Asia Pacific Journal of Innovation and Entrepreneurship

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The analytical framework for assessing competition structure of IP market

Tao Dong
Beijing International Studies University, Beijing, China

Received 1 August 2024
Revised 28 October 2024
27 December 2024
2 March 2025
Accepted 10 March 2025

Abstract

Purpose – Competition structure of intellectual property (IP) market reflects the overall effect of IP system impact on the relevant market, i.e. the status whether the incentive structure of IP system functions well. Assessing competition structure in IP market is to find out what's wrong with the system and react appropriately within the legal framework of competition law. The purpose of this paper is trying to set up an analytical framework for assessing competition Structure of IP market.

Design/methodology/approach – This study is divided on a two-step theoretical construction. The first step is to set up a basic framework to assess the competition structure of IP market. And in the later future, the author will set up hierarchical indicia to evaluate the competition status of IP market in current China. This paper is the result of the first phrasal study.

Findings – The major finding is the theoretic framework to assess the competition structure of IP market, which includes: the basic condition and institutional infrastructure, the basic structure of IP market, the competitive process, the overall appraisal of competition performance, the criteria to determine whether a conduct is anticompetitive and the interaction among different factors.

Originality/value – Distinct from existing studies, this paper uses structure-conduct-performance paradigm as analytical tool to set up a theoretic framework to assess the competition structure of IP market.

Keywords IP, IP market, Competition, Competition structure, Theoretic framework to assess

Paper type Research paper

1. Introduction

Intellectual Property Rights (IPRs) are legal power to help innovator to appropriate the results of investment in innovative activities. Intellectual property (IP) market is a marketplace where IPRs themselves, such as patented technology, trademark license and copyrighted work, or the downstream products IP rights involved, were transacted. Fierce competition in free-market economies will force enterprises seek advantage over other rivals through innovation.

But why many firms from developed countries or regions, like the USA or Europe Union (EU), will invest huge financial capital in innovative activities and compete in IP market, and many others, especially from some developing countries, choose rent-seeking activities, such as bribery? Why innovation benefits just a limited sub-sector of the industry and the

Asia Pacific Journal of Innovation and Entrepreneurship
Vol. 19 No. 4, 2025
pp. 329-351
Emerald Publishing Limited
e-ISSN: 2398-7812
p-ISSN: 2071-1395
DOI 10.1108/APJIE-08-2024-0165

economy, leaving other producers to fend with obsolete techniques and products (Baumol, 2002). One major reasons underlying lies in the competition structure of IP market.

"Innovation has come to be regarded largely as purposeful activity, subject to guidance in pace and direction" (Kamien and Schwartz, 1982). IP system constructs the incentive structure for continuous innovation, that is, the rightholder will be forced to invest more in innovation due to the pressure of competition by substitution (Drexl, 2008). Essentially, this kind of competitive mechanism constitutes the engine of what Baumol (2002) called free-market innovation machine.

"It is the goal of competition law to protect the competitive mechanism of the IP system against distortions"(Drexl, 2008). These distortions usually come mainly from two sources: First, the rightholders misuse the legal power of IPRs, erect the barriers to entry, impair the fair competition; second, the IP system cannot reward the innovation enough, the capital siphoned out into other more profitable activities, which causes insufficient competition in IP market.

Competition structure of IP market reflects the overall effect of IP system impact on the relevant market, i.e. the status whether the incentive structure of IP system functions well. Assessing competition structure in IP market is to what's wrong with the system and react appropriately within the legal framework of competition law (Drexl, 2008). The competition structure in IP market has salient differences compared to general commodity market in that the basic structures in terms of leadership, forms of competition, relative size of firm and production facilities, and many others. All these call a particular analytical framework for the assessment.

In contrast to conventional antitrust papers of IPRs, which deal mainly with the former problem, namely, to find out how to regulate the misuse of legal power of IPRs by the rightholders, this paper pays much more attention to the latter problem, and tries to observe the functioning of competitive mechanism of IP system from a macro-dynamic angle instead of a micro-one. Because the author, as a policy-researcher from China, believe the latter, if not more severe, is as important as the former in most developing countries, especially, in China or PRC.

This research uses structure-conduct-performance (SCP) paradigm as a major analytical tool to establish a theoretic framework to analyze the overall status of the competition structure of IP market [1]. Section 2 describes the infrastructure of IP market, includes basic condition and institutional infrastructure. Section 3 examines the basic structure of IP market. Section 4 sorts out the competitive behaviors in IP market used by rivals. Section 5 deals with how to evaluate the performance of competition in IP market. Section 6 tackles with the criteria to determine whether a conduct is anti-competitive. Section 7 explores the feedback effect among the infrastructure, basic structure, competitive behaviors and performance in IP market. Section 8 concludes.

2. The infrastructure of IP market

This includes basic conditions and the institutional infrastructure of laws and regulations.

2.1 Basic conditions

The IP market is affected by a variety of basic conditions, such as macroeconomic trend, knowledge base, supply of technical capabilities, size of market, financial facilities and so on.

2.1.1 Macroeconomic trend. 2.1.1.1 The business cycle. Most IPRs, such as patented invention, well-known trademark, copyrighted software, are capital-intensive goods and react to the investment fluctuations by the long-term growth of the world economy. In fact,

the flow of patented inventions in many industries appears to parallel closely to the volume of sales of a product both over the business cycle and in terms of longer-run trends (Baumol, 2002).

2.1.1.2 The changes of cost of innovative activities. Acquiring and defending formal IPRs cost huge investment and managerial time. The radical changes in relative prices, such as the price of labor, or the price of machines, or the prices of inputs and outputs of raw materials, will surely be influential factors to the IPR activities.

2.1.1.3 The expected profit in different industries. Firms can be expected to direct their efforts to where the money is [2]. With IPRs are increasingly developed or adopted in the form of new types of capital goods, if the profitability of IP activities cannot as high as other sectors many firms will be tempted to allocate their resources to other activities that promise to be lucrative, such as rent-seeking or destructive entrepreneurial activities (Baumol, 2002). The IP market will shrink gradually.

2.1.2 The techno-economic paradigm. The innovative activity involves the use of information drawn from previous experience and formal knowledge (Dosi, 1988), thus the firm-based capabilities to reap the technological opportunities in a great degree constrained by the exogenous scientific inputs. The supply of technical capability from exogenous domain (techno-economic paradigm), the diffusion pattern of a new techno-economic paradigm spread from the initial industries to a much wider range of industries, are different from sectors to sectors, or countries to countries, and can be treated parametrically.

2.1.3 The size of market. The rate and propensity to innovate, in a great degree, are determined by the market size and market growth. Schmookler (1966) offered extensive evidence indicating that the amount of innovation is affected by the size of the market for related final products. It follows that growing population and expanding gross domestic product (GDP) can both speed up the pace of innovation.

2.1.4 Financial facilities to the innovative firms. The firms' innovative activities, no matter the investment in R&D, or gain control over the main channel of distribution and develop a reputation or identity through an advertising campaign, are constrained by the capability to access to capital.

2.2 The institutional infrastructure

The construction of markets requires the simultaneous construction of institutional systems capable of sustaining it. Vibrant market is dependent on, and even constituted by, sensible regulations. The institutional infrastructure is the network of norms, laws, regulations, supervisory entities and the whole structure responsible for social governance sustaining IP market.

