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**Intellectual Property
Management**
Interdisciplinary
Knowledge for Business
Decision-Making

Irina Heim

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Intellectual Property Management

“The book makes a fresh and novel addition to the literature in the intellectual property management field. Various examples from related industries provide a rigorous understanding of business strategies that can create value from intangible assets. The book explores the phenomenon from a new, interdisciplinary angle and, in this way, makes a substantial contribution to management science.”

—Professor Maksim Belitski, *Professor of Entrepreneurship and Innovation at the University of Reading, United Kingdom*

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PREFACE AND ACKNOWLEDGEMENT

The intellectual property (IP) system is designed to encourage innovation and technological developments and advance economic growth and post-pandemic economic recovery. The modern world IP protection system is under development to adapt to the needs pertaining to the development of frontier technologies and new players in emerging countries. Even more, than in the past, IP matters in the modern world that has become driven by innovation.

This book is based on Intellectual Property Management course lectures delivered at the Henley Business School, University of Reading, in January–March 2022. I am thankful to the students on this course who provided very positive feedback and, in this way, encouraged me to turn my lectures into this book. I am also thankful to Yelena Kalyuzhnova for giving me the opportunity to develop the learning content for this new course. I would also like to thank Maria Richert and Can Ererdi for providing teaching assistance on this course and Maksim Belitski for his feedback on the book. I acknowledge David Mercer for the proofreading of the manuscript. No specific financial support has been received for the research, authorship, and/or publication of this book.

Historically, the study of IP management has involved different disciplines, including technology management, law and economics. Consequently, few works and individuals have bridged these views. This book tackles this underlying issue by linking the three disciplines into one subject in the form of IP management. For companies to successfully manage their IP and extract the expected value, these three topics must be understood and utilised in a union. As such, the book covers a topic of

great importance to many practitioners, researchers and students. It covers several relevant topics, such as IP strategy, methods of appropriation, and the internal management of IP within a company. The book provides an insight into these topics and serves as a broad introduction to IP management for the reader. However, it does not discuss the optimal macroeconomic IP policy; it takes the existence of such a policy for granted and looks at how businesses can create value from IP and intangible assets.

The book discusses the details of IP management and strategy and how IP and competitiveness are connected. Consequently, it will be interesting for students and academics studying innovation and IP, professional readers and policymakers. It assumes no prior knowledge of intellectual property management.

Reading, UK

Irina Heim

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ABBREVIATIONS

EEA	European Economic Area
EMA	European Medicines Agency
EU	European Union
ETSI	European Telecommunications Standards Institute
GATT	General Agreement on Tariffs and Trade
ICT	information and communications technologies
IP and IPR	intellectual property and intellectual property rights
LSS	life sciences sector
NIH	US National Institutes of Health
NFTs	non-fungible tokens
OECD	Organisation for Economic Co-operation and Development (OECD)
PCT	Patent Cooperation Treaty
P&L	profit and loss
RCD	registered community design
R&D	research and development
SEPs	Standard Essential Patents
SME	small or medium-sized enterprise
SPC	supplementary protection certificate
SSOs	standard-setting organizations
TCA	Trade and Cooperation Agreement
TRIPS	Trade-Related Aspects of Intellectual Property Rights
WIPO	World Intellectual Property Organization
WHO	World Health Organization
UN	United Nations
UNAIDS	The Joint United Nations Programme on HIV/AIDS

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CHAPTER 1

The Intellectual Property Landscape

Abstract This chapter will discuss what is meant by intellectual property (IP) management, the main types of intellectual property rights (IPR)—copyright, design rights, patents and trademarks—the historical context of IP law, its social and cultural impact, and international influences.

Keywords Knowledge economy • IP regimes • International IP landscape • Monopoly

“The Intellectual Property system exists to encourage innovators and creators who make the world a better place”
World Intellectual Property Organisation

WHAT IS IP MANAGEMENT?

This book concerns the application of IP to business, focusing on how companies can use IP to generate value and competitive advantage. However, there is little agreement on the precise coverage of the term IP, especially for businesses. Most definitions have the character of lists—sometimes even open-ended since they originate from the law discipline (Bently et al., 2018). The term IPR refers to the rights relating to the

creations of the mind¹ and includes a set of industrial property-related exclusive rights (patents, utility models, trademarks, design rights). It also refers to the property rights related to copyright (photographs, rights of the database manufacturer, rights to films) and specific know-how (procedural knowledge). IPR includes intangible assets—research, technology, software, and human capital, as well as licenses, knowledge, and business and trade secrets companies use to create value.

The term *business model* describes how a firm is organised to facilitate the interrelated activities of value generation and value capture, including activities, extended beyond the boundaries of an organisation, including among customers, suppliers and other actors (Erickson, 2018). This book will discuss traditional versus IP-based business models, digital business models, closed versus open business models and cost versus value-driven business models. Business models in the knowledge economy, especially in the digital and tertiary sectors, operate differently from those in the manufacturing economy.

The term *management* describes the targeted coordination of various individual processes and functions within an organisation; this includes all management tasks such as organisation, planning, goal setting, management and control. Weathersby (1999) defined management as the allocation of scarce resources against organisational goals, the establishment of priorities, the design of work and the achievement of results. Therefore, this book understands IP management as IP-resources allocation against strategic goals. IP management is responsible for an organisation's IP policy determination, its IP strategy, the coordination of IP-related work within the company, and protection against threats posed by competitors. Historically, different disciplines have looked at IP management from their own perspectives. This attitude also prevails in the field of IP, where academics and students in single disciplines, such as law, economics or technology, have studied and interpreted IP differently. Each science affords a specific perspective on IP. Lawyers analyse IP through the legal lens, asking what is (and is not) permissible in various jurisdictions.² At its

¹ See World Intellectual Property Organization (WIPO) at www.wipo.int.

² Jurisdiction is a legal entity to enact justice. In the context of IPR, areas of jurisdiction usually apply to national and supra-national levels.

core, IP policy³ roots in economics as the primary disciplinary approach (Ghafele et al., 2007).

Innovation economists look at IP from an innovation/technology perspective and seek to identify how companies and society can benefit from innovation systems most effectively and efficiently. For their part, technologists are thrilled by the prospect of advancing science and offering new solutions to technical challenges. However, in an increasingly complex global business environment, real-life challenges can rarely be resolved through one-dimensional approaches. Today's companies recognise the need for interdisciplinary approaches. They realise that because not enough people in the market can leverage IP-based value, significant wealth remains uncaptured in markets. For example, business executives estimate that IP underpins between 50% and 70% of a country's private sector gross earnings, so it is often decisive for commercial success or failure. Thousands of inventors and innovators file patents each year, although research estimates that only one in 100 will cover costs and only one in 1400 will become a cash cow (Ghafele et al., 2007).

The number of academic research publications on the topic in the last four decades, especially after 2007, reflects the growing importance of IP (Fig. 1.1).

THE MAIN TYPES OF IP RIGHTS

The main types of IPR are patents, copyright, design rights (or design patents in the US and Japan), trademarks and trade secrets.

A *Patent* is a monopoly⁴ granted for a limited period (usually 20 years) in return for the disclosure of technical information about the invention to the public. A monopoly is a market structure characterised by the absence of competition where the only supplier sells a single product in the market. It will be discussed in detail in Chap. 5 of this book. A patentholder remains an exclusive producer, user and seller of an invention for the period covered by a patent. Technical information for a patent is provided in the application for registration. Anyone can freely access this information

³In the IP context, by policy, we understand government and other institutions' decisions in the form of laws, regulations, procedures, administrative actions, incentives and voluntary practices.

⁴A market structure characterised by the absence of competition where the only supplier sells a single product in the market (for details, see Chap. 5).

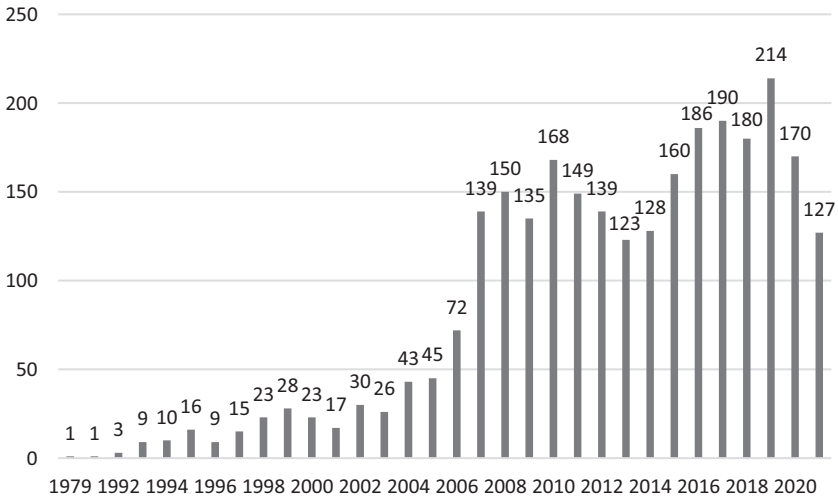


Fig. 1.1 The number of business and management publications by year. (Source: Author's depiction based on a Web of Sciences search)

through patent databases. The patent owner may decide to assign, license, or franchise the invention to third parties. Patents, like most of IPR, are territorial rights, as they are adopted by national governments. In general, the exclusive rights are only applicable in the country or region in which granted a patent in conformity with the law of that country or region. However, the Patent Cooperation Treaty (PCT) assists applicants in filing patents internationally to simultaneously seek protection for an invention in a large number of countries (WIPO, *n.d.*).

Copyright refers to the protection of literary and artistic works. According to the Berne Convention, copyright does not have to be registered. It is therefore recognised automatically worldwide in the countries that have signed the treaty.⁵ However, most countries have a voluntary registration system in place to improve the use of IPR protection. Copyright is granted for a fixed number of years, including the period of the author's life, plus 70 years for most literary pieces and 25 years for computer-generated material. Types of works protected by copyright include literary works, names and invented words, tables and

⁵ Only four countries in the world are not members of the Berne Convention.

compilations, databases, musical, dramatic and artistic works (photographs, paintings, sculpture), works of architecture, craftsmanship, films, sound recordings, broadcasts, published editions (Bently et al., 2018). Table 1.1 offers a comparison of the two most used regimes.

A *trademark* is a sign that identifies a business as the only source of a product under a particular brand and distinguishes it from similar competing products. It, therefore, allows a brand to stand out from the competition. A trademark may be words, a logo, or a combination of two.⁶ It can last for an unlimited time if renewed every ten years, and trademark infringement, which means the high likelihood of people confusing two brands with similar trademarks, is easy to test. The registration must be filed in each country where the protection is sought.

Table 1.1 Comparison of two most used IP regimes, patents and copyright protection

<i>Indicator</i>	<i>Patent</i>	<i>Copyright</i>
Requirements for protection	Novelty, inventive step, enablement and embodiment	Originality, authorship, a form of expression
Ownership	First to file	Author/creator
Scope of rights	Bundle of rights extending to the idea: exclusive rights against all commercial uses (make, use, sell innovation)	Economic and moral rights on the form of expression: exclusive rights against copying (rights of performance, display, reproduction, derivative works)
Scope of protection	Wide	Narrow
Duration	20 years from the filing	Life of author plus 70 years
Costs of protection	Filing, issue, and maintenance fees; litigation costs	No filing is necessary; the suit requires registration; litigation costs
An organisation that administers the rights	Intellectual Property Office	Collecting Society

Source: Author based on Belleflamme and Peitz (2015)

⁶Existing trademarks can be found here: <https://www.uspto.gov/trademarks/search>. To avoid trademark infringement, it is advised to check if any trademark has already been registered or applied before marketing or advertising a product.

