

Rebutting a Major Misconception about the Patent System: How Patent Protection Promotes Technology Dissemination

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Abstract

In this paper, we focus on correcting the misconception that patent protection always limits the use of intellectual property to its inventor or someone who purchases the rights from the inventor. We will show that this hardly reflects the whole reality of how patents are, and should be, used by inventors and firms. Rather, one of the most useful goals of the patent system is to disseminate technical information about inventions. Patents provide a powerful mechanism for disseminating technical information since each patent application is a publicly available document that describes the invention in detail, including its principles of operation, its advantages, how to replicate it, and how to use it. Thus, patents make it feasible economically for an inventor to show a prospective licensee the details of the invention without any danger that the idea will be stolen. By broadcasting the fruits of the inventing efforts of a single individual or company, the world receives the benefit of that information and economic productivity is increased.

Keywords:

Patents, Intellectual property, Innovation, Technology, Dissemination, Licensing, Research & Development, General welfare.

JEL classification:

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Note: Portions of this paper are based on Baumol, (2005).

Rebatiendo un importante concepto erróneo sobre el Sistema de Patentes. Cómo promueve la difusión tecnológica la protección de patentes

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Resumen

En este artículo nos centramos en corregir la idea errónea de que la protección de patentes siempre limita el uso de la propiedad intelectual a su inventor o a quien compra los derechos del inventor. Demostraremos que esta idea difícilmente refleja toda la realidad de cómo las patentes son, y deben ser, utilizadas por los inventores y las empresas. Más bien, uno de los objetivos del sistema de patentes es difundir la información técnica sobre las invenciones. Las patentes constituyen un poderoso mecanismo de difusión de información técnica, ya que cada solicitud de patente es un documento público que describe detalladamente la invención, incluyendo sus principios de funcionamiento, sus ventajas, cómo replicarla y cómo usarla. Por tanto, las patentes permiten que sea económicamente factible para el inventor el mostrar al potencial licenciatario los detalles de la invención sin peligro alguno de que la idea sea robada. Al difundirse los frutos de los esfuerzos de la invención de una sola persona o empresa, el mundo recibe el beneficio de la información y la productividad económica aumenta.

Palabras clave:

Patentes, propiedad intelectual, innovación, tecnología, difusión, concesión de licencias, investigación y desarrollo, bienestar general.

■ 1. Introduction

The patent system does have shortcomings, and its performance clearly can be improved significantly. However, we argue that the belief that the primary goal of patents is to compensate and protect inventors by preventing other people from using their inventions or other intellectual property (IP) is a basic misunderstanding of the patent system. On the contrary, patents benefit the general welfare by encouraging and facilitating rapid and substantial dissemination of inventions. Indeed, without patent protection, much of the economy's manufacturing output would be condemned to obsolescence because inventors would only be able protect their new ideas by keeping them secret.

In this paper, we focus on correcting the misconception that patent protection always limits the use of IP to its inventor or someone who purchases the rights from the inventor. We will show that this hardly reflects the whole reality of how patents are, and should be, used by inventors and firms. Rather, one of the most useful goals of the patent system is to disseminate technical information about inventions. Patents provide a powerful mechanism for disseminating technical information since each patent application is a publicly available document that describes the invention in detail, including its principles of operation, its advantages, how to replicate it, and how to use it. By broadcasting the fruits of the inventing efforts of a single individual or company, the world receives the benefit of that information and economic productivity is increased.

■ 2. Monopolization vs. Dissemination: Dueling Goals of the Patent System

Patenting, as the guardian of society's interests in intellectual property (IP) has two primary objectives. The first is to ensure that the creators of the IP—that is, inventors—have an opportunity to obtain some reward from their efforts, both as a matter of equity and as an incentive for the expenditure of further creative effort. The second, and apparently rather incompatible goal, is ease of access and dissemination to others, which ensures that the benefits of the IP are as substantial and widely available to all of society as possible.