2.2.1 The array of possible policy instruments. The competition in IP market is routinely influenced by the following policy instruments:

- Defining the standards for granting IPRs and determining the resources that allocate to the rights-grant authorities to review applications for patents or other IPRs.
- Creating sector-specific IP regimes, such as the regulation that governs the entry of generic drugs in competition with branded pharmaceuticals.
- The substantial sums on direct subsidies to R&D, as Pigouvian subsidies, to change the private parties' incentives to innovate, and the standards for defining the ownership of IPRs created through the expenditure of public funds.
- Court's damage awards that might attract more and more firms to register patent, or create hold-up problem, such as patent thicket and flooding.

2.2.2 The distortion of incentive to innovation. In those transitional country undergoing market reform without corresponding political reform, the political system is likely to be what Shelifer and Vishney (1998) said "grabbing hand," to hobble or prey on the nascent markets (Weingast, 2007). To guarantee the maximum socially useful innovation, or an ideal allocation of resources, a thriving market economy simply requires the absence of predation of any kind. The following index can be indicators of these predation and distortion.

2.2.2.1 Index of economic freedom. The economic freedom reflects the degree of absence of predation in a society and provides a framework for the operation of IP market. Heritage Foundation's index of economic freedom can be used to measure the freedom of economy in a specific country (Heritage Foundation, 2025) [3].

2.2.2.2 Index of transparency. Corruption erodes economic freedom by introducing insecurity and uncertainty into economic relationships. Greater freedom from corruption is associated with greater transparency and predictability in the institutional context, which is important for investment in IP industries. The Transparency International's Corruption Perceptions Index will be used to measure the status of different countries (Transparency International's Corruption Perceptions Index, 2025) [4].

3. The basic structure of IP market

The basic structure of IP market is characterized by the number, size and leadership of IP holders, the supply and demand of IPRs, the entry and exit barriers, geographical market and so on.

3.1 Definition of IP market

3.1.1 Goods markets and IP markets. The distinction between the goods (products) market which is protected by IP and the market of IPRs itself recurs in a range of competition law contexts. In 1962, Arrow recognized that IPRs form a separate market from the assets that embody them (Arrow, 1962). In his paper, IPRs do not simply reside in marketable products, they are the subject of markets in their own. There is a clear distinction in EU competition law between the market of goods protected by an IP right and market of IP right itself [5]. This distinction allows IP right to define the goods market and lead to distinction of downstream goods market and upstream licensing market.

IP-related goods market is the marketplace where the firms use goods compete with other rivalries. In the early theory, the transactional role of IRPs is generally seen as barriers to entry of goods markets. IPRs make the final or intermediate goods value-added, expand the firm's market share in an existing market and gain in form of monopoly profits.

The ubiquity of technology and branding means that few goods markets will not be affected by IP rights. In principle, defining downstream goods markets where IPRs are involved is no different from defining goods markets generally (Anderman and Kallaugher, 2006). The key to define IP-related goods markets is to tackle with the competitive relationship among goods incorporating different IPRs.

IPRs are not only restraint of competition or barrier to enter goods market, but also a kind of private right for certain types of information, which can be evaluated and transacted on the markets. IPRs market is where no identifiable end goods but the IP right itself and its close substitutes are licensed or assigned separately from the goods for which they protect.

3.1.2 Main and derivative markets. The scope of IP right covers not only the market for where the right has been primarily conferred, but also secondary market, i.e. the derivative market. For example, the coverage of a patent on a certain chemical substance will not be confined to a certain application only, but gives absolute protection to all possible kinds of use. A copyright on a book does not only protect against copying the book without

permission of author, but also against renting, translating, broadcasting and turning the book into a movie (Heinemann, 2008).

These derivative markets include the vertically related markets and other product markets as well. The Microsoft case is a good illustration. There is different market for the PC operating systems and the application software, such as internet browsers, media players or file management, which are compatible products that serving different functions. From the perspective of demand substitutability, these application software do not belong to the same market of operating systems since they serve different needs. But the application software need interoperability with the operating system to work. The Windows operating system could be looked as the main IP-based market, the application software should be looked as adjacent markets for the primary market of the operating system (Anderman and Kallaugher, 2006). All these can be called derivative market of IPRs.

3.1.3 Distinguishing among markets of different types of IPRs. There is a distinction among markets of different types of IPR. As for the market of patents, since the logic of patent law is technology-oriented, the better way to define the market of patent is on a functional basis of "technology" from the perspective of potential licensees. For some licensees, a product may require different "technology" (Anderman and Kallaugher, 2006). The full bundle of technology required to produce a product might constitute the "technology." When acting alone, the patent holders looked like individual monopolists of complementary technology or information inputs (Shapiro, 2000).

Trademarks and copyrights pursue different goals and can be seen as slightly different legal mechanisms. Trademark law is intended to increase market transparency by enabling consumers to distinguish products and services according to their sources. Copyright is hoped to enhance creativity, and not innovation. The authors of copyrighted works are often driven by noneconomic incentives (Drexl, 2008).

A registered trademark creates a monopoly in the use of a specific mark for a given product. The monopolistic nature of a given trademark is closely linked to the economics of product differentiation and monopolistic competition. The proprietor of a trademark shall have the power to impede the effective competition over a considerable part of relevant market.

The detailed preferences of consumers could lead to atomistic layout of copyright markets, for instance, for a certain novel, or at least for a certain author who for his readers is not interchangeable (Heinemann, 2008). Plus, to some copyrighted works, such as software, a separate "application" would usually constitute a market on this basis. These will cause the defined market too narrow. To avoid atomistic layout exaggerated, the preferences of aggregate group instead of single consumers, should be taken into account (Heinemann, 2008).

3.2 Major players in IP market

Almost anyone with the appropriate resources capable of innovating can be players in the IP market. Firms, various universities, university professors' consulting projects and scientific think-tanks, could function in this market where they compete with each for customers to fund R&D in their field of specialty (Horener, 1995). But the following should be paid special attentions.

3.2.1 The division of innovative labor. The increasing complexity of technologies and research activities at the beginning of last century militates in favor of formal organizations (in-house R&D) as opposed to individual innovators (Dosi, 1988). Later, to optimize plants to reduce manufacturing cost, and improve product quality, there appeared a division of

innovative labor between producers and engineering firms specializing (SEFs) (Arora *et al.*, 2001).

The transition from in-house R&D to SEFs give evidence to the division of innovative labor between those who invent and those who manufacture most efficiently, which can speed up the rate of innovation and result in broader, faster distribution of new products to consumers. As major suppliers of patented technologies and know-how to new entrants, SEFs helped create a market for IP rights, making process patents into a "commodity" that could be bought and sold (Arora *et al.*, 2001).

3.2.2 The manufacturer and nonmanufacturer innovators. In traditional or "closed" model of innovation, a firm's R&D activities led to internally developed products that the company sold. This was the predominant model of innovation for many companies in the past, especially those having large research arms, like AT&T's Bell Labs (Chesbrough *et al.*, 2006). The firms with build manufacturing facilities and established distributional channels were the primary players in the IP market.

Nowadays, the model of "open innovation" allows the acquiring firm to leverage external sources of knowledge to support its own innovation (Chesbrough *et al.*, 2006). Under this model of innovation, more and more nonmanufacturer innovators, such as small companies and start-ups, begin to play larger and larger role in the IP market.