Trade secrets are a type of IP that comprise formulas, practices, processes, designs, instruments, patterns, or compilations of information. They have inherent economic value because they are not known or readily ascertainable by others and which the owner takes reasonable measures to keep secret. Trade secrets are not limited in time and remain so unless the organisation decides to keep them secret.

Design rights give exclusive rights related to the visual appearance of a product or an item. Industrial designs must be new and have an industrial character. In the United Kingdom, industrial designs are granted by the Patent Office and protect only the non-functional features of the product. Design rights usually last 15 years and are an effective and low-cost form of IPR. However, the disadvantage is the maximum 25-year life span of UK- and EU-registered designs. National laws define a primary form of IP utilised for the protection of industrial design rights (a design patent). For example, designs registered at the German Patent and Trademark Office (DPMA) are only valid in the territory of the Federal Republic of Germany. If owners wish to protect the design in the member states of the European Union (EU) or other countries, they can apply for a Europe-wide or international registration. The Hague Agreement governs the international registration of industrial designs in member jurisdictions by permitting an applicant to file a single international design application to obtain protection, similar to how the PCT and the Madrid System enable protection for utility patent and trademark rights respectively, in multiple member jurisdictions. For example, The United States joined the Geneva Act of the Hague Agreement on February 13th, 2015, with the treaty taking effect on May 13th, 2015 (USPTO, *n.d.*; WIPO, *n.d.*).

Patents, trademarks, industrial designs and copyright are formal protection mechanisms, while trade secrets are informal since they do not require registration. Patents, copyrights and trademarks are traditional forms of IP. Non-traditional or new forms of IP, which have become popular more recently, include industrial designs and trade secrets, and some other new IP types such as domain names, confidential information, plant varieties⁷

⁷ A plant variety certificate is a type of IPR protection related to plant intervention and methods for making new plants. The EU grants IPR to new plant varieties similar to a patent that, once given, is valid throughout the EU. The EU database of registered plant varieties includes all the agricultural and vegetable plant varieties whose seeds can be marketed throughout the EU. Applications for Plant Breeder's Right (UKPVR) are made to the Plant Variety Rights Office in Cambridge, England.

Table 1.2 Top ten companies with the most US patents granted in 2020, number of patents

<i>Company</i>	<i>Number of patents granted</i>
International Business Machines Corp.	9130
Samsung Electronics Co Ltd	6415
Canon KK	3225
Microsoft Technology Licencing LLP	2905
Intel Corp	2867
TSMC Co Ltd	2833
Apple	2791
Huawei Technologies Co Ltd	2761
Qualcomm Inc	2276
Amazon Technologies Inc	2244

Source: Statista

and circuit layouts⁸ (Ryder & Madhavan, 2014). Geographical indications, signs used on products that originate from a specific geographical area and, due to that origin, have qualities or a reputation, are another new type of IP that has become more common.

Tables 1.2 and 1.3 present the companies that obtained US patents between 1991 and 2021. It can be noted that most of these companies are American and Japanese. In 2021, the top patent filers worldwide were: China-based telecoms giant Huawei Technologies, with 6952 published PCT applications, followed by Qualcomm Inc. of the US with 3931 applications, Samsung Electronics with 3041 applications and LG Electronics Inc. with 2885, both companies of the Republic of Korea, and Mitsubishi Electric Corp. of Japan with 2673 applications (WIPO, 2022). In 2022, Forbes's top-10 most valuable trademarks include the technology companies, such as Apple, Amazon, Google, Microsoft, Facebook, IMB and a small number of manufacturing companies (Swant, 2020).

⁸ Circuit layouts protect the layout plans or designs of electronic components in an integrated circuit and computer chips or semi-conductors used in personal computers and computer-reliant equipment.

Table 1.3 Most valuable brands worldwide in 2021, in billion US dollars

<i>Company</i>	<i>Number of patents granted</i>
Amazon	683.9
Apple	612.0
Google	458.0
Microsoft	410.3
Tencent	240.9
Facebook	226.7
Alibaba	196.7
Visa	191.3
McDonald's	154.9
Mastercard	112.9

Source: Statista

THE HISTORICAL CONTEXT AND THE SOCIAL AND CULTURAL IMPACT OF IP

The term IP has already been used for about 150 years. However, in the way described in this book way it has been used for only the last 40 years. It is worth knowing some of the memorable events in the history of IP:

- in the historical development of trademarks, traders applied marks to their goods to indicate ownership of their products
- the first national IP laws emerged in the nineteenth century
- one of the first IP treaties, the Paris Convention for the Protection of Industrial Property of 1883, came into force
- the Berne Convention of 1886 provided minimal protection to copyright owners and authors
- convention establishing the WIPO in 1967
- the EU laws, such as the Charter of Fundamental Rights and Freedoms of 2000, declared the protection of IP
- the Socialist Republic of Vietnam accessed the WIPO Copyright Treaty on February 17th, 2022

IP is associated with significant social change. IP attracted the most attention during the last 30 or 40 years with the development of a knowledge-based economy—an economic system in which the production of goods and services is based principally on knowledge-intensive activities that contribute to advancement in technical and scientific

innovation (Powell & Snellman, 2004). Shifts from historical ways of economic management based on industrial production and the sale of physical goods towards the commoditisation of intangible assets have made IPRs critical to capital accumulation in an increasingly globalised informational economy. The continuing technological developments have resulted in higher labour productivity in many sectors by reducing the demand for workers for routine tasks. Individuals with more advanced skills are taking advantage of new technologies to adapt to the changing nature of work (World Bank, 2019).

IP and the sales opportunities they create have become a driving force and a basis for further capital accumulation. However, purely economic considerations of IP ignore its cultural and social impact and the effects they may have. For example, the development of information products and cultural expressions impacts the nature of communication. It also raises concerns regarding access and distributional equity with regard to essential goods such as medicine, food and health care. Other considerations include links between IP infringement, organised crime and terrorism (Coombe & Turcotte, 2012).

At the same time, the cultural, political and social implications of IPR, such as access to medicine, food and healthcare in developing countries, are topics of growing importance. That includes problems of equal distribution and access to Covid-19 vaccines and drugs, grey marketing, product counterfeiting, and other forms of piracy. For example, in May 2021, at a meeting of the World Trade Organization (WTO), India and South Africa, supported by more than 100 countries, including the United States, along with international organisations such as the World Health Organization (WHO) and the United Nations AIDS (UNAIDS) charity, initiated the campaign for temporarily waiving IP protection on coronavirus vaccines. The goal was to reduce the barriers to vaccine manufacturing by countries that cannot develop and patent their own vaccines—particularly for the lowest-income nations. The WTO proposed that every country should have the right to make domestically produced vaccines during a pandemic (Nature Editorial, 2021). Consider the fact that Remdesivir, the first drug shown to be effective against the coronavirus, will be sold at \$390 per vial, or \$2340 per treatment course, for patients in the US on government-sponsored insurance and for those in other advanced countries with national health care systems able to cover these costs. The question arises, to what extent will it be accessible for citizens of low-income countries?

Another social implication of IPR is its infringement—a term that describes the violation of IPR. According to the US Department of Justice, IP can be stolen (i.e., infringed or misappropriated) in different ways. For example, copyrighted works, such as movies, music, books, software, or games, can be illegally infringed by reproducing or distributing unauthorised copies of such works, either online or by manufacturing and distributing infringing data storage devices containing the pirated content. A trademark or service mark can be infringed by offering goods, services, labels, or other packaging containing a counterfeit or similar sign. A company insider or someone outside a company can misappropriate a trade secret and use it to benefit the thief, a competitor, or another third party (U.S. Department of Justice, 2018).

THE INTERNATIONAL FOOTPRINT OF IP

One of the primary characteristics of IPR is that they are national or territorial by nature—that is, they do not ordinarily operate outside the national territory that granted them protection (Bently et al., 2018). This territorial nature of IP has long been a problem for those IP holders that are engaged in international business because IP protection depends on the level of institutional development: of national legal norms and their effectiveness, as well as law enforcement in countries where investments are made, especially emerging and developing countries (Ambalov & Heim, 2020). However, with an increase in the number of countries involved in international activities with IP assets, such countries began to protect their owners or IP by way of treaties—an agreement between states—first in terms of bilateral (between two countries) treaties, and later multilateral treaties.

The first multilateral treaties were the Paris Convention for the Protection of Industrial Property of 1883 and the Berne Convention of 1886—international agreements which allow for the mutual recognition of rights to member states. The further expansion of international arrangements related to IP continued throughout the twentieth century into the twenty-first. Following the 1967 Convention, the WIPO was established. It is a global forum for IP services, policy, information and cooperation and is one of the specialised, self-funded agencies of the United Nations (UN), with headquarters in Geneva (Switzerland). It was created to promote and protect IP across the world by initiating cooperation between countries as well as between international organisations. Currently, it accounts for 193

member countries and continues to be the leading organisation for the development of new IP-related initiatives at the international level. Until the 1980s, countries such as the United States, the Soviet Union and China believed that they were net consumers of IP and, therefore, recognition of the rights of other countries would work against their national economic interests. These countries did not sign international treaty arrangements. By the 1980s, the US realised that they were a net producer of IP, along with Japan and the European countries, and began to advocate for IP protection on a global level. In particular, the US sought to bring IPR within the General Agreement on Tariff and Trade (GATT). In 1995, the Treaty on Trade-Related Aspect of Intellectual Property Rights (TRIPS), an Annex to the WTO Agreement signed by 164 countries, came into force. This agreement is put together and introduces the modern versions of the earlier IP treaties. The WIPO has established several international systems for IP registration—PCT (patents), the Madrid System (trademarks), the Hague System (designs), the Lisbon System (geographical indications), and the Budapest System (microorganism deposits for patents involving biological materials). For example, the Madrid System established by the WIPO in 1995 allows the registration and management of trademarks worldwide. The new guide to the Madrid System that provides owners and IP professionals with everything they need to know about trademark protection was released on May 31st, 2022. Since June 2022, all documents have been available in digital format by e-mail.

An international framework in the form of The Industrial Design Forum (ID5) brings together the five largest industrial design offices in the world: the China National IP Administration (CNIPA), the EU IP Office (EUIPO), the Japan Patent Office (JPO), the Korea Intellectual Property Office (KIPO) and the USPTO. The WIPO participates in this forum as an observer. Together, these five IP offices represent approximately 90% of the world's annual industrial design application filings. The ID5 creates a platform for industrial design policy development and the identification of best practices and procedures to ensure that effective industrial design protection exists for designs in all technologies. The aim is to improve consistency in design examination policies and practices and to focus global efforts on identifying the needs and challenges of the design community through stakeholder outreach and information sharing (USPTO, *n.d.*).

Table 1.4 shows the ranking of IPR systems in the top ten countries in 2020. The first column presents the survey results conducted by the World

Table 1.4 Evaluation of IPR systems in top ten countries, 2020

<i>WEF ranking</i>	<i>IPRI ranking</i>
Finland	Finland
Singapore	USA
Switzerland	Switzerland
Netherlands	Australia
Hong Kong SAR	Japan
Luxembourg	Netherlands
Belgium	UK
Japan	Austria
Austria	Sweden
New Zealand	Germany

Source: World Economic Forum (WEF) and International Property Rights Index (IPRI)

Economic Forum (WEF). They asked executives to rate the level of IP protection in their country, ranging from 1 (lowest) to 7 (highest). As can be seen from their answers, Finland leads, followed by Singapore, Switzerland, the Netherlands and Hong Kong. The second column presents survey results conducted by the Property Rights Alliance (PRA), which uses IPRI ranking. They added two more variables—patent protection and copyright piracy level (0 = not at all and 10 = to a great extent). Finland leads again, followed by the USA, Switzerland, Australia and Japan. Although some countries keep their leading positions due to the quality of IPR, in the second survey, the results are slightly different. Some reasons for these differences are patent-friendly reform in the USA, the strong technology sector in Finland and Switzerland, and trademarks and copyright becoming more prevalent than patents in the UK due to the growing service sector.

