

# ***I BATTELLI DEL RENO***

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Rivista on-line di diritto ed economia dell'impresa

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ISSN 2282-2461 I Battelli del Reno [on line]

I Battelli del Reno, rivista on line di diritto ed economia dell'impresa, è registrata presso il Tribunale di Bari (decreto n. 16/2012)

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## SAGGI

Giuseppe Sanseverino

## PATENTS AND OPEN INNOVATION: A COLLABORATIVE RELATIONSHIP

SUMMARY: 1. *Patent protection and the economic model of open innovation.* - 2. *Innovations in the fields of ICT and IOT.* - 3. *Final remarks.*

1. *Patent protection and the economic model of open innovation.* - The term "open innovation" refers to a very broad economic model and, from a conceptual point of view, designates an attempt to classify - empirically - certain methods of developing innovation and systems for circulating technological information inside and outside companies.<sup>1</sup>

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(<sup>1</sup>) The reference paper for understanding the phenomenon is undoubtedly H.W. Chesbrough, *Open innovation: the new imperative for creating and profiting from technology*, Boston, Harvard Business School Press, 2003, in which the author refers to "(...) the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively, and states that (...) firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology". This theme has been studied extensively by this author in various writings, many of which have had an extensive series of empirical or statistical surveys as their basis of reference: H.W. Chesbrough, "The era of open innovation" (2003) in *Sloan Management Review*, 35; H.W. Chesbrough, "A better way to innovate" (2003) in *Harvard Business Review*, 12; H.W. Chesbrough, *Open business models: how to thrive in the new innovation landscape*, Harvard Business School Press, Boston, 2006; H.W. Chesbrough, "Why companies should have open business models" (2007) in *Sloan Management Review*, 22; H.W. Chesbrough, "Business model innovation: it's not about technology anymore" (2007) in *Strategy & Leadership*, 35; see also H.W. Chesbrough and R. Rosenbloom, "The role of business models in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies" (2002) in *Industrial and Corporate Change*, 529.

As is clear from this description, and from general analysis, this economic model contrasts with the classic “closed innovation” method whereby companies establish their own innovation development process based on secret internal research - so-called “closed innovation”. Under this traditional economic model, activity directed towards innovation is carried out exclusively within the company and the entire process, from research to production - and even the phase of product or service marketing - relies on a vertical and highly reserved integration of the economic and human resources directed towards the creation and control of innovation, and its subsequent use and circulation.

In an ontologically opposite sense, the so-called “open innovation” model envisages the use by the company of accessible external sources to propel the innovative process. Consequently, especially in the preliminary stages of research, the productive activity of the firm is aimed at managing flows of knowledge into and out of external environments.<sup>2</sup>

The open innovation system allows companies to exploit the ideas and technologies of others, not only in order to engage with totally new technological fields, but also to increase and improve the lines of research that already exist internally. In both cases, a firm often allows its research activity to be exploited freely by other firms, whether its research is totally new or has been ongoing. Making a comparison that is certainly simplistic but closely related to the general coordinates of the phenomenon, it could be argued that open innovation is parallel to the existing paradigm for copyright as it relates to innovation in the field of software defined as “open source”.<sup>3</sup>

The “open innovation” economic model is conceptually broad and the economic literature does not identify or lay down typifying rules for it.

Even in the legal field, there are no univocal contractual rules or rules relating to technological exchange or techniques that can help to clarify the main elements of the

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<sup>(2)</sup> See D. Vertésy, and G. Damioli, G., *The Innovation Output Indicator 2019: In search of global innovation champions*, in *Publications Office of the European Union*, Luxembourg, (2020), available in internet; V. Lipton, *Legal issues arising in open scientific data*, in *Open Scientific Data – Why choosing and reusing the right data matters*, IntechOpen (2020) (<https://doi.org/10.5772/intechopen.91713>); E. Méndez, R. Lawrance, C.J. MacCallum and E. Moar, *Progress on open science pen Science, Towards a Shared Research Knowledge System: Final report of the open science policy platform*, in *Publications Office of the European Union*, (2020), Luxembourg (<https://doi.org/10.2777/00139>).