3.2.3 IP intermediaries and non-practicing entities. In recent years, IP market has experienced significant changes. More and more new players, such as IP broker, patent pool facilitator and IP investment banks have entered in the IP market, and new types of IP transactions and new ways of developing and sourcing are emerging (Yanagisawa and Guellec, 2009). These IP intermediaries are both a natural outcome of the growth of markets for IP and a critical factor in expanding them. The presence of the new players and business model suggests that all the relevant features of a full-fledged market for IPRs are gradually developing.

There also appears a new entity termed "non-practicing entity (NPE)" whose activities are primarily to develop and transfer technology but not produce product or practice the technology themselves. The NPE can improve the liquidity of IP market a lot. But one kind of NPEs termed "patent assertion entity" has raised heated debate whether it will lead to encourage innovation or a severe problem of hold up of innovation without making a technological contribution (U.S. FTC, 2011).

3.3 Degree of competition, firm size and market concentration

3.3.1 The degree of current competition. Usually, the "intensity of rivalry," together with profits and costs, determine the speed of development of an innovation. Because there are often a variety of routes to a same target, thus the innovator may take possible existence of unidentified rivals into account in deciding how rapidly to develop his innovation (Kamien and Schwartz, 1982).

To determine the intensity of rivalry is to determine the intensity of independent R&D efforts are closely substitute, that should take all these factors into consideration: the nature, scope and magnitude of their R&D efforts; their access to financial support; their access to IP, skilled personnel, or other specialized assets; their timing; and their ability, either acting alone or through others, to successfully commercialize innovation (DeSanti and Cohen, 2001).

The "intensity of rivalry" is not only related to the number of rivals but also can be showed by how many similar brands competing against and cannibalizing each other in a submarket? How many patent rights the rivals in stock, the size of rival's patent portfolio and the relationship with these patents: blocking, complementary of substitutable and so on.

3.3.2 Firm size and innovative activities. According to Schumpeter's hypothesis, larger firms are more innovative than smaller ones. The measure of firm size includes total assets, employment and sales. R&D activity can be measured either by variables of input intensity or variables of output intensity. The former includes the ratio of S&T personnel to all employees or fraction of annual budget devoted, the latter includes measures based on patents or innovations (Kamien and Schwartz, 1982).

Larger companies have noteworthy advantages in supporting R&D. But the bulk of the empirical findings indicates that except in the chemical industry, the inventive activity does not increase faster than that of firm size. R&D activity, measured by either input or output intensity, shows a trend to increase with firm size up to a point and then level off or decline (Kamien and Schwartz, 1982). "Technological progress thrives best in an environment that nurtures a diversity of sizes" (Scherer and Ross, 1990).

3.3.3 The role of market concentration. Evidence suggests that rivalry in R&D may be affected by the industry concentration ratio. Many studies for the leading nations reveal "a positive correlation between concentration and industry R&D/sales ratios, or cruder proxies for that ratio"(Scherer and Ross, 1990). But "a new hypothesis has emerged that a market structure intermediate between monopoly and perfect competition would promote the highest rate of inventive activity" (Kamien and Schwartz, 1982).

Inter-industrial differences in the richness of technological opportunities might affect concentration–R&D relationships in another way. Inability to appropriate a sufficient share of innovation's rents because of excessive rivalry is more likely when the relevant science base is advancing slowly and predictably than it moves forward rapidly and discontinuously, that is, in breakthroughs. There appears to be a rough tendency for concentration to be more conducive to technological vigor in relatively slow-moving fields (Scherer and Ross, 1990).

3.4 Cost structure, supply and demand curve of IP market

Compared to traditional goods market, the cost, supply and demand curve of IP market are quite different. Because lack of relevant information in the determination of necessary equilibrium point, it is hard to use traditional methods to analyze.

3.4.1 The cost structure of IP market. 3.4.1.1 Sunk cost and marginal costs. The acquirement of IPRs needs sink outlays repeatedly into R&D activities, advertising and long-term commitments to high quality services. The costs of individual industrial R&D projects vary widely. It involves great uncertainties about cost, the time will be consumed, and nothing useful at all will emerge. Usually, the upfront sunk costs for creation of IPRs are quite high, but the marginal costs for delivery are relatively low or negligible.

3.4.1.2 Mental labor and technological equipment. R&D may be thought of using two types of input, the mental labor, that is, human resources, and technological equipment, such as computers. The human resources is a crucial input for the research process, but the productivity of mental labor cannot be more proficient since the Industrial Revolution took off. This means that the opportunity cost of an hour devoted to the technologically process of thinking has risen significantly. Such a rise in its relative price must have induced some substitution away from this input and toward other inputs whose real cost was reduced by technical change, and cause the characteristics of asymptotic stagnancy, although one with some intertemporal variation in input proportions (Baumol, 2002).

3.4.1.3 The cost to acquire and enforce IPRs. It will cost both managerial time and fees when acquiring and defending formal IPRs, and these costs should be weighted against the benefits. The main costs include two parts: those for acquiring the IPRs and those for defending them in law if infringed. Usually the acquisition cost of IPR is a fixed amount of

fees, the cost of litigation is subject to uncertainty, because it will involve a probability of incurring large compensation.

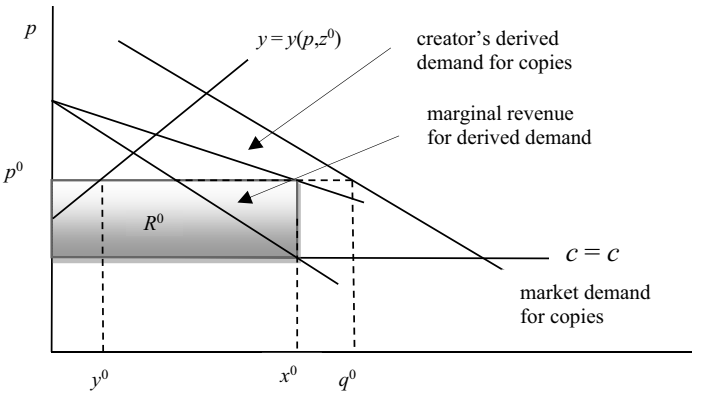
3.4.2 The supply and demand curve of IP market. 3.4.2.1 Copyright works. According to Landes and Posner (2003), the creators and copiers produce quality-adjusted copies that can substitute with each other in the copyright market. The cost of expression is the only fixed cost of an expressive work, and that the marginal costs of creators, are negligible and constant. Figure 1 illustrates the market for copies.

According to Landes and Posner (2003), by subtracting the copiers' supply curve ($y = y(p,z^0)$) from the market demand for copies can get the demand curve for copies produced by the creator of the expressive work. Usually, the creator of the expressive work shall set marginal cost equal to the marginal revenue. This yields a price of p^0, quantities of copies produced by the creator and copiers of x^0 and y^0, respectively, and total number of copies of $q^0(=x^0+y^0)$. The level of copyright protection will have a decisive effect on the copiers' supply curve. An increase of level of copyright protection (z) will affect output, prices and the gross profits earned by the copyright holder.

