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Intellectual property as a key to internationalisation

Plenary session

The impact of STPs and AOIs

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Intellectual property as a key to internationalisation

Executive Summary

Intellectual property rights are important intangible assets for any enterprise. Numerous studies have shown that patent applications increase the valuation of companies. A recent study further demonstrates that granted patents are especially important for early stage technology-oriented start-ups. Start-ups can employ efficient and cost-effective strategies for obtaining granted patents across multiple jurisdictions. By doing so, their valuation can increase quickly. When possible, management of science parks and areas of innovation should consider establishing IP Centres, or increasing the available services of existing IP Centres, to assist their member companies with intellectual property-related activities.

Introduction: The impact of innovation on economic growth

In today's knowledge-based economy, innovation is recognized as a key driver of economic growth. To be successfully managed, however, innovation requires the active contribution of a wide range of actors including the state, patent offices, innovative companies, public and private investors and of course science parks and areas of innovation.

First, the state itself should not confine its role to the financial support of innovation. As the economist Mariana Mazzucato recently pointed out, criticizing the conventional negative assessment of the role of the state in this field:

> In countries that owe their growth to innovation, the state has historically served not as a meddler in the private sector but as a key partner of it - and often a more daring one, willing to take the risks that businesses won't. Across the entire innovation chain, from basic research to commercialization, governments have stepped up with needed investment that the private sector has been too scared to provide. This spending has proved transformative, creating entirely new markets and sectors, including the Internet, nanotechnology, biotechnology, and clean energy[1].

In particular, Mazzucato highlights the benefit of "*empowering governments to envision a direction for technological change and to invest in that direction*"[2]. Thus, governments can assume a critical role in formulating policies to encourage technological development in particular areas for the benefit of innovation in general and for society as a whole.

Along with the state, regions and cities that develop appropriate policies also are important drivers of local innovation and economic growth.

Second, national and international patent offices should continue to proceed in the direction of global harmonization of intellectual property laws and policies, in order to accelerate the granting of high quality intellectual property rights across multiple jurisdictions.

Third, it is important to recognize that today's start-ups manage increasingly sophisticated business models in which intangible assets are becoming much more important. Such assets can represent a large percentage of the overall value of a company.

Finally, science parks and areas of innovation are perfectly situated to link the relevant actors (state, authorities, investors, universities, start-ups, etc.) and to provide them with access to educational, legal, consulting and networking resources.

In this paper, the authors will discuss the role of intellectual property as a key to internationalization. While the focus of the paper will be directed primarily on technology-oriented start-ups located in science parks, most of the points discussed herein are broadly applicable to any company actively engaged in innovation.

I. Correlation between intellectual property assets and the market value of a start-up

Various types of intellectual property can be important assets, even if intangible, for any organization[3].

[1] M. Mazzucato, "The Innovative State: Governments should make markets, not just fix them", *Foreign Affairs*, vol. 94, No. 1, 2014, 61.

[2] Ibid., 62.

[3] For example, a recent report shows that UK investment in intangible assets protected by intellectual property rights has risen from £23.8 billion in 1990 to £63.5 billion in 2011; a 167% increase (UK Intellectual Property Office, *Fast Facts 2015*, https://www.gov.uk/government/statistics/intellectual-property-fast-facts-2015, last accessed on April 21, 2016).

A 2015 report by the Office of Economic Cooperation and Development (OECD) on "Intellectual Property as an Economic Asset" noted that:

> An increasing share of the market value of firms appears to derive from their intellectual assets and financial analysts and investors increasingly recognise IP as a key element in the value of a firm and as an indicator of its technological capabilities[4].

Among intangibles, patents and know-how can be particularly important assets for technology-oriented start-up companies. Numerous studies show positive correlations between patent filings and the actual or perceived value of a company, especially at an early stage.

Indeed, the OECD report highlights that:

> For small and medium-size enterprises (SMEs) that lack internal sources of financing and track records of success needed to attract external financers, patents are increasingly seen as a tool to attract and secure financing. Ownership of a strong IP portfolio can signal to investors that a firm has a technological advantage over its competitors – one that it can protect via patent law. Furthermore, some banks are beginning to accept patents as collateral for bank loans and to develop IP-backed securities that patent holders can use to access financing[5].

In today's knowledge-based economy, the value of non-tangible assets can represent up to 80% of the business value of a company. With respect to newer start-ups, the number is often higher[6].

A recent study conducted on the financing and patenting activities of over 300 venture capital-backed Israeli technological start-ups confirms the importance of patent filings and granted patents for such entities[7]. This study found that doubling the number of patent application filings resulted in an increase in valuation of the company by nearly 50%. Further, a doubling of granted patents in newer start-ups (under six years) resulted in an additional increase in valuation of 30%. All of these effects occurred prior to the company generating its own revenues[8].

