sup>

### **2.3.1.2 ECONOMICS OF PATENT MONOPOLY**

The basic economic philosophy of the patent system is to stimulate innovation by conferring a monopoly right to the inventor. The monopoly will allow them to recover the financial and intellectual investment.<sup>27</sup> Economic analysis from another perspective shows that, the patent system is designed to protect the inventors from market failures, by awarding a property right on a discovery. This is done by allowing the inventors to exclude others from making, using or selling their discoveries.<sup>28</sup>

The economic analysis suggests that intellectual property rights should not be created and extended casually. They should be established only in contexts in which their benefits exceed their concomitant social costs in order to stimulate productivity.

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<sup>23</sup> Daryl Lim, *Re-Defining The Rights And Responsibilities Of Database Owners Under Competition Law*, 18 S Ac L. J. 418, p. 420 (2006).

<sup>24</sup> *Ibid.*

<sup>25</sup> *Ibid.*

<sup>26</sup> *Ibid.*

<sup>27</sup> William W. Fisher, *Theories of Intellectual Property*, p. 2.

<sup>28</sup> Michael S. Mireles, *An Examination Of Patents, Licensing, Research Tools, And The Tragedy Of The Anticommons In Biotechnology Innovation*, U. Mich. J.L. Reform [Vol. 38:1] p.152 (2005).

This basic economic insight has guided many scholars in their efforts to determine the optimal scope of intellectual property rights.<sup>29</sup> Several economists have explored the question of optimal patent duration for better economic utilisation.<sup>30</sup>

William Nordhaus, suggests that the duration of patent must be optimal and each increase in the duration or strength of patents stimulates an increase in inventive activity. The gains resulting from the increase in duration is social welfare, which will ultimately induce the creation of intellectual products.<sup>31</sup> However, social welfare is reduced by larger administrative costs and burden of high price associated with intellectual products. According to him these products would have been created even in the absence of the enhanced incentive. He further suggests that the patent duration or strength should be increased up to the point where an additional extension would generate more social costs than benefits. Other analysis in the same direction was made by Louis Kaplow's. He attempted to locate the optimal boundary between patent law which permits and encourages the exercise of monopoly and antitrust law which forbids the monopoly.<sup>32</sup> Both of them tried to explain patent monopoly as a socially beneficial concept.

The concept of monopoly right in new innovations varies from situation to situation. Research on modern biotechnology and nanotechnology research has a different nature regarding the patentability concept. Traditional patent regime is apparently ineffective in handling these new areas of technology. The various studies suggest that the patent monopoly in biotechnology has given rise to many issues relating to access to research data enabling future research.

### **2.3.2 INTELLECTUAL CREATIVITY - INTRINSIC AND EXTRINSIC MOTIVATIONS**

Research is an outcome of intellectual input and it involves investment of time and money. We require strong motivating factors to invest on research. Motivation is the energisation and direction of behaviour where energy describes the needs of the

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<sup>29</sup> Michael S. Mireles, *An Examination Of Patents, Licensing, Research Tools*, p.152

<sup>30</sup> Robert P. Merges and Richard R. Nelson, *On The Complex Economics Of Patent Scope*, 90 Colum. L. Rev.839., p.840 (1990).

<sup>31</sup> William W. Fisher, *Theories of Intellectual Property*, p.14.

<sup>32</sup> Ibid.

individual and direction describes the processes and structures that relate those needs to behaviour.<sup>33</sup> Motivation comprises several factors that may explain each individual's overall motivation towards specific tasks.

According to Deci and Ryan's self-determination theory, three main types of motivation exist: intrinsic motivation, extrinsic motivation, and amotivation.<sup>34</sup> Doing an activity just for the satisfaction derived from it is intrinsic motivation. Whereas, the extrinsic motivation is; performing a task as a means to an end or due to an obligation. Amotivation results from the dislike of accomplishing an activity or the feeling of being unable to carry it out.<sup>35</sup> Researchers have a wide variety of intrinsic and extrinsic motivations for contributing to creativity. They are some times for personal enjoyment, sense of community obligation, remunerations, solving a specific problem, honing skills and enhancing career prospects. Motivation is an antecedent of behaviour and performance; research in psychology has also recognized the effect of performance feedback on motivation.<sup>36</sup>

### 2.3.2.1 INTRINSIC MOTIVATION

Intrinsic motivations are the primary factors behind individual creativity. Self driven researchers normally act under this motivation. Commercial motives are comparatively less in the case of intrinsic motivation. Though multiple motivations may be working behind contributors, empirical study shows that the intrinsic motivation is the strongest driver of participation.<sup>37</sup> Intrinsically motivated people are satisfied through the exploring, challenging, playful, novel, spontaneous, or creative nature of the work itself.<sup>38</sup> This is evident in the area of open source software projects where we can see that the researchers working within an open source community are driven solely by their own intrinsic motivations to develop a high quality program.

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<sup>33</sup> Edward L. Deci and Richard M. Ryan, *Intrinsic motivation and self determination in human behavior*, (New York, Plenum Press, 1985), p.3

<sup>34</sup> Edward L. Deci and Richard M. Ryan, *The "What" and "Why" of Goal Pursuits: Human Needs and the Self-Determination of Behavior*, *Psychological Inquiry*, Vol. 11, No. 4, p.237 (2000).

<sup>35</sup> Ibid.

<sup>36</sup> Ibid.

<sup>37</sup> Karim R Lakhani, Robert G. Wolf. *Why Hackers do what they do: Understanding Motivation Effort in Free/Open Software Projects*, MIT Sloan Working Paper No. 4425-03. P.6 (2003) Available at SSRN: <http://ssrn.com/abstract=443040> or doi:10.2139/ssrn.443040. last accessed on 4-12-2010.

<sup>38</sup> Ibid.

According to Deci and Ryan psychological needs, the desire for competence, autonomy and relatedness are the other factors affecting intrinsic motivation. Thus, any external factor affecting one or more of these needs may either undermine or enhance the intrinsic motivation.<sup>39</sup> Enjoyment-based intrinsic motivation is the strongest and most pervasive driver. We can see that the intellectual stimulation derived from writing code and improving programming skills are top motivators of intellectual contribution.<sup>40</sup>

### 2.3.2.2 EXTRINSIC MOTIVATIONS

Extrinsic motivations are equally motivating. In contrast, extrinsic motivations may not have any relation with any specific task and are usually applied by someone other than the person being motivated. Economists explain how extrinsic motivations drive human behaviour. According to them human behaviour is based on incentives which they receive. People change their actions because they are induced to do so by an external intervention. Economic theory suggests that extrinsic motivations are relevant for these actions.”<sup>41</sup> Apart from perceived talents of a researcher additional extrinsic motivation can lead to potentially superior research outcomes.<sup>42</sup> The extrinsic motivations are easy to explain by relating to software sector where majority contributions can be classified on the basis of intrinsic and extrinsic motivations.

Extrinsic motivations can be a result of lots of other contributing factors like personal need. For example, in software sector one may invest their intellectual inputs to fix to an existing bug or to include a missing feature or an add-on in a piece of existing software explicitly to meet his personal requirement.<sup>43</sup> Some times Sharing software codes and knowledge with other members of the community will motivate

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<sup>39</sup> Edward L. Deci and Richard M. Ryan, *The “What” and “Why” of Goal Pursuits: Human Needs and the Self-Determination of Behavior*, p.237.

<sup>40</sup> Karim R Lakhani, Robert G. Wolf. *Why Hackers do what they do: Understanding Motivation Effort in Free/Open Software Projects*, p.4.

<sup>41</sup> Ibid.

<sup>42</sup> Ibid.

<sup>43</sup> Karim R Lakhani, Robert G. Wolf. *Why Hackers do what they do: Understanding Motivation Effort in Free/Open Software Projects*, p. 4.

others to give something in return. This is generally termed as “Signalling incentives”. This again is an extrinsic factor that will help intellectual contribution.<sup>44</sup>

Another factor contributing to extrinsic motivation is peer recognition or professional status enhancement where people try to demonstrate their talents to future employers by their contributions so that it may boost their future career development<sup>45</sup>. Another example for extrinsically motivated work is the involvement of programmers in projects to enhance their programming expertise. Skill enhancement is made through receiving constructive feedback from the community by peer reviews on their contributions.<sup>46</sup>

## 2.4 THEORIES OF PATENTS

Patent is all about rewarding the inventor for giving something useful to the society. Perhaps the earliest known recording of this idea is found in Aristotle’s “Politics” dating back to the fourth century B.C. where Aristotle sharply criticized a proposal by Hippodamou of Miletus who called for a system of rewards to those who discovered useful things.<sup>47</sup> Hippodamou’s proposal demonstrates the utilitarian philosophy which says that if you reward the creators of useful things you get more useful things. Aristotle’s counter argument is also equally relevant. According to him such a system of individual reward may otherwise reduce social welfare.

There are several points of views about property right over innovations. Different philosophers have proposed various theories of patents from different perspectives based on philosophical, economical and social justifications. However we can see that all these theories about patents are interrelated. Some consider a patent as a natural right where as some others see it as a social contract. Property right in patents is based on different philosophical justifications. In the views of John Locke, the inventor must be given adequate incentives for the labour he expended.<sup>48</sup>

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<sup>44</sup> Aaron Schiff, *The Economics of Open Source Software: A Survey of the Early Literature*. Review of Network Economics 66, Vol.1:1, p.69 (2002)

<sup>45</sup> Karim R Lakhani, Robert G. Wolf. *Why Hackers do what they do: Understanding Motivation Effort in Free/Open Software Projects*. p.5.

<sup>46</sup> Ibid.

<sup>47</sup> Anthony D’Amato and Doris Estelle long, ed., *International intellectual property law*, (London, Kluwer Law International, 1997) p. 27.

<sup>48</sup> Justin Hughes, *The Philosophy of Intellectual Property*, p.303.

Whereas, the contract theory stipulates that the right granted to the inventor is for disclosing the invention to the society. Essentially it is a contract between the inventor and the state. According to Hegel's personality theory, an invention is basically an idea and an idea belongs to its creator and it is a manifestation of the creator's personality<sup>49</sup>. The theories of patents generally justify property-right on inventions.

Apart from securing a property right, a patent also provides a commercial platform for promoting technological innovations. It also serves the public good aspect. A patent can be construed as business tool with huge potential for profit through licensing, and by working out the invention. The most recent view by some of the scientists is that a patent is an obstacle to innovation.

#### 2.4.1 LOCKEAN LABOUR THEORY

According to John Locke's Labour theory "labour is inherently unpleasant, such that property rights in the fruits of the labourer's efforts are required as an incentive for the labourer to engage in the unpleasant activity."<sup>50</sup> This theory of labour as incentive has a utilitarian foundation because labour is necessary to promote the public good. Lockean property theory is not a pure natural law theory. According to Locke's, the property right should be inherent with the creation because that was how one would provide incentive to create.<sup>51</sup>

A second argument of Lockean labour theory is that when labour is applied to nature, the value added by the labourer must be rewarded.<sup>52</sup> The value added theory means that labourers will only add value to nature if they expect to receive equal value in return from society.<sup>53</sup> The Lockean labour theory is understood as an instrumentalist approach which has gained acceptance in international sphere. In brief, Lockean Labour theory asserts that creators deserve to own and control intellectual works because they labour to create them. Many of the researchers supported this instrumentalist approach. Scholars such as Mark Lemley and Dan Burk have explored whether patent system in various ways would increase incentives to innovate and to

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<sup>49</sup> Ibid.

<sup>50</sup> Ibid.

<sup>51</sup> Anthony D'Amato and Doris Estelle Long, ed., *International intellectual property law*, p. 28.

<sup>52</sup> Ibid.

<sup>53</sup> Ibid.

develop commercial products in fields such as biotechnology and traditional pharmaceutical sector.<sup>54</sup>

According to Lockean property arguments, resources are commonly owned with out any stake in it. No one has any intrinsic claim over any particular resource.<sup>55</sup> According to Locke’s philosophy, an individual may use resources from the common pool and privately appropriate them. However, it is limited to exerting his labour to improve them. He may thereby generate a claim over these particular resources so long as he leaves ‘enough and good for others’ and does not waste what he takes.<sup>56</sup>

Some scholars have criticised the Lockean instrumentalist approach. Peter Drahos, for example, argues that the original inventor would seek to minimize proprietary control over information.<sup>57</sup> Drahos views information as a primary good because, it has a central role in human planning.<sup>58</sup> It is a primary good that is essential to liberty and it should be distributed equally, unless unequal distribution is necessary to benefit the least advantaged members of society.<sup>59</sup>

Another area which the Lockean concept failed to explain is about how to give a strong positive argument as to why intellectual works should be privately ownable at all<sup>60</sup>. Each of us has an equal moral claim to resources in which we all have interests and it should be understood as a manifestation of our equal moral standing. In the words of Thomas Jefferson;<sup>61</sup>

“He who receives an idea from me, receives instruction himself without lessening mine; as he who lights his taper at mine, receives light without darkening me. That ideas should freely spread from one to another

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<sup>54</sup> Mark Lemley and Dan Burk, *Biotechnology’s Uncertainty Principle*, 54 Case W. Res. L. Rev., Vol., p. 691, (2004).