3.4.2.2 Trademarks. In a competitive market, each firm takes price as given. The stronger the firm's trademark, the higher the price, since it includes the price of a good to the buyer plus the search costs to find out the quality of the good. The producer's profit function of a trademarked good is the price of the firm charges minus the cost of producing and the cost of the firm's producing a unit of trademark.

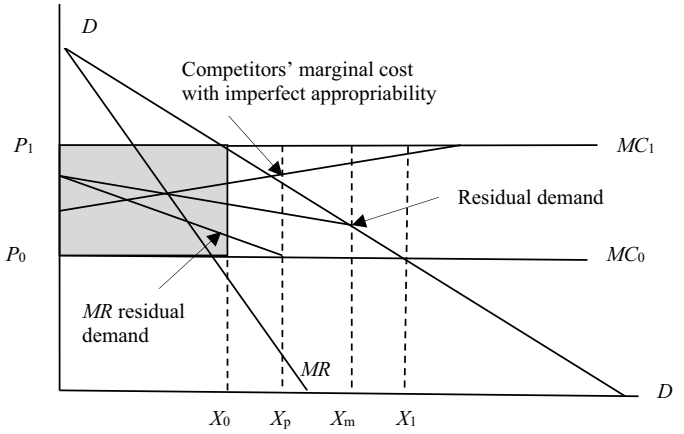
Assume in a competitive industry (i.e. the price of a unit is independent of the quantity), there will be a positive and decreasing marginal product for a trademark in lowering search costs and an increasing marginal cost for producing a good, the firm's supply curve will be the point where the price equates to the marginal return and the marginal cost from a one-unit increase in trademark, which will maximize its profits (Landes and Posner, 2003).

3.4.2.3 Patent. The essential effect of patent of process is to reduce the cost of manufacturing an existing product (X). In Figure 2, the margin between two marginal cost curves MC_0 MC_1 is the cost which is saved by the process patent. The supply curve of patent holder will be either by producing the entire industry output X_0 by licensing the patent to



Source(s): Figure courtesy of Landes and Posner (2003)

Figure 1. The market for copies



Source(s): Figure courtesy of Landes and Posner (2003)

Figure 2. Effect of process patent

existing firms at a royalty rate just below $P_1 - P_0$ or at a price slightly below P_1 (Landes and Posner, 2003).

The successful development of a product patent will result in a different configuration of changes in costs and rewards. The process innovation is one that shifts the pertinent cost curves downward, while a product innovation is one that shifts the demand curve to the right. By introducing a new product the firm aims to achieve an outward shift and steeper slope to the demand for its product (Greenhalgh and Rogers, 2010).

3.5 Geographical market

3.5.1 The territorial limit of IP right. IPR are granted under the national law. Usually the IP markets are geographically limited to the national territory where a specific IP right is valid as a relevant geographic market. But the factors that limit geographic markets for physical products or services do not limit IP licensing, and transport costs are irrelevant to sale of rights in intangible property. The geographic markets for IP rights will seldom be limited to national territories and usually be global in scope (Anderman and Kallaugher, 2006).

Especially, it is the case when there are more and more works being made available digitally and circulate in the internet. Plus, the regulatory barriers of IP are overcome by the worldwide coverage of PCT of WIPO and TRIPS of WTO. There is also a system to streamline simultaneous applications to many countries about trademark referred to as the Madrid Protocol. The spread of copyright is worldwide in geographical terms because most countries are signatories to the Berne Convention.

IP rights may affect geographic markets in one special circumstance, that is, the firms located in different territories have conflicting rights:

> This occurs most often where firms have conflicting trademarks. Patents or similar rights can, however, also lead to separate geographic markets where they allow the incumbent in one territory to block entry by a firm active in selling the same products in a different territory (Anderman and Kallaugher, 2006).

3.5.2 Parallel imports. The power to block parallel imports enables manufacturers and distributors to erect "vertical restrains" in the market, through which the IP owners can partition geographical market more freely as will. The different attitudes to the exhaustion of right adopted in different countries will give the IP owners different degree of power to regulate the price charged for the articles embodying IP right, limit how many embodiments are available in the market, increase competition and lower prices and alter the division of geographical market of IP protected goods greatly (Greenhalgh and Rogers, 2010).

3.6 Ease of entry

There are mainly three kinds of barrier to impede the entry of IP market, namely, the traditional barriers of cost, the strategic use of IP by rivals and the legal standard for subject matter and infringement.

3.6.1 The competencies and costs to acquire IPRs. The entry of IP market not only needs huge cost in innovation, advertising, long-term commitments to high quality services, but also special innovative and managerial talents. These factors constitute the typical form of barrier to exit and entry, and it is a little like the traditional ones of sunk cost and economy of scale.

3.6.2 The strategic use of IPRs. The strategic use of IPRs by the rightholders, such as amassing a large portfolio of IPRs for defensive purpose, joint R&D venture, exploitation of patent standard setting, patent pool, territorial restrictions, captive use restrictions, horizontal and vertical collusions, will raise rivals' costs and constitute new kind of barrier to entry.

3.6.3 The legal standard for subject matter and infringement. Creating a new expressive work typically involves borrowing or building on materials from a prior work, as well as adding original expression to it. Patentable subject matter must meet the basic requirement of non-obviousness. Adjusting the legal standard for subject matter and infringement can be used to avoid being invented around and deter rivals from entering of IP market easily.

4. The competitive process in IP market

The competition forms and behaviors in IP market are different from traditional market.

4.1 Competition forms of IP market

4.1.1 The cycle of "creative destruction". The major form of competition in IP market is in a style of leader and follower termed by Schumpeter as "creative destruction." A firm pursues leadership by innovation and maintains an oligopolistic market position through IPRs. The supercompetitive profit attracts followers come in, imitate, invent around or innovate superior product and displace the first dominant firms. The new dominant firm then has its chance to acquire the dominant position. However, it also will be pushed aside by another new entrant, and this cycle continues (McNutt, 2005).

"This type of competition occurs over time, as new firms and products enter and old firms, and products exit, hence it is often called dynamic competition" (Greenhalgh and Rogers, 2010). Once the firms engage in this dynamic competition, there is a ratchet mechanism force firms to run as fast as they can in R&D race just to keep up with others. This kind of race also exists in the advertising outlays. A superior image is attained, prices can be held above costs, and more intensive advertising is encouraged.

4.1.2 Inter- and intra-brand competition. Another form of competition in IP market is in a style of inter- and intra-brand competition. The rivalry among competing producers is the inter-brand competition, and the rivalry among different licensees of a brand is the intra-brand competition. Their interplay tends to keep prices relatively close to costs, provides

choices for consumers and allocates resources to their best use in view of consumer demand [6].

Inter-brand competitions will often partition the market and have important influence to the firms' formulation of marketing strategies. There is a tension between intra- and inter-brand competition. Most producers tend to limit the intra-brand competition, which will cause reduction of consumer's benefits. But if the inter-brand competition is healthy, concerns about the effects on consumers of reduced intra-brand competition can generally be dismissed (Ridyard, 2002).

4.2 Competitive behaviors in IP market

4.2.1 Maximize profit from IPRs. Under the competition pressures, every firm tries to maximize the return from their investment in R&D activities.