Several authors have attributed this increase in valuation to the signaling effect of patents, especially in younger start-ups. More specifically, patents "*provide a mechanism by which the quality of a startup's innovative capabilities can be identified and sorted*"[9].

In addition, there is:

> new evidence that patenting can positively affect investors' perception of start-up quality across multiple stages of the entrepreneurial life cycle, as measured by the likelihood of receiving initial backing from a prominent venture capitalist, by

[4] OECD, *Intellectual Property as an Economic Asset: Key Issues in Valuation and Exploitation, Background and Issues*, Paris, 2005, https://www.oecd.org/sti/sci-tech/35043640.pdf (last accessed on April 22, 2016), 3.

[5] Ibid., 5.

[6] M. Juetten, "Pay Attention To Innovation And Intangibles -- They're More Than 80% Of Your Business' Value", *Forbes* http://www.forbes.com/sites/maryjuetten/2014/10/02/pay-attention-to-innovation-and-intangibles-more-than-80-of-your-business-value/#c6b759768128, 2014 (last accessed on April 21, 2016). The author notes that even large companies often have less than twenty percent of their value in tangible assets listed on their balance sheet.

[7] G. Greenberg, "Small Firms, Big Patents? Estimating Patent Value Using Data on Israeli Start-Up Firms' Financing Rounds", *European Management Review*, Vol. 10 (2013), 183 -196.

[8] Ibid., 184.

[9] Hsu D. H. and R.H. Ziedonis, "Patents as quality signals for entrepreneurial ventures", *Academy of Management Best Paper Proceedings*, 2006. This article reported the results of a study conducted on nearly 400 U.S. venture capital-backed semi-conductor start-ups established between 1975 and 1999.

> unexpected increases in valuation estimates across rounds of financing, and by the probability of successful exit through an initial public offering[10].

In contrast, other studies have shown that "*a lack of patents reduces a start-up's pre-money valuation by 17% to 20%*"[11].

As noted above, compared to patent application filings, granted patents provide even greater value for newer technology-oriented start-ups. The enhanced value of granted patents at an early stage is likely because "*formal IPR is more important to firms that lack other mechanisms to prevent the expropriation of their ideas, such as reputation, bargaining power, or network effects. These mechanisms become more available to firms as they mature and establish proven track records*"[12].

As a result, it is important that technology-oriented start-ups understand and take advantage of various mechanisms to accelerate the process of obtaining granted patents in the relevant markets for their technology. One such mechanism is the use of patent prosecution highway (PPH) agreements in order to (1) shorten the process for obtaining a granted patent, and (2) reduce the costs associated with patent protection across multiple jurisdictions. PPH strategies are discussed in more detail in Section V. below.

II. Intellectual property as a strategic asset for internationalization

In addition to increasing the valuation of a start-up company, robust patent portfolios also may be used for other business objectives.

An empirical study by Sichelman and Graham[13] found that start-ups primarily file patents:

- to prevent competitors from copying
- to promote financing and to improve the company image
- for defensive reasons, including enhancement of bargaining power

It must be remembered, however, that intellectual property rights of all types, including patents, are jurisdictional. Thus, a patent filed and granted in one country, only provides protection in that country. Thus, a company interested in markets beyond its own "home" country should consider patent protection in all of the relevant markets for the technology.

Decisions about what innovation should be protected, and where, should be based on an evaluation of several factors including *inter alia*:

- the target or potential market for the innovation
- expenses in obtaining patent protection in the relevant market
- the ability to enforce patents in those markets

It is especially important for newer technology-oriented start-ups to align their intellectual property strategy with their overall business strategy on an international scale. Intellectual property strategies can be developed through a patent landscape analysis (PLA) in order to acquire an overview of pre-existing patenting activities in a particular country or region or even on a global level. A PLA can provide valuable information about the likelihood of obtaining IP rights and the overall market conditions, including the identity and strategies of competitors and/or potential business partners.

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[10] Ibid.

[11] G. Greenberg, *cit.*, 185, citing Hsu, D. H., "What do entrepreneurs pay for venture capital affiliation?", *Journal of Finance*, Vol. LIX, no. 4, 1805-1844 (2004).

[12] G. Greenberg, *cit.*, 193.

[13] Ted Sichelman & Stuart J. Graham, "Patenting by Entrepreneurs: An Empirical Study", *17 Mich. Telecomm. & Tech. L. Rev.* 111 (2010).

III. Recent trends in international patent application filings

A review of recent statistics on patent filings around the world provides an understanding of (1) where innovation originates, which is suggested by national patent application filings, and (2) where innovation is marketed, which is suggested by subsequent international filings.

Over the past 10 years patent application filing numbers have steadily increased worldwide.