<sup>55</sup> William W. Fisher, *Theories of Intellectual Property*, p.14

<sup>56</sup> Ibid.

<sup>57</sup> Steven J. Horowitz, *Rethinking Lockean Copyright And Fair Use*, Deakin Law Review Volume 10 No 1, p.211(1993).

<sup>58</sup> Ibid.

<sup>59</sup> Ibid.

<sup>60</sup> Seana Valentine Shiffrin, ‘Lockean arguments for private intellectual property’, in *New Essays in the Legal and Political Theory of Property*, ed. S. R. Munzer (Cambridge: Cambridge University Press, 2001), pp. 138–67.

<sup>61</sup> Thomas Jefferson, ‘The Invention of Elevators (Letter)’ (1813), in *The Complete Jefferson*, ed. S. K. Padover (New York: Dell, Sloan & Pearce, 1943), p. 1015. ( Thomas Jefferson was the first head of the US Patent Office and a Lockean )

over the globe, for the moral and mutual instruction of man, and improvement of his condition, seems to have been peculiarly and benevolently designed by nature, when she made them like fire, expansible over all space, without lessening their density in any point, and like the air in which we breath... incapable of confinement or exclusive appropriation. Inventions then cannot, in nature, be a subject of property”.

#### 2.4.2 THE SCHUMPETERIAN THEORY

According to Joseph Schumpeter imitation is the key threat to the profits of patent holders. IPR protections reduce the probability of imitation and thereby increase the expected return for innovation and the equilibrium rate of growth. Schumpeter described the process of “creative destruction” and the ‘dynamics of innovation’ as the most important drivers of the competitive process.<sup>62</sup> According to ‘The Schumpeterian theory of the innovator,’ the invention if happened should secure the inventor’s profit and rent; thus there is no need for government to compensate or reward inventions in the first place. Rewards from the innovator’s innovative activities can be obtained without IPR protection, when the inventor gets an increasing return of their activity and impound their particular technological advancements.<sup>63</sup>

According to his Theory of Economic Development published in 1934, there are five types of innovation,<sup>64</sup> and they are:

- The introduction of a new product not yet known to the consumer or the introduction of a new quality of a familiar product;
- The introduction of a new production method that need not in any way be based on a new scientific discovery;
- Access to a new source of raw materials and semi finished products;
- The re-organization of an industry, such as the establishment or dismantling of a monopoly;

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<sup>62</sup> Daryl Lim, *Beyond Microsoft: Intellectual Property, Peer Production and the Law’s Concern with Market Dominance*, p. 304.

<sup>63</sup> Birgitte Andersen , ‘If ‘Intellectual Property Rights’ is the Answer, What is the Question? Revisiting the Patent Controversies’, in *Intellectual Property Rights Innovation, Governance and the Institutional Environment*, Birgitte Andersen ed. (Edward Elgar Publishing Limited 2006) p. 116.

<sup>64</sup> Jaap Bloem, Menno van Doorn and Erik van Ommeren, *Open for Business Open Source Inspired Innovation Research*, (VINT, Research Institute for the Analysis of New Technology, 2007) p. 43.

- And the opening of or entry into a new market.

The Schumpeterian growth model suggests that private IPR protection in the above context has no possibility of imitation. Rather, current patent holders are threatened with replacement by innovators who develop a higher quality version of their patented good. To protect their rents, patent holders devote resources to litigation and lobbying, and they reduce the instantaneous probability of further innovation. Because these Rent Protection Activities (RPAs) use resources and serve to block the next round of innovation, any policy change that raises the efficiency of RPAs reduces innovation and growth.<sup>65</sup>

Another concept suggested by Schumpeter is about “gale of creative destruction.” where he was referring to revolutionary innovations in which old ideas, technologies and skills are made surplus by the arrival of the new technologies. According to Schumpeter actual monopoly power in the market promotes development. However his views were widely disputed. Many economists are doubtful about the development capacity of monopolists with actual market power.<sup>66</sup>

### 2.4.3 SOCIAL CONTRACT THEORY

Patents are commonly understood as a hypothetical contract between the inventor and the government resulting in a quid pro quo of innovation for exclusivity.<sup>67</sup> According to the social contract theory the function of the patent system is to promote the diffusion of innovative knowledge. In the absence of patent protection innovators would rely on trade secrecy. It was held by the court in a decision that disclosure of an invention is “the price paid for the exclusivity secured.”<sup>68</sup> John Locke argued for a ‘natural rights theory of the social contract’ in the context that the ideas are protected under the principle of natural law, in the sense that somebody’s idea is a natural right.<sup>69</sup> According the contract theory, patent is a

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<sup>65</sup> Lewis S. Davis and Fuat Şener *Private Patent Protection in the Theory of Schumpeterian Growth*, p. 3 available at <http://ssrn.com/abstract=1750393> last accessed on 9-7-2011

<sup>66</sup> Arti K Rai, *Regulating Scientific Research: Intellectual Property Rights And The Norms Of Science*, 94 Nw. U.L. Rev. 77., p. 120 (1999)

<sup>67</sup> Shubha Ghosh, *Patents And The Regulatory State: Rethinking The Patent Bargain Metaphor After Eldred*, Berkeley Technology Law Journal p. 1316 (2004)

<sup>68</sup> *Eldred v. Ashcroft*, 537 U.S. 186 (2003)

<sup>69</sup> Andersen, *Intellectual Property Rights*, p. 112.

contract between innovators and society whereby a property right is granted in exchange for disclosure. The US Constitution itself provides that the intellectual property rights are granted for promoting the Progress of Science and useful Arts.<sup>70</sup> According to contract theory, inventions are disclosed in exchange of patent right for a limited period of time. Disclosing the invention means that the inventor is placing the invention on public domain instead of keeping it as trade secret. Hence the contract theory is also termed as ‘trade secret avoidance theory’.

This theory has a long tradition and is popular with courts. In the landmark case *Universal Oil Products v. Globe Oil & Refining*<sup>71</sup> Justice Reed delivered the opinion that:

“As a reward for inventions and to encourage their disclosure, the United States offers a seventeen-year monopoly to an inventor who refrains from keeping his invention a trade secret. But the *quid pro quo* is disclosure of a process or device in sufficient detail to enable one skilled in the art to practice the invention once the period of the monopoly has expired; and the same precision of disclosure is likewise essential to warn the industry concerned of the precise scope of the monopoly asserted.”

One of the arguments against the contract theory is that the disclosure motive alone cannot justify patents. The patent life must be at least as long as the expected duration of the secret. But this implies that the expected burden of loss associated with patents must be at least as large as that associated with secrecy. This means that patents cannot improve social welfare unless they lead to greater innovative effort as suggested by the reward theory.

Another argument against the contract theory is that patents, unlike many other property rights, may be withdrawn after they have been granted<sup>72</sup>. Patents may be rescinded either because the patent may be invalidated or the scope of patent protection may be modified in post grant litigation. Thus, a patent may be viewed as a

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<sup>70</sup> U.S. Constitution. art. I, Section 8, cl. 8. reads as:

To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries

<sup>71</sup> *Universal Oil Products v. Globe Oil & Refining*, 322 U.S. 471 (1944).

<sup>72</sup> Jay P. Kesan and Marc Banik, *Patents As Incomplete Contracts: Aligning Incentives For R&D Investment With Incentives To Disclose Prior Art*, Wash. U. J.L. & Pol'y, Vol. 2, p. 25 (2000).

contingent property right.<sup>73</sup> Another argument is that the investors in Research and Development (R&D) projects will view the patent in terms of a probabilistic property right, where the probability of invalidation reduces the expected return of an R&D investment project.<sup>74</sup> Thus we can see that patents are incomplete contracts because they create contingent property rights, which in turn reduce incentives for investment in R&D. Reduced levels of R&D investment retard the rate at which new technologies are delivered to the public.<sup>75</sup>

#### 2.4.4 TRADE SECRET AVOIDANCE THEORY

Patents were introduced as alternatives to trade secrets as legal devices able to induce innovators to disclose to the public their innovation rather than as tools necessary to foster industrial research. However, we can see that the importance of trade secrecy has increased over the last decade.<sup>76</sup> This is evident by the emphasis given to trade secret protection in Trade Related Aspects of Intellectual Property Rights (TRIPs) chapter of the Uruguay Round Agreement of 1994. The TRIPs insist up on member nations to enact legislations to protect trade secrets. In fact, Art. 39 of the TRIPs defines minimal international standard for the legal protection of ‘undisclosed information’ against unfair competition.<sup>77</sup> This has become compulsory for all countries belonging to the World Trade Organization (WTO).

One argument is that technical complexity combined with trade secret law makes secrecy an effective and valuable tool to protect innovations. This assumption is clearly not appropriate for certain industries, while it is for many others. However, large amount of empirical evidence shows that secrecy and lead-time are consistently

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<sup>73</sup> Ibid.

<sup>74</sup> Ibid.

<sup>75</sup> Ibid.

<sup>76</sup> Vincenzo Denicolo and Luigi Alberto Franzoni, *The contract theory of patents*, Int'l Rev. L. & Econ. Vol 23: 4, p. 369 (2004).

<sup>77</sup> TRIPs Article 39 section 2 reads as follows

2. Natural and legal persons shall have the possibility of preventing information lawfully within their control from being disclosed to, acquired by, or used by others without their consent in a manner contrary to honest commercial practices so long as such information:

(a) is secret in the sense that it is not, as a body or in the precise configuration and assembly of its components, generally known among or readily accessible to persons within the circles that normally deal with the kind of information in question;

(b) has commercial value because it is secret; and

(c) has been subject to reasonable steps under the circumstances, by the person lawfully in control of the information, to keep it secret.

regarded as better protection mechanisms than patents by most firms with the notable exception of those active in the pharmaceutical, chemical and mechanical industries.<sup>78</sup>

#### 2.4.5 UTILITARIANISM

Jeremy Bentham is the founder of modern utilitarianism. Utilitarian theory does not believe in natural rights and recognizes property only as utilitarian property rights. Utilitarian property rights are conditional rights that further society's goals of utility or wealth maximization<sup>79</sup>. It is argued that the patent system justified on utilitarian grounds acts as a tool to stimulate the innovation for the greater good of society. The inventor benefits from a monopoly over his invention for a limited period of time in exchange of publicly divulging it. However, this argument also explains the existence of a fundamental contradiction within the patent system. The system aims to stimulate innovation by granting a monopoly to the inventor who will then have the means to restrict the use and the perfecting of his invention by others.<sup>80</sup> Economist Joan Robinson commented on the patent system:

“Since it is rooted in contradiction, there can be no such thing as an ideally beneficial patent system, and it is bound to produce negative results in particular instances, impeding progress unnecessarily even if its general effect is favourable on the balance.”<sup>81</sup>

The utilitarian theory of intellectual property interprets the Bentham's idea of the “greatest good of the greatest number” into a more specific and administrable standard. Proponents of the utilitarian philosophy choose the concept of wealth maximization criterion to establish utility. It enables the lawmakers to create a system of rules that maximizes social welfare.<sup>82</sup>

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<sup>78</sup> Ibid. at p.366.

<sup>79</sup> Jeanne L. Schroeder, *Unnatural Rights: Hegel And Intellectual Property*, Cardozo Law, Legal Studies Research Paper No. 80. Available at SSRN: <http://ssrn.com/abstract=518182> last accessed on 18<sup>th</sup> June 2011.

<sup>80</sup> Edwin C. Hettinger, *Justifying Intellectual Property Rights*. p.51.

<sup>81</sup> Yann Joly, *Open Source Approaches in Biotechnology: Utopia Revisited*, 59 Me. L. Rev., p. 391, (2007).

<sup>82</sup> Richard Posner, *Economic Analysis of Law*, in The Stanford Encyclopedia of Philosophy (Fall 2008 Edition), Edward N. Zalta, ed., available <http://plato.stanford.edu/archives/fall2008/entries/legal-econanalysis/>, last accessed on 12<sup>th</sup> May 2011.