Major US innovative clusters such as Silicon Valley high-tech and Boston life sciences grew up in entrepreneurial ecosystems in regions with related resources, and one of the most important aspects was the experience with the protection of IP. The promise of IP protection and defence from litigation provided a forceful incentive to anyone attempting to use technology to build a company in these areas. When local firms sought protection for their IP or guidance on how to avoid infringing on the patents of others, San Francisco- and Boston-based attorneys specialising in IP were ready to help (Adams, 2021). Nowadays, the US aims to grow innovation clusters beyond Silicon Valley and Boston (Valigra, 2022).

The upcoming European Innovation Agenda, which the European Commission has adopted in July 2022, aims to make Europe a tech start-up leader and create a pan-European innovation ecosystem (see the text box below). IPRs are crucial to the EU's global competitiveness. IPR-intensive industries generate almost half (45%) of the EU's economic activity, worth €6.6 trillion, and provide nearly a third (29%) of the total EU's employment (Apelblat, 2022). However, the EU's system for protecting IP, in particular industrial designs and trademarks, is not as effective as it could be in support of these plans (European Court of Auditors, 2022).

The New European Innovation Policy and IP

In July 2022, the European Government communicated that the new European innovation policy focuses on supporting a new wave of innovation, deep tech (DT) innovation. DI innovations are those that usually emerge from innovative start-ups that have the potential to drive innovation across the economy and society. The DT refers to the company's core business activity, which must build a physical product based on fundamental research in frontier technologies.⁹ The technological fields include science, advanced manufacturing, artificial intelligence, biotechnology, blockchain, carbon capture, electronics, nuclear and wind energy, photonics, robotics, space technology, synthetic biology, and quantum computing. The DT companies often address grand societal challenges¹⁰ of our time, including those mentioned in the UN Sustainable Development Goals—global problems that can be tackled through coordinated and collaborative effort—while delivering financially viable outcomes. DT innovations can advance sustainability and solve the climate crisis by, for example, developing solutions for the associated gas flaring elimination—the process by which natural gas is burned off into the atmosphere when extracting oil (Heim et al., 2022). Start-ups like Crusoe Energy (operating since 2018)¹¹ proposed a way to transform gas emissions into electricity

⁹ Frontier technologies are (1) digital technologies, such as the Internet of Things (IoT), blockchain, artificial intelligence (AI), big data and cloud computing, (2) physical technologies, such as autonomous driving, 3D printing and hardware innovations, and (3) biological technologies such as genetic engineering, human augmentation and the brain-computer-interface (WIPO, n.d.).

¹⁰ Grand challenges are climate change, aging societies, management of natural resources, societal resilience, digitalisation, and gender inequality, among others.

¹¹ For more information, see <https://www.crusoenergy.com/>.

for computationally intensive at the well site. Because of the complexity and large scale of these innovations, and the deep scientific background that is needed to drive them, DTs, in contrast to traditional start-ups, involve research in universities labs, large institutions, and funding sources, often public, from the start (Gourévitch et al., 2021). Due to a lack of established revenue streams and secured cash flow, DT innovation requires large amounts of patient capital. For them, it will take time to deploy their R&D results to deliver marketable products and achieve financial returns. DTs are rich in IP but have little tangible collateral. Institutional investors like the European Government, alongside other top investors, the USA and China, aim to address the persistent innovation divide across the EU Member States and regions to enhance internal cohesion through investments in DTs. In the upcoming years, Europe aims to become a global leader in the current wave of DT innovation by attempting to leverage its knowledge base, intellectual assets, and industrial capabilities.

Source: Author, based on European Commission (2022a, 2022b).

IP plays a crucial role in post-pandemic economic recovery. For example, in June 2021, Italy adopted the plan for strategic intervention concerning the industrial property for the years 2021–2023 that include (1) improvement of the IP protection system, (2) wider spread of IP, in particular by small and medium-sized enterprises (SMEs), (3) increased knowledge of, and ease of access to, patents, (4) more rigorous enforcement of IPR and (5) a strengthening role of national IPR at the international level. The academic community points out the role of IPR in reducing distributional inequality of the access to Covid-19 vaccines in developing countries. It resulted from the IP provisions that were foisted on them 30 years ago (Stiglitz, 2022).

Table 1.4 shows that while advanced economies dominate knowledge-intensive flows, the share of emerging countries is rapidly growing. Countries such as China and India have experienced a recent explosion in patent filings. China became a member of the WIPO in 1980. Five years later, in 1985, the country signed the Paris Convention and, in 1993, the PCT. China moved the next step forward again by becoming a member of the WTO in 2001 and agreeing to adhere to the TRIPS agreement. China has implemented laws for all relevant IPRs, such as patents, trademarks, and copyrights. The number of patent applications filed at the CNIPA, founded in 1985, has grown tremendously in recent decades. By 2009, CNIPA had become the world's third largest patent office (Liegsalz &

Wagner, 2013). An IPR analysis report from the WIPO revealed that China surpassed the USA in patent application volume in 2011 (Cao & Zhao, 2013). The Patent Law in China was passed in 1984 and revised in 1992, 2000, and 2008 to facilitate progress in scientific research and technological development (Xu et al., 2021). The country also has the most active trademark system and accounts for one-third of the world's industrial design registrations. With China's 69,540 applications (+0.9% year-on-year growth), the country remains the largest user of the international patent system, PCT. Although Chinese firms file a significant number of patent applications at the WIPO, at the same time, they often violate IPR violations and commit patent infringements (Li & Alon, 2020; Xu et al., 2021). For example, according to the US government, in 2013, China accounted for nearly 80% of all IP thefts from US-headquartered organisations (Schotter & Teagarden, 2014).

THE UK IP LANDSCAPE AND THE IPR-RELATED IMPLICATIONS OF BREXIT

The UK is an attractive consumer market with a high volume of patent applications as firms protect their IP in this significant market. The UKIPO notes that in 2014 the UK was the sixth-largest national jurisdiction in terms of the number of patent applications filed, in a world ranking led by China and the USA (UKIPO, 2017). Adjusting these figures for GDP and population puts the UK fourth and second in the world, respectively. However, foreign applicants file the most UK patent applications. In 2012, only 7% of patent applications covering the UK (including patents valid in the EPO) were filed by domestic applicants, compared to 34% in Germany, 48% in the USA, and 76% in South Korea (IAM, 2018). The reason for this can be the increasing dominance of service industries even in hitherto manufacturing sectors, the domination of knowledge-intensive business services (KIBS) in innovative activities, and the attractiveness of the British market to foreign investors. Even in markets such as China, which has traditionally had a low regime of appropriability,¹² the importance of IP protection seems to be gaining momentum as local companies start to protect their products from imitation. Growing emphasis on IPR is illustrated by high growth rates for patent and trademark applications,

¹²A regime of appropriability refers to the external factors, excluding firm and market structure, which govern an innovator's ability to capture the profits generated by innovation.

securing China first place for patent applications worldwide (Athreye, Fassio & Roper, 2021).

The UK's exit from the EU on January 31st, 2020, is one of the main events that influenced the European IP landscape. The transition period ended on December 31st, 2020. Existing EU Treaties, EU free movement rights and the general principles of EU law no longer apply to the UK. EU regulations continue to work in UK domestic law to the extent that they are not modified or revoked by regulations under the European Union Withdrawal Act 2018. To assist citizens and businesses, the European Commission has developed over 100 sector-specific stakeholder preparedness notices published during the Article 50 negotiations with the UK (European Commission, 2020).

The EU and the UK negotiating teams have agreed on the terms of a detailed post-Brexit Trade and Cooperation Agreement (TCA) which is in effect from January 1st, 2021. Some IPR-related implications of Brexit will apply to organisations, in the same way, whether they operate in the UK, in the EU, or elsewhere in the world, while the exclusion of the UK from the European Digital Single Market the UK companies will feel more profoundly (Shortose, 2021):

- to a great extent, patents continue as before. The UK remains a member of the Paris Convention, which means that applicants who have applied for a patent in the UK are able to subsequently claim the priority of that application for patent registration in other countries and vice versa.
- supplementary protection certificates (SPCs), a type of IPR that serves as a 5-year extension to a patent right and applies to specific pharmaceutical and plant protection products, have been approved for use by regulatory authorities. They were transposed into UK national law because, after Brexit, the decisions on granting SPCs are taken by the EU and the UK separately.
- although a single pan-EU Unitary Patent (UP) covering most of the EU countries will continue to exist, the UK withdrew from it, and businesses will need to use national patents to protect inventions in the UK. The EU introduced the new patent regime to provide patentees with an option to apply for a single pan-EU unitary patent covering most of the EU, as was before Brexit. The Unified Patent Court (UPC) makes it possible to hear and resolve patent disputes

- on an EU-wide basis. After Brexit, the EU legislation will not include the UK territory in the list of jurisdictions their IP laws cover.
- the UK IPO has automatically created a comparable UK Trademark (UK TM) and registered Community Designs (RCDs) for every registered EU TM. However, this does not apply to pending applications, so companies with pending applications should apply to register a comparable UK trademark. However, there is no need for companies with registrations that existed at the end of the transition period to re-file for equivalent registrations in the UK.
 - the effects of Brexit on the life sciences sector (LSS) are substantial. The LSS is one of the most highly regulated and globally harmonised industrial sectors, especially in terms of the development of pharmaceutical products. Many UK regulations have originated from its membership in the EU in the form of Directives or Regulations. The European Medical Agency (EMA) was based in London and has moved to Amsterdam. As a result of Brexit, the UK will not be a part of the regulatory regime of the LSS at the EU level. For example, it does not have access to the centralised procedure for market authorisations, the EU portal for clinical trials, and the Pharmacovigilance database. Instead, the UK Government has created a new framework at the national level (Government of the UK, 2021). The administrative burden of LSS has increased because regulatory requirements now need to be obtained under a different legal framework, as a company must apply for two separate patents.

There is little effect on copyright in the UK, as so much of the UK's copyright law has its roots in international treaties rather than EU laws. However, some changes are applied. For example, UK citizens, residents and businesses will not be able to hold rights in the European Economic Area (EEA) for databases created on or after January 1st, 2021. Although significant changes are unlikely to happen in terms of IP due to Brexit, given the continued uncertainty about the long-term future, IP owners should identify which of their rights are now likely to be affected. They may need further applications/registrations to achieve maximum protection over that right. The increasing protection is necessary because the UK will no longer have a voice in Europe, which may affect the position of UK-based companies and make it a little harder to compete, especially with highly competitive US companies (Shortose, 2021).

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The Creation of IP

Abstract This chapter discusses how different types of IP are created through research and development (R&D) and innovations in different business contexts and how IP supports organisational performance and success.

Keywords Innovation • Technological cycles • Open innovation • R&D • Strategy

INNOVATION AND IP

The WIPO stated that the IP system exists to encourage innovators and creators who make the world a better place. The Organisation for Economic Co-operation and Development (OECD) defines innovation as the implementation of a new or significantly improved product, good or service; a new marketing method; or a new organisational method in business practices, workplace organisation or external relations (OECD/Eurostat, 2005). Innovation can be radical or incremental. Radical or disruptive innovation has a significant impact on a market and the economic activity of firms. The dominant form, incremental innovation, significantly enhance or upgrade the performance of an existing product, service, process, organisation, or method. Schumpeter suggested radical innovations create significant disruptive changes while incremental innovations

continuously advance the process of change (Schumpeter, 1942). In organisations and industries, industrial R&D puts the insights of basic scientific research into practice in a real-world setting—accelerating commercialisation and bringing innovation closer to customers. Figure 2.1 presents the ranking of industrial sectors by overall sector R&D intensity in 2019. It can be used as an indicator of innovation activity. Studies often assign companies and sectors to high (>2%), medium (1–2%), or low technology groups (1%), depending on R&D intensity. However, such classifications should be treated with caution. Other data, such as absolute levels of R&D, the distribution of R&D, or other measures of innovative effort distribution, should also be employed where possible. Firm-specific data would be preferable. It would be necessary to analyse the different areas where individual firms are engaged in R&D (Hughes, 1988). The number of IP applications, such as patents (or patent citations¹), can be used as a proxy for the value of the underlying innovation and knowledge flows (Jaffe & Trajtenberg, 2002).