The so-called IP5 countries/regions (IP5 Bloc), which include Europe, Japan, South Korea, China and the United States, accounted for nearly 92% of worldwide patent filings from 2009 to 2013[14]. Figure 1 provides a graphical representation of IP5 Bloc filing trends over the past 10 years. These filings include both domestic (national) filings and international filings originating from another country or region.

This data is consistent with substantial efforts recently made by China to increase the number of patent filings. Indeed, Figure 1 below shows that China is largely responsible for the overall increase. Compared to China, patent application filings of the other IP5 members over the past 10 years have been relatively stable.

FIGURE 1

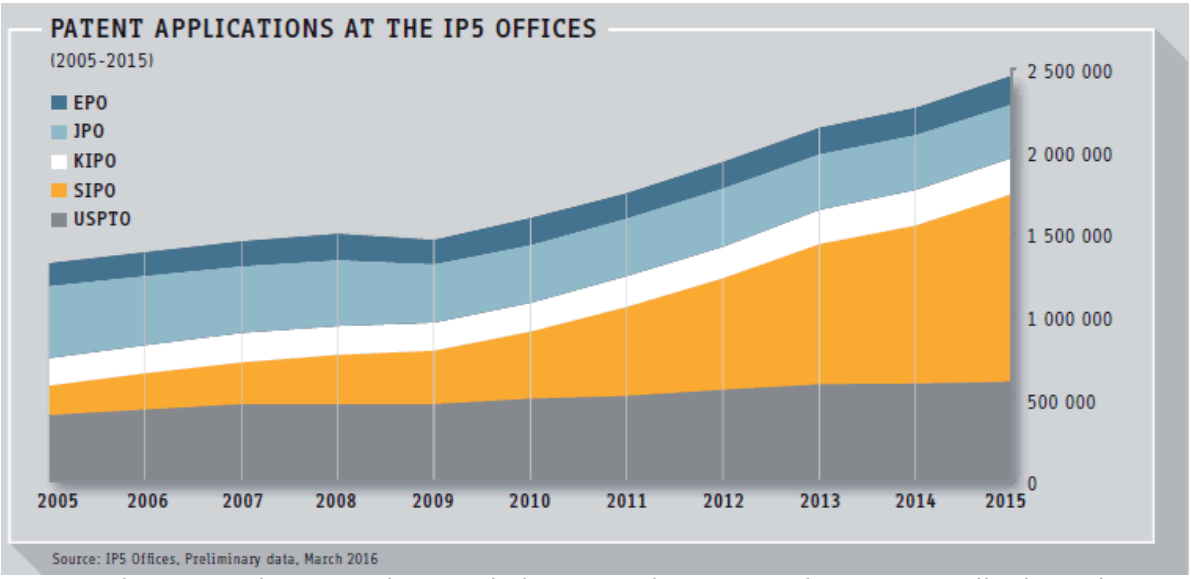


Figure 1, however, does not distinguish between domestic and internationally-derived patent filings. Figure 2 illustrates the relative proportion of domestic and international patent application filings in each of the IP5 Bloc patent offices in 2015[15]. This provides a better understanding of the level of innovation originating in each country and how appealing each country is to foreign applicants. Figure 2 reveals, for example, that the US and Europe each had a relatively high percentage of applications originating from one of the other IP5 Bloc members. This suggests that applicants located in the other IP5 members consider the US (50% foreign-derived) and Europe (52% foreign-derived) to be important markets for their technology.

FIGURE 2

[14] IP5 Offices, *IP5 Statistics Report 2014 Edition*, www.fiveipoffices.org/statistics.html (last accessed on April 26, 2016), 35.

[15] IP5 Offices, *Key IP5 statistical indicators 2015*, http://www.fiveipoffices.org/statistics.html (last accessed on April 26, 2016).