Utilitarian concept attempted to bridge individual preferences or utility and thereby attempted to achieve happiness for the greatest possible number of people. Thus, Utilitarian ethics began to decline into mere emotivism, in which personal preference are nothing more than personal expressions of subjective preferences. MacIntyre puts it,<sup>83</sup>

“The history of utilitarianism thus links historically the eighteenth-century project of justifying morality and the twentieth century’s decline into emotivism.”<sup>84</sup>

One argument put forwarded by some economists and political theorists who draw inspiration from the rich tradition of utilitarianism contends that ‘wealth-maximization criteria’ define social welfare too narrowly.<sup>85</sup>

#### **2.4.6 HEGELIAN THEME (PERSONALITY THEORY)**

Georg Wilhelm Friedrich Hegel is the proponent of the Hegelian theme which has emerged as one of the most popular among various personality theories. The Hegelian theme emerged as the most powerful alternative to Lockean labour theory and the Lockean model of property. The Hegelian theory provides a personality justification for the property right. According to him personal property provides a unique or especially suitable mechanism for self actualisation, personal expression, dignity and recognition as an individual person.”<sup>86</sup> Further, the theory provides that the private property is necessary to achieve proper self-development. According to Margaret Radin, personality is another key justification for property rights. His personhood perspective' corresponds to the personality theory of property.<sup>87</sup>

Like the Lokean labour theory, the personality theory has an intuitive appeal when applied to intellectual property<sup>88</sup>. According to Hegelian theme, an idea belongs to its creator because the idea is a manifestation of the creator's personality or self.<sup>89</sup>

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<sup>83</sup> David W. Opderbeck, *Avirtue-Centered Approach To The Biotechnology Commons* p. 324.

<sup>84</sup> Ibid.

<sup>85</sup> Ibid.

<sup>86</sup> Justin Hughes, *The Philosophy of Intellectual Property*, p.330

<sup>87</sup> Margaret Jane Radin, *Property and Personhood*, 34 Stan. L. Rev. p. 957 (1982).

<sup>88</sup> Ibid.

<sup>89</sup> Justin Hughes, *The Philosophy of Intellectual Property*, p. 300

The best known personality theory is Hegel's theory of property. According to the theory, private property is necessary because “to achieve proper self development an individual needs some control over resources in the external environment.”<sup>90</sup> While applied to intellectual property, this notion is particularly relevant because creative expression is the basic element of the property right.<sup>91</sup> Accordingly, authors may alienate copies of their work, but they “keeps the universal aspect of expression” as their own. According to personality theory the alienation of the personal aspect of expression would be tantamount to slavery.<sup>92</sup>

From the writings of Kant and Hegel, private property rights are crucial to the satisfaction of some fundamental human needs. Policymakers should make every effort to create and allocate personally property right.<sup>93</sup> Hence according to Hegel, intellectual property rights may be justified on the ground that they protect the work of authors and artists from appropriation or modification by others. Further, they create social and economic conditions conducive to creative intellectual activity, which in turn is important to human flourishing.<sup>94</sup> According to Hegel, intellectual property need not be justified by similarity to physical property. According to him the equivalence to physical property may destroy the significance he attributes to personality and mental traits in the creative work. People have the right to enjoy the fruits of their labour, even when the labours are intellectual.<sup>95</sup>

From the Hegelian perspective, payments from intellectual property users to the property creator are acts of recognition.<sup>96</sup> These payments acknowledge the individual's claim over the property and it is through such acknowledgement that an individual is recognized by others as a person. Intellectual property claim is recognised by implicit payment<sup>97</sup>. Purchasers of a copyrighted work or licensees of a patent form a circle of people who recognise the personality stake in the creation.<sup>98</sup>

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<sup>90</sup> Justin Hughes, *The Philosophy of Intellectual Property*, p. 300.

<sup>91</sup> Ibid.

<sup>92</sup> Ibid.

<sup>93</sup> William W. Fisher, *Theories of Intellectual Property*, p.5.

<sup>94</sup> ibid

<sup>95</sup> Justin Hughes, *The Philosophy of Intellectual Property*, at p. 301.

<sup>96</sup> Ibid.

<sup>97</sup> ibid

<sup>98</sup> ibid

“Jeremy Bentham, the founder of modern utilitarianism thought that the very concept of natural rights was “nonsense on stilts”. Whereas, Hegel goes a step further and considers the expression ‘natural rights’ to be an “oxymoron”. To Hegel, nature is unfree and legal rights are artificial constructs created as a means of actualizing freedom by escaping the causal chains of nature.”<sup>99</sup>

#### 2.4.6.1 THE PROBLEM WITH HEGELIAN PERSONALITY PROPERTY

A property system protecting personality will have difficulty in understanding whether people do or do not have a personality stake in a particular object.<sup>100</sup> The personality justification also leaves some theoretical questions. Even a person possesses a personality stake in an object; we will find that this personality is manifested to varying degrees on different objects. There will be varying amounts of labor one puts into different objects.<sup>101</sup> This argument is highly relevant in the case of patents because most of the pioneering innovations do not have personality stakes. They own the right more as an organization or as joint ventures or some times involving cooperative arrangements.

The personality justification has the same problem with those intellectual products that appear to reflect little or no personality from their creators. Some categories of intellectual property like copyright can be a reflection of personality; others do not manifest any personality of their creators. Poems, stories, novels, and musical works are clearly receptacles for personality<sup>102</sup>. The same can be said for sculpture, paintings, and prints. Whereas, problems arise for personality justification when it comes to areas like copyrightable computer software and other technological categories of intellectual property like patents in biotechnology, microchip masks and engineering trade secrets. These items usually embody strongly utilitarian solutions to very specific needs.<sup>103</sup>

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<sup>99</sup> Schroeder, Jeanne L., *Unnatural Rights: Hegel and Intellectual Property* (March 1, 2004). Cardozo Law, Legal Studies Research Paper No. 80. Available at SSRN: <http://ssrn.com/abstract=518182> last accessed on 21-03-2010

<sup>100</sup> Justin Hughes, *The Philosophy of Intellectual Property*. p. 32.

<sup>101</sup> Ibid.

<sup>102</sup> Justin Hughes, *The Philosophy of Intellectual Property*. p. 32.

<sup>103</sup> Ibid.

Another major problem with the personality theory is that, similar to Lockean labour theory discussed earlier, some intellectual products have no apparent social value or require no labour to produce, leaving these pieces of property unjustified by the labour theory.<sup>104</sup> The personality justification has the same problem with those intellectual products that appear to reflect little or no personality from their creators. Hence the Hegelian justification also failed to give a comprehensive justification to Intellectual property rights.

#### 2.4.7 INCENTIVE TO CREATIVITY

Profit is a powerful incentive to creative activity. Incentive is the basis of creativity and is actually what motivates people to create.<sup>105</sup> Intellectual property rights attempt to stimulate knowledge creation by granting a monetary incentive to the inventor. However, we can also see that people, to a large extent, are naturally inclined to create. Great inventors of the past did not innovate merely because of monetary incentives or profit. “They might have created for the sake of knowledge, might have celebrated a divinity to secure a place in the afterlife or they might have done it for intellectual or spiritual enlightenment.”<sup>106</sup>

According to Albert Einstein;

"who knows scientific research merely by its practical effects, cannot have an adequate opinion about the mood of these inventors and what made them pursue their objectives notwithstanding countless failures. Cosmic religion lavishes such strength".<sup>107</sup>

Cosmic religion according to him is a ‘profound joy before the structure of the world and burning desire for knowledge.’<sup>108</sup>

However, in the words of Sir Thomas Edison “Genius is one percent inspiration, ninety nine percent perspiration.”<sup>109</sup> A patent system should reward the

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<sup>104</sup> Ibid.

<sup>105</sup> Valentina Vadi, *Sapere Aude! Access To Knowledge As A Human Right And A Key Instrument Of Development*, 12 Int'l J. Comm. L. & Pol'y.345., p.349 (2008).

<sup>106</sup> Ibid.

<sup>107</sup> Valentina Vadi, in , *Sapere Aude! Access To Knowledge As A Human Right And A Key Instrument Of Development*, 12 Int'l J. Comm. L. & Pol'y.345, p.349 (2008).

<sup>108</sup> Ibid.

ninety- nine percent perspiration, not the one percent inspiration. In inventing the light bulb, Edison laboriously experimented with some 3000 possible materials for the filament before finding upon carbonized cotton thread. If Edison were to patent the light bulb today, he may have applied for a patent in the use of the “electrical resistor for the production of electro-magnetic radiation” as such and this patent would have covered even elements as well as light bulbs.<sup>110</sup> The patent also would have covered everything that creates electromagnetic radiation.

#### **2.4.8 INCENTIVE TO INVENT THEORY (REWARD THEORY)**

According to the reward theory, a patent is aimed to motivate inventors by rewarding them with a temporary monopoly on an invention. This would enable the inventor to commercialize the invention without fear of rapid imitation. patent would allow the inventor sufficient time to assemble the resources needed for commercialization. The property rights in patent would facilitate negotiations for financial and other resources.<sup>111</sup>

According to the reward theory, society has an obligation, on the ground of equity, to reward the inventor for his contribution to scientific progress. The simplest way to recognise his contribution is to grant him an exclusive right to exploit his innovation.<sup>112</sup> The Reward theory assumes that some inventions, once known, often are easily imitated. Inventions that require significant amounts of research and development or marketing may be discouraged if the owners cannot hope to recapture their investment<sup>113</sup>. The rationale behind this theory is that once the invented product is introduced into the market, its underlying information might unavoidably be disclosed. This is due to the intangibility of the information incorporated with those inventions. Thus the invention can be copied and misused by imitators who do not share in the original investment. These competitors can sell the invention at a lower

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<sup>109</sup> Alexander Tabarrok, *Patent Theory versus Patent Law*, Contributions to Economic Analysis & Policy, Vol. 1 Issue. 1, Art. 9, p. 6 (2002).

<sup>110</sup> Ibid.

<sup>111</sup> Martin Campbell-Kelly and Patrick Valduriez, *An Empirical Study of the Patent Prospect Theory: An Evaluation of Antispam Patents* Virginia Journal Of Law & Technology, Vol.11., no.10, p.3 (2006).

<sup>112</sup> David T Keeling, *Intellectual Property Rights in EU Law*, Volume 1, (oxford university press, 2003), p. 243.

<sup>113</sup> Denicolo And Franzoni, *The Contract Theory Of Patents*, p.367.

price than the price which the potential users would have been willing to pay the inventor. In this case, the inventor may be unable to appropriate enough of the social value of the invention to justify the initial research and development (R&D) expenditures.<sup>114</sup>

There are, of course, arguments both for and against patents in the context of the reward theory. For example, some commentators have argued that society can lose out because an inventor with a monopoly may not be able to fully exploit the opportunity and thereby restricting output and increasing prices.<sup>115</sup> One of the arguments put forwarded by Mazzoleni and Nelson is that an implicit feature of reward type theories would apply to narrow domains of invention where “there is basically one commercial product at the end of the rainbow.”<sup>116</sup> Examples of such inventions will include King Gillette’s safety razor and Lazlo Biro’s ballpoint pen<sup>117</sup>. However it cannot be argued that these inventions cannot be improved upon. There is only the possibility of narrow developments that do not open up major areas of innovative activity<sup>118</sup>. Another argument is that the expected burden of loss associated with patents must be at least as large as that is associated with trade secrecy. This means that patents cannot improve social welfare unless they lead to greater innovative effort, as suggested by the reward theory.<sup>119</sup>

There are a number of other objections to this theory. One objection is about the basic assumption of the theory, where it is sure that the invention would not exist without the effort of the inventor who patented it. This view is also debatable. It might be that another inventor would have made the same invention unrelated to the first inventor's efforts. In that case, awarding monopoly rights only to the first inventor contradicts the basic rational of the theory.<sup>120</sup> Where as, the second innovator is denied an opportunity. Another objection to the theory is that, it is possible to have alternative incentives to invest in research. For example, the inventor might gain an

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<sup>114</sup> Rebecca S. Eisenberge, *Patent and Progress of Science: Exclusive Rights and Experimental Use*, p.1017.

<sup>115</sup> Ibid.

<sup>116</sup> Roberto Mazzoleni and Richard R. Nelson, *Economic Theories about the Benefits and Costs of Patents*, 32(4) J. Econ. Issues.1031, p.1038 (1998).

<sup>117</sup> Ibid.

<sup>118</sup> Ibid.

<sup>119</sup> Ibid.

<sup>120</sup> Denicolo and Franzoni, *The contract theory of patents*, p.366.

advantage from being the first in the market (i.e. a “head start” advantage). Competition with market rivals might also be sufficient to stimulate inventions apart from the reward. In addition, various barriers to enter the market may reduce competition to a point that would make R&D profitable even without patent protection. In those cases, the harmful effects of patent protection might outweigh its benefits.<sup>121</sup> Further, patent protection might force competitors to withdraw from the area of research so as to avoid infringement, waste of time and effort in the search for other solutions to the technological problem already solved by the original invention.

