**Chapter 6 – Technology Protection**

**TM Activity- Protection:** Introduction, Definition, Protection processes, Case study. [TB 1: Ch. 6)

**Introduction**

Transferring technology knowledge from one organization to another (whether in the form of know-how, know-what or know-who) is well known to be problematic as far as Intellectual Property (IP) is concerned. It differs from the transfer of products and goods in various ways:

- Exchanges of knowledge cannot be reversed. Once knowledge is transferred it cannot be taken back.
- In certain cases it is difficult to verify if a specific piece of knowledge has been (ab)used. For example, it is difficult to ascertain if specific know-how on production technologies has been employed in another company’s production plants.
- It is extremely difficult to pinpoint the ownership of an idea and where it originates.
- Every country has different laws regarding knowledge protection.
- It is very difficult to assemble the necessary parts of knowledge required to develop future IP.

**Two Perspectives on Technology IP**

There are two ways of looking at technology IP which need to be considered:

- Background IP
- Future IP

**Background IP**

It is often difficult to find one’s way through the varied IP landscape and several problems may arise. In particular, to innovate in a certain field you need to ensure that existing IP is not infringed and the rights to use it are acquired.

Firms use a number of strategies to defend their IP and have for example created ‘patent thickets’ – dense portfolios of overlapping patents – which are used to prevent others using their invention.

Another problem is that IP may be so fragmented that it is difficult for anyone to use it. This phenomenon is often referred to as ‘the tragedy of anticommons’. Patent or knowledge pools – agreements between the owners of independent pieces of IP – can be a solution, packaging together complementary areas of the technology’s IP and reducing transaction costs. This is sometimes done to develop industry standards.
It is of paramount importance for the acquirer to understand as much as possible about the technology’s background IP and who owns it, to guarantee that any future innovation will not be hampered by patent lawsuits. To this end firms routinely perform ‘due diligence’ research on the publicly available information concerning

**Knowledge Protection Mechanisms**

A number of mechanisms can be used to protect knowledge:

- Patents and registration of design patterns
- Copyright
- Secrecy
- Design complexity
- Gaining lead-time advantage
- Trademarks
- Confidentiality agreements and knowledge management

The choice of protection mechanism depends on whether the knowledge is codified or tacit and whether the output (i.e. the final innovation) is tangible or intangible.

The degree of protection required also depends on how fast a technology is evolving. If the technology is new (fast evolving and closer to science), increased knowledge diffusion will increase future gains. Hence, there is an advantage in sharing it and a low degree of IP protection is appropriate. For slow moving, more mature and well-understood technologies, higher profits are possible. Hence firms will be more inclined to own the IP and impose a higher degree of protection. Some economic studies provide a way to determine the ideal length of the protection method. These suggest that the optimal span is two years for a copyright term and ten years for patents.

**Protected/Proprietary technology Protection**

Protected/Proprietary technology is a process, tool, system or similar item that is the property of a business or an individual and provides some sort of benefit or advantage to the owner. In some industries, proprietary technologies are a key determinant of success. As a result, they are guarded closely within a corporation and are protected legally by patents and copyrights. Companies that are able to develop useful proprietary technologies in-house are rewarded with a valuable asset: they can either use it exclusively or profit from the sale of licensing of their technology to other parties.
Technological protection is a broad term that covers many different types of technologies used to control access to copyright content, or to prevent users from copying protected/ proprietary content.

Content that is protected by a copy protection technology could include movies, games, software, CDs or digital music files, or even content stored in a protected area on a website (eg, where you have to pay money or enter a password to access the content). There are two types of technological protection measures:

I. Access Control Technological Protection Measures
II. Copy Control Technological Protection Measures

Access control technologies are technological protection measures which are used by copyright owners to control access to their content. Some examples of access control technologies could be:

- password control systems (eg, a 'members only' password which limits access to special content on a website to authorized members)
- Payment systems (eg, where you have to pay a fee to access certain content on a website). For example, the Choice website has some freely available publications and some publications that are restricted to people who have paid to access them
- time access controls (eg, a technology that manages how long you can access copyright content). For example, some movie download sites allow you to 'rent' and watch a movie for a period of time (eg, 24 hours). An access control disables your access to the film at the end of the 24 hour period.

On the other hand, Copy control technologies are technological protections measures applied to copyright content which prevent, inhibit or restrict the doing of a copyright act with that content (eg, making a copy of a protected film, emailing it or putting it online). Some examples of copy control technologies could be:

- a software lock which prevents you from making a copy of a computer program encryption measures stored on the disk containing a movie or CD which prevent you from copying the movie or songs on the disk
- a technology that 'locks' documents to prevent them from being copied (eg, the function that 'locks' a PDF document to stop you from making a copy)
- a technology that makes an unauthorised copy of a film unwatchable (eg, some copy protection technologies add elements to the signal produced by a DVD/VHS player which make any recording of the film unwatchable)

Trademark, Patent, or Copyright

Intellectual property (or IP) refers to creative work which can be treated as an asset or physical property. Intellectual property rights fall principally into four main areas; copyright, trademarks, design rights and patents.