4.2.1.1 Internal: routinizing the innovation spending. The R&D involves great uncertainties about cost. To survive in the market competition, firms are forced to incorporate the management of R&D spending as an important part of their routine operations. This may not remove the uncertainty from any one of the innovation-development projects; it just increases the likelihood that some successful innovations will emerge at reasonably regular intervals (Baumol, 2002).

4.2.1.2 External: pricing of IP products and licensing for profit. When IP rightholders produce the commodity items themselves, they must charge a higher price above marginal cost, otherwise they cannot recoup their fixed or sunk costs. To maximize profit, the IP rightholders will also use discriminatory price. Without such deviations from behavior in the perfectly competitive model, innovation outlays and other unavoidable and repeated sunk outlays cannot be recouped (Baumol, 2002).

Traditional explanations for licensing view "firms as zealous guardians of the proprietary innovations in their possession, using patents or secrecy to keep their technical knowledge from others for as long as possible" (Baumol, 2002). But in practice, competition and the pursuit for profit drive firms to look for ways to gain higher revenues by marketing their IPR assets to other whose production is not in direct competition with their own (Greenhalgh and Rogers, 2010). There are extensive evidences of increasingly use of licensing in technology-based industries. "Licensing is a business in itself" (Arora *et al.*, 2001).

4.2.2 Strategic use of IP for competitive advantage. 4.2.2.1 Patent as fence. Firms stack patents as much as others' as a strategy of defense because any one who falls behind will "be denied to the potential purchasers whose special needs they may meet satisfactorily" (Baumol, 2002). Firms accumulate patent as "fence" strategy will create a phenomenon of patent thicket, a dense web of overlapping IPRs that a firm is more difficult to invent around and must hack its way through to actually commercialize new technology (Shapiro, 2000). "A proliferation of IPRs may raise concerns of 'tragedy of anticommon' and to stifle follow-on innovation" (U.S. FTC, 2003).

4.2.2.2 Leveraging to influence related market. IPRs have effects on other product markets too. Many times, IP owners will leverage onto vertically related markets, such as up- and downstream markets, or neighboring product markets, such as complementary or simply "conglomerate" relationship. The Microsoft case is a typical case to illustrate this connection (Heinemann, 2008). In essence, the leveraging is the unilateral conduct of monopolies that extends market power to adjacent market to the detriment of consumers.

4.2.2.3 Coordination in R&D, standard-setting and patent pool. This feature of uncertainty makes innovation as a distributed phenomenon, even from the single firm's viewpoint (Gaffard and Quere, 2007). As a consequence, it requires some coordination mechanisms among firms to share the financial risk, realize economies of scale and scope.

Thus, more and more firms agree to jointly carry out R&D activities. Such arrangement gives firm a competitive advantage over those nonparticipants. Membership in such arrangement will provide an added incentive to invest in innovative activity (Baumol, 2002).

Firms collaborate to establish standards by working through standards setting organizations. The collaboratively standard-setting process will reduce the substitution, even eliminate the substitutes. Anointing an IP right as the standard improves the bargaining position of the owner of the IP right in licensing negotiations and put other rivals into a place of competitive disadvantage (U.S. DOJ&FTC, 2007).

To reduce transaction costs and overcome excessive fragmentation of market, IPR holders establish some kinds of mechanism, like patent pools or IPR-based collective rights organizations, to license each other and to third parties collectively. This collective mechanism is a tactical exercise serving strategic interests in the markets. It may strengthen the members' competitive advantage and affect nature of the competitive relations between members and non-members in the possibly downstream markets (Ulrich, 2008).

4.2.2.4 Merger and acquisition of IPRs. Merger or acquisition of IP rights may enable the merging parties to exercise a greater degree of market power:

> Incentives to innovate might be harmed and reduced by a merger due to the unifying of two or more originally self-standing research departments under a single management. It might lead to a reduction in the number of research trajectories and to the lowering of spillovers to other firms (Bejcek, 2008).

> The situation may be exacerbated when the merging entities possess important intellectual property rights and when the smaller competitors are not able to produce compatible or supplementary products to those produced by the merging entities (Bejcek, 2008).

4.2.2.5 IP litigation strategies. Remedies for IP infringement are crucial to IP owners' ability to reap benefits from their investment in R&D. But the increasing number and inflated damages of IP litigation will have a perverse effect of retarding innovation and a "ripple effect" on the far larger number of cases in which royalties are negotiated to avert or settle litigation. In recent years, more and more firms use the threat of imposing highly awarded damage of IP litigation as leverage to acquire competitive strength and to erect entry barrier.

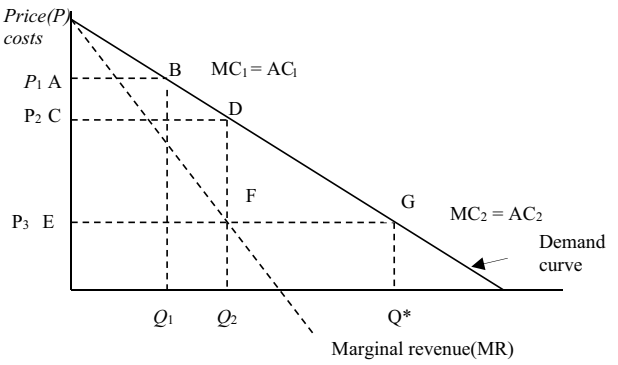
5. The overall appraisal of competition performance in IP market

The overall performance of competition in IP market shall be used to address the question whether the competition in IP market is health.

5.1 Is the competition in IP market workable?

5.1.1 Reward for innovation: the payoff structure of IP market. In Clark's (1940) workable competition, rewards for innovation have been used to show the absence of competition (McNutt, 2005). The only motive to innovate lies in the pursuit of profit. In real life, many innovative efforts fail to result in a commercially successful product, even in firms that are well-known as successful innovators. There are three kinds of profits firms can acquire from market competition, Ricardian (scarcity) rents, Schumpeterian (entrepreneurial) rents and Monopoly (Porterian) rents (David Teece, 2000).

The successful products require higher returns (Schumpeterian and Ricardian rents) to "pay back" the cost of those failed R&D efforts. The area of CDFE in Figure 3 can be seen as Schumpeterian & Ricardian rents. They are powerful and continuing force enticing entrepreneurs into productive rather than rent-seeking activities, and determined by following factors:



Source(s): Figure courtesy of Baumol (2002)

Figure 3. The benefit losses of innovation

- First, the strength of IP protection system. "Market can fully reward the innovator only where there is no infringement to dilute the reward" (U.S. FTC, 2011). "Weaker IP protection will undercompensate the innovators and reduce incentives to innovate below levels intended by the IP system" (U.S. FTC, 2011).
- Second, the economic value of the innovation to the society. It is hard to predict the profit of innovator from single or specific innovative activity. But from a view of whole industry, the whole and general profit level of innovative activities in IP market can be measured and quantified (Baumol, 2002).

5.1.2 The competitive pressure to innovation: the efficient entry. Another characteristic of workable competition is reasonable opportunity for entry. The allure of gaining supra-competitive profits in a market forces competitors to enter the market by innovation. Nonetheless, an incumbent firm has only low incentive to innovate when the barriers to entry make establishment of new innovations difficult (Mackenrodt, 2008). It should be considered from the following when assessing the entry conditions under workable competition.