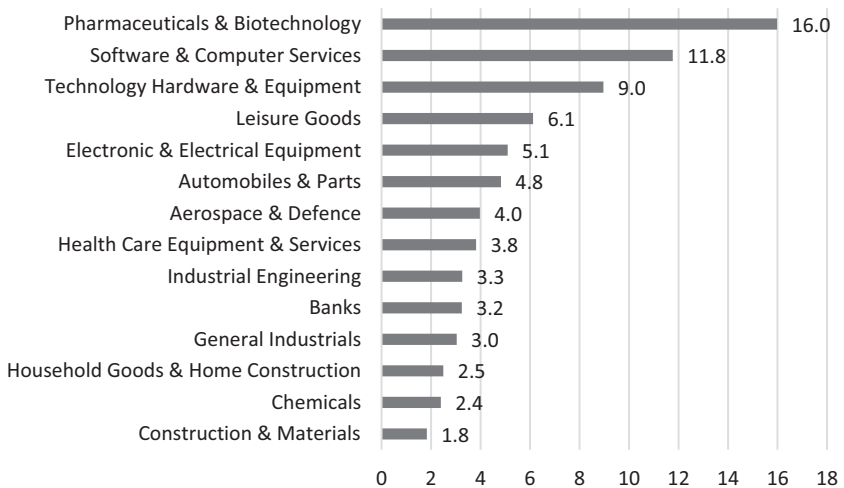


Fig. 2.1 Ranking of industrial sectors by overall sector R&D intensity in 2019, as % of net sales. (Source: Author's graphics based on Grassano et al. (2020))

¹ Patents include citations to previous patents and scientific literature.

How are companies going to benefit from R&D and innovation? The technological leadership of firms does not necessarily per se translate into economic benefits. The capacity of the firm to appropriate the advantages of its investment in technology depends on two strategies:

- the ability of the firm to translate its technological advantage into commercially viable products or processes, for example, through complementary assets or capabilities in marketing, distribution and production.
- capacity to defend against imitators, for example, through standards or IPR.

In this book, we will focus on the latter strategy, i.e., the appropriation of innovations through IP protection. The problem of appropriation can be explained as follows: producers of innovative goods can usually do little to stop other companies from replicating and selling such goods at a lower price. Balancing rights so that they are strong enough to encourage the creation of intellectual goods but not so strong that they prevent innovation is the primary focus of modern IP management.

THE TECHNOLOGY LIFE CYCLE PERSPECTIVE

Digitalisation, structural transformation, Industry 4.0, and the Fourth Industrial Revolution are terms used to describe the transformative technologies that are changing traditional industries. These technologies include the IoT, big data, AI, blockchain technology, and interconnected supply chains. Many of these technologies are based on innovative inventions, especially digital infrastructure and processes, and on the advanced information and communication technologies (ICT) that emerged during the previous Industrial Revolution, which saw the rise of electronics, telecommunications and, of course, computers between 1980 and 2000. Today, we talk about the new digital economy, which has emerged from a combination of technologies becoming pervasive across mechanical systems, communications, infrastructure and the built environment.

Economic theory explains the existence of such long technological cycles, called Kondratiev waves. The Russian economist Nikolai Kondratiev (1892–1938), who was the first to suggest the presence of such waves in 1925, stands behind this concept. The Austrian economist Joseph Schumpeter (1883–1950), in his 1939 book on business cycles, borrowed

Kondratiev's ideas to develop the innovation theory, which suggests that these waves arise from the accumulation of basic innovations that launch technological revolutions. Kondratiev waves also correlate with the ideas of the British economist John Maynard Keynes (1883–1946) about economic crises and cyclical development of the world economy, which became the most popular economic theory after the Second World War.² It also corresponds to the ideas of Professor Klaus Schwab, the inventor of the Industry 4.0 concept in the twenty-first century. Although the Keynesian and Schumpeterian economic doctrines³ agree on the cyclical character of the economy, they have different approaches to dealing with this peculiarity. Unlike the other prevailing economics doctrines, innovation economics (IE) postulates that innovation involving products, processes and business models drives economic growth (Atkinson, 2012).

Economic theories help explain the economy and markets, but unfortunately, they are insufficient when it comes to interpreting how innovative firms such as Amazon and Apple outcompete other innovative firms such as Nokia and Motorola and why the latter need to be far more agile or struggle to add significant value. Management theories clarify the micro-foundations of the macroeconomic phenomena in terms of economic agents' behaviours and interactions. More specifically, strategic management theory suggests that value is created in the economic system and is then shared between society and the various stakeholders (including shareholders and employees) of business firms that produce or adopt innovations through the dynamic allocation of resources (Teece, 2019). Table 2.1 presents some examples of firms that emerged during the most recent economic cycle (the 5th Kondratiev wave), such as eBay, Ryanair, Amazon, Apple's iTunes services, Google, PartyGaming, Facebook and YouTube. These are all service or platform companies based on business models that differ from those that launched manufacturing companies; this implies that they also operate under different strategies. This change can be observed in the list of the world's ten largest

²There have been three distinctive economic epochs in the years following the First World War—the roaring twenties and the Great Depression, the golden age of capitalism and stagflation, and the great moderation and subsequent financial crisis of 2008 (CORE Team and Education, 2017).

³Doctrines are economic philosophies about how the economy works (Atkinson, 2012). Three prevailing economic doctrines are conservative neoclassical, liberal neoclassical, and Neo-Keynesian economics, and a fourth emerging economics doctrine is neo-Schumpeterian or innovation economics (Atkinson & Audretsch, 2008).

Table 2.1 New firms emerged during the most recent economic cycle

<i>Company/industry</i>	<i>New service/business model</i>
Google/Internet services	A new way to search, analyse data and advertise on the Internet
eBay/E-commerce	A new way of buying and selling through the community of online users
Ryanair/Airline	A new low-cost business model with emphasis on economy and frills' service available for an extra charge
Amazon/ E-commerce	Online retailer with a new way of buying and delivering goods
Facebook/Social networking	Online community of users sharing information
YouTube/Online archive	Online community of users sharing videos
iTunes/Music	A new way to buy and download music
Paradox Interactive/Video gaming industry	Online gaming from any location

Source: Author

companies in 2008 and 2018. The list shows that platform-based businesses have replaced oil and gas, telecom and banking firms. A platform is a business based on a business model that creates value by facilitating exchanges between two or more interdependent groups, typically consumers and producers.

Technology and innovation, like economic development, are cyclical in nature and relate to technological change. Each wave revolves around the evolution of a few transforming technologies, giving rise to innovations so wide-ranging in their impact that they cause significant perturbations to the economic and social systems. Different types of innovations characterise each phase of the cycle. First, radical products/services emerge and at later stages, more incremental and process innovations arise (Fig. 2.2). These cycles often affect not only corporate and business strategies adopted by firms but also the design of national economic policies. Chandler (1962) defined a strategy as the determination of long-term goals and objectives and the organisational structure that an organisation builds to achieve these goals. Later, strategy came to be seen as a unique and valuable combination of resources and capabilities, resulting in a market position that involves securing a competitive advantage (Porter, 1985). The most recent definition explains strategy as the unifying effort of an organisation based on cooperation, innovation, agility and knowledge management (Whittington et al., 2020).

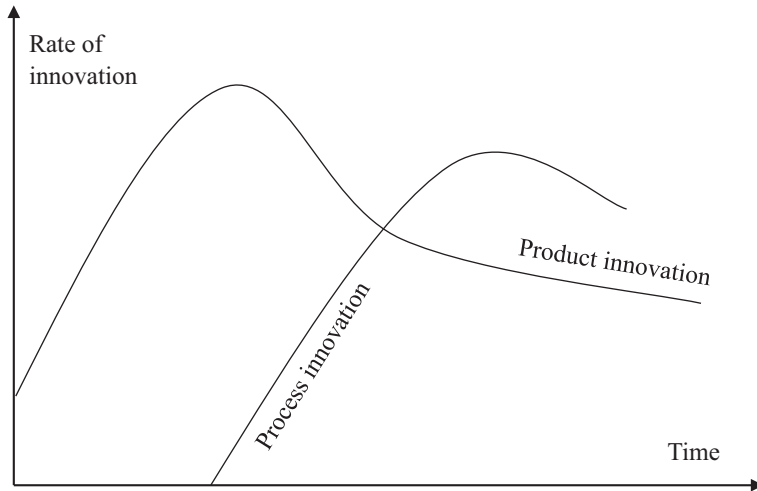


Fig. 2.2 Innovation over the product/industry life cycle. (Source: Author adapted from Teece (1986))

Innovation and a new view of strategy drive the advancement in technology.⁴ The potential for disruption—a radical change to an existing industry or market due to technological innovation—is significant. Technological change has an impact on both corporate strategies (e.g., where firms compete) and business strategies (e.g., how firms compete), in addition to their international strategies (e.g., how, where and when firms expand in international markets). Since strategy refers to the choice of a business model through which the firm will compete in the marketplace, technological change affects a business model and the process of value creation.

OPEN VERSUS TRADITIONAL INNOVATION

As first suggested by Henry Chesbrough in 2003, there are two paradigms in which organisations can develop innovations—closed and open innovation. The closed innovation paradigm and its associated mindset results in organising internal industrial R&D departments (Arora, Fosfuri & Gambardella, 2001). It has led to significant achievements and many commercial successes in the past and works for many companies presently. It is the model used by most major US corporations such as Xerox, Dell and

⁴About managing innovation see Tidd and Bessant (2018).

IBM. This inward-focused approach to knowledge creation perfectly fits with the knowledge environment of the industrial paradigm. However, this paradigm is increasingly at odds with the development of the knowledge economy based on the shift in advanced nations from an industrial to a knowledge-based economy based on intangible goods and assets (Chesbrough, 2003a).

The factors that contributed to the erosion of closed innovation based on traditional internal R&D departments are:

- the increasing capability of external suppliers
- external option for ideas sitting on the shelf
- the venture capital market
- the increasing availability and mobility of skilled workers

According to Chesbrough, this internally focused approach to R&D remains effective in specific industries and helps to manage innovations well. In such industries, the protection of IP is very tight, regulatory restrictions are very high, or both; start-ups seldom arise, and venture capital makes few investments. Firms can store their technologies on the shelf until they are ready to take their discoveries to market, without fear of significant leakage of that technology from the company into a start-up or a rival company. In other industries, companies are structured in such a way that they have a distributed knowledge landscape, where companies cannot keep the technologies until their business exploits them. Instead of accumulating technology for internal business use, they make money by integrating their technologies with new external knowledge. In this case, companies manage IP to advance their own business model and to profit from rivals' use of their IP. The companies might occasionally fund a young start-up or acquire a young company to explore the area of potential interest or to integrate it into the existing portfolio (Chesbrough, 2003b).

The knowledge monopolies built by central R&D labs have ended. The distribution of patent awards has also changed. According to the US Patent and Trademark Office (USPTO), small and medium-sized companies (SMEs) now obtain more patents than before. However, it is widely recognised that firms of all sizes find it difficult to appropriate the returns to innovation, leading to under-investment in R&D and innovation. But is there value in terms of patenting for small firms? Recent research has found that smaller firms are not less likely to patent any specific innovation compared with larger firms (Athreya et al., 2021).