A trademark is a word, phrase, symbol, and/or design that identifies and distinguishes the source of the goods of one party from those of others. A service mark is a word, phrase, symbol, and/or design that identifies and distinguishes the source of a service rather than goods. Some
examples include: brand names, slogans, and logos. The term "trademark" is often used in a general sense to refer to both trademarks and service marks.

Unlike patents and copyrights, trademarks do not expire after a set term of years. Trademark rights come from actual “use”. Therefore, a trademark can last forever - so long as you continue to use the mark in commerce to indicate the source of goods and services.

The registration of trademark is not mandatory. You can establish “common law” rights in a mark based solely on use of the mark in commerce, without a registration. However, the registration of a trademark with the Patent Registration Office has several advantages, including a notice to the public of the registrant's claim of ownership of the mark, a legal presumption of ownership nationwide, and the exclusive right to use the mark on or in connection with the goods or services set forth in the registration.

Each time you use your mark, it is best to use a designation with it, like the ® symbol after your mark. If not yet registered, you may use TM for goods or SM for services, to indicate that you have adopted this as a “common law” trademark or service mark.

Registering in countries such as the US, the UK, Japan, etc will protect your mark in that country only, but within the European Union, there now exists a Community Trade Mark (CTM) which covers the mark in all EU countries. There is also the Madrid System. The Madrid System is a one stop solution for registering and managing marks worldwide. File one application, in one language, and pay one set of fees to protect your mark in the territories of up to 98 members.

**Patents** apply to industrial processes and inventions, and protect against the unauthorized implementation of the invention. Patentable materials include machines, manufactured articles, industrial processes, and chemical compositions. Patents can be of different type, like Design Patents, Utility patents and plant patents.

Patents are grants made by national governments that give the creator of an invention an exclusive right to use, sell or manufacture the invention. Like trademarks, patents are registered at a national or territory level with an appointed government body. Patents typically take 2 to 3 years to be granted. The duration of patent protection depends on the type of patent granted – between 15 years to 20 years.

**Copyrights**

Copyrights are a means of protecting authorship of intellectual ideas including literary, artistic and musical forms which have been captured on, or through, a tangible medium. In contrast to patents, copyright protection starts immediately, without the need for an application and an evaluation of originality, as soon as the authors of the work codify the knowledge (e.g. on paper, on the web etc.) Copyrights allocate exclusive rights to the author(s) to reproduce the work, as well as to modify, disseminate, and publicly perform or display the work. However, even during the period of protection (usually the lifetime of the authors), the original ideas can be reproduced by others, if minimally changed. This means that copyrights are weaker forms of protection than
patents.
Software is a typical example of invention protected by copyrights, but more recently examples exist of patent protection granted to software. Another area typically covered by copyrights is databases. The rationale is that the assembling of data is considered the intellectual product of the authors.

A **copyright** protects original works of authorship including literary, dramatic, musical, and artistic works, such as poetry, novels, movies, songs, computer software, and architecture. It gives the author specific rights in relation to the work, prohibits unauthorized actions, and allows the author to take legal action against instances of infringement or plagiarism. The duration of copyright protection depends on several factors. For works created by an individual, protection lasts for the life of the author, plus 70 years. For works created anonymously, pseudonymously, and for hire, protection lasts 95 years from the date of publication or 120 years from the date of creation, whichever is shorter.

Copyright is an automatic international right, and excepting specific considerations for US citizens, a single registration with the UK Copyright Service ensures you have verifiable evidence of copyright ownership to help prove and protect your rights at a worldwide level. Immediate protection is available via the online copyright registration facility, while postal applications are typically processed in just a few days.

'Circumvention devices' are technologies that are used to remove, disable or circumvent technological protection measures. A 'circumvention service' is a service offered by someone to remove, disable or circumvent a technological protection measure.

**Patents and registration of design patterns**
The most discussed protection mechanism is that of patents. IP and patents are often referred to interchangeably because patents are often regarded as the strongest means of legally protecting intellectual assets. Patenting practices differ across disciplines and countries, but the overall tendency is towards an increase in patent applications and an increased length of such documents. For instance, newer disciplines seem to generate longer, unfocused applications which are later subdivided into several more focused applications. Furthermore, there seems to be a difference between those countries governed by common law and those where civil law applies: the former file much larger patent applications. However, as a result of an increased globalization of markets for technology and innovation, the Patent Cooperation Treaty was introduced to harmonize the styles of patent filing, using the US model as a basis.

