5. Concerns on the patent thicket

Other policy issues apart from *ordre public* and public health in connection with nanotechnological inventions are raising concerns. The early stage of development of nanotechnology and the rush of developers to file patent applications, a situation where the building blocks of nanotechnological inventions in areas such as biology or materials science may be patented, has been mentioned as an issue to consider. It has been remarked that these applicants following aggressive patenting strategies may take control over a wide range of basic inventions able to be applied in a broad spectrum of fields, with the ability to define whom, how, when and where the technology is going to be used.[51] The issue may have a big impact on nanotechnology related businesses if the same patent owners, following a commercial strategy, decide to restrict access and not to allow potential users or improvers to have access to the technology. This may represent an issue for countries without research exceptions or with a narrow understanding of them.[52] The relevance of the subject is based on the perception that nanotechnology will generate such an immense impact on the future life of people, from a radical increase in the productivity of food generation techniques to the development of revolutionary methods to treat diseases, that governments should assure that private ownership will not generate an unbalanced situation concerning access to the advance and benefit of technology for the majority of the population.[53]

From a policy perspective, patent law is accepted to be a tool by which some economic objectives are meet. Accordingly, a substantial part of patent law was developed as an instrument to encourage generation and commercialization of technology, which produces economic development for the country.[54] By encouraging people to invent, to negotiate access to technology and to put in the market their inventions, the welfare of society is increased, among other reasons, by the improvement of life quality of people. Nevertheless, increasing welfare of society appears only as a secondary result of patent law, as there is no requirement in the statutes that an invention to be patentable needs to be beneficial for the society. In the same way, no distinction is made among patent rights granted to

51 Mark Lemley, *Patenting Nanotechnology*, Stanford Law School, John M. Olin Program in Law and Economics Working Paper No. 304, June 2005.

52 For a list with countries without research exception provisions *see* Carlos M. Correa, *The International Dimension of the Research Exception*, AAAS, 2005.

53 *Id. supra* note 51.

54 For a discussion on how patents can put inventions into use, see Kieff, F. Scott, *IP Transactions: On the Theory & Practice of Commercializing Innovation*, Stanford Law and Economics Olin Working Paper No. 311, October 2005 and Kieff, F. Scott and Troy, A. Paredes, *Engineering a Deal: Toward a Private Ordering Solution to the Anticommons Problem*, Stanford Law and Economics Olin Working Paper No. 330, November 2006.

inventions of different social benefit and the rights granted by a patent are equivalent for any invention in any field of technology.

Some critics assure that in certain cases patent law may deter innovation. The theory of the patent thickets has been identified as one of the ways patent law may discourage innovation. Bessen has summarized this theory.[55] "Heller and Eisenberg (1998) raise the concern that transaction costs may become prohibitive when firms must bargain with many different patent holders to obtain the rights needed to make a product".[56] Besides, Bessen indicates "[…] that although cross-licensing and patent pools may resolve some problems of transaction cost and vertical monopoly, these institutions do not correct all problems associated with patent thickets."[57] If this theory is applied to the future evolution of nanotechnology, taking into account the high volume of patents that will cover the area in the near future, a non-promising scenario where no practical benefit from the generation of such technology is obtained may be expected.

The problem of the anti-commons and the blocking effect of patents over downstream research and commercialization are not broadly accepted as a proven theory. On the contrary, other views propose that patents may encourage parties to enter into negotiations to allow transactions involving technology and operate promoting a bargain effect among patent owners and other players in the market.[58] There are many counter examples to the anti-commons problem, like the case of technology involved in the manufacturing of portable computers, where thousands of patents protecting different portions of the software and hardware are packed in a single device.[59] In spite of this situation, it is clear that no problem has emerged and consumers are allowed to access the product easily and at reasonable prices.[60]

Other arguments in favor of the existence of a patent thicket are those related to the presence of patents covering broad aspects of basic nanotechnological inventions. As discussed, there is a spreading belief that the high potential of nanotechnology combined with its novelty is encouraging many people to rush to the patent offices to get broad protection on basic concepts suitable later to be applied in more specific fields.[61] However, as stated in section II.3, patenting the

55 James Bessen, *Patent Thickets: Strategic Patenting of Complex Technologies*, Boston University School of Law, available at http://www.researchoninnovation.org/thicket.pdf, (last visited September, 2009).