Open innovation is defined as “purposive inflows and outflows of knowledge to accelerate internal innovation and to expand the markets for external use of innovation” (Chesbrough et al., 2006, p. 1). The relationship between open innovation and IP protection is characterised by a paradox, where the question is whether or not appropriability enforces or impedes open innovation. On the one hand, companies need to consider adequate protection before engaging with external actors to prevent unwanted knowledge spillovers. This issue is usually solved through the application of IPR. On the other hand, there is only limited defensibility of such rights in juridical disputes because of the high cost and time investment.

Chesbrough suggested that how companies manage IP depends on whether they operate in a Closed Innovation paradigm or an Open Innovation paradigm. He also stressed that IP by itself has no inherent value; that value only arises when it is commercialised through a business model. To appropriate value from technology, companies must create a business model for it or allow someone else’s business model to extract the value realizable from innovation. Alternatively, a company’s business model might dictate that it would be better off by making its knowledge open to others. At other times, a company would be better off protecting it (Chesbrough, 2003a, b).

Research suggests that robust IPR based on formal protection supports creativity and innovation (Ezell & Cory, 2019). However, evidence from sectors such as video game production and 3-D printing indicates that business models based on open IP can also be profitable. For example, Erickson (2018) investigates the relationship between IP protection and value capture for creative industry firms engaged in collective/open innovation activities (see Fig. 2.3). In some cases, companies in creative industries can use open IP environments to enable business models that rely on user co-creation. In particular, companies count on the use of public domain materials or private-collective innovation (PCI) communities and incorporate users’ improvements into the design of their products.

IPR CHALLENGES IN OPEN INNOVATION

The high degree of openness in innovation usually correlates with lower levels of protection since knowledge and information need to be shared with a partner. Depending on the type of actors involved, private-collective, public-private and private-private forms of open innovation can be

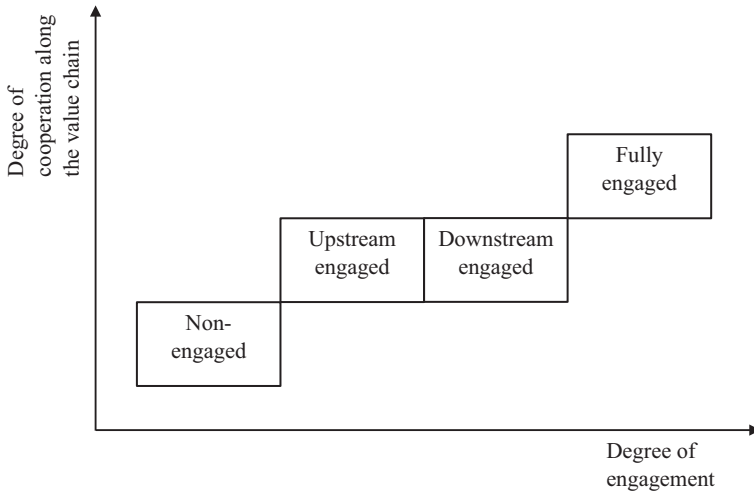


Fig. 2.3 Private-collective business models in the video game and 3-D printing industries. (Source: Author's graphic based on Erickson (2018))

distinguished. A business may involve different IPRs at different stages of innovation development but may also represent challenges resulting in disputes. The most recent prominent example of this in terms of public-private collaboration is the dispute between the biotechnology firm Moderna Therapeutics and the US Government's biomedical research agency—the US National Institutes of Health (NIH)—over the Covid-19 vaccine. The two vaccine collaborators are locked in the patent fight as to who should be named as an inventor on a vaccine patent application. Moderna, the primary inventor, collaborated with NIH researchers who were probably unfairly left off as co-inventors on a pivotal vaccine patent application. Moderna has projected to make up to US\$18 billion on its COVID-19 vaccine in 2021. Co-inventor status could enable the NIH to receive royalties and license the patent in competing vaccine makers, for example, those in low- and middle-income countries, where vaccines are still scarce and could be sold at a lower price. However, Moderna argues that its researchers developed the messenger ribonucleic acid (mRNA) sequence independently of NIH. The dispute concerns the active ingredient in a pharmaceutical product that is so important that competitors will not be able to produce the vaccine without it (Ledford, 2021). Moderna

received nearly \$10 billion in taxpayer funding to develop the vaccine, test it and supply it to the federal government and received contracts worth about \$35 billion through to the end of 2022. As is typical in the pharmaceutical industry, Moderna has sought several patents related to different aspects of its Covid-19 vaccine technology in the US and overseas. However, the disputed patent is the most important in Moderna's growing IP portfolio since it seeks to patent the mRNA used in the vaccine (Stolberg & Robbins, 2021).

The case of the Covid-19 vaccines shows that concerns have been raised that such a patent could prevent lower-cost vaccine production, especially in low- and middle-income countries. With this development, we might see governments taking a more active role in managing IP.

INNOVATIONS IN LARGE-SCALE COMPANIES

As with most processes, open innovation is likely to become more efficient as firms gain experience, which could explain why large-scale firms benefit more from openness. Consider the case of Big Pharma, a term used to refer to the global pharmaceutical industry,⁵ the company-originators of medicine. The questions that currently attract attention are: should Big Pharma waive IPR for COVID-19 vaccines? Should strategic patenting—the practices of Big Pharma companies to extend the breadth and duration of patent protection delay or block the market entry of generic companies—be limited or restricted? Big Pharma is one of the most powerful industries in the world. The global revenue for pharmaceuticals was over \$1 trillion in 2014. But nowhere else in the world is the LSS so powerful as in the US. Six of the top ten world pharmaceutical companies in 2017 had their headquarters in the States. These include Johnson & Johnson, Pfizer, Merck, Gilead, and Amgen. Proponents of the waiver have suggested that the monopoly of Big Pharma for vaccine development is unfair, considering that taxpayers funded most COVID-19 vaccines (Okereke, 2021). Another issue is the practice of strategic patenting used by pharmaceutical companies to delay or even block generic competition by extending the breadth and duration of originator patent protection and detaining or blocking the market entry of generic medicine (Gurgula, 2020). Generic companies are companies producing generic pharmaceutical drugs that contain the same chemical composition as patented substances. When a pharmaceutical company first markets a drug, it usually protects it

⁵ About patents and pharmaceutical industry see Jacob (2009).

with a patent. That means that until the patent expires, a company can use a patent to exclude competitors by suing them for patent infringement. In most cases, generic products become available after the patent protections afforded to the drug's original developer expire. Once such medicines enter the market, competition often leads to substantially lower prices for both the brand-name product and its generic equivalents.

The state heavily regulates the pharmaceutical industry, and the interests of the pharmaceutical business and society often compete. The pharmaceutical sector involves multiple actors, including originators, marketing authorisation bodies such as the European Medicine Agency (EMA) in the EU, and the Food and Drug Administration (FDA) in the US, generic companies, doctors, pharmacies, and patients. Originators play a crucial role in developing new and improved medicines for the benefit of society. Generic companies contribute to society by supplying cheaper equivalents of the originators' medicines reducing drug prices and easing access to affordable medicines. If the balance of interests between the originators and generic companies changes towards one of the players, society loses, as there is insufficient access to either innovative or affordable medicines. Therefore, both pharmaceutical innovation and generic competition must be duly incentivised and protected. To protect these significant efforts and investments, pharmaceutical companies rely heavily on the exclusivity granted by IPR, and more specifically—patents. Once such patent protection expires, other companies may develop generics of a branded drug and start competing with the originator for the market. This type of competition is called generic competition (Gurgula, 2020).

While, in the past, originators protected their products with a single patent covering an active compound, nowadays, they increasingly seek more patent protection on various aspects of a drug to protect their market position. A pharmaceutical company may want to obtain secondary patents, which may protect the process of drug manufacture, formulation, specific form, etc. Therefore, even after the basic patent covering an active compound expires, a drug may still be protected by other secondary patents. Additional patents may result in the extension of the scope and length of the protection of a product, especially if secondary patents have a later expiration date than the basic patent. While such patenting strategies by originators are lawful in principle, some approaches may be problematic. In anticipation of the loss of patent protection, originators may engage in strategic patenting that artificially prevents generic competition and results in an extension of their market monopoly. In recent years, pharmaceutical companies increasingly relied on the strategic use of the

patent system to combat the pressure of generic competition. Such practices are often called life cycle management by originators. A central element of any life cycle management strategy is to extend patent protection beyond the original patent term for as long as possible by filing secondary patents, which are effective for keeping generics off the market. As a result, despite the alleged surge in investment into pharmaceutical R&D, current statistics show that the number of breakthrough medicines is decreasing. On the other hand, the number of modifications to existing medications is growing, proving that pharmaceutical companies have been increasingly focusing their research on incremental drug development rather than breakthrough innovation (Gurgula, 2020).

INNOVATIONS IN SMALL- AND MEDIUM-SIZED FIRMS

In contrast to large companies, research on open innovation in SMEs has focused on the challenges firms face when engaging in open innovation. Many of these difficulties can be categorised into, for example, a lack of funding or resources. That, in turn, affects manufacturing, distribution, marketing and R&D capabilities or the recruitment of researchers. These difficulties are a direct result of the relatively small size of the organisation compared to large entities. Other difficulties are also a result of the size of an organisation, albeit indirectly. SMEs face financial burdens, such as the inability to finance research or in-house R&D departments. Open innovation can also turn out to be expensive. SMEs are rarely able to afford the direct employment of legal or patent experts and need to look outside the company for professional advice when engaging in open innovation activities. Hence, IPR offers SMEs opportunities for scaling their R&D activities which would not be feasible without protection options (Brem et al., 2017).

Research suggests that open innovation positively impacts SMEs' performance, but this impact only occurs when coupled with suitable IPR. SMEs tend to focus on patenting rather than on alternative options. However, IP protection through industrial designs and trademarks can also be favourable for SMEs' performance. Trademarks and copyright moderate the relationship between open innovation and firm performance. The performance is higher when SMEs use trademark protection. In some cases, the costs of IP protection related to open innovation possibly offset the resulting profit for SMEs. Small companies rarely use IPR

as a strategic tool because the patent system is often designed for large companies and, at the same time, is much less attractive to SMEs (Brem et al., 2017).

The reasons for not using IPR in the case of SMEs include the following (Athreye & Fassio, 2018):

- innovation is not eligible for patent protection
- a patent would be difficult to enforce
- innovation is not new to the market
- cost of a patent application is too high
- infringement of a patent would be difficult to detect
- a patent was not relevant
- a patent would have disclosed too much

It is often more problematic to advise SMEs on how to utilise IP to their advantage as they do not benefit from IP in the same way as larger firms, especially in open innovation. Research is necessary to understand how small firms can overcome the limitations related to the availability of resources and knowledge of IP management practices and strategies.

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The Protection of IP

Abstract This chapter will review how IP is globally protected and the impact of IP, which is left unprotected in different business contexts. It will discuss whether regulation offers the same level of protection across different IP contexts.

Keywords Property rights • IP laws • International treaties • Piracy • Digital economy

WHY DOES IP NEED PROTECTION?

In Chap. 2, we discussed the creation of IP through R&D and innovation, and whether or not IP systems exist to encourage or protect innovators was considered. But why do they need protection? Economic theory explains that the production of new ideas is associated with market failures—the inefficient distribution of goods and services in the free market. One of the most typical market failures can be attributed to the case of public goods. In economics, a public good refers to a commodity or service made available to all members of society. Nobody can be excluded from the use of a public good, and, in contrast to a private good, it can be consumed by more than one user. Examples of public goods include education, healthcare, street lighting, public roads, water, and public television. Applying to innovation: if someone invents a useful novation, other

persons can simply copy and produce it, and, in this way, more than one person (or the public in general) can use and consume it. The IP-based economic model uses property rights as instruments of exclusion and, consequently, guarantees a market monopoly. Market failure generates *a problem of appropriability* that innovators face a high risk of appropriating only incomplete returns from their activities that sometimes even does not cover all their costs. Therefore, government intervention with relevant legislation is necessary to correct this weakness.