Due to their explicit nature, the knowledge covered by patents can be assessed and traded in a relatively easy way.
### The preferred protection mechanisms for different types of knowledge

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<th>Type of knowledge</th>
<th>Preferred protection mechanism</th>
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<tr>
<td>Tangible/Codified</td>
<td>Patents as primary protection mechanism, plus copyrights, trademarks and confidentiality agreements</td>
</tr>
<tr>
<td>Intangible/Codified</td>
<td>Copyrights as primary protection mechanism complemented by trademarks and confidentiality agreements</td>
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<tr>
<td>Tangible/Tacit</td>
<td>Secrecy, complexity of design, lead-time advantage over competitors, confidentiality agreements and trademarks</td>
</tr>
<tr>
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<td>Trademarks complemented by secrecy, lead-time advantage over competitors</td>
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However, patents alone are insufficient to guarantee protection. It is also necessary to be able to enforce them. The infringement of intellectual property rights, as opposed to any other material property breach, is not covered by the state’s policing system. It is down to the individual private organization to fight its own battles. Hence, patents are not often a workable protection option for small and under-resourced organizations.

The nature of patents is also subject to debate. On the one hand they are considered an incentive to innovation, as the inventors can claim rights over the commercialization of an innovation. On the other hand, they are often regarded as an obstacle to innovation, for example in cases where ownership of the necessary IP to innovate is inaccessible or too distributed to generate future innovation. This is referred to as the ‘tragedy of the anti-commons’.

There is a continuous debate over how patents are and should be granted and the legislation has been evolving over time. What can or cannot be patented, and for how long, is decided on a national basis, with patenting policies being adapted at different rates across these different countries. While in some cases the granting of patents has been restricted, the general trend seems to be towards expanding patents applicability to new objects and subjects, shifting the locus of enforcement and granting longer terms of protection. For instance, in the US (whose patent law is one of the most influential), it is now possible to legally protect IP rights more upstream than in the past, including living organisms, basic research tools and procedural methods, together with algorithms, databases and journal articles. This trend is potentially risky for the development of future knowledge as the ‘tragedy of anti-commons’ might stifle future innovation.

There are several motives for patenting. These include:

- **Protection.** A firm can use patents to protect their inventions from imitation. Patents can also be used to safeguard national interests.

- **Blockade.** Using patents to create a blockade can be done in two strategic ways.
  
    Defensive patent strategies aim to stop others from patenting your inventions and allow suing
for infringement, regardless of whether the IP is needed or not. This strategy can also be pursued in order to generate revenue by trading IP with other firms. Offensive patent blockades aim to block others from getting into a certain innovation space and patenting inventions that are similar, but not identical, to the invention that is planned. In this case, the tactic is to build a broad patent wall or a ‘thicket’ around the innovation. This strategy is also used even if the firm does not intend to make use of the IP.

- **Reputation.** Improving the image of a company as an innovator and to increase the capital value of the firm (important for instance in M&As, or for attracting capital investments).

- **Exchange.** Patenting has great potential for encouraging cooperation. Having stronger patent protection over a technology improves a firm’s bargaining position and hence is particularly important for small and young companies who want to establish partnerships and alliances with well established firms.

- **Incentives.** Within large companies, patents are often used as a measurement of performance and as a basis for rewarding innovative members of staff.

There is evidence that firms who mostly use patents as a protection mechanism receive overall more citations of their patents in future patents applications. On the other hand, if patenting is used with the aim of blocking competitors or for exchange reasons, the number of citations received on the entire portfolio of patents is smaller. In addition, using patents as an offensive blocking strategy is likely to result in a great number of oppositions to the patent portfolio, as competitors are likely to react against this strategy. Oppositions to patents are also likely to be less for companies who take a cooperative approach to protection.9

**Weakness of patents**

By itself, filing a patent is not a strong protection mechanism because the art of drafting patents is quite difficult. If the patent claims are too specific and narrow there is always the risk that competitors will easily get around them. A potential strategy is to file relatively unfocused patents which could be later divided into more specific patents.

Patents’ values are also dependent on how unique the item in question is and how easy it is to work around it. An example is the now very common Schneider wheelie-bin, which was originally patented in 1976. The bin hooks on to a rack at the back of a lorry via a flange at the front of the bin, and it is this flange which the company decided to protect. Because the bin is polymer and hence has quite a low stiffness, the design needs to include substantial stiffening ribs and flanges. This is a very precise and narrowly-worded claim. It would probably not be possible to produce a plastic bin which was compatible with the same lorry attachment and did not infringe the patent. For steel it is a different story. In the 1980s a UK firm, EH Taylor Ltd,
produced a steel bin which did not infringe the Schneider patent and rapidly captured half the market for the large 1100 litre bins.