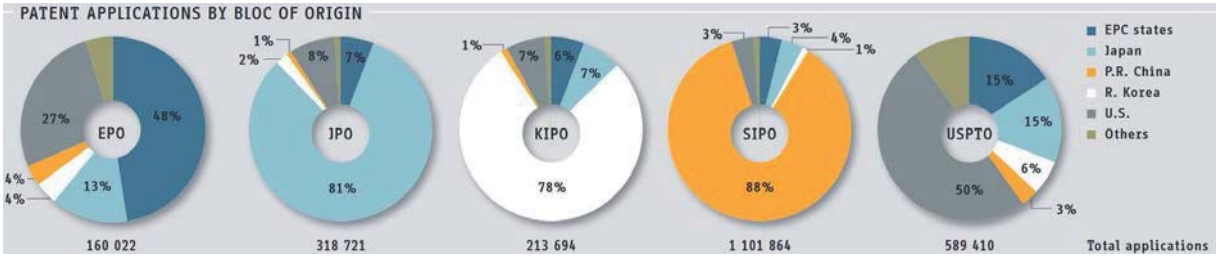
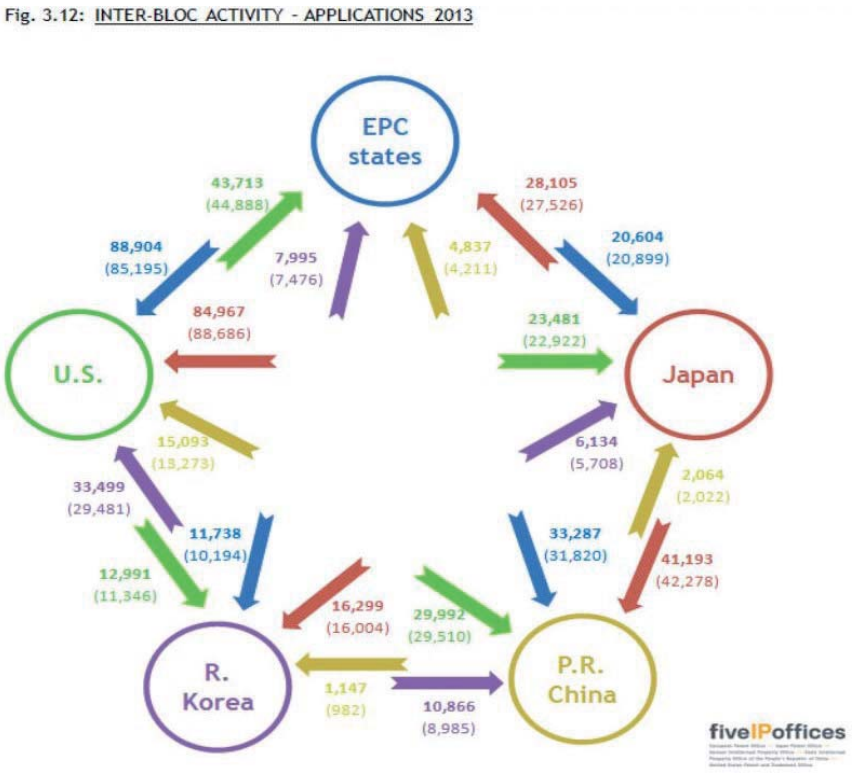


Figure 2 also shows that China "only" received about 12% of patent filings from the other IP5 Bloc members. However, because over one million patent applications were filed in China in 2015, 12% represents over 130,000 foreign-derived applications. Thus, China received more patent application filings from the other IP5 Bloc members than any other country except the United States.

Figure 3 provides another way of looking at this information. It shows the total number (rather than a percentage of the total) of patent filings received in 2013 (2012 in parentheses) by each IP5 Bloc member from each of the other members[16].

FIGURE 3



Statistics based on technological area are also useful in understanding the appeal of various markets for specific industries. Figure 4 shows the percentage of patent filings for each IP5 Bloc member based on the following subject matter: electrical engineering, instruments, chemistry, mechanical engineering and other fields[17].

FIGURE 4

[16] IP5 Office, *IP5 Statistics Report 2014 Edition*, *cit.*, 46.
[17] Ibid., 60.