Economic theory, therefore, explains that IP law attempts to find the best possible compromise between:

- investment considerations or *dynamic efficiency* (how to provide the right incentives to create and innovate)—private interests

and

- *static efficiency* considerations (how to promote the diffusion and the wider use of the results of creation and innovation)—public interests (Belleflamme & Peitz, 2015).

IP law grants exclusive rights for a limited period to keep a balance between these two conflicting problems.

An externality is another problem with innovations. It can be defined as a benefit to a third party that arises as an effect of another party's activity. Spillovers can be outward or inward. In the case of outward spillovers, firms are the source of innovation whose generated knowledge spills over to rivals. In the case of inward spillovers, firms are the receivers of innovation spillover and enjoy the benefits of externally generated knowledge from other firms' innovative activities (Entezarkheir & Moshiri, 2021).

THE DEGREE OF PROTECTION FOR DIVERSE TYPES OF IPR

Traditional forms of IP are patents, copyrights and trademarks, and non-traditional or new forms of IP that have become popular more recently include designs, domain names, circuit layouts, confidential information, plant varieties and trade secrets. In Chap. 1, we discussed that the IP protection legislation, which is targeted at different subject matters, generally distinguishes among separate IP regimes. On the one hand, patents, trade secrets, design rights and trademarks are enforced to protect *industrial*

and scientific property (such as inventions, processes, machines, brand names, and industrial designs). On the other hand, copyright concerns *literature and artistic fields*: literary, musical, choreographic, dramatic and artistic works (such as novels, poems, plays, films, songs, drawings, paintings, photographs, sculptures, and architectural designs).

Let us look closely at the two most typical IPRs—1) protecting industrial property (patent) and 2) copyright, concerned about the author's rights. Patent law provides inventors with a *strong and broad* form of protection, but over a relatively *short period*. By contrast, copyright law affords *a weaker and narrower* form of protection. It merely protects expression, not the underlying ideas but for a longer period. Broad protection means that potential competitors have to invent relatively different applications to obtain a patent. Some important terms are:

- litigation costs refer to the overall amount of money spent on a lawsuit.
- moral right is concerned with the natural rights of the author in their creation to secure their economic interest but also protects works against unauthorised use.
- rights of attribution (or paternity) are the right to be identified as the author of a work.
- inventive step is a test that ensures that the novel feature of an invention is not trivial and adds a useful technical effect.
- width of patent or copyright means the difference between competitive products. For example, if a company invents a new drug to alleviate a heart condition, how similar a drug should a competitor be allowed to sell? If a computer software firm markets a new program, how different should any rival product be required to be? (Klemperer, 1990).

IP AND COMMON LAW IN THE UK

The various forms of IP discussed above have their roots in common law—the law developed based on the decisions of the English and Scottish courts. There are two primary forms of common law IP protection: passing off and breach of confidence. *Passing off* is the protection of trade symbols. It allows a trader to prevent a competitor from passing off their goods as if they were their own. The usual question in passing off actions is whether, in marketing goods or services, one party has employed an

identifying device or badge associated in the market with another party or parties. What needs to be to succeed in a passing-off action are as follows: (1) first, in the mind of the purchasing public, there must be *goodwill or reputation* attached to the supplied goods or services; (2) second, a party must demonstrate a *misrepresentation* (whether or not intentional) leading or likely to lead the public to believe that goods or services offered by him are the goods or services of the plaintiff; (3) third, a party must demonstrate that they suffer or is likely to suffer *damage*. This definition, with its trilogy of goodwill, misrepresentation and damage, provides an excellent basic structure for an account of the typical case of passing-off, where one trader sells goods or services in the guise of another trader's goods or services. The definition of passing off assumes that it must occur in a business context. *Breach of confidence* prevents the use and disclosure of confidential information. For example, in employment cases, there should be a careful balance between protecting the employer's trade secrets after the employee has left and the ability of the employee to move on and utilise their acquired skill and knowledge (Brown et al., 2019).

STRENGTHENING INTERNATIONAL PROTECTION OF IPR

Under US and European initiatives, IP protection has been strengthened, broadened and harmonised internationally. In the early 1980s, legal and procedural reforms in the US provided stringent protection to holders of existing patents. The European Patent Office (EPO) granted the first European patents in 1978. A unitary European patent (superseding national patents) and the Unified Patent Court establishment are still under ratification by the EU countries.¹ Broadening IP includes new categories of inventions protected through an extension of patent protection to software, business methods, genetic inventions, semiconductors, and databases. Finally, the TRIPS Agreement of 1994, negotiated within the framework of the WTO, represents a further advance towards the harmonisation of IP laws. It includes a general definition of patents, which adopts US criteria and, thus, broadens the scope of patentable inventions internationally. Furthermore, the US and the EU repeatedly concluded bilateral agreements with their trading partners to coerce them and significantly strengthen their IP rights regimes.

¹The new system may be expected to start operating in late 2022 or early 2023.

Let us consider a case of argument against the extension of copyright terms in the USA in 1998. The Copyright Term Extension Act extended the duration of existing US copyrights by 20 years to the life of the author plus 70 years, and for works of corporate authorship to 120 years after creation or 95 years after publication, whichever endpoint is earlier. In 1999, a group of commercial and non-commercial interests who relied on the public domain for their work challenged its constitutionality. In 2002, 17 economists (among them five Nobel laureates) supported the petitioners by sending a special brief to assist the court in deciding the matter. They argued that it is highly unlikely that the economic benefits from copyright extension outweigh the costs. The economists argued that the revenue earned during the additional years of protection is heavily discounted. At the same time, the extension of protection generates a cost to society when the socially optimal quantity of a good or service is not produced (in this case, a good protected by copyright is not available for all of society). Despite this support, the Supreme Court found against the petitioners (Belleflamme & Peitz, 2015).

The patent system is designed to protect industrial property, such as inventions, processes, and machines. Yet, a wide range of other productions suffer from the same appropriability problem as industrial innovations but are not covered by the patent regime. The creation of literary, musical, choreographic, dramatic and artistic works (such as novels, poems, plays, films, songs, drawings, paintings, photographs, sculptures, and architectural designs), including digital business models, is protected by copyright. Although copyrights and patents are based on the same rationale, they involve a different balance between static and dynamic efficiency considerations: the protection offered by copyright is longer but narrower than the protection by a patent. Copyright applies to the expression of works, in whatever mode or form, and gives authors an exclusive right over the reproduction, performance, adaptation and translation of their work. Compared with patents, this protection is narrower, as only the expression is protected, and the underlying ideas are not protected. However, copyright is applied over a more extended period.

IP PROTECTION IN THE DIGITAL ECONOMY

Digital technology and the Internet have recently altered industries producing copyrighted goods and the way people use and enjoy these goods. The digital revolution has modified the interaction between copyright

holders, technology companies and consumers. That change presents new challenges for our understanding of IP protection.

IP laws are effective only if they are duly enforced and respected. Violation of IP protection in the case of copyright-protected goods often takes the form of piracy, including commercial and end-user piracy. The profits of copyright owners started to decrease when end-user piracy increased around the year 2000. As a result, sales of compact discs in the music industry dropped significantly. Studies investigating this phenomenon concluded that, instead of the legal purchase of goods, some customers engaged in illegal purchases to access the products (if counting any download as a lost sale). At the same time, studies found that customers would not be able to legally buy most illegally consumed goods because the legal price was too high.

Several studies have proved the positive effects that piracy may have on the profits of copyright owners (Harbaugh & Khemka, 2010; Peitz & Waelbroeck, 2006):

- a digital product can play a sampling role by attracting consumers and driving them to purchase a legitimate copy later.
- digital products generate network effects²—for example, a blog with many followers, the English language as a lingua franca in the business environment, etc.
- piracy can increase the demand for goods that are complementary to the pirated content (for example, tickets for the concert of an artist whose songs were pirated).

Digital technologies, such as blockchain technology, have significantly changed the context of the entertainment and media (E&M) industry. The blockchain is an unchangeable distributed³ digital ledger created to record cryptocurrency (bitcoin) transactions. In the case of the E&M industry, this technology presents an opportunity to exploit IP rights within the digital economy. PWC projected that, that in the UK, E&M industry revenues will rebound by 9% between 2020 and 2021 following the dip triggered by the pandemic—and will keep rising at a compound

²Network effects mean the situation when for the individual user, the benefit from the product increases when more people use it (Bhatia et al., 2017). For details, see Chap. 7.

³Unchangeable means a transaction or file recorded cannot be changed. Distributed means that digital records of transactions or data are stored in multiple places on a computer network.

annual growth rate (CAGR) of 5.4% to reach £87.6 billion in 2025 (PWC, 2022). The industry heavily relies on artistic creations, which implies that this industry is bounded by IP laws, in particular copyright. At the same time, the industry has experienced the transition to the digital economy and, in particular, the use of blockchain technology such as non-fungible tokens (NFTs). *Token* stands for something that can be transferred on a blockchain. While bitcoin and other cryptocurrencies are *fungible* tokens similar to cash (i.e., one token is much the same as another token of equivalent value), *non-fungible* stands for a unique asset. Overall, NFTs are assets carrying a unique digital identity that can be traded between users (such as a company,⁴ an institution, an artist, or a collector) on a public blockchain. NFTs tend to be associated with artwork but also with trading cards, comic books, sports collectibles, games, digital and in-person experiences, etc. NFTs can act as proof of ownership as they can be instantly and easily verified on the blockchain. Digital and in-person experiences may involve the future use of an NFT to unlock access to a digital or in-person gallery or event for a specific artist, with the NFT acting as a ticket or pass to grant access. Through exclusive experiences that can be virtual, in-person or both, NFTs can empower creators to connect directly with fans or collectors on online marketplaces or to permit exchanges personally between individuals. Like the traditional E&M industry, NFTs provide several IPR-based benefits, such as royalties for artists. NFTs can be programmed with royalty features that reward artists for every sale in specialised marketplaces such as Tezos, Rarible, Nifty Gateway and OpenSea, allowing artists to get royalties for secondary marketplace sales if their work is resold (Tezos, n.d). Any valuable physical object can have its NFT virtual twin. NFTs offer four main types of affordances: virtual assets, e.g., virtual arts and games; hybrid assets, e.g., virtual tickets and music albums with a physical presence; a physical/virtual interface, e.g., sneakers and watches with a virtual presence; and a metaverse⁵ asset, e.g., a weapon, skin, or land within the metaverse (Ball, 2022; Chandra, 2022).

⁴Companies including Balenciaga, Louis Vuitton, Gucci and Givenchy have sold NFTs ranging from branded digital art, games and game characters to virtual fashion items. Clinique offers an NFT in a bid to drive loyalty and add marketing weight to its top products (McDowell, 2021; McDowell & Schoaib, 2022).

⁵The Metaverse is an expansive network of persistent, real-time rendered 3D worlds and simulations that support continuity of identity, objects, history, payments and entitlements and can be experienced synchronously by an effectively unlimited number of users, each with individual sense of presence (Ball, 2021 cited by Robertson & Peters, 2021).