Patent analysis is one of the most common ways of gaining intelligence about a competitor and its technologies. As a result, firms may prefer not to broadcast this information to the world, using trade secrets and/or using complex designs to protect their technology instead.

**Design complexity**
Reverse engineering is often used to uncover and copy the working principles of a competitor’s technologies. A protective approach which could work in this case is that of making use of complex designs.

**Gaining lead time advantage**
Technology protection can also be achieved by gaining lead time over competitors. A firm may stay ahead of the game by protecting the market to which its technology will be applied. Imitators can be preempted by the occupation of existing and potential strategic niches in order to reduce the range of investment opportunities that are open to potential competitors. Companies employing technologies that demand skill from the user can gain an advantage by being first to the market. Customers who have invested time and effort in mastering a product are less likely to switch to another supplier. This is often the case with computer software for example. Being the first to market means that the firm can establish a user base, creating switching costs that lock-in consumers. Pre-emption can take a number of forms:

- **Proliferation of product varieties by a market leader.** This limits the number of opportunities for new entrants and smaller rivals to establish a market niche. For example, in the US between 1950 and 1972, the six leading suppliers of breakfast cereals introduced 80 new brands into the market, combined with large investments in production capacity. When done ahead of the growth of market demand, this also preempts market opportunities for rivals. For example, Monsanto’s heavy investment in plants for producing NutraSweet ahead of its patent expiration was a clear threat to would-be producers of generic aspartame.

- **Patent proliferation.** Protecting technology-based advantages by limiting the technical opportunities available to competitors. For example, in 1974, Xerox’s dominant market position was protected by a wall of over 2,000 patents, most of which were not used. When IBM introduced its first copier in 1970, Xerox went on to sue it for infringing 22 of these patents. These issues are critical in standards battles. The ownership of seven critical assets are essential in standards battles:
  I. Control of an installed base
II. Intellectual property rights  
III. Ability to innovate  
IV. First-mover advantages  
V. Manufacturing abilities  
VI. Presence in complementary products  
VII. Brand name and reputation.

The effectiveness of first to market is also dependent on the maturity of the technology or industry. For example, in immature fields such as nanotechnology, along with the opportunity to file patents, first mover advantage can allow firms to participate in standard setting with industry groups and government agencies. This can provide the firm with the additional leverage necessary to ensure that the selection environment favours its technology and that compatibility is protected.

Confidentiality agreements and knowledge management

Firms who want to collaborate with others in order to access knowledge, face the challenge of preventing knowledge leaks.

Non disclosure agreements (NDAs), also called confidentiality agreements, are often exchanged between parties to impose a protective umbrella on what can be disseminated outside the partnership, or even within other departments of the collaborating companies.

The most delicate stage is that just prior to signing the collaboration agreement. If the two parties eventually decide not to enter into collaboration, they may regret exchanging any information. This is why, in the majority of cases, firms say they refuse to sign confidentiality agreements until they are certain they have a real interest in the potential partnership.

Most open innovation internet portals set up by large firms, which are designed to attract ideas from external innovators, have an up front condition that ideas submitted must be non-confidential. While these websites are designed to identify new knowledge, they must also protect the prospective acquirer from the risk of being exposed to unsolicited and proprietary knowledge unintentional knowledge contamination is to involve independent third parties, or intermediaries in the process. Legal support will be required to set up NDAs. Even when NDAs are signed, the prospective collaborators need to be careful about what they exchange and how.

If the NDAs specify that both parties have to put what has been disclosed (and hence has to be kept secret) in writing, it is important that a good record of conversations is kept. This can be very difficult for firms who do not follow strong knowledge management practices.23

Maintaining such records is a critical practice to protect the firm from possible claims. The confidentiality agreements are a key protection tool as the risk of knowledge leakage could be severe.
Precautions are sometimes needed to prevent knowledge from crossing internal boundaries as well. For example a firm realized that a competitor had implemented a similar production technology to the one that they had developed a few years before in collaboration with a technology consultancy. After much investigation it was revealed that the competitor achieved a similar production capability by partnering with a second consultancy founded by a former employee of the first technology consultancy.

Another protection strategy is to fragment knowledge across the firm. An extreme example is provided by a firm working in the defence sector, for which security is paramount. The firm has different levels of security, imposing restrictions about what can be exchanged, even between parts of the same company. This proves particularly challenging as the firm is a multinational and the interests of different nations sometimes have which could infringe others’ rights. One solution to such to prevail over the company’s business interests and innovation needs. The internal infrastructure is carefully designed along multidimensional controls and labels to partition the firm’s knowledge management system and to allow the identification of safe areas of discussion and collaboration between employees with different disclosure rights. As security takes priority, staff are trained to file the documentation appropriately and to become highly dynamic in managing complexity.