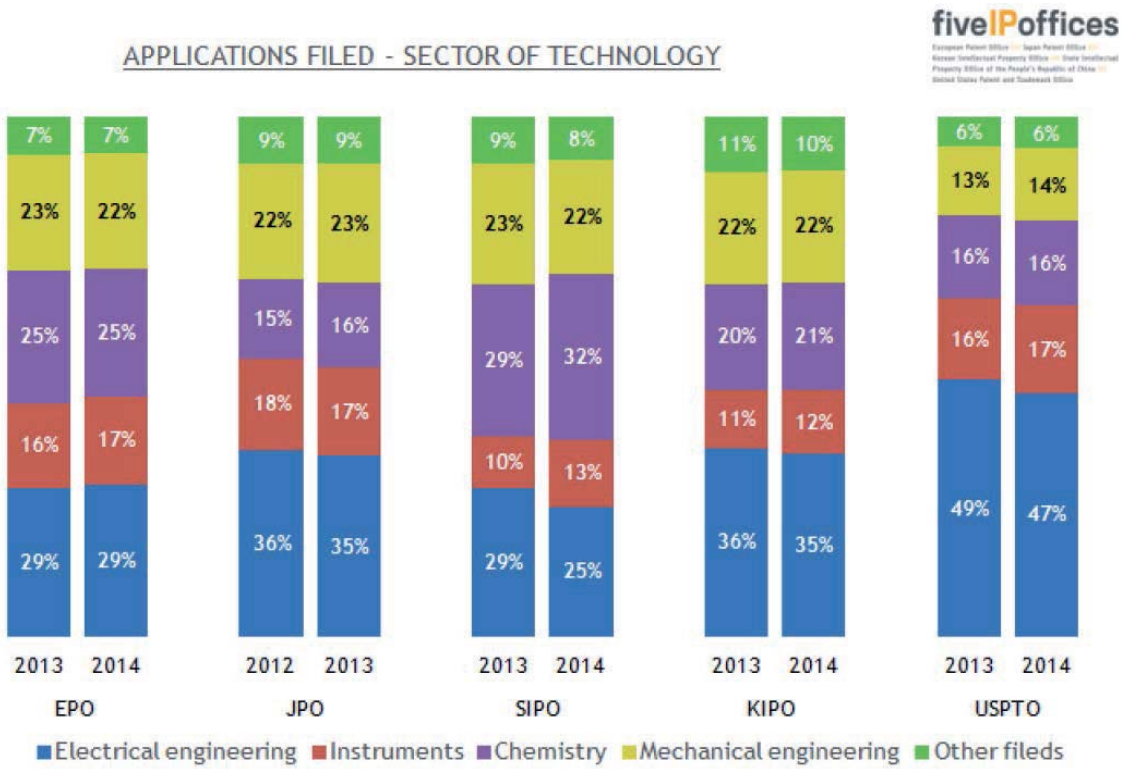


Figure 4 shows that in 2013 and 2014 (2012 and 2013 for Japan), as a percentage of total patent application filed, applications relating to electrical engineering were most prominent in the United States and least prominent in China. Applications in the chemical field were most prominent in China and least prominent in the United States and Japan. Filings relating to various types of instruments were most prominent at the EPO and in Japan and least prominent in China and South Korea. The United States had by far the lowest percentage of patent filings for mechanical engineering subject matter, while the other IP5 members are remarkably similar.

In general, Figures 1-4 indicate that the total number of patent applications worldwide is increasing, largely as a result of the increase in patent application filings in China. While each member of the IP5 files large numbers of patent applications with the patent offices of the other members, Europe, the United States, and recently China, appear to be the most interesting markets for foreign applicants. Large numbers of patent applications are filed in the fields of electrical engineering, instrumentation, chemistry and mechanical engineering at the patent office of each IP5 member, but there are some differences in the relative numbers of applications filed in each country or region for these technologies.

IV. Background and strategies for international patent application filing

As we saw in Section I., granted patents are important for increasing the valuation of newer technology-oriented start-up companies. Thus, efficient and cost-effective strategies for obtaining granted patents in the relevant markets are likewise important.

The usual procedure for developing a robust patent portfolio begins at the national level, typically where the invention was developed and where the company is located. After the initial domestic filing, there are two main options for extending patent protection internationally: the Paris Convention and the Patent Cooperation Treaty.

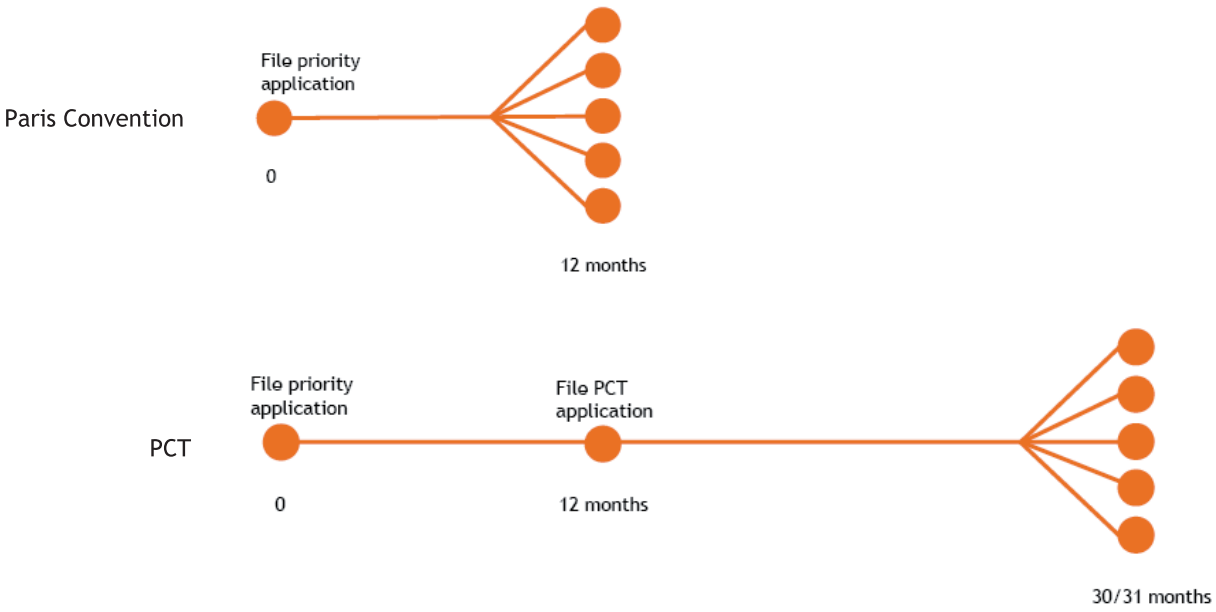
The Paris Convention, in place since 1883, now has 176 contracting member countries - virtually every country in the world. The Paris Convention provides for a so-called “convention priority right” which allows the applicant 12 months to decide on additional countries for which patent protection is desired, while still maintaining the original filing date of subsequent applications. Maintaining

the original filing date is important since any intervening publication or activity that would otherwise prevent patentability of an invention is not relevant, provided that it occurred after the date of the original filing.