NFTs have been enthusiastically adopted by creative industry entrepreneurs (CIEs), including creators such as musicians, artists, designers, photographers and ventures who operate in the broader ecosystem by supporting the production and distribution of creative goods. These include art galleries such as Sotheby's and Christie's, recording labels, investment firms, production companies, publishers, and stock image hosts. Digital affordances define the entrepreneurial potentialities of NFTs. That is the possibilities they might offer to perform new or existing functions or actions differently. Digital assets are characterised by infinite expansibility and non-rivalry in use, and this creates difficulties for CIEs because enforcing copyright law at scale has been challenging (Chalmers et al., 2022). However, NFTs' ability to confirm a digital record of ownership might have some use as evidence of property rights and, therefore, can be classified as a type of IPR. Overall, NFTs allow a company to access additional revenue streams on their copyrighted assets that otherwise are not generating any or just low revenues. Companies and individuals have continued to explore new and exciting ways to utilise NFTs with varying levels of commercial success, and its uses will continue to emerge. NFTs present many new opportunities for businesses if they are willing to be creative and commit to understanding the digital economy. However, it also presents some challenges with IPR. According to existing contracts, artists or creators are often not the owners of those rights or can license them based on standard pre-digital contractual arrangements with their record label or film studio. There may be room for disputes about ownership rights in particular cases as historical contracts may not be able to allocate relevant rights to one party or another. For example, Miramax recently brought claims of breach of contract, copyright and trademark infringement against Quentin Tarantino following his sale of NFTs based on scanned images of his original handwritten script for the *Pulp Fiction* film (Raustiala & Sprigman, 2021).

Chandra (2022) applies the theory of social construction to conceptualise NFT-enabled entrepreneurship. This theory, as suggested by Alvarez and Barney (2007), contends that when entrepreneurs act to exploit socially-constructed opportunities,⁶ they interact with an

⁶Socially constructed are opportunities that are not assumed to be objective phenomena formed by exogenous (external to a system) shocks to an industry or market but, instead, they are created endogenously by the actions, reactions, and enactments of entrepreneurs exploring ways to produce new products or services).

environment—the market—that, itself, is a social construction formed out of the perceptions and beliefs of numerous other individuals. Based on this theory, Chandra (2022) explains how external enablers (i.e., technologies and communities) and entrepreneurial agencies combine, and the result is an NFT-enabled entrepreneurial idea that leads to action. That enhances several mechanisms (e.g., generation, compression and elimination) that shape artefacts, ventures and institutions, which, in turn, inform the technologies, communities and agencies.

The music industry is another industry that relies on IPR and is undergoing digital transformation. In the new streaming music services landscape, music is predominantly recorded and consumed digitally. Digital music platforms such as Spotify, Apple Music, or YouTube connect content makers to consumers. Firms developed new digital business models as a response to IPR infringement. For example, the first answer to falling compact disc (CD) sales was to organise music distribution online. At the forefront was the iTunes Music Store operated by Apple, which opened in 2003. These legal online channels for digital music allowed consumers not only to find and download music as simply as via illegal ways but also to start buying individual tracks instead of being forced to buy albums. That may explain why online legal digital music sales suffer less from piracy than physical sales. New business models in the music industry also offer market solutions to increase revenue from the segment of consumers with a low willingness to pay for music and with, therefore, a high disposition to digital piracy. Streaming services such as Spotify adopted a freemium model, which combines free and premium paying services. After nearly two decades of piracy-driven decline, the industry started demonstrating growth. It took the industry more than ten years to enter the digital era by allowing the iTunes Music Store to access its music catalogues. And it required several more years to accept business models that consider the economic specificities of digital goods, such as models based on unlimited access with a flat rate (Moreau, 2013).

According to the Global Music Report 2022 by the International Federation of the Phonographic Industry (IFPI), global recorded music revenues amounted to \$25.9 billion in 2021, an increase of 18.5% compared with 2020 (IFPI, 2022). The major players in the industry are traditional investors such as record labels and music publishers and music royalty funds that invest in acquiring existing music rights with a history of stable income. The product—music, including lyrics, composition and sound recordings—is protected under copyright law. The music industry

is a highly concentrated oligopoly industry with a competitive fringe dominated by three major labels. These three major players—Universal Music Group, Sony Music Entertainment and Warner Music Group—have a dominant share of the music recording market. Similarly, the three largest music publishers—Sony, Universal Music Publishing and Warner Chappell Music—maintain a dominant share of the music publishing market. Independent labels, also frequently known as indie music or simply indies, deal with music produced independently from major commercial record labels. A process that may include an autonomous or do-it-yourself [approach](#) to recording and publishing or working with music publishers focused on the search for new talent and their promotion through the distribution networks and their marketing resources.

The most common types of IP in the music industry are a copyright, trademarks, patents and trade secrets. However, the focus is on copyright. Every song has two basic types of copyright attached to it—one for the composition and one for the song recording. The songwriter and publisher own the composition copyright from the point of creation. The sound recording copyright is owned by the artist who recorded the song and by the record label. Neighbouring rights (performance royalties) are payments due to the owner of the sound recording (typically the recording artist and the label) for the public performance of the song. Royalties for neighbouring rights are collected by major international collection agencies, as is the case with performance rights. The performing right refers to the right to perform the composition associated with a given song in public. It is part of copyright law and demands payment of neighbouring rights to the music's composer/lyricist (writer share) and publisher (publisher share), with the royalties generally split 50/50 between the two. Overall, technological advances driven by streaming have changed the music industry over the past five years and have resulted in a period of growth. While COVID-19 has created several challenges, the industry is holding up relatively well, with several new licencing opportunities on the horizon. As a result, investment is flowing into music IP, with new licencing options for music IP owners, such as short-form videos on TikTok, Facebook and some other platforms that are starting to license music IP from rightsholders.

Simon (1996) described five principal characteristics of digital environments which make strong IP protection an indispensable element of any business activity:

IPRs are critical for the content developed and made available over telecommunication networks such as the Internet and other communication networks.

- creators, resellers and service providers must be sure that the content will not be misappropriated.
- the content is transmitted throughout the infrastructure network of computers interacting with computer programs.
- users may reproduce material from a provider's equipment, downloading or accessing the content temporarily.
- even if a particular product is available only for online use and the purchase method is different, the IP issues are generally similar to those pertaining to accessing traditional content.

The software can be protected under patent, copyright and trade secret laws. There are quite different trends in software IPR protection, with firms in the software industry preferring copyrighting, whereas firms in the manufacturing industry prefer patenting (Suh & Hwang, 2010). Traditionally, computer programs in most countries have been protected by ordinary copyright law.⁷ There are differences between countries in their options for IPR protection in the software industry. For example, the USPTO grants more software patents than the EPO. In the EU, computer programs are not regarded as inventions 'as such,' according to the European Patent Convention. EPO (2013) states that computer software will only be patented if a computer-implemented invention solves a technical problem 'in a novel and non-obvious manner' (EPO, 2019). Overall, two types of copying in the software market exist—reverse engineering⁸ and software duplication. Copyright protects software from being copied. But software producers cannot prevent reverse engineering if they do not protect software by a patent. Reverse engineering is copying by rival

⁷ Patent laws in the UK and throughout Europe specify a non-exhaustive list of excluded things that are not regarded as inventions. This list includes programs for computers. Despite this, the [United Kingdom Intellectual Property Office](#) (UKIPO) regularly grants patents to inventions that are partly or wholly implemented in software.

⁸ Reverse engineering is the process of analysing a subject system to identify the system's components and their interrelationships and to create representations of the system in another form or at a higher level of abstraction in which the subject system is the end-product of software development (Chikofsky & Cross, 1990).

producers that use innovative technology by involving reverse engineering if that technology is not patented (Arai, 2018).

Overall, the software industry is challenging for IPR protection. Technology companies are part of a different culture (including the hacking culture) often associated with agility, flexibility and rapid change. For example, different views regarding software ownership in a hacking sub-culture exist, demonstrating differences in opinion concerning the topic of IP. The hacking ethic promotes cooperation, sharing and community in software development and influences the mainstream business view that fosters competition and the protection of ideas to obtain profits (McGowan et al., 2007). IPR plays a crucial role in preventing software piracy which often occurs when knowledge is transferred between countries, usually in the case of less-developed countries where technologies are employed to imitate, copy or pirate knowledge economy goods created in developed countries.

However, collaborative approaches, such as open-source software, developed due to coordination between numerous individual programmers who donate their time and effort free of charge. It has challenged the traditional views of IP protection in the software industry (Belleflamme & Peitz, 2015). Examples of open-source software are Linux, Firefox and many other software products. Another software industry specific is software development outsourcing—a knowledge-intensive process in which the contracting parties create a bundle of intellectual assets such as functional requirement specifications, business process designs, technology and data architectural plans and algorithm source codes. In these contractual arrangements, IPRs are often allocated between clients and vendors. The issue of IPR allocation is like those in biotechnology development, as discussed earlier (for example, the alliance between the NIH and Moderna to develop the Covid-19 vaccine). However, the outcomes can be different since the software development process is often integrated into the functional activities and interaction between clients and vendors. It makes it more complicated for parties to foresee and articulate contingencies compared to the biotechnology and R&D development sectors. The value and the appropriability of a copyright or trade secrets are also quite different from patent ownership, given that different rules govern these IPRs (Chen et al., 2017).

Video games is another emerging sector within the entertainment industry (Piechówka, 2021) and a relatively new area of IP law, where the protection of products through copyright, patents and trademarks share

similar issues with IP protection in the software industry. Market access is a critical feature within the gaming industry—cross-platform and multi-player gaming can be accessed from any geographical location and requires only an internet connection. This feature has driven the success of the video gaming industry in the last two decades. The scope of the protection varies in national jurisdictions, as there are legal controversies regarding the classification of video games in different countries. According to Lipson and Brien (2009, cited in Ramos et al., 2013), there are three groups of creative elements in video games:

- audio elements, including musical compositions, sound recordings, voice, imported sound effects and internal sound effects.
- video elements, including photographic images, digitally captured moving images, animation and text.
- computer code, including source code and object code such as primary game engine(s), ancillary code, plug-ins or third-party subroutines and comments.

Since the creative elements are subject to copyright laws, the IP has always been at the core of video games. Copyright protection for video games in different countries and jurisdictions is challenging, like for software programs, because video games involve software development (along with audio-visual elements). In some countries, jurisprudence or scholars consider video games as predominantly computer programs due to the specific nature of the works and their dependency on software. In contrast, other countries emphasise the complexity of video games. That implies that video games are given a distributive classification. Finally, a few countries suggest that video games are audio-visual works (Ramos et al., 2013).

As in the case of other quickly developing industries, the video game industry is a challenge for IP protection and laws. It is difficult for legal norms to keep pace with changing technology, so some level of legal uncertainty is unavoidable (WIPO, n.d). It has been suggested that as the entertainment industry is failing to protect copyright, it is necessary to re-think content protection to make it harder to copy the content and for governments to do more to make copyright legislation more effective (Timms, 2005). Technological advancement has made a change in copyright laws even more necessary. Policymakers will likely have to develop new protective mechanisms to defend authors from unauthorised sharing of information and downloads in a digital environment. Technologies

such as blockchain can serve to mitigate the risks of piracy. However, the more legislators and courts recognise that the creative elements of video games are as necessary to protect as those of traditional cultural works, the easier it will be for creators to assess potential risks in advance (Piechówka, 2021).

Digital technology, in particular the Internet, has changed the way authors', composers' and artists' works are reproduced, accessed, communicated and distributed. New technologies have enabled and encouraged more work to be distributed as digital products and through digital communications networks. These technologies have dramatically transformed the structure and economics of the business models under which innovations are used to deliver products. A virtual marketplace for music and entertainment products that now exists in cyberspace is not constrained by national borders. It challenges traditional IPR norms that are typically territorial in nature. Collaborative working arrangements, outsourcing and other forms of alliances create new challenges for IPR protection. The protection of IPR in cyberspace is not yet defined, as new technologies are continuously emerging.

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The Exploitation of IP

Abstract This chapter discusses how licensed IP can be integrated and exploited in a business model and how different sectors benefit from IP rights they haven't created.