The conflict between these two goals is widely recognized. The lower the hurdles that impede access to some IP, the less its creator can hope to charge for its use. If anyone can make use of it with no impediment, its price is apt to be driven toward zero. Indeed, a simplistic argument derived from static welfare theory in economics implies that zero is apt to be the welfare maximizing price because once some piece of IP has

been created, its employment by an additional user need not impede its use by anyone else. Thus, any positive price, if it prevents anyone from using the IP or reduces the amount of its use, prevents an act that could benefit society.

These two goals can be reconciled in a workable and apparently socially beneficial way, and it will be argued here that the instrument for this purpose is the patent. Contrary to what quick consideration might suggest, patents do not serve primarily to impede dissemination but, rather, generally facilitate and encourage it.

■ 3. Patents as Instruments for Intellectual Property Dissemination

The primary role of patents always has been to encourage inter-country technology transfer. The patent seems to have had its origins in Renaissance Italy, but the story pertinent to this discussion apparently began in England during the reign of Edward III. Indeed, the term itself comes from “letters patent”—that is, letters issued by the monarch meant to be visible (patent) to all, as distinguished from confidential “letters close.” Initially, these letters patent granted their recipients a monopoly, for a specified period, over production and sale of the item named in the letter. But initially they were granted not to the creator or inventor of the intellectual property (IP) at issue, but to a foreign producer who could *steal* the idea from his own country and export its use to England. For instance, a French workman who had mastered a trade initially carried out only in France would be offered a letter patent as an incentive to migrate to England and set up a competing trade there. Thus, this early use was not designed to offer protection to creators of IP but, quite the contrary, provided an incentive for the transfer of the IP—that is, limited dissemination.

Since then, and particularly in recent decades, the voluntary dissemination of patented material has become a major economic activity. Indeed, patent law throughout the world contains a provision—the mandatory full disclosure of the details of the IP—that can be interpreted as a direct denial that the purpose of the patent is to impede dissemination.¹ This surely is the most direct way to enable others to learn from the technology of the patented item and to facilitate the creation of competing substitutes or even outright imitations after the patent expires.

Thus, patents evidently were not designed to handicap dissemination. But in practice do patents actually encourage dissemination? To understand fully the capacity of the

¹ Patent law generally requires full disclosure of the technical details of the IP in question. In some places this occurs after the patent application is approved, but other countries require this disclosure when the application is received by the patenting agency.

patent to encourage and facilitate dissemination, one must consider the ways in which the creator or the proprietor of some IP can hope to use it to obtain any substantial revenues. For such a reward to be a realistic possibility the IP must somehow be protected because, as we have already noted, without such protection it can be copied without payment by others. There are only two devices clearly capable of providing such protection: secrecy and legal usage constraints (that is, the patent).

If secrecy is the only effective means to protect some IP, then its proprietor must use that IP directly in the creation of final products—whether or not the IP owner is a capable manufacturer of those final products. Release of the IP for use by others is not an option because this would undermine its protective secrecy. The owner cannot even sell the IP to others because, as we noted earlier, they will want to know what the invention does and how it works before laying out the cash demanded for it.

However, a patent transforms the IP into a readily saleable or rentable item. The patent, in effect, transforms the IP and the right to use it into marketable products. Then it becomes merely a matter of economic calculus to determine which of the options best suits the owner’s interests: sale, grant of access for a licensing fee, exclusive use by the owner, or some combination of these. Since at least the latter half of the 19th century, the sale or rental of IP access has become so attractive that it has resulted in the creation of markets dedicated to such transactions, with the assistance of professionals who specialize in such activities.²

Indeed, the sale, licensing, and trading of technology has become a large-scale activity. Arora *et al.*, (2001, pp. 30-31) report the results of a survey of 133 companies by a British consulting firm, indicating that 77 percent of the companies studied had licensed technology *from* others while 62 percent had licensed technology *to* others. Although they noted that investment in internal research and development (R&D) activities easily dwarfs licensing, the size of the overall “market for technology” is impressive even by today’s standards—about the size of the 1996 gross domestic expenditure on R&D in France and greater than that of the United Kingdom (Arora *et al.*, 2001, p. 31).