The second and more flexible option for acquiring international patent protection is through the Patent Cooperation Treaty (PCT). The PCT is an international patent law treaty which was enacted in 1970. Any contracting member of the Paris Convention may become a member of the PCT. There are currently 148 PCT contracting states with Saudi Arabia and Iran being among the most recent additions.

Just as with a Paris Convention application, a PCT application must be filed within 12 months of the priority application. After the PCT filing, the applicant typically has an additional 18 or 19 months (i.e., 30 or 31 months from the date of the original filing) to decide in which countries to file. Thus, compared with the Paris Convention, the PCT process provides a beneficial delay in the need to make final decisions on countries of interest and, perhaps even more importantly, it delays the expenses associated with Paris Convention filings.

These two options - the Paris Convention and the PCT route - can be graphically illustrated as follows:



There is a clear worldwide trend toward harmonization of intellectual property law. An example of this trend is the recent America Invents Act (AIA), which finally changed the United States from a "first to invent" to a "first to file" country, joining the rest of the world.[18]

One significant advantage resulting from such harmonization is that many countries recently have agreed to share various findings of their patent offices (e.g., prior art search results and assessment of the patentability of an invention) with the patent offices of other countries in order to expedite the patent prosecution process[19]. As mentioned in Section I., such arrangements are referred to as Patent Prosecution Highway agreements or PPH agreements.

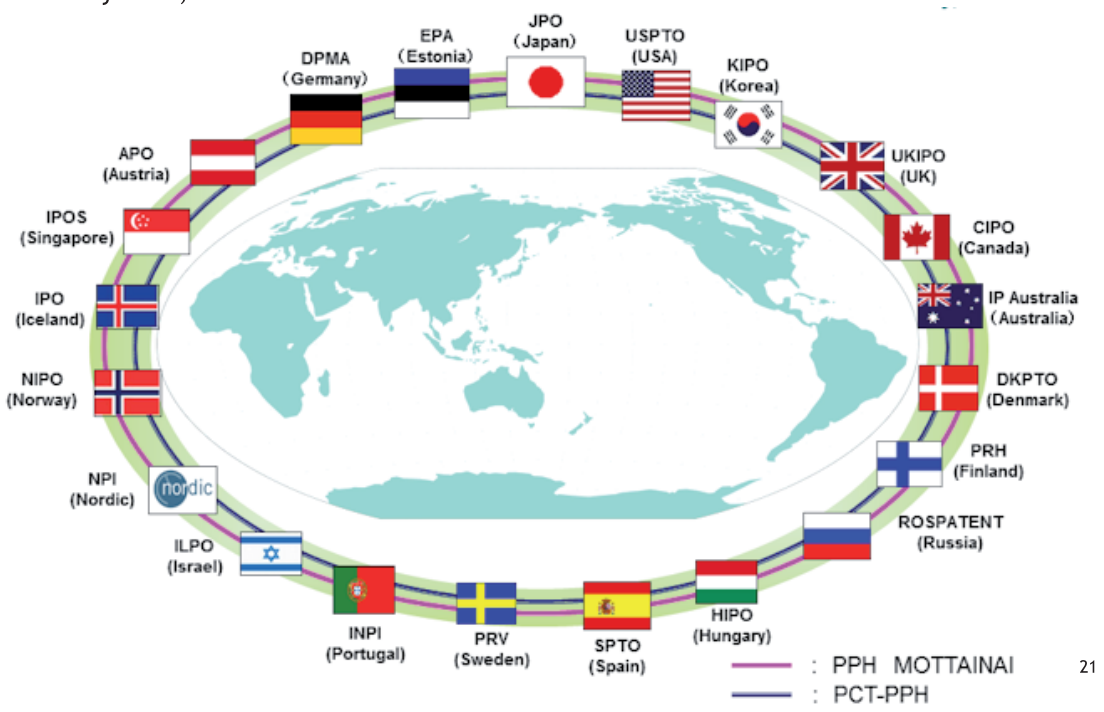
[18] "First to invent" means that an applicant who was not the "first to file" an application nevertheless may be entitled to a patent provided that the applicant is able to prove that the invention was conceived and reduced to practice before the invention date of the first filer. The AIA ended this anomaly.