<sup>(3)</sup> G. Sanseverino, *Le licenze free e open source*, ESI, 2007.

phenomenon. The only precepts that emerge from the studies carried out on the practice of companies that adopt this economic model for the development of innovation are the elimination (in whole or in part) of secrecy about lines of research, and the acquisition and external sharing (in whole or in part) of information relating to basic research and production processes.<sup>4</sup>

There is however a degree of homogeneity in the motives impelling companies to adopt this model. The rational considerations (and the assumptions deriving from the economic scenario) underlying the choice of the open innovation model are of two main kinds.<sup>5</sup>

Firstly, it is disadvantageous to allow a company's production processes to rely exclusively on innovation created with internal and reserved resources: in new (so-called "high-tech") technological contexts, the scope of internal research capabilities (even in the case of larger companies) is often insufficient to guarantee an adequate level of knowledge or is not comparable to the possibilities of acquiring such knowledge and learning from external sources.

The second reason is typical of new production contexts involving the use and management of enormous quantities of information, for example internet of things (IOT) technologies. It reflects the widespread evolution of certain economic factors over the last decade, such as the dizzying increase in costs related to research and the progressive and increasingly rapid reduction in the life cycle of products due to rapid replacement on the market (so-called "obsolescence due to improved replacement").<sup>6</sup>

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(<sup>4</sup>) The economic assumptions that favour the choice of open innovation have been extensively studied by E. Enkel and O. Gassmann, *Driving open innovation in the front end. The IBM case*, Working paper, University of St. Gallen and Zeppelin University, 2008; H.W. Chesbrough, "Open R&D and open innovation: exploring the phenomenon" (2009) in *R&D Management*, 311; O. Gassmann, "Crossing the industry line: breakthrough innovation through cross-industry alliances with 'non suppliers'" (2010) in *Long Range Planning*, 5-6, 639; O. Gassmann, C. Kaush and E. Enkel, "Negative side effects of customer integration" (2010) in *International Journal of Technology Management*, 43-63.

(<sup>5</sup>) For more information, refer to J. Schultz and J. Urban, "Protecting open innovation: the defensive patent license as a new approach to patent threats, transaction costs, and tactical disarmament" (2012) in *Harvard Journal of Law & Technology*, Vol. 26, 3; R. Cooper Dreyfuss, *Does IP Need IP? Accommodating Intellectual Production Outside the Intellectual Property Paradigm*, New York University School of Law, Public Law & Legal Theory, Law & Economics Research Paper Series Working Paper No. 10-34, August 2010; see also M. Maggiolino and M. Lillà Montagnani, "Standardized Terms and Conditions For Open Patenting" (2013) in *Minn. J. L. Sci. & Tech*, vol. 14, available at SSRN: <https://ssrn.com/abstract=2298593>.

(<sup>6</sup>) See U. Lichtenthaler, "Leveraging technology assets in the presence of markets for knowledge" (2007) in *European Management Journal*, 122; S.J.H. Graham, R.P. Merges, P. Samuelson and T.M. Sichelman,

It is obvious, even without referring to research in the economic field,<sup>7</sup> that these factors have greatly compromised the capabilities, even for the largest companies, of undertaking innovative activity solely by focusing on internal technological knowledge and resources. In the technological innovation system, the need to survive in the marketplace pushes companies to turn outwards to develop a level of innovation with the speed and flexibility required in current production contexts (so-called “time to market”).

The open innovation model is also advantageous when it comes to the transfer and/or disclosure of information relating to internal research activities because it provides a way of generating revenues and leads to the opening up of new markets.

It is therefore evident that open innovation relates essentially to a form of digital technology and is concerned exclusively with information/data and the possibility and ease of its circulation. In the traffic of data/information exchange, there is no distinction between the collection and aggregation of simple data (personal, statistical, basic technical) and the methods for which it is used, or even the type of information or traditional technologies used with them.

The IT and/or digital medium used for the circulation of information is also crucial in identifying the sectors in which innovation operates (to a greater extent in ICT) and in the choice of development methods for the various lines of research.

It is for this reason that open innovation, from its very inception, stands before the jurist as a real “market need” deriving from the new (information) innovation system, i.e. a system based on the value of knowledge as being on a par with the merits of its circulation. And although the framework of the open innovation method outlined above seems to be diametrically opposed to patent protection, this contrast is only apparent.

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“High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey” (2009) in *Berkeley Tech. L.J.*, 24, 1255.

(7) P. Almeida, J. Song, and R.M. Grant, “Are firms superior to alliances and markets? An empirical test of cross-border knowledge building” (2002) in *Organization Science*, 13(2), 147; R. Amit and C. Zott, “Value creation in e-business” (2001) in *Strategic Management Journal*, 22, 493; J.B. Barney, “Firm resources and sustained competitive advantage” (1991) in *Journal of Management*, 17, 9; J.B. Barney, “How firms’ capabilities affect boundary decisions” (1999) in *Sloan Management Review*, Spring, 137; D.J. Teece, “Profiting from technological innovation: implications for integration, collaboration, licensing and public policy” (1986) in *Research Policy*, 15, 285.