56 *Id.*

57 *Id.*

58 Kieff, F. Scott, *On Coordinating Transactions in Information: A Response to Smith's Delineating Entitlements in Information*, 117 YALE L.J. POCKET PART 101, 2007. Available at http://thepocketpart.org/2007/10/10/ kieff.html, (last visited May, 2009).

59 *Id.*

60 *Id.*

61 *Id. supra* note 51

basic concepts of nanotechnology might face some restrictions, mostly when discoveries and knowledge about the theory behind the operation of nanotechnological inventions are involved. It was concluded that general basic knowledge can be considered a patentable invention if it has technical character and industrial applicability is disclosed (in addition to the fulfillment of the other patentability requisites). Furthermore, for complex nanotechnological inventions, applicants might be forced to disclose the scientific fundamentals behind the functioning of the invention, knowledge that cannot be protected by the claims of the patent.

These thoughts may indicate that such broad knowledge on the basic elements of nanotechnology are impossible to be monopolized by patents, and are to a large extent trade secrets which may generate difficulties for the access to knowledge by third parties interested in carrying out research in the same field. This idea is concordant with one of the basic theoretical foundations of the patent system, oriented to promote and incentivize the disclosure of information through the publication of patents in exchange for a limited monopoly. As it was said, in the case of nanotechnological inventions, the patentability requirements may force applicants to disclose more than what is requested in other fields. An example can be found for the case of researchers at universities (one of the institutions accused of monopolization of the basic blocks of nanotechnology). They are not that interested in protecting the result of research through trade secrets, given that secrets may be more difficult to control and license.[62] Moreover, keeping results and inventions under secrecy would be contrary to the interest of the Academy to contribute to the public knowledge for the advance of science.

It is strange that the issue of patent thickets is presented as a problem for the case of nanotechnology at this early stage. The number of patents granted to nanotechnological inventions is far from being high when compared with other industries. In other cases like polymers or steel alloys, there exists a flood of patents protecting detailed and limited but complementing aspects of the involved technologies. Even considering the particularities of these industries, these may be further examples where patent thickets are not a real problem for companies agreeing on commercialization of technology protected by scattered patent rights.

At this point, it is necessary to analyze if the concern and critique leveled against the grant of broad patents is based on a problem that arises from patent law and from difficulties in the administrative procedures at patent offices or, on the contrary, whether it is a problem inherent to the general applicability nature of the technology under analysis.

There are arguments to support both views. On one hand what makes this issue more relevant for nanotechnology is the newness of the field and the problems that

62 *Id. supra* note 55.

patent offices are encountering in making a good assessment on patentability due to lack of knowledge or lack of access to relevant prior art to evaluate novelty and inventive step of the inventions and to force applicants to reduce the scope of the claims in view of the prior art. On the other hand, some arguments establish that the general applicability of innovative nanotechnological inventions makes them general in nature and consequently claimed in a general and broad way in a patent specification. This position infers that, due to the early stage of the development of nanotechnological inventions, they are broad and applicable to various fields.