#### 2.4.9 THE INCENTIVE TO DISCLOSE THEORY

The Incentive theory is the most widely held patent thesis in the western world founded on the assumption that the people and commercial enterprises are more likely to invest on scientific research if they are guaranteed an exclusive right to protect their inventions.<sup>122</sup> The underlying reasoning of the incentive to disclose theory (i.e. the enablement theory) is that in the absence of patent protection, inventors would keep their inventions secret in order to prevent free riding by competitors and thus protect their investments.<sup>123</sup>

Trade secrets hide valuable information from the public and prevent them from accessing the benefit of the new knowledge. Secrets can also cause duplicative research since competitors may try to invent themselves the same concealed technology. Moreover, trade secrecy has difficulty when it comes to sell or license an invention. It is difficult to persuade someone to buy an invention without telling him the details. However the disclosure causes the product to lose its value from a potential buyer and the inventor has nothing left to sell.<sup>124</sup> So an effective alternative is to opt for monopoly right by way of patent instead of trade secrets.

Patent protection awards the patentee the temporary right to exclude others from using the invention and thus eliminates the danger of free riding by competitors. Once no protection is possible for a significant amount of time from the inventor's

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<sup>121</sup> Michal Cohen, *Patent Protection of Biotechnological Inventions – Economic Perspectives and the EC Directive Analysis*, A thesis submitted for the degree of E.M.L.E., Erasmus Program in Law & Economics, p.19 (2004).

<sup>122</sup> Keeling, *Intellectual Property Rights in EU Law*, p.243.

<sup>123</sup> Ibid.

<sup>124</sup> Denicolo and Franzoni, *The contract theory of patents*, p.366.

point of view secrecy is likely to yield less benefit than costs of protecting it. Thus, patent protection discourages secrecy and facilitates disclosure. Patent law actually requires full disclosure of the invention in return to patent protection. In general it is required that the specification of the invention in the patent application will be sufficiently clear and complete to enable a person skilled in the art to work out the invention. This knowledge will be part of the public domain once the patent expires. The disclosure requirement generates benefit to the public and eliminates waste of duplicative research. The patent protection awarded, in return, allows an inventor to disclose the invention to potential buyers and licensees without risking a loss of value.<sup>125</sup>

Thus, according to this theory, the patent system ensures efficiency *ex post facto*. That is to say, assuming the invention will be made, regardless of the availability of patent protection, this protection is needed to assure the disclosure of the invention that would otherwise remain secret.<sup>126</sup>

#### **2.4.10 PATENT PROSPECT THEORY**

The concept of a technology prospect was first proposed by Edmund Kitch in 1977<sup>127</sup>. Kitch emphasized the way in which the grant of patents could be analogized to the grant of mineral rights, giving the grantee an incentive to invest in the exploitation of the ‘prospect’. This was evolved at the time when Kitch was writing, the “reward theory” which had dominated economic discussions of the patent system for many years. The reward theories put forward that a patent system motivates the inventors by rewarding them a temporary monopoly on an invention.<sup>128</sup> This would enable the inventor to commercialize the invention without fear of rapid imitation. It would allow the inventor sufficient time to assemble the resources needed for commercialization<sup>129</sup>. However according to patent prospect theory, an initial discovery or invention will open up a whole range of follow-on developments or inventions. For example, inventions such as antibiotics, semiconductors or speech

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<sup>125</sup> Cohen, *Patent Protection of Biotechnological Inventions*. p. 27.

<sup>126</sup> Ibid.

<sup>127</sup> Edmund W. Kitch, *The Nature and Function of the Patent System*, 20(2) J.L. & ECON. 265, p.265 (1977).

<sup>128</sup> Martin Campbell-Kelly, And Patrick Valduriez, *An Empirical Study of the Patent Prospect Theory: An Evaluation of Anti-Spam Patents*, 11 Va. J.L. & Tech 10 p. 4 (2006)

<sup>129</sup> Kitch, *The Nature and Function of the Patent System* p.266.

recognition technologies are technological prospects of the greatest importance to the society. These innovations open up such a broad terrain of research opportunities which cannot be fully exploited by a single inventor or even by a single firm.<sup>130</sup>

In explaining the prospect theory, Kitch illustrates the analogy of mineral claim system developed in the American West during the second half of the nineteenth century.<sup>131</sup> This system enables a person who discovered mineralization on public land to file a claim which gave him exclusive mining rights. Kitch noted that, far from restricting output, the claim system ‘tended to generate the socially optimum level of investment in prospecting.’<sup>132</sup> However, it is pointed out that such broad patents could have the adverse social effect of reducing the number of diverse inventors working the prospect. Thus, from the perspective of prospect theory, the patent system should award patents that are sufficiently broad to discourage overlapping inventions. But it should be sufficiently narrow that enough diverse inventors are encouraged to work the prospect.<sup>133</sup> Broad upstream patents give the inventor a property rights to the technological development and he has the liberty to disclose it or to keep the area of invention enclosed. Thus, they are ideal patents in the view of prospect theorists.<sup>134</sup>

#### **2.4.11 DOCTRINE OF EQUIVALENTS**

The Doctrine of equivalents is a common-law doctrine which extends patent protection to cover certain similar devices that do not literally infringe on the patent’s claims. It is an equitable doctrine meant to protect patentees against devices whose elements perform substantially the same functions, in substantially the same ways, with substantially the same results as the patentee’s claimed elements (the “function-way-result” test).<sup>135</sup> If doctrine of equivalence is not in force, the competitors could easily undermine the monopoly protection granted by a patent simply by making an

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<sup>130</sup> Ibid. at p.279.

<sup>131</sup> Ibid.

<sup>132</sup> Ibid.

<sup>133</sup> Ibid.

<sup>134</sup> Martin Campbell-Kelly and Patrick Valduriez, *An Empirical Study of the Patent Prospect Theory*, p.36.

<sup>135</sup> *Festo Corp. v. Shoketsu KinzokuKogyo Kabushiki Co., Ltd*, 535 U.S. 722, 122 S. Ct. 1831 (2002)

equivalent product for a patented product and thereby skirting liability for literal infringement. Such a loophole would severely threaten the patent system.<sup>136</sup>

Courts have justified the doctrine of equivalence as necessary to insulate a patentee from the adverse possibility of using language to describe inventions whose elements perform substantially the same functions. Infringement under the doctrine of equivalents is an equitable doctrine intended to apply in situations where there is no literal infringement. But it also prevents the piracy of the patentee's invention.<sup>137</sup> To constitute an infringement under the doctrine of equivalents, an accused product or process must perform substantially the same function in substantially the same way to obtain the same result.

Normally, a patent's claims set out the area of the invention. The patent claim has dual purposes. They define and protect the area of invention and provide public notice of what the patent product is. Both functions stimulate innovation in different ways. The public-notice function encourages innovation by competitors to make incremental improvements on already patented product without fear of infringing on the claims of existing inventions.<sup>138</sup> The protective function promotes the investment necessary for breakthrough inventions. Interestingly, the emphasis is mostly on the public-notice function which promotes improvements to existing technologies.

The Court first adopted the doctrine of equivalents conceptually in 1854.<sup>139</sup> In the case of *Graver Tank & Manufacturing Co. v. Linde Air Products Co.*<sup>140</sup>, the U.S. Supreme Court reaffirmed the role of the doctrine of equivalents in protecting patents against insubstantial variations. The case involved the composition of flux, a material used to facilitate welding. The patent claimed flux composed of alkaline earth metal silicates such as magnesium. The flux, accused of infringing, was composed of manganese silicate.<sup>141</sup> Although manganese is not an alkaline earth metal, the Court

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<sup>136</sup> Ibid. the case explained how to functional equivalent can be identified

“Once the relevant structure in the accused device has been identified, a party may prove it is equivalent to the disclosed structure by showing that the two perform the identical function in substantially the same way, with substantially the same result.

<sup>137</sup> Jeremy T. Marr, *Foreseeability as a Bar to the Doctrine of Equivalents* 2003 B.C. Intell. Prop. & Tech. F. 103101, p.1. (2003)

<sup>138</sup> Ibid.

<sup>139</sup> *Winans v. Denmead*, 56 U.S. 330, 344 (1854).

<sup>140</sup> *Graver Tank & Manufacturing Co. v. Linde Air Products Co* 339 U.S. 605 (1950).

<sup>141</sup> Ibid.

found infringement under the doctrine of equivalents. Disclosures that manganese silicate was a viable flux ingredient contained both in the patent's written description and in prior art references, appeared to influence the Court's decision. Prior art reference regarding the foreseeability of a particular substitute helped establish protection for that unclaimed substitute under the doctrine of equivalents.<sup>142</sup>

## **2.5 BIOTECHNOLOGY RESEARCH AND THE PATENT SHORTCOMINGS**

Traditional patent system offers a positive atmosphere to innovations. It acts as an incentive to innovate by providing a monopoly to the innovator. However the application of patent to the new areas of research like modern biotechnology has many compatibility issues. Traditionally, biotechnology researchers were opting patent as the common mode of protection to their innovations. Dramatic growth of biotechnology has brought forward many contemporary issues. The heavy patenting rush has caused many issues like patent thickets and anticommon effects. Further the new trend of applying patents on basic research tools and materials like gene and gene fragments has triggered many heated debates. A major section of researchers believe that these new trends may adversely affect the ongoing research by impeding access to basic research materials and tools.

### **2.5.1 THE PROBLEM OF RENT DISSIPATION**

One of the complications identified by intellectual-property theorists is that the Intellectual-property rights can sometimes stimulate too much innovation. In other words, they can sometimes give rise to socially wasteful duplicative or uncoordinated inventive activity resulting in wastage of socially desirable resources.<sup>143</sup> The foundation for this approach was laid by a group of economists led by Yoram Barzel who studied the inventive activity competition among firms and its impact on the patent system.<sup>144</sup>

The economic impact of these inventive activities can be made clear only by analysing the concept of rent and rent dissipation. The concept of rent in economics means returns over and above the investment required for the production of an article

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<sup>142</sup> Ibid.

<sup>143</sup> William W. Fisher, *Intellectual Property and Innovation*, p. 7.

<sup>144</sup> Ibid.

or to keep it in production. Some rents may be created or maintained as the result of government protection which includes registration expenses, prosecution expenses, litigation cost and so on. Whereas, others may arise from a more efficient way of producing an existing good or from the production of a new product that yields benefits in excess of costs. Increase in investment causes rent seeking, resulting in wastage of resources.<sup>145</sup>

The rent can be classified into two categories private and public<sup>146</sup>. Private rents are those accruing to the individual and public rents are those accumulated to society as a whole.<sup>147</sup> Private and public rents may be different. The potential difference between public and private rent is that in case of private rents may cause private incentives to engage in a given rent-generating activity. The availability of private rents provides incentives for an individual to engage in efforts to generate private rent.<sup>148</sup> Public rents are those resulting from private rents which ultimately turn out to dissipate the social rents. Patent protection to new innovation is the example of private rent. Where as government-sponsored cash rewards for a particular innovation over and above the patents protection is an example of public rent.<sup>149</sup>

In the case of a highly desirable innovation, its discovery, improvement and ownership require the use of scarce resources leading to social cost<sup>150</sup>. Dissipation or economic wastage can occur at three stages in the inventive process. First, in the case of a highly potential patent which is commercially valuable may attract large number of persons and organizations into the race to be the first to reach the invention in question<sup>151</sup>. Second, the race to develop a lucrative improvement on an existing technology may generate a similar situation. Finally, persons or organisations may try to invent around technologies already patented by their rivals to develop functionally

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<sup>145</sup> Donald L. Martin, *Reducing Anticipated Rewards From Innovation Through Patents: Or Less Is More*, 78 Va. L. Rev. p.351 (1992).

<sup>146</sup> Ibid.

<sup>147</sup> Kieff, F. Scott, *Coordination, Property & Intellectual Property: An Unconventional Approach to Anticompetitive Effects & Downstream Access* (June 2006). Stanford Law and Economics on line Working Paper No. 323. p.28 Available at SSRN: <http://ssrn.com/abstract=910656> accessed on 21-01-2009.

<sup>148</sup> Ibid.

<sup>149</sup> Ibid at p.29

<sup>150</sup> Donald L. Martin, *Reducing Anticipated Rewards From Innovation Through Patents: Or Less Is More*, 78 Va. L. Rev. p.351(1992).

<sup>151</sup> Ibid.

equivalent but non-infringing products.<sup>152</sup> All these efforts are rational from the standpoint of the individual firms and that causes wastage of society's resources.