The adoption of open innovation provides for a broad and precise series of strategies for the management of corporate knowledge and the type of results that the research process produces, and therefore companies are interested in selecting the most appropriate practices. Collaboration in research and development, and even outsourcing, can be adopted to explore new fields or delve more deeply into complex research topics, but the innovations that result, when viable or useful, are not always left to be freely exploited by third parties. Patent protection is always valued as a key element of knowledge and innovation management when this is economically useful in relation to future developments in research.

*2. Innovations in the fields of ICT and IOT.* – The framework outlined above provides an opportunity for numerous reflections. The following is a brief introduction to and a broad examination of the type of legal phenomena emerging from economic research concerned with the operating methods of companies that have adopted this model, including matters of patent protection.

Before proceeding to a legal analysis of the economic phenomena arising from open innovation, we must consider and interpret some preliminary aspects. It is first necessary to identify the concept of innovation on which this economic model is based (at least in general terms); secondly, we need to study the concrete ways in which the dissemination of information and research takes place; thirdly and finally, we must identify the juridical-economic function pursued by these circulatory models of technological knowledge.

The economic studies that have analyzed the phenomenon of open innovation agree, in principle, on at least two coexisting concepts of innovation.

A first broad and generic concept regards innovation as a technical teaching whose primary and final objective is the achievement and dissemination of new technological systems that can transform social and economic habits, e.g. personal computers or smartphones.

A second line of thought tends rather to develop an economic (and empirical) classification of the effects produced upstream and downstream of the research, identifying at least three types of innovation based on the impact that a new technology produces on the reference market. The first is a type of innovation defined by many

authors as “architectural”, which occurs when technological progress opens up a new market because earlier technologies are inadequate.

The second is a “regular” or “incremental” type of innovation resulting from a product technology that does not change the market and offers only slight improvements. This latter type of innovation, which essentially coincides with the inventive-step concept adopted by most patent offices, does not imply the abandonment of old technologies, but tends to improve them from different points of view such as efficiency, quality of production or enlargement of the possibilities of use.

The third type of innovation envisaged in the classification indicated above, referred to as “radical”, represents an intermediate level, i.e. it produces an important modification of the product concerned but does not change or create new markets. One of the examples cited in the literature is the introduction of the DVD format to replace the VHS format for time-asymmetrical viewing of television programmes, concerts and films.<sup>8</sup>

The lower-level concepts stand in a relationship of progressive competition as the objective is to achieve so-called “architectural” innovation. Consequently, technologies that produce minor economic effects are seen merely as intermediate steps, useful only in getting to the main one, i.e. the opening of new markets and the modification or improvement of personal and social habits.

The role of low-impact technologies, as well as of basic research, is therefore only to be used widely and for the extensive dissemination of knowledge. This dissemination of information accelerates achievement of the primary objective, which would certainly be slowed down by secrecy or the segmentation of research knowledge. In essence, the incremental effect is a necessary but intermediate step, and therefore from the point of

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(<sup>8</sup>) See W.J. Abernathy and K.B. Clark, “Innovation: mapping the winds of creative destruction” (1985) in *Research Policy*, 14, 3 (the first and most complete essay); see also W.M. Cohen and D.A. Levinthal, “Absorptive capacity: a new perspective on learning innovation” (1990) in *Administrative Science Quarterly*, 35, 128; H. Enkel, O. Gassmann and H.W. Chesbrough, “Open R&D and open innovation: exploring the phenomenon” (2009) in *R&D Management*, 39, 311; O. Gassmann, “Opening up the innovation process: toward an agenda” (2006) in *R&D Management*, 36, 223; O. Gassmann, “Crossing the industry line: breakthrough innovation through cross-industry alliances with ‘non-suppliers’” (2010) in *Long Range Planning*, 43, 5-6, 639; U. Lichtenthaler and H. Ernst, “Attitudes to externally organising knowledge management tasks: a review, reconsideration and extension of the NIH syndrome” in *R&D Management* 36, 4, 2006, 367; U. Lichtenthaler, “Technology transfer across organizational boundaries: absorptive and desorptive capacity” (2010) in *California Management Review*, 53, 154.



view of open innovation, and in respect of the main and final result, would not (and should not) be protectable, unlike the apical (or so-called “architectural”) result, which instead tends to be accorded strong patent protection.