Supporting the idea that the nature of the technology and the inventiveness of the inventor is the only factor regulating the scope of a patent, it has been said that "[I]f [the inventor] has made an invention of general applicability, a generic claim is not the consequence of a verbal skill of the attorney, […], but of the breath of application of the invention".[63]

Even while this may be true in some cases, the common practice carried out by a good patent attorney in drafting a patent application is different.[64] When an inventor comes to a patent professional to ask for the drafting of a patent application, the work of the attorney is to prepare a description and a set of claims protecting not only the invention, but also anything else between the invention and the relevant prior art. Usually, a patent application including a set of claims limited to the embodiments identified by the inventor is not the kind of job expected from a patent attorney. Instead, the final application is merely developed based on the invention. The skills of the attorney are used to extend the scope of the claims, taking care to comply with the patentability requirements and at the same time protecting the invention to the broadest possible extent.[65] In following this practice, the attorney is excluding from the claim any non-essential embodiment in order to avoid potential infringers circumventing the patent, and is providing the patent owner an extended monopoly on the general inventive concept involved in the invention. This is one of the reasons why drafting patent applications is taken so seriously by applicants. The high quality applications are not only easier to be enforced but also more likely to get protection for a wide variety of possible modifications, improvements and other infringing products or methods using such base knowledge.[66] For example, if an inventor comes to a patent attorney asking to get protection for an invention defined as the use of a newly developed nanocomposite material as a coating, the patent attorney will not limit the claims to the use of such material, but will extend the

63 Joseph Straus, *Biotechnology and patents*, 54 CHIMIA, No. 5, 293-298, 2000.

64 *See,* Ronald D. Slusky, *Invention Analysis and Claiming: A Patent Lawyer's Guide*, American Bar Association; May 2007.

65 *Id.*

66 *Id.*

scope to the material itself, to allow the patent owner to get protection for any other use of the invention, even if those uses where not considered by the inventor.[67]

Some other comments make reference to the lack of training, to difficulties in becoming aware of relevant to prior art, and to the patent examiner's individual way of working, making it impossible to cover all the aspects of a multidisciplinary field to which nanotechnology may apply. This is partially true due to the nature of nanotechnology and the failure of patent offices to deal with this kind of invention in the past. Some offices have already tackled these problems, by the creation of a specific classification structure for nanotechnology and teams of examiners specially working on patent applications related to those classes.[68] This initiative will surely improve the quality and the certainty on validity of issued patents, but will not solve completely the problems related to the existence of low quality or invalid patents.

More drastic groups believe that granting companies being with legal monopolies on broad patents for nanotechnological inventions represents a real and specific risk in terms of accessibility to technology for developing countries. The ETC group represents an example of this position.[69] Supporting a view against patentability of nanotechnology, the organization considers that "[…] breathtakingly broad nanotech patents have been granted that cut across multiple industry sectors and include sweeping claims on entire areas of the Periodic Table [...] creating thorny barriers for would-be innovators".[70] Based on these assumptions, they recommend that WIPO "[to] initiate a global suspension of patent approvals related to nanotechnology until South governments and countries-in-transition can undertake a full evaluation of their impacts, and […] to examine the impact of nanotech-related intellectual property on monopoly practices, technology transfer and trade."[71] In line with the ETC Group's position, raising awareness on the issue but without requesting concrete actions, the European Commission considers that "[…] nanotechnology is raising fundamental questions as to what should, and should not, be patentable."[72] These are just a few examples of voices of concern on the role of intellectual property law on the development of nanotechnology. At the moment arguments based on tangible facts to support extreme positions on the inconvenience of granting patents in the field are not available. Nevertheless some specific aspects

67 *See*, for example, patent EP0842967B1 *Composite materials*, filed in 1997.

68 *Id. Supra* note 6

69 ETC Group, *Nanotech's Second Nature Patents: Implications for the Global South*, Special Report N0. 87, 2005.

70 *Id.*

71 *Id.*

72 *See*, Communication from the Commission, *Towards and European strategy for nanotechnology*, European Communities, available at http://ec.europa.eu/nanotechnology/pdf/nano_com_en_new.pdf, 2004 (last visited September 2009).

of patent law that will be discussed in this Thesis may support the need to assess and track evolution of economical and legal indicators in order to be ready to act if such concerns are proven valid.