In all the three situations, the rent dissipation or the economic wastage is results of patenting rush. In the case of follow-on improvements to the already patented product or idea by the competitors, the expected value of investment would be greater than the development cost to any individual follow-on inventor.<sup>153</sup> Apart from the inventing activity the enforcement of patent is another area that is contributing to rent dissipation. This shows that there is an implicit weighing of benefits against costs in patent enforcement. When ever there is follow-on improvements in an area, failure to enforce a patent would lead to a race to improve the invention. This will result in rent-dissipating consequences.<sup>154</sup> Grady and Alexander argue that the courts are likely to enforce patents in situations where follow-on improvements cause rent dissipation.<sup>155</sup> Thus, the rent caused by patent enforcement, though helps in avoiding races to improve are likely to exceed the rent dissipation caused by the races to create situation. Grady and Alexander's rent dissipation hypothesis provides a positive theory of patent enforcement. It also supports the controversial common law view of economically efficient outcomes.<sup>156</sup>

Edmund Kitch's suggest that a broad patent issued leading technology can be socially beneficial by empowering subsequent research and development in the field, thus reducing rent dissipation associated with the uncoordinated, rivalries and activity by secondary inventors.<sup>157</sup> This argument also gives rise to problem of denying opportunities to other innovators by blocking off or fencing the area of research. Grady and Alexander's theory can be better illustrated with the help of a decision in *Reckendorfer v. Faber*<sup>158</sup>, where US Supreme Court refused to enforce the eraser-tipped pencil patent, despite the fact that the eraser pencil was a tremendous commercial success. According to Grady and Alexander, the potential for improvement in the innovation was extremely limited because a patent would foster

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<sup>152</sup> Ibid at p.354.

<sup>153</sup> Ibid.

<sup>154</sup> Ibid.

<sup>155</sup> Ibid.

<sup>156</sup> Ibid.

<sup>157</sup> Mark F. Grady and Jay I. Alexander, *Patent Law and Rent Dissipation*, 78 Va. L. Rev. 305., p. 312 (1992).

<sup>158</sup> *Reckendorfer v. Faber* 92 U.S. 347 (1875).

only rent dissipation at the conception or creative stage and will create further rent dissipation at the improvement stage.<sup>159</sup> The eraser pencil cases perfectly justify Grady and Alexander's theory. According to Grady and Alexander if we had placed faith in the reward theory instead of the rent dissipation theory we would have been disappointed by the decision of the court.<sup>160</sup>

This argument does not seem appealing in the case of patenting genes or other pioneer biotechnological inventions. The concept of race to be the first to invent in the genetic research using routine methods would be higher than the dissipation that might be generated by a race to invent alternative process.<sup>161</sup> To be more precise, the fast growing biotechnology research is on a race to invent rather than on a race to invent alternative products. The follow on research is given much emphasis by the researchers in the biotechnology sector rather than going for alternative solutions.<sup>162</sup> Either way Grady and Alexander's rent dissipation hypothesis or Edmund Kitch's broad patent concept does not provide a hundred percent justifiable conclusion regarding the patent right and the economic justification.

## 2.5.2 PATENTS ARE EXPENSIVE TO MAINTAIN

It is a widely recognised fact that the patent is the most expensive of all the intellectual property rights. Enforcing property rights in patent would require that, it mitigates the various social costs generally associated with maintaining these rights.<sup>163</sup> The cost of maintaining patent system starts with the establishment and maintenance of patent registration systems, the staffing of courts to interpret and enforce rights, and the employment of lawyers to obtain and then to protect the rights. All of these things consume substantial amount of money.<sup>164</sup> The patent owner will need to conform himself to the regulatory framework applicable in the country where

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<sup>159</sup> Martin, *Reducing Anticipated Rewards* p. 355.

<sup>160</sup> Ibid.

<sup>161</sup> Michal Cohen, *Patent Protection of Biotechnological Inventions – Economic Perspectives and the EC Directive Analysis*, A thesis submitted for the degree of E.M.L.E., Erasmus Program in Law & Economics, p.19 (2004)

<sup>162</sup> Ibid.

<sup>163</sup> Scott, *Coordination, Property & Intellectual Property*, p.31.

<sup>164</sup> William W. Fisher, *Intellectual Property and Innovation*, p. 7.

the invention will be used. All these costs will be directly or indirectly born by the patent right holder which contributes to the high maintenance cost.<sup>165</sup>

The heavy cost starts with filing of the patent application, prosecution, till the grant of patent. Further, patent litigations are considered to be the most expensive in the area intellectual property rights enforcement. Patent is prone to infringement and appropriation of patented technology will damage patent holders right. They may have to enforce their patent rights in multiple courts incurring huge expenses. On the other hand, third parties may have many defences. They may either argue that the patent is invalid for the lack of novelty, obviousness or lack of written description and so on. They may sometimes establish that the particular patent rights have been granted erroneously and will initiate revocation proceedings against the patents. Either way this will add to the increased cost of maintenance to the patent right holder. The effect will be on the patented technology pricing where all these expenses of investments, cost of maintenance and a reasonable profit has to be covered by the price. The cost of maintaining a single patent in the United States for its 20 year lifespan requires around 100000 to 500000 thousand dollars on an average.<sup>166</sup> Patent enforcement and legal defences typically cost 1.6 million dollars per contested patent which ultimately make them more affordable for large companies than for small inventors.<sup>167</sup>

### 2.5.2.1 TRANSACTION COST

Transaction cost is another major problem with the patents and Intellectual Property rights. The patent right holder like other property owners must be able to sell and license their invention to those who are interested in the innovation.<sup>168</sup> This process may require huge investment which includes, cost contracting among individuals, cost of tracing and finding the appropriate individual and dealing with each other, the costs of lawyers and other professionals to arrange the deals, the cost

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<sup>165</sup> F. Scott Kieff, *Coordination, Property & Intellectual Property: An Unconventional Approach to Anticompetitive Effects & Downstream Access*, 56 Emory L.J., p. 375 (2006)

<sup>166</sup> David Malakoff, *Will a Small Genome Complicate the Patent Chase*, 291 Science 5507 p. 1194 (2001).

<sup>167</sup> Ibid.

<sup>168</sup> F. Scott Kieff, *Coordination, Property & Intellectual Property: An Unconventional Approach to Anticompetitive Effects & Downstream Access*, 56 Emory L.J., p. 375 (2006)

bargaining and so on.<sup>169</sup> All the above referred expenses can be categorised as ‘transaction cost’. The transaction cost also covers the costs of failed transactions and also the lost opportunities.<sup>170</sup>

The harmful impact of the transaction costs associated with a situation involving patents must be compared against the similar problems that arise without patents. We can see that the scientist working in an area of research wants to gain access to the patented technology. However the patent technology restriction forces them to spend large amount of time and money to hire a team of expensive lawyers and to carry out negotiation. The resultant transaction cost will force them to opt for much cheaper cost effective alternatives. The transaction costs relating to patents are evident in the field of basic biotechnology research as well.<sup>171</sup>

### 2.5.2.2 PATENT LITIGATION

Patent litigation has been called the sport of kings. It is complex, uncertain, and expensive. A study conducted by John R. Allison & Mark A. Lemley on the validity of litigated patents shows that there exists significant risk of a patent getting invalidated at trial.<sup>172</sup> According to statistics, the estimated total cost of litigation for a patent including the discovery and litigation comes around \$500,000; this cost is on patent suits with less than \$1 million at risk where the average estimated cost of discovery is \$290,000.<sup>173</sup> And for suits with more than \$25 million at risk, the estimated cost of discovery is \$2.5 million and the average estimated total litigation cost is \$3.995 million.<sup>174</sup> This shows the magnitude of the litigation cost involving patents.

According to Kimberly Moore, each year the United States Patent and Trademark Office receives about 3,50,000 patent applications and issues about 180,000 patents. About 3,000 patent suits are being filed involving about 4,500

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<sup>169</sup> Ibid at p. 417

<sup>170</sup> Ibid.

<sup>171</sup> Michael A. Heller and Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anti-commons in Biomedical Research*, 280 Science 698, p. 698 (1998).

<sup>172</sup> John R. Allison & Mark A. Lemley, *Empirical Evidence on the Validity of Litigated Patents*, 26 AIPLA Q.J.185, p. 205 (1998).

<sup>173</sup> James Bessen and Michael J. Meurer, *Lessons For Patent Policy From Empirical Research On Patent Litigation*, Lewis And Clark Law Review Vol. 9:1, p. 2.

<sup>174</sup> Ibid.

patents<sup>175</sup>. Interestingly, more than half (53.71%) of the patents issued in 1991 expired before their full term due to nonpayment of maintenance fees.<sup>176</sup> This is purely an indication of heavy cost of patent maintenance.

A very recent study conducted by Prof. Dietmar Harhoff, “Economic Cost-Benefit Analysis of a Unified and Integrated European Patent Litigation System,”<sup>177</sup> throws light on issues concerning patent litigation in the European Union. According to the report, one crucial aspect is the costs of litigation. Costs will differ based on complexity and technical field of the case.<sup>178</sup> Further, according to this report, the cost may differ significantly from one jurisdiction to another. According to the report the costs are high in common law countries.<sup>179</sup> The report further cites that a case involving a value of EUR 250,000 may cost each party in the first instance proceedings about EUR 50,000 to 90,000 in Germany and similar amounts in France and the Netherlands. Where as the costs of litigation may be between EUR 150,000 and EUR 1,150,000 (150,000 to 1,000,000) in the United Kingdom<sup>180</sup>. All these studies are pointing toward the high cost of maintenance of patents which will ultimately reflect on the value of it. The higher the transaction cost the higher will be the cost of the patented technology.

### 2.5.3 PATENT PROLIFERATION

The area of scientific research is witnessing a huge patent proliferation especially in the biotechnology sector. The rush patent in the research sector is causing patent proliferation. Further, rush for patent even for slight improvements leads to an overlapping set of patent rights, generally termed as patent proliferation.<sup>181</sup>

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<sup>175</sup> Kimberly A. Moore, *Worthless Patents*, Berkeley Technology Law Journal [Vol. 20] p.1522. (2004) Each year the number of patents issued rises substantially and the above referred data is based on the U.S. Patent Statistics, Calendar Years 1963-2004,

<sup>176</sup> Ibid.

<sup>177</sup> Dietmar Harhoff, *Economic Cost-Benefit Analysis of a Unified and Integrated European Patent Litigation System* Final Report 26 (2009) study conducted for European commission on patent litigation pp. 1-84 available at [http://ec.europa.eu/internal\\_market/indprop/docs/patent/studies/litigation\\_system\\_en.pdf](http://ec.europa.eu/internal_market/indprop/docs/patent/studies/litigation_system_en.pdf) accessed on 10-5-2011

<sup>178</sup> Harhoff, *Economic Cost-Benefit Analysis*, p.12.

<sup>179</sup> Ibid.

<sup>180</sup> Ibid.

<sup>181</sup> Andres Guadamuz Gonzalez, *Open Science: Open Source Licenses in Scientific Research*, 7 N.C. J.L. & Tech. p. 336 (2006).

This situation will cause researchers to seek license from multiple patentees to commercialise a new technology.

The biotechnology and pharmaceutical industries protect their inventions mostly through patents are also facing the problem of patent proliferation. However, many commentators suggest that these industries are at the risk of research hindrance due to proliferation of patent resulting in anticommons or a patent thicket. Example is malaria vaccine where patents are blocking the development. One malaria-derived protein that could be targeted by a vaccine is subject to thirty-four patents.<sup>182</sup> Thus, if a researcher wants to work in the area, he must first negotiate with all the rights holders prior to developing or testing a vaccine against that particular protein.

Patent proliferation again may cause underutilisation of a scarce resource. This happens as a result of multiple owners blocking each other through the proliferation of fragmented and overlapping intellectual property rights.<sup>183</sup> The bundling of intellectual property due to proliferation of patent is an impediment to research. Economists have termed it as ‘tragedy of the anticommons’. A detailed analysis of the anticommons concept is given in following session.

#### **2.5.4 PATENT THICKETS**

One of the seriously debated issues in the field of intellectual property law is regarding the existence of patent thickets and the extent to which any such thicket may be interfering with research. The rhetoric is particularly heated these days because of dramatic changes in patent laws. Even though Intellectual Property rights are designed to encourage scientific progress, over-proliferation of patent rights could create bottlenecks that obstruct the flow of research.<sup>184</sup> Scholars have used the term “patent thicket” to describe the problem of multiple overlapping rights that can hamper innovation by creating transaction barriers. Large numbers of rights hamper research and innovation, particularly in the biotechnology field. “The term ‘patent

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<sup>182</sup> Katherine M. Nolan-Stevaux, *Open Source Biology: A Means to Address The Access & Research Gaps?*, 23 Santa Clara Computer & High Tech. L.J.271., p.272. (2007).

<sup>183</sup> Ibid at p.278.