This conceptual approach, which differs considerably from that of the patent as the only development system (in which it is appropriate to patent all types of innovation), calls at least for an explanation of the advantages of openly and freely disseminating the results of technological research.

The diffusion of knowledge and research is useful in terms of its economic effects because, although in principle it may be easy to anticipate or assume the technical effects of an innovation, it is often almost impossible to anticipate the practices of users and the economies that may arise. Disseminating information therefore means not only increasing the potential for accelerated technological innovation but also expanding the underlying or new market possibilities that may blossom with the use of new innovative products. Open innovation does not consider technological innovation from a purely scientific point of view, but also sees it as a concrete operational module of an economic kind.

The development of IOT technology is a real confirmation of this. Going beyond the traditional and classic limits of corporate research on the information level means obtaining the maximum return from the ideas of customers and users. Typically, the user of an IOT technology, by disseminating and returning information while using an innovative product, provides more or less tacit and implicit knowledge of the concrete effects of the research and thus helps remove the new product’s defects. This feedback triggers the search for new features and, finally, implements and improves the usefulness of the technology itself with secondary information. Moreover, the dissemination of technological information and its widespread use stimulates interaction between different technological fields by exploiting the different types of knowledge of the people who use that innovation in conjunction with foreign tools and methods.

Based on this assumption, the economic studies that have dealt with the topic, taking into account a very large quantity of empirical research, have established that the legal methods whereby knowledge of technological research is disseminated in open innovation models are implemented through at least three main types of exchanges: i) simple informal collaboration without an agreement, with free sharing between the

company and external sources of information, ii) the issue of license agreements on advantageous terms, iii) the granting of authorizations to use patents and/or the technology not used internally. In all cases, the result of the research is contractually preserved for exclusive use and, when the result of the innovation is predetermined as interesting, the possibility of patenting is also maintained.<sup>9</sup>

This is also confirmed by the fact that the research consulted reiterates the attitude of companies to distrust and avoid more complex configurations, such as mergers and acquisitions or corporate transactions (e.g. share capital swaps), for the widespread exercise of research activities and the circulation of information in the new ICT sectors.<sup>10</sup>

Economic analyses of open innovation always pay particular attention to the question of appropriability, capturing the proprietary and competitive dimension of technological change. It is interesting to note that when research is precisely developed in a single specific field of technology, the possible knowledge management strategies are mutually exclusive: one chooses either the path of open innovation or the path of patenting. When innovation involves the use of knowledge from different technological fields, or advanced projects are undertaken, the tendency to use open innovation in the early stages of research is more marked.

3. *Final remarks.* - Companies operating in open innovation are not prejudicially averse to dealing with the contractual difficulties that necessarily arise in the context of normal technological licensing relationships, but at the same time, all the players in this economic model recognize that only an open and widespread system of technological knowledge represents a real drive to achieve total sharing and thus innovative results.

In conclusion, it follows that, within this framework, the system of intellectual property rules must cope with the fact that the race towards patent - or in any case

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<sup>(9)</sup> E. Méndez, *Open Science .. op. cit.*, 8 e ss..

<sup>(10)</sup> M.A. Schilling, *Gestione dell'innovazione*, McGraw-Hill, 2009, 8; A. Sobrero, *La gestione dell'innovazione. Strategia, organizzazione e tecniche operative*, Carocci, 1999; J.Tidd, J.R. Bessant, *Managing Innovation: Integrating technological, market and organizational change*, John Wiley & Sons, England, 2005; J. Fagerberg, *The Oxford Handbook of Innovation*, Oxford University Press, Oxford, 2004; H.W. Chesbrough and A.R. Garman, "How open innovation can help you cope in lean times" (2009) in *Harvard Business Review*, 76 ff; U. Lichtenthaler, "Leveraging technology assets in the presence of markets for knowledge" (2007) in *European Management Journal*, 27; U. Lichtenthaler, "Outbound open innovation and its effect on firm performance: examining environmental influences" (2009) in *R&D Management*, 39; see also EU European Commission, *Innovation Management and the Knowledge-Driven Economy*, Directorate-General for Enterprise, Brussels, 2004.