The prevalence of IP licensing has been sufficient for the formation of the Licensing Executives Society International, which reports a membership of more than 12,000 from more than 90 countries and runs seminars and conferences, such as one on “Leveraging Technology for Competitive Advantage.” In addition, there are many websites offering information and help for licensing and technology transfer. Clearly voluntary dissemination is neither isolated nor unusual.

² For more on markets for the sale or rental of IP access, see the fascinating work of Lamoreaux and Sokoloff (1996).

Sharing information on proprietary technology can take many forms. The most widely recognized are research joint ventures in which several firms finance some R&D activity, whose results are made available to all the companies that supported it (see, for example, Katz and Ordover, 1990). Sometimes the sharing is informal, with no contracts and no license fees—each firm helps its rivals to adopt and utilize new techniques, with the understanding that the favor will be returned. Often, of course, firms enter into contracts in which one gives the other permission to use its proprietary technology in return for a license fee. Alternatively, firms may enter into reciprocal licensing contracts, in which the participants agree to permit one another to use not only their current technology but also any future innovations of the sorts specified during a defined period of time. Thus, there is no single, standardized approach employed in the voluntary business dissemination of technology. However, all of these methods depend on the availability of a patent system that protects the interests of each participant firm, while revealing its secrets to its partner enterprise.

■ 4. Why Do Firms Undertake Technology Sharing and Transfer Arrangements?

The existence of extensive markets in intellectual property ensures that access to improved technology usually is a relatively straightforward matter, though it can entail extensive negotiations and complex contractual arrangements. But this widespread and voluntary transfer of technology flies in the face of the common impression that firms with intellectual property generally seek to prevent others—particularly competitors—from getting access to the innovations that contribute competitive advantage to their proprietors. After all, if the licensing fee offered by the would-be user is right, it *will* be profitable to permit its use. Once one frees oneself of the prejudgment that the self interest of firms will generally lead them to withhold their technological information from others, it is easy to think of many reasons why they may want to behave otherwise, though some of these reasons that are not quite so obvious.

The most straightforward reason is the high cost of research and development (R&D) activity. By entering into some sort of sharing consortium, the burden can be divided and reduced for each participant. Given the public-good attribute of the results of R&D, it is far less expensive (per user) to provide such information to several firms than only to supply it to one because two firms may be able to divide up the cost of some contemplated R&D if each undertakes a different portion of the task.

A second reason is reduction of risk. In any given year a single firm's R&D division may fail to come up with any significant breakthroughs. The management of firm A

inevitably fears that this will happen in a year when its rival, B, manages a significant breakthrough, and vice versa for firm B. Since product and process improvement are a matter of life and death in high-tech industries characterized by vigorous oligopolistic competition, technology sharing agreements serve as effective insurance policies, protecting each participant from such catastrophes.

A third reason simply has to do with profits. Suppose firm A invents a new widget component and expects to make a net profit of X dollars per widget of the resulting new type that it produces. If rival firm B offers firm A Y dollars ($Y > X$) per widget sold to license the new widget, then firm A will be better off letting firm B license the new widget, even if every widget sold by firm B means one less sale for firm A. Of course, firm B generally will be able to afford such a high licensing fee *only* if it is a more efficient *producer* of widgets than firm A (though B may be an inferior inventor). In this way the price mechanism not only facilitates licensing, but also encourages efficient specialization, with inventive activity undertaken primarily by the more effective inventor and production of the resulting products undertaken predominantly by the more efficient producer. In practice, such unreciprocated licensing usually entails the sale of licenses by large firms that undertake extensive R&D activity to smaller enterprises that cannot afford to carry out such activity or do not possess personnel qualified to do so.