<sup>184</sup> Robin Feldman and Kris Nelson, *Open Source, Open Access, and Open Transfer: Market Approaches to Research Bottlenecks*, p.2, available at <http://ssrn.com/abstract=1127571> last visited on 8-11-2010.

thicket' was coined to characterise a technological field where multiple patent rights are owned by multiple actors.<sup>185</sup>

Theoretically multiple overlapping of patent rights can hamper innovation by creating high transactions costs to researchers. These costs can discourage investment in research or distort the paths that researchers take. Because it is difficult to identify and negotiate all the underlying rights necessary to begin the research. This leads to inefficiencies and underutilization of intellectual resources.<sup>186</sup> Despite these concerns some commanders argue that patent thickets are not a problem in modern industries. According to them either patent thickets do not exist or if they do, patent thickets may not interfere with the progress of research.<sup>187</sup> In particular, two widely-cited empirical studies by John Walsh and his colleagues conclude that although the number of patents on research tools has increased dramatically, drug discovery has not been substantially harmed.<sup>188</sup>

The problems of patent thickets are most common in the software sector. It is alleged that patents allow a company or individual to prevent the incremental innovation which is highly significant in the software industry<sup>189</sup>. Patenting of small pieces of software which have huge amount of applications may pose great threat to other complex software. It is most likely that each complex program will infringe small software patent. Strategic patenting results in a patent thicket, an impenetrable barrier to further innovation.<sup>190</sup>

## 2.5.5 THE TRAGEDY OF ANTICOMMONS

The 'tragedy of the commons' is a metaphor which explains why people overuse shared resources. But the recent proliferation of intellectual property rights in biotechnology research suggests a different tragedy. This phenomenon called

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<sup>185</sup> Mireles, *An Examination Of Patents*, p.148.

<sup>186</sup> Ibid.

<sup>187</sup> John P. Walsh, et. al., *View from the Bench: Patents and Material Transfers*, 309 Science 2002, p. 2002 (2005).

<sup>188</sup> Ibid.

<sup>189</sup> David S. Evans and Anne Layne-Farrar, *Software Patents And Open Source: The Battle Over Intellectual Property Rights*, Virginia Journal Of Law & Technology Vol. 9 No. 10 p.22 (2004).

<sup>190</sup> Ibid.

‘anticommons’ in which people underuse scarce resources because too many owners can block each other.<sup>191</sup>

The “Anticommons theory” was developed by Michael A. Heller and adapted in the field of biotechnology by Heller and Eisenberg in their article published in *Science* in May of 1998.<sup>192</sup> ‘Tragedy of anticommon’ is the most influential and damaging criticism put forwarded against application of patent system to the field of biotechnology. Nearly forty years ago Garrett Hardin introduced the metaphor “tragedy of the commons” to explain overpopulation, air pollution and species extinction<sup>193</sup>. People often overuse resources they own in common because they have no incentive to conserve. Hardin’s metaphor highlights the cost of overuse when governments allow too many people to use a scarce resource.

Hardin’s metaphor overlooks the possibility of under use when governments give too many people rights to exclude others. According to him, privatisation can solve one tragedy but cause another.<sup>194</sup> Since 1970s, there has been a move from a commons model toward a privatization model. In 1980s the US congress passed Bayh Dole Act in an effort to promote commercial development of new technologies.<sup>195</sup> The Act encouraged universities and other institutions to patent the research result from government funded projects and to transfer their technology to the private sector. This resulted in increased patent filings and private investment. However critiques feared that this would cause deterioration in the culture of upstream research. They also feared that the proliferation of intellectual property rights may be stifling upstream life-saving innovations. Bayh Dole Act was originally intended to improve university research and publicly funded research, but resulted in excessive commercialisation of research results.<sup>196</sup>

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<sup>191</sup> Heller and Eisenberg, *Can Patents Deter Innovation*, p. 698.

<sup>192</sup> *Ibid.*

<sup>193</sup> *Ibid.*

<sup>194</sup> *Ibid.*

<sup>195</sup> By enacting Bayh-Dole Act of 1980, the US Congress allowed universities and other institutions to patent discoveries arising from federally funded research.

<sup>196</sup> Robert Rhines, *Consequences of the Bayh-Dole Act*, p.2. available at [http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-901-inventions-and-patents-fall-2005/projects/bayh\\_dole.pdf](http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-901-inventions-and-patents-fall-2005/projects/bayh_dole.pdf), last accessed on 18-1-2011.

This expression of anticommons describes a situation in which several individuals own rights to exclude. By exercising those rights, they restrict access to others to use the common resources. If there are too many patent rights in a particular area, it will be extremely difficult to negotiate with all the rights holders to work on a particular area.<sup>197</sup> The tragedy of the anti-commons refers to the complex obstacles that arise when a user needs access to multiple patented inputs to create a single useful product. This occurs when too many patents relating to an innovation where many pieces of right are held by different patent owners. These type of patents inadvertently create anticommons by creating too many concurrent fragments of intellectual property rights in potential future products. Patent rights may also create anticommons by permitting too many upstream patent owners to stack licenses on top of their future discoveries.<sup>198</sup> The proliferations of patents on individual fragments also lead to heavy transaction costs. This is because potential researchers have to seek licenses from different patent holder to develop any of these products.

According to Heller and Eisenberg the proliferation of fragmented and overlapping intellectual property rights in the area of genetic research tool also may create the problem of “tragedy of the anticommons”.<sup>199</sup> Any researcher who wants to do research in an area where there is patent proliferation, it will be extremely difficult to negotiate between all the rights holders. Even if he could possibly negotiate licenses with all relevant rights holders, high transaction costs, license fees and stacking of royalty obligations may render the new projects unattractive.<sup>200</sup> According to Carl Shapiro, the patent system produced an overlapping set of patent rights in some of the key industries including biotechnology resulting in patent thicket. This will delay the new technology to come in to market because the producer has to obtain license from multiple patent right holders.<sup>201</sup> Whereas according to David Blumenthal commercial incentives were responsible for significant delays in the publication of research

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<sup>197</sup> Heller and Eisenberg, *Can Patents Deter Innovation?*, p. 699.

<sup>198</sup> *Ibid.*

<sup>199</sup> *Ibid.*

<sup>200</sup> *Ibid.*

<sup>201</sup> Yann Joly, *Open Source Approaches in Biotechnology: Utopia Revisited*, *Maine Law Review*, Vol. 59, No. 2, p. 391, (2007).

findings and this stifled collaboration to a large extent, especially in the field of biomedicine.<sup>202</sup>

Reach Through License Agreements (RTLAs) is where the patent owner grants licence to use the patented discoveries or research tools to down stream researchers and retain certain rights in subsequent downstream discoveries. Such rights may take the form of a royalty on sales that result from the use of the upstream research tool, an exclusive or non exclusive license on future discoveries or an option to acquire such a license. RTLAs on patented research tools is again another path by which an anticommons may emerge.<sup>203</sup> In principle, RTLAs offer advantages to both patent holders and researchers. They permit researchers to use patented research tools and delay payment until the research yields valuable results. Patent holders may also prefer get a larger return from sales of down stream products rather than smaller licensing fees. In effect, the use of RTLAs gives each upstream patent owner a continuing right in down stream product development may lead to anticommons problem.<sup>204</sup>

Another arena which possibly causes anticommon effect is defensive patenting. Walsh, Arora and Cohen looked into whether excessive and defensive patenting has led to an anticommons tragedy in the biomedical industry<sup>205</sup>. The biomedical industry witnessed increased patenting of upstream research tools strictly for defensive purposes. How ever the study did not find much anticommons breakdown in the industry. What they found instead was that licensing of patented technology was common and research exemptions were liberally taken. The study revealed that biomedical patents rarely prevented further innovation in either the private or the public sectors.<sup>206</sup>

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<sup>202</sup>David Blumenthal et al., *Data withholding in Genetics and the Other Life Sciences: Prevalences and Predictors*, 81 ACADE. MED. 137, p.145 (2006).

<sup>203</sup>Heller and Eisenberg, *Can Patents Deter Innovation?*, p. 699.

<sup>204</sup>Ibid.

<sup>205</sup>John Walsh, Ashish Arora, and Wesley Cohen, "Effects of Research Tool Patenting and Licensing and Biomedical Innovation", In, *Patents in the Knowledge-Based Economy*, W.M. Cohen and S. Merrill, eds. (Washington, DC: National Academies Press.), p.12, available at; <http://sippi.aaas.org/utt/WalshetalAAAS.pdf>, last accessed on 12-12-2010.

<sup>206</sup>Ibid.

Ziedonis and Hall took a similar approach to the semiconductor industry. Similar to the software and biotech industries, the semiconductor industry has demonstrated rapid technological advancement in an R&D sector.<sup>207</sup> Their study reveals that strategic patenting does exist and is a primary cause for the increased propensity to patent the innovations. Some of the studies attempted to answer whether the tragedy of anti common really exists or not. In one study by the National Institutes of Health (“NIH”) found that researchers had the difficulties and delays associated with licensing proprietary rights in biotechnology research tools involving patented technologies.<sup>208</sup> And the second study conducted by Professors Walsh, Arora, and Cohen, reveals that, there is increase in the number of patents on research tools in biotechnology sector. This develops a situation conducive to the creation of a Tragedy of the Anticommons. However, biomedical research industry has not been substantially impeded by this increase in number of patents.<sup>209</sup>

A recent article Professor Paul David argues that the Walsh Study was flawed in several respects. According to him the study failed to describe the interview protocol followed in the survey.<sup>210</sup> According to him a search for evidence of tragedy of the anticommons would be difficult because the researcher might attempt to prove something that is counterfactual.<sup>211</sup>

### 2.5.5.1 GOLDEN RICE AND TRAGEDY OF ANTICOMMONS

The existence of ‘tragedy of anti common’ was established in the ‘golden rice case.’ Researchers at the Swiss Federal Institute of Technology could transplant certain genes from the daffodil plant into rice, creating a new variety of rice capable of producing a precursor chemical to vitamin A. This rice was called “golden rice” which had the potential to improve life threatening vitamin A deficiency.<sup>212</sup> However the major impediment before the scientists was that the university had already

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<sup>207</sup> Bronwyn Hall, and Rosemarie Ziedonis, *The Patent Paradox Revisited: An Empirical Study of Patenting in the U.S. Semiconductor Industry, 1979-1995*, 32 Rand Journal Of Economics 1, p. 101 (2001).

<sup>208</sup> Mireles, *An Examination Of Patents, Licensing*, p.144

<sup>209</sup> Richard Li-Dar Wang, *Biomedical Upstream Patenting and Scientific Research: The Case For Compulsory Licenses Bearing Reach-Through Royalties*, 10 Yale J. L. & Tech.251., p.293, (2007)

<sup>210</sup> Mireles, *An Examination Of Patents*, p.145 (2005)

<sup>211</sup> Ibid.

<sup>212</sup> Ibid. at p.144

patented technology of transplanting genes to rice. The patented technology had already been licensed to private agricultural biotechnology companies. Forty patents relating to gene transfer and contractual obligations associated with material transfer agreements caused major obstacles to produce golden rice.<sup>213</sup> The private companies were unwilling to license the technology to the researchers and ultimately they had to abandon the project. However there was a huge public debate in Europe concerning genetically modified rice, which was believed to be ultimately beneficial to the poor. Due to the public pressure and the opportunity to demonstrate their views on helping the poor, the private companies transferred the necessary rights to the researchers so that they could develop and produce the crops.<sup>214</sup>

### 2.5.6 INHERENT ANTICIPATION

Inherent anticipation is one of the most troublesome areas in the patent laws. Patentable invention must be novel and the novelty depends on whether the invention or an element of it never existed in the prior art. Inherent anticipation happens when similarity is found despite the absence of express disclosure in a prior art reference<sup>215</sup>. Generally, for an invention to be invalid for anticipation, a single prior art reference must disclose every limitation of the later-claimed invention. However, the courts had already recognized that this disclosure might be inherent as well as express. A prior art reference may still anticipate a claimed invention even though the reference does not expressly disclose every limitation of later inventions.

*Continental Can Co*<sup>216</sup> case is a typical example of the issue of inherent anticipation. A description in the document published before the priority date of the patent illustrates a container with several plastic ribs. According to the Continental Can Co's application, the patent was involving a container structure with multiple hollow plastic ribs. However the publication did not explicitly state that the ribs were hollow, but it indicated that the ribs of the depicted container were formed by conventional blow-moulding techniques. Evidence beyond publication is required to determine whether or not the practice of these conventional blow moulding

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<sup>213</sup> Ibid.

<sup>214</sup> Mireles, *An Examination Of Patents*, p. 145 (2005).

<sup>215</sup> Daniel M. Becker, *Inherent anticipation*, Nature Reviews, Drug Discovery, Volume 4, p. 451 (2005).

<sup>216</sup> *Continental Can Co. USA v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir.1991).

techniques would have resulted in hollow ribs. If such evidences establish that the blow- moulded ribs are hollow, this would mean that the patented invention is not novel, and it means that it is anticipated, and thus is not patentable.<sup>217</sup>

*Continental Can Co. v. Monsanto Co.*, It was held that;

“To serve as anticipation when the reference is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence. Such evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.”