5.1.2.1 Whether there are barriers to entry?

- Measure the rate of return. Industries with above-average accounting rates of return were presumed to have above-average economic rates of return and this indicated the presence of entry barriers. Although the use of accounting rates of return as a substitute for the economic rate of return is criticized by many researchers, many argued that the accounting rate of return will be imperfect measure of the economic rate of return, but others hold that the measurement error is just correlated with variables (McAuliffe, 1987).
- Measure the sufficiency of entry. The entering innovator's effort would be "sufficient" might depend on whether the entry is likely and timely. Factors such as:

  Whether the potential entry would involve the same or a different research track; whether the potential entry would involve resource commitments sufficient to make the innovation effort likely to succeed should be taken into account (DeSanti and Cohen, 2001).

5.1.2.2 Who raises the barriers to entry? The sources of barriers to entry should be distinguished:

- The nature of innovative activities. R&D and advertising activities require a substantial cost and skilled talents. The cost, talents and specialized assets all constitute a form of barrier to exit and entry.
- Legal act. IP law, industrial policy, government regulations, state aid and important tariff can all erect the barriers to entry.
- The rivals' behaviors. Unilateral or bilateral restriction, brand loyalty of consumers created by strong advertising, patent pool and standard-setting can all be used to foreclose competitors.

5.1.2.3 Whether the barriers to entry legitimate and reasonable? It should distinguish the legitimate and reasonable barriers to entry from those are not. The essence of IPRs is to exclude entry by simple imitation but encourages entry by substitution (Drexl, 2012), which can be seen as the steps of human technical progress. Any proper exercise of IPRs should be seen as legitimate and reasonable.

5.2 Welfare benefits and losses

5.2.1 The welfare losses. 5.2.1.1 Deadweight loss of consumer benefits. The total social welfare gain from the innovation in the long run is given by the area of ABGE in Figure 3, all of which accrues to consumers by increasing their consumer surplus (Greenhalgh and Rogers, 2010). With IP protection, innovator produces less than Q^* and receives profits of CDFE. Consumers lose because a monopolist restricts output to raise prices: that is, the triangle DGF, they lose out because not enough of the innovative good is being sold (Greenhalgh and Rogers, 2010).

5.2.1.2 Holdup effect on follow-on innovation. Innovation is often an ongoing, cumulative process, with each generation of innovations building on what came before. To obtain competitive advantage, firms not only race to top by R&D activities themselves, but also through various IP strategies to hold up follow-on innovation activities. These strategic behaviors, exacerbated by the undeterred NPEs, will raise rival's cost and cause holdup injury on follow-on innovation (U.S. FTC, 2003).

5.2.1.3 Resources waste. Competitive pressures force firms to engage in R&D and advertising race to keep up with others. Although increased R&D expenditure will bring public benefits of diversity of research path, but overheated R&D investment and rivalrous inflation of advertising, together with patent arm race, will cause a lot of unnecessary resource waste.

5.2.2 The welfare benefits. 5.2.2.1 Benefits to consumers. When competitors race in product patent, that will produce new and improved products generate consumer surplus by enlarging choice, and in process patent, output can be expected to expand, and price reduced. The race in advertising will supply information about a variety of product characteristics such as quality, price and distribution outlet to consumers and make them aware of substitute products (McAuliffe, 1987). All these will bring the benefits of products differentiation to the consumers.

5.2.2.2 The incessant innovation spurred by competition. Competition can stimulate innovation and transform the technological improvements into rapid economic growth. The state of competition among the firms and the different degree of appropriability may be the key determinants of pace and direction for innovation (Scherer and Ross, 1990):

> Under the powerful mechanism of competition, from a once-and-for-all increase in the level of expenditure on R&D, it can be expected a permanent increase in the rate of innovation and growth (Baumol, 2002).

5.2.2.3 The spillovers of social returns. The pursuit of profits drives many firms to disseminate their technologies voluntarily. The spillover of innovation can increase the whole economic welfare of the society. These spillovers, will raises the general living standards, are the innovation's primary social benefits. The share of benefits of innovation that goes to persons other than the investors is called "spillover ratio." Using the "spillover ratio" index can measure the degree the society reward innovator under current appropriability regime and the range of possible Pareto optima (Baumol, 2002).

5.3 The size and depth of IP market

The size and depth of IP market represent the number and willingness of entrepreneurs' to use IP system as a main weapon to acquire competitive advantages in the marketplace. That means in what degree the firms would like to ensure the full deployment and the widest spread of technological innovation. In Baumol's words, "does the economy engage in too much or too little creative destruction?"(Baumol, 2002)

There is no systematic assessment of the scope and depth of IP market, WIPO, USPTO and EU attempted to do some research on the measurement of IP-intensive industries. Although these methods raise heated debates about their accuracy, it does provide a way to measure the size of IP market.

5.3.1 Copyright industry. Since 2002, the WIPO supports research on assessing copyright industries (CRI). The methodology divides four groups of copyright industries, core, interdependent, partial and non-dedicated support industries and establishes a set of major indicators. There are three indicators: the percentage of the size of copyright-based industries in GDP; foreign trade (share of imports and exports); and employment. These indicators are mutually complementary and provide a comprehensive horizontal picture of the copyright-based industries in a given country (WIPO, 2025).

5.3.2 Patent industry. Siwek (2005) used industry-specific data to calculate the ratio of IP industry to the national GDP. In this report, the author put forward the concept of "patent industry." The "total" US IP industries are analyzed in three separate industry groups: the digital "convergence industries"; the "other patent industries"; an allocated fraction of US "non-dedicated support industries."

2012, USA Patent and Trademark Office (USPTO) issued a report, which calculated a measure of industry patent "intensity," defined as the ratio of total patents over the five years in a North American Industry Classification System (NAICS) category to the average payroll employment by industry, normalizes patenting activity with respect to industry size. They defined the patent-intensive industries as ones with above-average patent intensity (patent/job) when comparing all industries (USPTO, 2016).

5.3.3 Trademark-intensive industry. USPTO report also put forward a concept of trademark-intensive industry. Unlike patent-intensive industries, the report relied on three related but distinct approaches, using different samples of companies that have registered USPTO trademark.

6. The criteria to determine whether a conduct is anti-competitive

It is difficult to identify anti-competitive practices in IP market. To identify whether a particular conduct contributes to an anticompetitive result, it must satisfy several criteria as follows:

6.1 There are observed results of departures from competition

6.1.1 The benchmark to understand departures from competition. The departures from competition mean the market failure caused by market's imperfection. To define departures from competition, the benchmark is still being perfect competition (Ledyard, 1989). The departures from competition, namely, the inefficient allocation of resources with markets, can occur if there are too few markets, noncompetitive behavior or non-existence problems (Ledyard, 1989). "Pareto-ranking efficiency is seldom achieved, the more utilitarian standard of efficiency adopted is 'Kaldor-Hicks efficiency'" (Anderman and Kallaugher, 2006).

6.1.2 The distinguish between existence and exercise of IPRs. The existence of IPR implies that the conduct inherent in the IPR might exclude others, restrict competition in a static sense and cause market imperfection, but it should not in itself be seemed as anticompetitive [7]. The granting of IPR confers its owner a kind of market power does not by itself distort or harm competition (U.S. DOJ&FTC, 1995). Only those improper exercise behavior or behaviors induced structural change that could reduce efficiency in connection with such property should be condemned as anticompetitive.