A fourth and less obvious reason for voluntary dissemination entails trading technology because this protects the firms involved in the trade from entry by other competitors. To see how this works, consider an industry with 10 firms of identical size—each with an R&D division with similar staffing and similar funding. Each firm will then have access to the discoveries of its own R&D efforts, as well as to those of nine other firms in the consortium. Now suppose an eleventh firm wants to enter the market, but is not invited to join the technology sharing consortium. Having only the products of its own R&D division at its disposal, while the other firms each obtain the outputs of 10 R&D establishments, the entrant may find itself at a severe competitive disadvantage.

If no anticompetitive conspiracy is present, this type of arrangement can stimulate innovative effort. Like any profitable sale of a license for use of proprietary technology, it helps to internalize the externalities generated by the innovative efforts of each firm. But in addition, if as happens in practice, in such an exchange each firm undertakes compensation equalization payments to any other member of the consortium when the latter's innovations are of market value significantly superior to its own, then the firm has a direct incentive to come to the contract bargaining table with a menu of valuable innovations to offer. Formation of such a consortium also tends to enhance the economic welfare of the general public

by stimulating the invention of better products and processes (Baumol, 2002, Chapter 7).³

■ 5. The Benefits of Technology Dissemination

It is true that patents can be—and often are—used to obtain monopoly profits by keeping competitors from entering a market. This is hardly an insignificant phenomenon. For instance, some pharmaceutical firms reportedly invest heavily in research and development in order to obtain patents that can be used to keep competitors out of the market. Granted, the monopoly power conferred by a patent may provide the necessary incentive for inventors and entrepreneurs to undertake burdensome innovative activities. Thus, if the labor and cost necessary to carry out the invention process would not be expended unless the inventor is assured of receiving at least some temporary financial reward, then even a monopolist producer may be preferable to no producer at all. Elsewhere we suggest ways to address this monopolization phenomenon, but here we focus on the reverse phenomenon: the fact that, when employed properly, patents often encourage competition in markets and facilitate the dissemination of innovative products to other producers and sellers.⁴

Widespread and prompt dissemination of an invention can benefit consumers in many ways. The most obvious is that it can facilitate competition among suppliers of a new product. If production of a particular technology is licensed to a number of users, in a market where price fixing conspiracies are effectively prevented by regulators, then competition among licensees can bring down the market price of an invention (or of a product in which the invention is used).

Competition frequently entails licensing the right to use a patented invention to rivals, as in the simple illustration that follows. Patent holder A authorizes B to use an invention in exchange for a substantial monetary payment or, perhaps, permission to make use of one of B's patents. Such exchanges are common and may even be organized and

³ Yet, there are evidently exceptions. Such consortia can serve as vehicles or as camouflage for anticompetitive behavior. For example, contract discussions can serve as a disguise for price fixing by competitors. In addition, the firms can enter into a technology sharing agreement to restrict their R&D expenditures mutually—each firm knowing that it can safely limit its innovative efforts because it can rely on its rivals to do the same. Finally, the contracts can be offered in a discriminatory manner that limits the benefits offered to new entrants or denies them access altogether.

It is of some interest that the U.S. Department of Justice and the Federal Trade Commission have recognized the two sides of this issue. Their 2000 Guidelines for the Licensing of Intellectual Property very explicitly discuss the pro-competitive benefits of licensing, as well as the associated concerns. This is not the place to offer an evaluation of those guidelines. However, it is important to note that licensing, as the prime instrument for technology dissemination, has become sufficiently important to merit this sort of attention by antitrust regulators.

⁴ For more details, see our forthcoming book, *Innovation Markets*, which proposes several market-based solutions for key problems with the current U.S. patent system. We are deeply indebted to the Ewing Marion Kauffman Foundation for its generous support of our work.

operated by complex organizations (“patent pools”) involving many participants and extensive rules and legal commitments.

The importance of such licensing activities may not be immediately apparent. But consider an ordinary laptop, which is constructed and operated with technology incorporating thousands of inventions and covered by literally thousands of different patents held by many different proprietors. As such, laptop computers are essentially dense bundles of mutually beneficial innovations that work together to offer consumers a beneficial product or service. For instance, an estimated 90,000-plus patents related to microprocessors were held by more than 10,000 parties in 2002 (U.S. Federal Trade Commission, 2003, p. 9).