In *Schering*<sup>218</sup>, Geneva Pharmaceuticals Inc. and other generic drug companies challenged the validity of a Schering patent that claimed anti- histamine nature of descarboethoxy lo- ratadine (DCL). Schering had previously obtained a patent claiming loratadine, which was the active component of Claritin, the best-selling antihistamine drug. The issue was whether Schering’s prior art of loratadine patent inherently anticipated his DCL patent it being a metabolite of loratadine.<sup>219</sup> Federal Circuit panel found that Schering’s claims were inherently anticipated by the company’s earlier patent. The court expressly held that “inherent anticipation does not require that a person of ordinary skill in the art at the time should have recognized the inherent disclosure.” It was held that a patent to a previously unknown compound might be invalidated as inherently anticipated if the compound was later discovered to be a metabolite of another compound in the prior art<sup>220</sup>.

Inherency may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient to establish the inherency.<sup>221</sup> However, if the prior art disclosure is sufficient to show that it is natural development from the prior art reference which influenced the

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<sup>217</sup> Ibid.

<sup>218</sup> *Schering Corp. v. Geneva Pharmaceuticals Inc.*, 339 F.3d 1373 (Fed. Cir. 2003)

<sup>219</sup> Ibid.

<sup>220</sup> Daniel M. Becker, *Inherent anticipation*. Nature Reviews, Drug Discovery, Volume 4, p. 451(2005)

<sup>221</sup> *Schering Corp. v. Geneva Pharmaceuticals*

performance of the invention to be patented, then it settled that the disclosure should be regarded as sufficiently inevitable or inherently anticipated.<sup>222</sup>

Professor Dan Burk and Mark Lemley proposed a “public benefit” test to resolve the doctrinal chaos of inherency law. According to them the Inherency is perhaps the most elusive doctrine in all patent laws.<sup>223</sup>”

“The inherency cases are all ultimately about whether the public already get the benefit of the claimed element or invention. If the public already benefit from the invention, even if they don’t know why, the invention is inherent in the prior art. If the public do not benefit from the invention, there is no inherency.”

Decision in Schering’s case created additional challenges and hurdles for biotechnology and chemical patents. Due to development of the doctrine of inherent anticipation, biotechnology and chemical patents claiming metabolites now face higher risks of invalidity.<sup>224</sup> Although the Federal Circuit resolved the debate over whether recognition of the inherent feature was required in the prior art, its position created further controversy and unique challenges in obtaining patent protection in the biotechnology and chemical sector.

If the prior art that explicitly describes a claimed invention but does not explain its mode of manufacture then it cannot be regarded as anticipated. However if prior art reference relating to a claimed invention, if practiced would result in the creation of that claimed invention; it can be considered as inherently anticipated<sup>225</sup>. According to the theory of inherent anticipation a prior art reference must be freely available for practice to every one. If the granting of patent protection on the disputed claim covering a prior art reference, it would allow the patentee to exclude the public from practicing the prior art, then that claim is considered to be anticipated. The doctrine of inherent anticipation stipulates that the prior art references would destroys novelty by establishing inherent anticipation.<sup>226</sup>

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<sup>222</sup> Ibid.

<sup>223</sup> Janice M. Mueller and Donald S. Chisum, *Enabling Patent Law’s Inherent Anticipation Doctrine*, Houston Law Review, 45:4,1101., p. 1103 (2008)

<sup>224</sup> Mueller and Chisum, *Enabling Patent Law’s Inherent Anticipation Doctrine*, p. 1103

<sup>225</sup> Ibid.

<sup>226</sup> Ibid.

### 2.5.7 PATENT MONOPOLIES STIFLE UPSTREAM RESEARCH

Another major argument against the patent system is that, it may stifle future innovations. The stronger patent rights will actually impede access to future innovations. Intellectual property rights are originally intended as an incentive instrument; now appear to be a factor of distortion. Patent confers monopoly leading to rent-seeking which is disadvantageous to the consumers. It also enables the right holder to blocking off competitors with monopoly right. Traditional incentive based approach in intellectual property right makes the biotechnology research sector highly profit oriented. Search for commercial incentives causes significant delays in the publication of research findings. This may also result in stifled collaboration, biotechnology research sector.<sup>227</sup>

For example, Sir Thomas Edison's famous patent for the filament of incandescent lamps demonstrated issues with idle innovation which had tremendous capability for follow on innovations.<sup>228</sup> Edison received a patent for the invention of carbon filament in 1880.<sup>229</sup> After introducing the new incandescent lamp and its first modifications to the market, Edison's company, Edison General Electric, did not make many substantial improvements to its products until after merger with Thomson-Houston in 1896.<sup>230</sup> Initially, several lamp-producing companies competed effectively with Edison's company by providing timely improvement and better electrical efficiency. This led to a number of litigations between Edison's company and its competitors.<sup>231</sup> Finally Edison's company won the cases and swiftly acquired injunctions that closed down a number of competitors.<sup>232</sup> The company had no intention of granting licenses. It tried to retain a monopoly for the remainder of the patent life that ended in 1894. However, between 1885 and 1894, progress in lamp

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<sup>227</sup> David Blumenthal et al., *Data withholding in Genetics and the Other Life Sciences: Prevalences and Predictors*, 81 ACADE. MED.pp 137- 145 (2006) available at [http://journals.lww.com/academicmedicine/Fulltext/2006/02000/Data\\_Withholding\\_in\\_Genetics\\_and\\_the\\_Other\\_Life.6.aspx](http://journals.lww.com/academicmedicine/Fulltext/2006/02000/Data_Withholding_in_Genetics_and_the_Other_Life.6.aspx). last accessed on 29-4-2011

<sup>228</sup> Li-Dar Wang, *Biomedical Upstream Patenting And Scientific Research*,p.276.

<sup>229</sup> Ibid.

<sup>230</sup> Ibid.

<sup>231</sup> *Edison Elec. Light Co. v. U.S. Elec. Lighting Co.*, 47 F. 454 (C.C.S.D.N.Y. 1891).

<sup>232</sup> Li-Dar Wang, *Biomedical Upstream Patenting And Scientific Research*, p.277.

design was seriously hampered by protracted and expensive patent struggles between Edison's company and its competitors.<sup>233</sup>

Application of patent for every new product with no known use or use which has a potential for further research, is not a patentable invention.

According to Fortas J: <sup>234</sup>

‘Such a patent may confer power to block off whole areas of scientific development without compensating benefit to the public. ‘a patent is not a hunting license and it is not a reward for the search, but compensation for its successful conclusion<sup>235</sup>’

### 2.5.8 EVERGREENING AND CONTINUATION PRACTICE

“Evergreening” refers to attempts by owners of pharmaceutical product patents to effectively extend the term of their patents by obtaining related patents on modified forms of the same drug, new delivery systems for the drug, new uses of the drug and the like.<sup>236</sup> Evergreening is one of the major problems posed by the patent regime. Drawing the line between legitimate incremental innovation and the improper attempts at evergreening is a broad and difficult problem faced by the patent law.

According to Alfred B. Engelberg evergreening is “using a series of related patents covering different aspects of the same basic product invention in order to extent the patent term to unduly prolong the exclusive market period.<sup>237</sup> The problem of evergreening is most evident in the biotechnology sector. The most important and potentially lucrative products developed in biotechnology are drugs. The pharmaceutical companies have traditionally employed continuation practice to evergreen their proprietary position, a process sometimes referred to as ‘life cycle

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<sup>233</sup> Ibid.

<sup>234</sup> *Brenner v Manson*, 383 US 519 (1966).

<sup>235</sup> Ibid.

<sup>236</sup> Mueller and Chisum, *Enabling Patent Law's Inherent Anticipation Doctrine*, p.1106.

<sup>237</sup> Alfred B. Engelberg, *Special Patent Provisions for Pharmaceuticals: Have They Outlived Their Usefulness?*, 39 IDEA 389. p 401 (1999).

management.’ Through evergreening, many highly profitable drugs are kept under the patent term long before the expiration of the initial patent covering the drug itself.<sup>238</sup>

One of the thrust areas of biotechnology research is genomics where the biotechnology companies file patent applications disclosing hundreds or even thousands of individual gene sequences. Some times these sequences could be potentially patentable as a separate invention of its own. It is interesting to note that the inventors often have no idea if any of these sequences might some day turn out to be valuable and worthy of patent protection. Filing individual applications on each sequence would be prohibitively expensive; so the company files a collection genomics application disclosing all of the sequences, thereby establishing a priority date and staking a claim to all of the sequences. Later if one or more sequences are found worthy of patent protection, the company can file divisional applications directed to the particular sequences of interest.<sup>239</sup> This approach is generally termed as continuation practice and it is common because it allows biotechnology companies to obtain adequate protection for exploiting the full scope of their inventions. It also gives the inventor a lead time to understand his or her basic invention in the sequences.<sup>240</sup> Biotechnology companies have used continuation practice to evergreen protection for some of the basic enabling technologies of biotechnology.

In “*Cabilly* patent<sup>241</sup>” a recent high profile case, a biotech company Genentech took advantage of the continuation practice to obtain a twenty-nine year patent term covering the fundamental technology required for the artificial synthesis of antibody molecules, commonly referred to as the “*Cabilly* patent.”<sup>242</sup> The victims of this particular evergreening included another large biotechnology company, MedImmune, who decided to challenge Genentech in the courts. MedImmune’s appeal was rejected by the Federal Circuit for lack of jurisdiction, with the court essentially finding that as a licensee of the patent, MedImmune lacked standing to challenge the patent’s validity.<sup>243</sup> Whereas, the U.S. Supreme Court recently granted a *writ of certiorari* on

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<sup>238</sup> Christopher M. Holman, *Biotechnology’s Prescription for Patent Reform*, 5 J. Marshall Rev. Intell. Prop. L. 318., p.332-333 (2006).

<sup>239</sup> Holman, *Biotechnology’s Prescription for Patent Reform*, p. 333.

<sup>240</sup> *Ibid.*

<sup>241</sup> *Medimmune, Inc. v. Genentech, Inc.*, 427 F.3d 958, 961 (Fed. Cir. 2005).

<sup>242</sup> *Ibid.*

<sup>243</sup> *Ibid.*

this case to consider whether the Federal Circuit erred in denying judgement to MedImmune.<sup>244</sup>

In another famous case Columbia University owned a patent in a technology known as co-transformation used in the production of many of biotechnology's most profitable protein-based drugs. The original patent application covering the technology was filed in 1980, the U.S. Patent was issued in 1983, and expired in 2000. Many biotechnology companies, including Genentech, licensed the technology and paid millions of dollars in royalties annually to use the technology in their drug production processes. However, Columbia pursued a variety of approaches in an attempt to evergreen its proprietary position.<sup>245</sup> In 2002, Columbia succeeded in convincing the PTO to grant another patent covering what many considered to be essentially the same technology for another full seventeen year term. These companies unexpectedly faced the prospect of seventeen more years of royalty payments as a consequence of Columbia being able to exploit the laws of continuation practice. Genentech and the other affected companies banded together and mounted a variety of legal challenges to the second patent by the Columbia University and ultimately it resulted in Columbia agreeing not to assert the patent. These cases illustrate the potential for mischief inherent in continuation practice and the impact of such mischief can have on biotechnology.<sup>246</sup>

### **2.5.9 PATENT TOLL (TOLLBOOTH)**

A patent early on in the innovative process can impose a toll on all subsequent innovations that rely on it.<sup>247</sup> Later inventors therefore face higher transaction costs and they must pay licensing fees before they can further refine a technology. These tolls built over a period of time on the path of technology's development, may discourage the later research altogether. Each upstream patent allows its owner to set

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<sup>244</sup> *MedImmune, Inc. v. Genentech, Inc.*, 126 S. Ct. 1329 (2006).

<sup>245</sup> Holman, *Biotechnology's Prescription for Patent Reform*, p. 334.

<sup>246</sup> *Ibid.*

<sup>247</sup> Carl Shapiro, "Navigating the Packet Thicket: Cross Licenses, Patent Pools, and Standard Setting", in *Innovation Policy and The Economy*, Adam Jaffe et al. eds., Vol.1, p. 119 ( 2001).

up another tollbooth on the road to product development, adding to the cost of research and slowing the pace of downstream innovation.<sup>248</sup>

These issues are prevalent in business method patents as well. They stifle not only innovation but also competition. Even if a business method patent is ultimately held invalid, patent holders may be able to use it to threaten litigation and to bully competitors, especially those who cannot bear the costs of a drawn out, fact-intensive patent litigation.<sup>249</sup> That can take a particular toll on small and upstart businesses. Patents always serve as a barrier to competition for the type of subject matter that is patented. But patents on business methods are patents on business itself.