[19] Patent prosecution refers to the back-and-forth process between the patent office and the applicant in which the patent office may note various reasons why the invention is not entitled to a patent and the applicant responds with amendments and/or arguments in favor of patentability. At the end of the process, if all goes well, the patent office will grant the patent.

A PPH agreement can be bilateral – that is, between two countries or regions, or multilateral among several countries or regions. Two well-known examples of multilateral PPH programs are the IP5 program (IP5 PPH) and the global PPH pilot scheme (Global PPH).

The IP5 PPH includes sharing patent office work product among the IP5 Bloc members referred to in Section III., namely: (1) the European Patent Office (EPO), (2) the Japan Patent Office (JPO), (3) the Korean Intellectual Property Office (KIPO), (4) the State Intellectual Property Office of the People's Republic of China (SIPO) and (5) the United States Patent and Trademark Office (USPTO).

As of July 2015, the Global PPH includes 21 countries as shown below[20].



Under any type of PPH program if at least one patent claim is found to be allowable by one patent office, the applicant is entitled to request fast track processing of a corresponding application in any other participating country's patent office. As a result, granted patents may be obtained across multiple jurisdictions much more quickly and at significantly reduced costs.

A particularly useful PPH program is called the PCT-Patent Prosecution Highway Pilot (PCT-PPH). Under the PCT-PPH a favourable report on patentability of the claims during the PCT phase can be used to fast track an application in many countries around the world. Thus, by the time a patent applicant is ready to file national phase applications ahead of the 30 or 31 month deadline, such filing often can be accompanied by a PCT-PPH request.

Coordination of international patent prosecution strategy is also very important. For example, arguments made in favor of patentability of an invention in one country should be consistent with arguments made in other countries. Inconsistent arguments can be used by potential infringing

[20] Global Patent Prosecution Highway (PPH) pilot, http://www.jpo.go.jp/ppph-portal/globalpph.htm (last accessed on April 26, 2016).

[21] Mottainai (もったいない) is a Japanese term meaning "a sense of regret concerning waste when the intrinsic value of an object or resource is not properly utilized". The expression "Mottainai!" can be uttered alone as an exclamation when something useful, such as food or time, is wasted, meaning roughly "Oh, what a waste!" https://en.wikipedia.org/wiki/Mottainai. The Mottainai PPH program greatly simplified the requirements of several earlier programs. It provides an efficient and cost-effective means for protecting the results of innovation across multiple jurisdictions. Thus, the fruits of innovative efforts are not wasted.

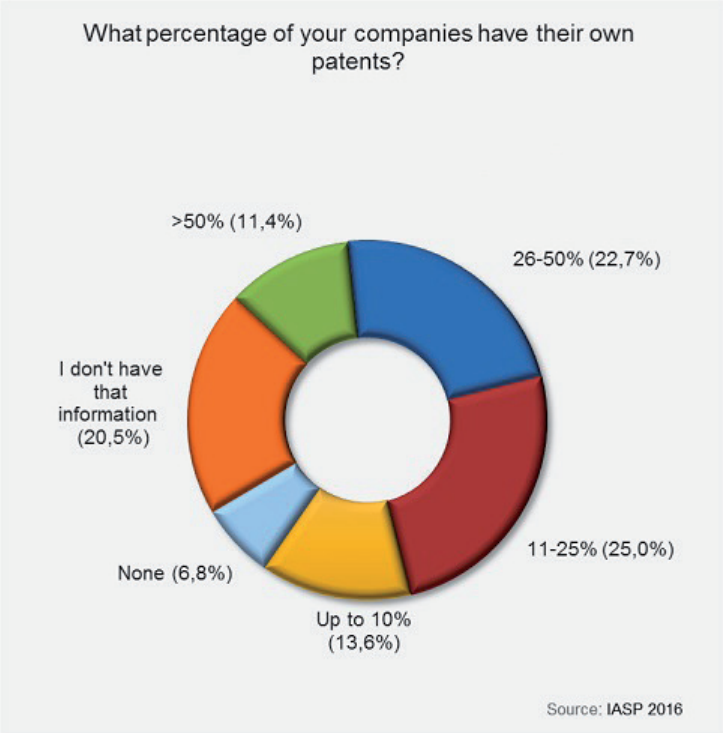
parties in various types of proceedings in order to invalidate a patent. In addition, in the United States there is a particular requirement called the "duty of candor" which requires an applicant, usually through his or her professional representative, to disclose to the USPTO any document or activity, which is material to the patentability of a patent application. Failure to satisfy this duty of candor can lead to unenforceability of a patent[22].

Thus, strategies for coordinating patent prosecution strategy should be used to ensure that once a patent is obtained, it will not be vulnerable to attack by third parties.

V. Managing Intellectual Property in Science Parks and Areas of Innovation

Aligning intellectual property strategies with a company's business plans is crucial to the international success of technology-oriented enterprises and, in particular, start-ups.