Different patent owners possess special expertise in particular components and, as such, may focus on continually improving these (for example, making them faster, cheaper, or more durable). Imagine the case of two computer manufacturers—one may be able to provide a high quality screen, while the other offers a better microprocessor. If each firm retained its own invention and refused to license it to the other, consumers would be condemned to choose between a computer with an obsolete screen or another with an obsolete microprocessor.

Patent protection allows each firm to “show” the other the specifications of its technology and ultimately exchange the rights to make use of each other’s inventions through licensing agreements. The ability of many different firms to create and sell specialized components yields laptops that are superior to any that could be produced entirely by a single firm. Indeed, without the possibility of licensing or exchanging intellectual property for the various inventive components of laptops, our computers—if they existed at all—would be built with relatively obsolete and inefficient components. Thus, patents facilitate the process of making all of the latest technological improvements available to all customers. The resulting benefits accrue to both firms and their customers, who are offered a better final product unencumbered by obsolete features.

Leasing patent rights promotes the voluntary exchange of inventions and speeds the retirement of obsolete technology. In order to compete in this marketplace, suppliers rush to add the latest and most efficient technology to their products. Thus, paradoxically, instead of preventing widespread utilization of patented technology, patents facilitate rapid and ubiquitous dissemination of new technology and ensure that obsolete technology is retired swiftly.

Indeed, without patents the dissemination and widespread use of new technology would be prevented, thereby extending the lifetime of obsolete technology and hindering the

economy's productivity growth. Why are patents indispensable to the dissemination of technology? Consider an example. Inventor A has created a brilliant new invention, X, that is capable of significantly enhancing productivity. Her competitor, Inventor B, hears about invention X and considers paying for the right to use it, though he knows none of X's details. In general, A can either keep X secret to prevent copying by B or any others, or she can patent X, which ensures that any entity seeking permission to copy X must offer her acceptable compensation. Without a patent (or before the patent is granted), A has *only one* defense—secrecy—so she cannot reveal many details about invention X to B. However, it is unlikely that B will be willing to pay substantially for the right to use invention X before he knows what exactly he will get in exchange. Without patent protection to prevent B from copying A's invention, no licensing deal can be reached and invention X may never be manufactured and marketed by A, B, or any other inventor or manufacturer. Thus, invention X cannot be disseminated to consumers.

The two cases described next help to bring out the serious consequences of impeded IP dissemination.

Case 1. Firm A is an efficient inventor but a very poor manufacturer, while the reverse is true of Firm B. So when Firm A creates an important new product or process, it should sell or license it to Firm B, whose manufacturing efficiency will yield greater profits (to be divided between them) than A could obtain as sole manufacturer. However, without patent protection it is difficult to carry out the transfer of information about the new invention.

Case 2. Firms A and B possess inventions that can be used with maximum effectiveness only if they are employed together—for instance, it may entail a graphics card that is worthless without a computer system. Without patent protection for both inventions, the exchange of information required to manufacture computer systems with graphics cards may never occur.

■ 6. Conclusions

With the aid of the patent system, the market mechanism has introduced powerful incentives for the rapid dissemination of novel products and processes. Moreover, it has done so without creating a major disincentive for investment in the innovation process. That is no minor accomplishment and no minor contribution to technical progress and growth. The conflict between encouragement of innovative effort and facilitation of dissemination has hardly been eliminated, but profitable dissemination has ameliorated the problem to a considerable degree. It has done this by creating markets in technology, in which inventors willingly offer the use of their intellectual

property to others in return for a quid pro quo, which rewards the inventor while facilitating the use of the intellectual property by others. Under such an arrangement, society has it both ways: technology licensing that permits imitation by others benefits both the imitator and the inventor and, through the resulting stimulus for growth, this becomes a very valuable benefit to society.

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