6.2 The conduct must be socially inefficient

To identify whether a conduct restricting competition inefficient is to assess whether the economic harms exceed the benefits. In the context of dynamic competition, impair the incentive to innovation should be taken into consideration primarily.

6.2.1 Innovation as a primary parameter. Innovation can promote both competition and economic welfare. Innovation is a powerful force animating competition. "Drastic and rapid innovations may often disrupt the market (creating new winner-take-all races) and sometimes act as substitute for antitrust regulation (overturning the dominant firms as a self-corrective force)" (Bejcek, 2008). Competition policy is "increasingly likely to look first at whether corporate behavior aids or impedes innovation" (Gilbert and Tom, 2001). The conduct affects the nature and rate of innovation negatively should be deemed as socially inefficient.

6.2.2 The conduct should be assessed on an economic approach. To assess whether there is potential loss of innovation should pay attention to the unusual disjuncture between the timing of anticompetitive effect and anti-competitive conduct. In traditional antitrust analysis, the anticompetitive conduct and anticompetitive effects occur at essentially the same time and inherent in effectively the same conduct: anticompetitive price increases. But the anticompetitive conduct of slowing (or ending) an innovation effort would only manifest its anti-competitive effects in the future, and then only as "non-events," that is, a product would not appear as soon as it otherwise would (or would not appear at all). These "non-events" do constitute consumer harm, but it is quite difficult to assess their competitive significance (DeSanti and Cohen, 2001).

And the exercise of IPRs raises the debate about the relationship between the short-term restriction of market and the long-term viability of industry as well as growth-enhancing effect over time (Gaffard and Quere, 2007). It needs a more open approach with sufficient flexibility for hosting different economic insights on the linkage between concrete business strategies and their impact on R&D efforts as a parameter of competition (Drexl, 2012).

Given the competitive environment changed by technical developments constantly and drastically, the EU had adopted a new paradigm, move away from a more rigid legalistic and form-based approach to a more flexible effect-based approach to the regulation of anticompetitive behaviors. The new approach takes a greater account the economic analysis of possible costs and benefits, or "efficiencies" of certain restrictive practices (Anderman and Kallaugher, 2006).

6.2.3 The safe harbor and hardcore exception. The EU also revised the block exemption regulation [8]. in a modernized setting. The new Technology Transfer Block Exemption Regulation creates a safe harbor by subjects to market share thresholds by defining a class of agreements "which can be assumed with sufficient certainty to satisfy the conditions of Article 81(3)." Where licensing occurs between firms that were not previously competitors, substantial competitive harm is highly unlikely if the market share in the affected markets does not exceed 30% (Commission guidelines, 2004).

It also contains a list of hardcore restrictions of competition. Any agreement that contains such hardcore restriction as a whole falls outside the scope of the block exemption. The hardcore restrictions based on the nature of the restriction and experience show that such restrictions are almost always anticompetitive (Commission guidelines, 2004). The safe harbor and hardcore-list provide firms some basic certainty through "a form of 'sailing instructions'" (Anderman and Kallaugher, 2006).

6.3 "Market power" as major analytical tool

6.3.1 Market power and market dominance. Market power has been the central concept of competition. Modern economic theory could allow firms obtain a degree of market power and holds that conducts will harm competition if there were abuse of market power. In the past years, there is a well-known presumption that products covered by IP rights are presumed to have market power or a dominant position. The identification of market power is the key to assess whether there is anticompetitive behavior.

6.3.2 Evaluating market power of IPRs. There is a long tradition to presume the IPRs with market power [9]. This doctrine has been criticized heavily because the mere existence of IPRs does not create demand for the product (U.S. DOJ&FTC, 1995). More and more believe that if there are adequate substitutes, dominant position for IPRs are impossible to sustain. When evaluating the market power of IPRs, it should consider from following perspectives:

6.3.2.1 Structural indicators still can be used. The long tradition of inferring the extent of market power from such as market share or profitability cannot reflect market position in IP market accurately, but it can provide a basic degree of certainty. Market structure will still be used as indictors in the EU IP guideline, such as size, cost and concentration, especially in the merger control case.

6.3.2.2 Demand side. It should consider from the purchasing power of buyers and the demand substitutability of IPRs. Both can be a significant constraint on the market power of IPRs. The essence of demand substitutability is an assessment of customer needs. There are two different ways of viewing substitution in the IP circumstances.

One is "top-down" approach, namely, the particular characteristics required for the end product that influence the choice of input IP right that is incorporated. Another is "bottom-up" approach, namely, the makers of end products choose input IP rights based on the functionality tradeoffs they present, and the manufacturer's views of the value of these tradeoffs (Pleatsikas and Teece, 2001).

6.3.2.3 Supply side. Supply side includes two factors: the power of competitors and the supply substitutability. IP rights exclude competitors from imitating the products covered by the IP rights; the supply elasticity is always lower than those that are not. But the effective substitutes available are still possible, for example, a survey shows the licensor faced no alternative supplier in 27% cases. There are two to five alternatives existing in 34% cases, and 10 or more substitutes in 29% cases (OECD, 1989).

The capacity of existing competitors to provide the substitute products to serve the previous customers of the IPRs owner is constraint by the cost, talent and the validity and

scope of protection provided by IP law. The circumstances of substitution is not possible can be seen as dominant position.

6.3.2.4 The technology-economic paradigm. The different paradigms of technology will have different impact on the market power of IPRs too. In the preparadigmatic phase, there are too many alternative paths of R&D to choose, it is hard for IPRs to acquire dominant position (Teece, 1986). However, as the leading design or designs begin to be revealed, the demand is relatively stable or declining, and easier to acquire dominant position through the market power of IPRs.

6.3.2.5 Different IPRs should be assessed. Different IPRs should be treated differently in the analysis of market power because the legal principle and logic of patent law is more or less different from copyright law and trademark law. Patent can cover all possible application of a function. Copyrighted work is sold in monopolistic competition with works of the same or similar genre (Netanel, 2005). Trademark can increase their market power by reducing firm's elasticity of demand, increasing market share through advertising (McAuliffe, 1987).

6.3.2.6 The factors augmenting the market power of IPRs. A few factors could be used to augment the market power of IPRs and should be taken into consideration when assessing. Standard setting has the potential to create market power because a technology that has been named as standard will separate it from formerly equivalent substitutes. IPR in a network standard usually excludes the near rival and more likely awards a monopoly position. The patent pools or IPR-based collective rights organization may affect the nature of the competitive relations between members and nonmembers, since it will broaden the members' market power and strengthen their competitive advantage.

6.4 It is better to focus on market process

There is no optimal market structure to stimulate innovation and can be *a priori* identified. The large firms have noteworthy advantages in supporting R&D and innovation, but an incumbent has only limited incentive to innovate as long as he can reap supra-competitive profits due to his dominant market position is unchallenged (Mackenrodt, 2008). If the firms conceive competitive pressure from others, then they have to invest to innovate with their monopoly profits at their disposal (Drexl, 2008).

Thus, the evaluation should pay more attention to the market competition process. On one hand, to keep the market open enough, that they facilitate and create incentives to challenge established positions and that they eliminate activities which are no longer viable in the prevailing environment; on the other hand, to keep rivalry among firms does not result in excessive turbulence that hampers the viability of the process of change. This requires appropriate (i.e. temporary and changing) market imperfections that prevent excessive and cumulative disequilibria and hence sustain the growth process (Gaffard and Quere, 2007).