Patents on business methods were useful for encouraging innovation and disclosure. It is doubtful that they would balance, facilitate or impede the progress of business. For, even when patents encourage innovation and disclosure, too much patent protection can impede rather than ‘promote the Progress of useful Arts’<sup>250</sup>. This issue is typical in the case of patents relating to gene and gene fragments. The patent will create roadblocks on research relating to the same gene until a toll is paid to the patent owner. These tollbooths could prove a big obstacle for biotechnology researchers. The researchers need to obtain numerous licences to proceed with the research.<sup>251</sup>

### 2.5.10 PATENT TROLLING

Patent troll is one of the major problems existing in the area of patent. Patent troll and patent toll are entirely different concepts. The term ‘patent troll’ was coined by Peter Detkin, a former assistant general counsel of Intel, to denote those firms that, in his words, “try to make a lot of money of a patent that they are not practicing and have no intention of practicing and in most cases never practiced.”<sup>252</sup> Most patent trolls do not manufacture any products. Most of them neither engage in research nor

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<sup>248</sup> Ibid.

<sup>249</sup> *In re Bilski*, 545 F.3d 943 (Fed. Cir. 2008 ).

<sup>250</sup> *Laboratory Corp. of America Holdings v. Metabolite Laboratories, Inc.*, 548 U. S. 124, p. 126–127 (2006).

<sup>251</sup> Molly A. Holman and Stephen R. Munzer, *Intellectual Property Rights in Genes and Gene Fragments: A Registration Solution for Expressed Sequence Tags*, 85 Iowa L. Rev. 735., p782 (2000).

<sup>252</sup> Li-Dar Wang, *Biomedical Upstream Patenting And Scientific Research*, p.305

sponsor innovative campaigns. The primary line of their business is patent licensing and they have a strong willingness to go to litigations especially infringement lawsuits.

A patent troll is a company that acquires patents of failed companies or independent innovators and uses these patents to threaten suit against alleged infringers, without having the intention of actively using the patent they assert<sup>253</sup>. The patent trolls buy the patents and act as patent locks; they preferably buy patents without the intention of using them. They look out for patent holders that cannot afford to maintain their patent anymore or patentees who fear the risk of litigations because of the fact that the patented technology has grown too high for them.<sup>254</sup> Another group of potential licensors are those who cannot proceed with the research or unable to exploit their patent as they may infringe another overlapping patent.<sup>255</sup>

The way in which the patent trolls exploit their licence is by patiently waiting for possible and actual infringers to violate the patent or potential licensees in order to negotiate high royalties, licenses and damages. Patent trolls also do not fear any litigation process. Their actual business is to catch infringers and to exploit those instead of the patent. The patent trolls are indeed specialised in patent litigation without any productive activity.<sup>256</sup>

It is understood that the traditional patent regime and litigation system contribute to the widespread occurrence of trolling. The high cost of legal proceedings both from filing to defending and that of litigation are the contributing factors of patent trolling. Thus the normal researcher who cannot afford the huge financial burden is forced to license the patent to the trollers.<sup>257</sup>

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<sup>253</sup> Harhoff, *Economic Cost-Benefit Analysis* p.10.

<sup>254</sup> Ibid.

<sup>255</sup> Sigrid Nicole Muller, *Should Research Tools Be Patentable? Troubles & Chances Of Patenting Research Tools In Biotechnology And Nanotechnology* Master Thesis, Master of Law & Technology Tilburg University, Netherlands, p. 38 (2008).

<sup>256</sup> Francois Leveque And Yann Meniere, *Copyright Versus Patents: The Open Source Software Legal Battle*, Review of Economic Research on Copyright Issues, vol. 4(1), p. 39 (2007).

<sup>257</sup> Harhoff, *Economic Cost-Benefit Analysis* p.10.

A study by professor Dietmar Harhoff suggests that the following aspects are supportive of patent trolling<sup>258</sup>:

- High costs of legal proceedings;
- Cost allocation rules in court (both parties bear their own costs);
- contingency fee payments for lawyers, creating incentives for lawsuits;
- High damage awards and risk of treble damages in the case of “wilful infringement”;
- pro-patentee posture of US courts and juries;
- Low examination quality creating uncertainty about the scope of protection;
- General and broadly defined extension of patentable subject matter to software and business method.

The study further made a comparative analysis of patent trolling in the US and the European Union. According to the study, the practice of patent trolling has played a prominent role in the US where as in Europe the trolling is comparatively less. The study reveals that, several patents have been purchased by the trolls. One of the major instruments used by trolls to exert pressure on presumed infringers is quasi-automatic injunctions. In May 2006, the US Supreme Court decided to put an end to quasi-automatic injunctions in the US litigation system.<sup>259</sup>

One fertile area for patent trolls is the biomedical sector where troll will have nothing to lose when they bring infringement litigation against academic institutions and researchers.<sup>260</sup> They do not share the incentives for maintaining a cordial relationship with the scientific community. The patent trolls hold their patents neither for development nor for prospective licensing, but solely to catch hold of others who accidentally stumble in their path. Trolls are in the business for making money through litigation rather than through product development.<sup>261</sup>

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<sup>258</sup> Ibid.

<sup>259</sup> *eBay Inc v. MercExchange, L.L.C.*, 547 U.S 388(2006).

<sup>260</sup> Li-Dar Wang, *Biomedical Upstream Patenting And Scientific Research*, p. 306.

<sup>261</sup> Jerome H. Reichman and Rochelle Cooper Dreyfuss, *Harmonization Without Consensus: Critical Reflections On Drafting a Substantive Patent Law Treaty*, 57 Duke L.J. 85., p.110 (2007).

### 2.5.11 SUBMARINE PATENTS

The submarine patents are those applied earlier but not known to the public.<sup>262</sup> These patents that surface years after an industry are in operation and as a result the companies working in the same area are automatically put in to infringement liability.<sup>263</sup> These patents often remain as pending applications in the Patent and Trademark Office for a very long time. They come to the surface as issued patents after many other companies establish themselves in the area of patented technology. These submarine patents often attack the industries by root because the long pendency of the applications permits the applicants to write claims that directly cover standard products in the industry. Submarine patent has also been used to describe patents applications that lie dormant for a long period and are asserted when a competitor produces a product or process which infringes the claimed invention. Submarine patent take advantage of the 'priority' date which they had obtained much earlier.<sup>264</sup>

Jerome Lemelson, a prolific inventor with approximately 600 patents, is known as the master of submarine patents.<sup>265</sup> Lemelson's patents were kept hidden for many years and slowed the prosecution of his patents, sometimes for over twenty years. He used to wait until his technologies were independently invented and commercialized by some other companies. Then he brings his patent to the surface when potential licensees were locked into the patented technology and negotiated for royalties<sup>266</sup>. Although his patents covered breakthrough technologies such as barcode scanning, he did not contribute these breakthroughs to society.<sup>267</sup>

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<sup>262</sup> Mark A. Lemley and Kimberly A. Moore, *Ending Abuse of Patent Continuations*, 84 B.U. L. Rev. 63, p. 88 (2004).

<sup>263</sup> Ibid.

<sup>264</sup> Paul Oldham, *Global Status And Trends In Intellectual Property Claims: Genomics, Proteomics And Biotechnology*, report Submitted to the Executive Secretary of the Convention on Biological Diversity, through, The Economic and Social Research Council (ESRC) Centre for Economic and Social Aspects of Genomics, United Kingdom., UNEP/CBD/WG-ABS/3/INF/4 11 January 2005. p.37

<sup>265</sup> James Bessen and Michael J. Meurer, *Patent Failure, How Judges, Bureaucrats, and Lawyers Put Innovators at Risk*, Princeton University Press. 2008.

<sup>266</sup> Ibid.

<sup>267</sup> Ibid.

One of the illustrious cases of Lemelson's patent was for the "machine vision".<sup>268</sup> Lemelson's idea behind the patent was that of the video camcorder but, he did not build any camcorders. This was the most infamous Lemelson patent illustrating the problem of submarine patent. The patent application on "Apparatus and Methods for Automated Observation of Objects" was originally filed in 1954 but due to delay at the patent office and a series of amendments, the patent was not granted until 1994. The patent gave Lemelson the rights to the concept of machine vision. However, Lemelson did not build these systems and the development of machine vision had nothing to his patent. The potential existence of the patent application was a secret until 1994.<sup>269</sup> Apparently when the patent was granted, thousands of firms became instant infringers and as a result the Lemelson's patent on machine vision generated hundreds of millions in royalties.<sup>270</sup>

The submarine patents are also a result of international filings of patent applications like Patent Cooperation Treaty (PCT). The PCT patent application allows an inventor to file a patent application in several PCT member countries by making a single application in his home country. This will enable the inventor to seek patent protection in PCT countries by avoiding the need of filing separate applications in each individual country in which protection is sought. The national patent application has the effect of an international patent application in those PCT contracting states which the patentee designates in his application. The granting of a patent remains the responsibility of the national or regional offices. In simple terms, an inventor can file an international patent application in India and obtain patent protection in all the countries designated in the application, provided the invention is entitled to patentability under laws of such countries. The whole process will give the international applicants an edge over the rival competitors. Strategically these filings will help the inventors to gain advantages over competitors by waiting to see what product the competitor makes. Then they draft patent claims specifically designed to cover that product<sup>271</sup>.

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<sup>268</sup> Alexander Tabarrok *Patent Theory versus Patent Law* Contributions to Economic Analysis & Policy, Volume 1, Issue 1.p 6 (2002).

<sup>269</sup> Tabarrok *Patent Theory versus Patent Law*, p. 6.

<sup>270</sup> Ibid.

<sup>271</sup> Lemley and Moore, *Ending Abuse of Patent Continuations*, p.88.

## 2.6 CONCLUSION

Intellectual property right protects human creativity for a limited period of time so that the creator can recuperate the time and money spent on innovative process or creative efforts. Historically patent monopoly grants exclusive protection to innovations. The rights granted by the state to the innovators are continuously reviewed in order to keep it updated with the changing circumstances. The patent protection is justified by socio-economic and philosophical rationale. The patent concept and philosophies are subjected to constant evaluation in order to be in line with the growing technological terrains.

There are various theories and philosophies put forwarded to justify patent system. All of them can convincingly justify their views by applying them to a particular circumstance. But these theories may be conflicting when viewed from an entirely different perspective. For example, the natural right theory claims patent as a natural right for time and money the inventor has expended in bringing out the new product. Hence patent is an incentive to invent. Whereas the other side of the argument is that the exclusive protection granted to the inventor is for disclosing the invention to the public. So the first theory insists on a more affirmative action by way claiming patent protection as a natural right or as an incentive to invent. And the second argument is that the inventor gets the right more as a favour for disclosing the invention to the society. The public good is the primary ingredient of intellectual property rights.

This chapter analysed various theories of patent which shows that patent as an exclusive right is a reciprocal arrangement between the society and the inventor. Even though patent grants a monopoly right, the public good aspect of the patent regime ensures its social acceptance. The moral and philosophical rationale of the patent system has been justified by various patent theories. The analysis of various patent philosophy shows that the innovators are generally driven by motivation. These can be classified as intrinsic and extrinsic. Self driven individual with out commercial objective can be considered as intrinsically motivated. Whereas, the extrinsic motivations are those which driven by economic incentives.

All the theories about patent system are striving hard to maintain equilibrium between property right and public good aspect. Though the patent system appears to be a common method of protection to innovations, it has confronted many problems when applied to diverse field of technologies. This is because the nature of innovation varies with different technologies. The nature of innovation in the field of engineering technology is different from that of software. It is again different when applied to biotechnology and life science. This is mainly because of the difference in research concepts and norms.

Apart from this basic issue scientific research has been witnessing many problems with the patent regime. Even though the common mode of protection adopted by biotechnology researchers are patent, they apprehend many dangers associated with the patent protection. Biotechnology research tools and data are basic instruments for the ongoing research. It is feared that the patent protection will impede access to research tools and research data. The patent protection will cause excessive commercialisation of the research tool resulting in high price. The patenting rush will cause many related problems. Patent proliferation is one such issue faced by biotechnology research. Patent proliferation will further cause many issues like 'Research Bottlenecks,' 'patent thickets' and the problem of tragedy of anticommon. In all these three situations patent owners of patent will block off each other. Anticommon effect occurs when several individuals hold multiple fragmented right in an innovation. By exercising those rights, they restrict access to use the common resources. Anti common effect in biotechnology research may stifle ongoing biotechnology research. Apart from these basic issues, there are some unhealthy practices followed by the patent right holders like Evergreening or continuation practice, patent trolls, submarine patents, and so on. These problem are threatening the biotechnology research sector.

This chapter analyses major issues related to patents in biotechnology sector directly or indirectly affecting scientific progress. The analysis indicates that the patent system as applicable to scientific research tend to slowdown the pace of research in a number of ways. The inherent issue in the patent system and the patent misuses are the contributory factors to these problems. These issues are not favourable to scientific progress in biotechnology research sector. This chapter

elucidated the fundamental problems with patent system that stifle scientific progress in biotechnology research sector. The following chapters further analyses various option to resolve these paradoxical issues so as to ensure scientific progress and social welfare.