A recent IASP survey (Question of the Month: March 2016) shows that a significant number of IASP science park members are already active in patenting the results of their innovative activities.

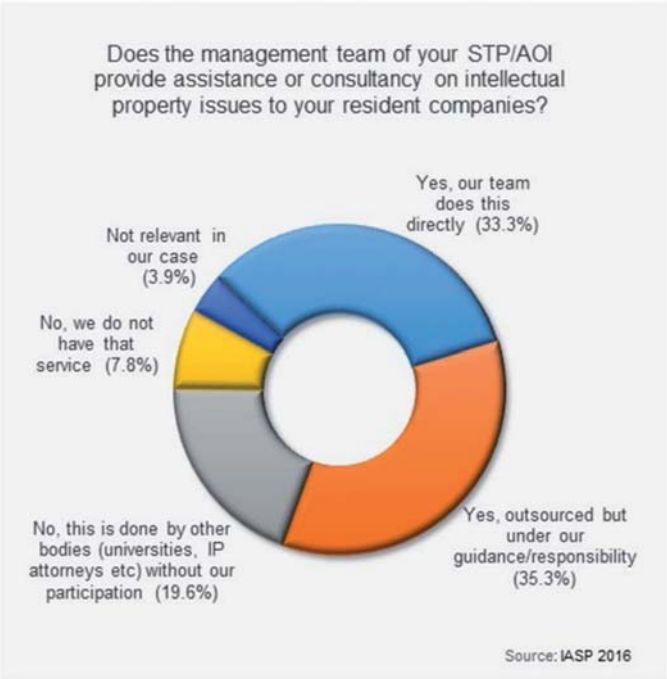


Indeed, only 6.8% of respondents indicated that their members were not engaged in patenting activities.

It is important, however, that start-ups already engaged in patenting coordinate such activities with their internationalization goals. Efficient use of cost-effective patenting strategies can be important in preserving financial resources for other purposes.

In another IASP survey (Question of the Month: April 2016), the results of which are shown below, a large percentage of respondents indicated that their science park or area of innovation either provides IP services directly or supervises the outsourcing of such services.

[22] Unenforceability of a patent means that no claim of the patent is enforceable. This result is more severe than invalidity which may apply to some, but not all, claims of a patent.



Around one-third of the respondents indicated that their science park provides IP services directly. Another 35% indicated that such activities are outsourced but remain under the guidance or responsibility of the science park management. Only about 12% of respondents indicated that they did not have the service or that it was not relevant in their particular case.

In light of the already widespread interest of science park members to invest in protecting their innovative activity, as demonstrated above, the authors recommend that management of science parks and areas of innovation consider moving toward a full-service IP Centre approach when their budgets permit. A full-service approach can provide a more efficient allocation of resources in order to align the intellectual property strategies of technology-oriented start-ups with their international business plans. Rather than requiring each start-up company to spend time and money independently developing a better understanding of intellectual property strategies, a full-service IP Centre can provide such assistance more efficiently.

The types of activities a full-service IP Centre might adopt can include:

- Developing IP policies and educational programs for science parks members in order to avoid common mistakes which can result in the loss of opportunities to protect worthy inventions
- Receiving, evaluating and reviewing invention disclosures
- Choosing the most appropriate intellectual property protection for an invention (e.g., patent, utility model, design, copyright, know-how, etc.)
- Assessing the potential commercial value of an invention and the relevant markets
- Assisting start-ups in aligning their intellectual property strategies with their international business plans
- Filing and prosecuting domestic (national) patent applications or supervising such activities which may be delegated to a local IP agent
- Overseeing international patent filings or supervising such activities which may be delegated to a local IP agent

- Organizing pitch sessions, networking events and coordinating communication with investors on the local, national and international levels

- Providing contractual protection of R&D activities and of their inventive results (including protection of confidential information through non-disclosure agreements)

Over time IP Centres can acquire specialized expertise which can be a valuable resource for all of the technology-oriented companies of the science park.

If a science park is not yet structured to establish a full-service IP Centre, it is still important for it to have an IP manager to coordinate the outsourcing of these activities.

Conclusion

Start-ups moving toward internationalization should align their intellectual property strategies with their overall business plans. Even prior to generating direct revenues a start-up can increase the value of the company by filing patent applications and obtaining granted patents. Granted patents in particular can attract venture capital and other investments and thus can increase the overall valuation of the start-up at an early stage.

Strategies for obtaining patent protection across multiple jurisdictions can include using one or more PPH agreements. Use of a PPH program often decreases the time needed for obtaining granted patents and also lowers overall costs for obtaining patent rights across multiple jurisdictions.

Science parks and areas of innovation can facilitate the internationalization efforts of all of their members by establishing a full-service IP Centre or by increasing the available services of existing IP Centres, such as those services listed above.