7. Feedback loops: innovation, competition and market structure

There are loop hoop effects among structure, conduct and performance. Firms can endogenously choose their conduct and respond to structural change, and in return affect the market structure.

7.1 Effects of innovation on market structure

Market structure influences the rate and direction of innovation, and innovation is necessarily a source of increasing uncertainty to influence the existing market structure. Each great surge of technological innovation represents structural changes in production, distribution, communication and consumption as well as to profound and qualitative changes in society (Perez, 2002).

Innovation affects market structure in two ways. First, influencing the optimal scale of production in an industry. Second, erecting of entry barriers. In general, the market structure

is shaped by the technological leaders (the most efficient producers) in their favor, and also improves aggregate industrial performance, by eliminating the laggard producers (Dosi, 1988). In this way, innovation plays a critical role in determining the entry rates and eventual number of firms in the market.

7.2 Form of competition on competitive structure

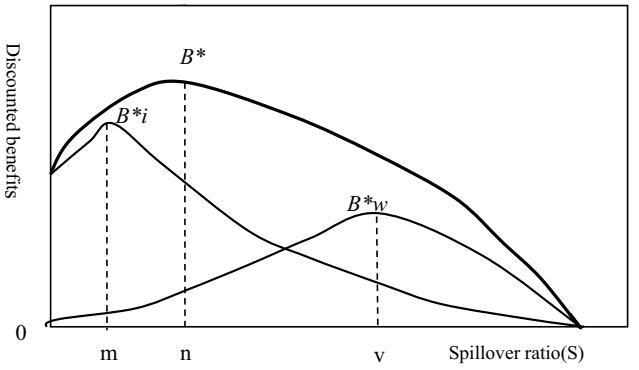
There is growing recognition in the world that inter- and intra-brand competition are the essence of competition. Under this form of competition, firms can consider development of a new brand for a submarket to gain additional sales or profit if they can identify a submarket where the firm does not already have a brand (Kalwani *et al.*, 2025). The market is structured into multiple partitions; firms desire to have a brand in each of the major partitions of a market and to avoid unnecessary duplication of brands.

This form of competition caused a fundamental structural change of modern competitive markets. In fact, the oligopolistic competition is permitted in both intrabrand and interbrand. The primary purpose of competition policy is to protect interbrand competition and the absence of any predatory pricing to ensure that the level of consumer prices does not undermine such competition (McNutt, 2005). In a degree, the interbrand competition could be looked as a style of contest competition, and the intrabrand competition, the scramble competition.

7.3 Competitive performance on incentive structure of innovation

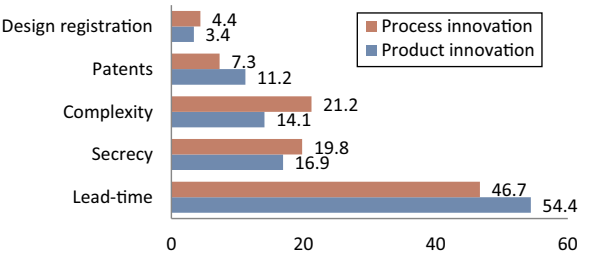
The profitability performance in IP market depends on the technological and marketing capacity of firms and will put forward demand to the institutional infrastructure of IP laws and regulations in turn.

According to Baumol (2002), since 1870, the USA's GDP has increased almost ninefold, nearly 90% was contributed by the innovation, only 20% of the benefits have gone to the persons who made direct contribution to innovation. That is the point *m* in Figure 4. The distance between point *m* and *n* means the beneficial innovations will be lost due to the appropriability problems. To solve this problem put a new demand for the perfection of the most important regime for appropriating the returns of investment in R&D, that is, IP system.



Source(s): Figure courtesy of Baumol (2002)

Figure 4. Benefits as a function of the spillover ratio



Source(s): Figure courtesy of Arundel (2001)

Figure 5. The appropriability of different mechanism

In recent years, many scholars criticize that stronger IP system implies a lower social welfare even if it implies higher profits for the firms (EU Commission on Intellectual Property Rights, 2002). These opinions take place without reference to the losses caused by the imperfections inside the internal structure of IP regime. The bars in Figure 5 show that in all IPRs, the rates of patent and design registration are about 15% (Arundel, 2001). Considering the total returns to innovation calculated by Baumol, the innovators only appropriate 20% × 15% = 3% benefits from innovation through patent system.

The rates of secrecy and complexity are around 30%–40%. Compared to patent system, secrecy would entail several welfare losses to society because the innovators will reluctant to disclose their knowledge to a more efficient producer. In fact, the patent system and secrecy are antithetical with each other. The preliminary purpose of patent system is to in place of the secrecy as possible as it can (Landes and Posner, 2003). So, if innovators find IP system not as effective and expedient as secrecy, they will not quit it and the welfare losses will keep on. Thus, to maximize the profitability performance of firms in IP market also put forward a requirement to adjust the internal structure IP system.

8. Concluding remarks

This article uses SCP paradigm as a major tool, attempts to set up a theoretic framework of the competition structure in IP market in the first phase, then in the later phase, to set up hierarchical indicia to evaluate the competition status of IP market in current China. In many transitional countries, how to make the IP market more attractive to the firms, that is, to earn more money through competition in IP market, is the most urgent problem to solve. This is what the paper different from conventional antitrust ones of IPRs, namely, pays as much attention to find out the cause of malfunction of competitive mechanism of IP system through observing the competition structure of IP market as to find out how to regulate the misuse of legal power conferred by IPRs. Anyway, if an animal is without teeth, why bother to worry it will bite.

Notes

1. The SCP paradigm has to be subjected to a number of serious critiques. But this paper concentrates on macro instead of micro one, the apparent simplicity of SCP model, can provide a good theoretic framework to organize relevant theories and facts for decision-making based on data that are usually easily obtained.

2. In long-run competitive equilibrium, the returns earned by marginal investments should be equal across industries after adjusting for risk. If investors are able to earn higher returns in some industries, then capital will leave industries with lower marginal returns and move into industries with higher marginal returns.
3. The indices measure the economic freedom from ten categories, i.e. economic openness, competitiveness and the rule of law, such as business freedom, trade freedom, fiscal freedom and property rights. Countries that score well demonstrate a commitment to individual empowerment, non-discrimination and the promotion of competition.
4. The index is based on a 10-point scale in which a score of 10 indicates very little corruption and a score of 0 indicates a very corrupt government.
5. The ECJ established this point in the 1968 *Serena case*. Case 40/70 Serena v. Eda[1970] ECR 69 at 83.
6. Bus. Elecs. Corp. v. Sharp Elecs. Corp., 485 U.S. 717(1988).
7. The distinction between existence and exercise of IPRs drawn by the Court of Justice introduced in 1966 in *Consten and Grundig* and maintained in its later case law.
8. The Unified Technology Transfer Block Exemption Regulation of EU (240/96).
9. In the case of Loew's, the definition of market power was not based on market conditions but on the existence of copyright protection. See United States v. Loew's, 371 US 38(1960).

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Corresponding author
Tao Dong can be contacted at: dongtao5@263.net