proprietary - protection (which is still a driving force in promoting technological progress in certain more traditional sectors) no longer has a central and prominent role in technological sectors where the predominance of information (in terms of quantity, quality and speed of use and re-use) is necessary and essential. The interests involved in the new ICT and IOT sectors have become more composite and, paradoxically, the adoption of these new economic models has resulted in a new paradigm that overturns the traditional rules and creates a need to protect access to information (*Datennutzungsrecht*) and carefully weigh up the use of patent protection.<sup>11</sup>

The economic research studied for the purpose of this paper, and the business models analyzed, almost unanimously shows that, for the industrial world, the implementation of open innovation, especially in the new ICT and IOT technologies, involves data-sharing and presupposes reliance on the right (including through license agreements) of easy access to technological information, as well as to information (not strictly of a technological nature) gathered from the use of the innovative techniques/technologies concerned. It likewise reveals an aptitude to avoid or to fight the introduction of an exclusively proprietary system.

Therefore, where legal mechanisms are concerned, although open-source activity is affected by significant ideological dynamics (together with constitutional tensions over the use of protected content), as well as by economic forces, the need to be able to access a wide and unlimited range of knowledge on technological innovations, and the resulting information (even if not protectable), is a prerequisite for the development of innovation. In this new paradigm, the objective of promoting the pro-competitive effects of research and preserving market efficiency leads to a paradoxical situation: that of not having patent protection as an exclusive objective and indeed of having to protect free accessibility to technological information.

Moreover, the attitude that emerges from economic analysis of the new technological fields would seem to favour the adoption of free circulation, at least of the feedback that the innovations concerned tend to collect. In the early stages of research on industrial projects, the adoption of patents unduly increases the market power of the holders of

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(<sup>11</sup>) Cfr. R. Hilty e K. Köklü, *Access and use: Open vs. proprietary worlds*, in Max Planck Institute for Innovation and Competition Research Paper No. 14-07, <http://ssrn.com/abstract=2425637>; see also N. Lee, S. Nystén-Haarala and L. Huhtilainen, *Interfacing Intellectual property rights and Open innovation*, Lappeenranta University of Technology, Department of Industrial Management Research Report No. 225, also available at <http://ssrn.com/abstract=1674365>.

upstream information/data, creating barriers to access and hindering the development of innovation. Patent protection must therefore be modulated in the appropriate phases. At least in the initial phase, it would seem that (free) access to data (and its management) favours the economy and the development of technological innovations. As evidenced by IOT technology, the concrete and material utility that is provided in conjunction with traditional products and services is the consequence of connecting information/data with other surrounding systems and serves for their better management. This exponentially increases the amount of data collected, which, despite its enormous volume, can be connected with other large collections of data for the most diverse technological and informational purposes.

Far from being weakened, this argument can be validated by relating the dissemination of technological innovations in the new IOT and ICT sectors with the management of information/data and the consequent facilitation of big data analysis<sup>12</sup> and its decentralized use.<sup>13</sup>

Ultimately, the open innovation model values the centrality of access to technological information as a tool for channeling investment and as a pro-competitive stimulus to innovation, and tends to shift the centre of gravity of economic interests away from proprietary legal protection techniques - implicitly and without ideological derivations of any kind.<sup>14</sup>

The final conclusion is clear: companies that support knowledge-management strategies by adopting the open innovation system achieve excellent results, and this path can be implemented through a wide range of practices, without excluding resort to patents. Patenting is appropriate when the level of innovation of the technologies concerned is significant, or the research has reached the stage of maturity. This way of thinking «based on the notion of ‘as open as possible as close as necessary’, the protection of knowledge is an important step for the achievement of the Union’s policy goals, such as strategic autonomy and green and digital transition».<sup>15</sup>

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(<sup>12</sup>) Ottolia, *Big Data e innovazione*, Quaderni di Aida, Giappichelli, 2017.

(<sup>13</sup>) Cfr. *The Economist*, “Fuel of the future. Data is giving rise to a new economy”, May 6, 2017.

(<sup>14</sup>) E. Méndez, *Open Science .. op. cit.*, 5.

(<sup>15</sup>) E. Méndez, *Open Science .. op. cit.*, 9.

As well as depicting the current state of the strategies involved in the open innovation system, this analysis provides a starting point for reflecting on the ways in which intellectual property law can enhance the use of license agreements and for considering the role of patent protection in the context of combining innovative practices and knowledge during the different phases of research, especially in R&D-intensive sectors.<sup>16</sup>

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<sup>(16)</sup> Cfr. E. Méndez, *Open Science .. op. cit.*, 2 e ss..