Keywords IP strategy • Licencing • Standard essential patent • Franchising • Merchandising

HOW COMPANIES EXPLOIT IPR

Business executives are impressed by the value IP can extract from technologies and want to implement relevant IP management practices. Teece (1986) presented how practitioners in the 1980s viewed the exogenous role of IP in business strategy and noted the convergence in the two fields of management science—innovation and strategic management. Considering recent changes in IP nature resulting from a proliferation of the knowledge economy, IP research 20 years later concluded that appropriability regimes are not given as context but are a part of conscious strategies (Pisano, 2006). Parr (2018) suggested that the management of IP in an organisation can achieve several levels of advancement. A strategy with a simple objective assumes that the protection of profits and markets is the principal objective of a *defensive strategy*. An IP portfolio is maintained to hold competitors in the position of being unable to gain a

competitive advantage. Companies' legal departments are often the central force behind this strategy. They file and maintain patents against competitors, trying to invade the business markets of the company. This strategy has evolved because traditional *barriers to entry*¹ have deteriorated. The next step up from a defensive strategy is a *cost centre strategy* that assumes the cost allocation for maintaining the IP portfolio among the different business units that benefit from the portfolio. The assessment of business unit managers, including their salary, bonus and career, depends on the profitability of their business units. At the next management level, the goal for the *profit centre strategy* involves producing income directly from the IP portfolio. Generally, defensive goals are still part of the overall strategy, but this is where income-producing goals additionally come into play. The new objective involves the generation of income directly from the company's IP. It can be accomplished by licencing patents, trademarks and copyrights inside and outside the industry and the sale of IP assets sale. The *integrated management strategy* adds to the defensive, cost-saving and profit objectives, the concept of making strategic decisions regarding IP. These decisions may involve entering joint ventures and strategic alliances and establishing universal industry standards. Cost-saving and profit centre goals continue to be essential, but at this stage, the business management models are making IP an integral part of the overall corporate strategy. It becomes the driving force behind major decisions. Finally, when a company gets to the *visionary strategy* level, the IP portfolio becomes the foundation for the company's future—and possibly for the rest of the industry. The strategy takes a global view, wherein some units invent and others manufacture, but both get involved in the global value chains benefiting from innovation. This strategy not only brings the company forward but also creates new markets for its products and services (Parr, 2018).

So, how do companies exploit IPR, and what strategies do they apply in practice? Let us consider the case of Nokia. The company has one of the broadest patent portfolios in the ICT industry. For more than 30 years, Nokia has produced many of the fundamental technologies used in virtually all mobile devices, including consumer products, IoT-connected industrial equipment, and vehicles. Nokia has played an instrumental role in enabling complete solutions and ecosystems through GSM, LTE and

¹Barriers to entry are impediments that make it more difficult for a firm to enter a market (OECD, 2007).

5G telecommunication standards leadership. The number of Nokia patents is as follows:

- €130bn invested in R&D since 2000, including around 4.1 billion euros in 2020
- ~20,000 patent families
- 1500+ patents filed on new inventions in 2020
- 4300+ declared cellular standard essential patent (SEP) families
- 4000+ patent families declared essential to 5G, with more to follow
- ~200 patent licensees across all programs, including most major smartphone vendors and many automotive brands.

Nokia can enable a business to access the patented technology it needs and has dedicated teams and licencing programs for four industries: mobile devices, consumer electronics, automotive and the IoT. Nokia currently has around 200 licensees provided with IP through the patent licencing programs. Nokia's experts can help a business enter into license agreements for its SEP portfolio to add standards-compliant connectivity and video processing to its products (Nokia, n.d.). Legal experts highly recommend signing a written licencing agreement, as it creates a formal legal relationship between the licensor and the licensee. In addition, the licencing agreement should clearly define the scope of protection and licensee rights, thereby avoiding possible future disputes. The company intending to enter into such business can find an example of licencing agreement proposed by Nokia on their website. For companies new to this type of legal arrangement, Nokia also offers helpful guidance and information (through a Q&A section) to help potential licensees assess their licencing needs and understand how to conduct licencing negotiations.

As can be seen from Fig. 4.1, Nokia owns different types of IPR. Depending upon the type of property involved, the licencing of such IP differs. For instance, if the property to be licensed is a technological invention or knowledge, then the licencing of such property is often referred to as patent licencing. Similarly, if the property to be licensed is software, such licencing is referred to as software licencing. In the same way, if the licensee obtains a license for using the brand name or the trademark of another company with a well-established brand image, then the act of doing so is called trademark licencing or merchandising. A franchising agreement employs licencing the entire marketing concept. We will discuss these types of arrangements below.

Nokia, Nokia Connecting People, Ascent, Axta, Bantumi, The Big Roll In Paradise, Booklet, Bounce, Bounce Boing Voyage, Car Stars, Club Nokia, Comes With Music, Cseries, Dance Fabulous, Defend Your Turf, Dirk Dagger, E50-E99, Eseries, Friendstalk, Hooked on, Human Technology, Intrigue, Life Goes Mobile, Luna, Maemo, Magic Draw, Mail For Exchange, Make a Connection, Mega Monsters, Meta-Hop, Mile High Pinball, Mobile Deck, Mobira, Mobiledu, Monsn, Mupe, Mural, N70-N99, Navi, N-Gage, N-Gage Anyone Anywhere logo, N-Gage logo, Nokia Connecting People logo, Nokia Gol, the Nokia Hands animation, Nokia Mashups, Nokia Mediamaster, Nokia Messaging, Nokia Money, Nokia OK logo, Nokia Original Accessories logo, Nokia Original Enhancements logo, Nokia Remade, Nokia Traffic Service, the Nokia Trends animation, Nokia Trends logo, Nokia Tune sound mark, Nokia XpressMusic, Nitrospin Racer, Nseries, ONE logo, Ovi, Ovi Prime Place, OZ, Point & Find, Pop-Port, Preminet, Privacy by Design, QT, QT logo, Reset Generation, Ringo, Rotation, S60, S60 and logo, See new. Hear new. Feel new. Series 60, Sirocco, Smartcover, Smart Messaging, Snakes logo, Space Impact, Surge, System Rush, Tippit, Triple Pop, Trip Line, Twist, The V Collection, Vertu, Vertu Constellation, Virtually Board, WE: logo, WiFi Network logo, Works With Nokia fig, XpressMusic, Xpress-on, XpressRadio, XpressRadio fig, Xseries, Yamake, أختي بلا حدود, 乐随享, Вмечте c музыкой, 诺基亚, 热舞青春, 生活通 ...

Fig. 4.1 Nokia's trademarks and registered trademarks. (Source: The author's depiction of the information from the company website)

LICENCING PRINCIPLES

Licencing is when IPR transfers the right to exploit them to another party while retaining ownership. It is a *business arrangement* in which one company grants another company permission to use their IPR for a specified payment:

- opposed to a sale agreement when the ownership is also transferred.
- licencing is contracted through a legal agreement, usually called a license agreement
- a company could “license-out” IP, “license-in” IP or enter into cross-licencing agreements where each company licenses in and out IP.

The fundamentals of the license agreement are as follows:

- who and what—relates to parties involved and subject matter in terms of what specifically is being licensed.
- extent—exclusive, non-exclusive or sole (licensor and licensee can operate in the territory)

- the field of use—a defined area of permissible operation by the licensee, for example, manufacturing patented engines only for incorporation into trucks; territory where the agreement is at work.
- sublicences and to whom they can be granted, what rights they have, what sort of control over these transactions the licensor has, whether prior written approval is necessary from the licensor, and what happens when the agreement ends.
- best effort—an obligation by the licensee to spend agreed amounts on activities to increase the likelihood of success; it is better to specify actions, such as marketing actions, etc.
- in case of third-party infringements related to the licensee, a licensing agreement needs to specify actions taken by the licensor, including actions taken jointly with the licensee or adjustments made in case of infringement by the licensee.
- financials—how much and how the royalties will be paid; lump-sum, royalties (per unit sold or % of revenue) or annual minimum royalty.²

It is critical to be attentive to the license terms that give rise to a royalty rate taken from the market. If licence agreements transfer only a part of the full rights of ownership (e.g., the licensor keeps the right to exploit the IP itself or to license to others), the payment for those limited rights (royalties) may not be adequate to the full economic benefits of ownership.

Due diligence can be a part of some agreements, for example, franchising, to ensure that all conditions are fulfilled. It is an investigation or an audit that is often expected in case of the following business events:

- entering a new business combination (merger, acquisitions)
- starting joint ventures or other partnership arrangements (including license agreements)
- as a result of lender or investor requirements
- regulatory compliance requirements
- litigation

The aim of the licence agreement should be mutual benefit to all sides involved (a so-called win-win situation). It is necessary to build the team—the leader needs support from technical, legal and financial specialists.

²The most common royalty rate is 5% of sales.

Remember that licencing is an ongoing relationship: reporting, audit, visits, and assistance will be necessary after the agreement is signed.

SPECIFIC TYPES OF LICENCING: TRADEMARK LICENCING, FRANCHISING AND MERCHANDISING

As was discussed in earlier chapters, IPR is territorial in nature, i.e., a specific IPR does not necessarily exist in all countries but only where it was sought. Protection by IPR is necessary for technology, or another kind of expression of human creativity, to be considered a property owned by someone. Otherwise, the issue of licencing does not arise. Therefore, licencing is only relevant where there is a protected IPR. Some countries require such agreements to be approved by government authorities, and other may require licencing agreements to be registered with the relevant authority.

Many products that we rely upon are manufactured under license. In this case, quality control is essential to meet consumer expectations, and the use of the trademark assures customers of source and quality when products are produced under a license agreement. As IP can take various forms, so too can licence agreements. There are specific types of trademark licencing, such as franchising or merchandising:

- trademark licencing: TM is an indication of the source. Licencing means that the product is no longer original.
- franchising: a specialised license where, in return for a fee, the franchisee is allowed by the franchisor to use a particular business model and is licensed a bundle of IP rights (TM, service marks, patents, trade secrets, copyrighted works...) and supported by training, technical support and mentoring.
- merchandising: this is the licencing of trademarks, designs, artworks, fictional characters (protected by these rights) and real personalities.

There are also assignments when the ownership of trademarks is transferred, i.e., a trademark is sold. The acquisition of Rolls Royce manufacturing facilities by Volkswagen is an example that can illustrate that type of agreement. In this deal, the production has been sold to Volkswagen and the trademark to BMW. Years later, that resulted in BMW owning the Rolls Royce company. The transaction, which took place in 1998, required

four years of cooperation between BMW and Volkswagen regarding production and distribution before leaving BMW with control of the Rolls-Royce trademark and automobile models beginning in 2003 (Buerkle, 1998). Volkswagen received the Bentley models and the factory in Crewe, where both Bentley and Rolls-Royce car lines were produced. That allowed BMW time to build a new Rolls-Royce administrative headquarters and production facility in West Sussex and develop the Phantom, the first Rolls-Royce from the new company. Rolls-Royce Motor Cars Limited became the exclusive manufacturer of Rolls-Royce branded cars in 2003. In September 2014, Rolls-Royce announced the building of a new technology and logistics centre due to open in 2016.

Franchising is a popular business arrangement in industries such as fast food, fashion, restaurants, grocery and some other industries. Franchising assumes that a franchisee receives not only the right to use IP but also the use of the relevant business model, know-how, procedures and processes, IP, brand, and rights to sell its branded products and services. One of the most well-known franchising systems is that launched by McDonald's. It requires a minimum investment of \$500,000 of non-borrowed personal funds to get the franchise. McDonald's IP is protected by a bundle of trademarks, patents and designs, but many patents and designs have expired.

Sanrio's cute cartoon cat, Hello Kitty, generated nearly \$1 billion in revenue in 2002, partly through licencing agreements with more than 500 companies in Japan and hundreds more overseas (Belson & Bremner, 2004). Sanrio Company Ltd. is a "social communication" business founded in 1960. It is now a worldwide designer and distributor of character-branded stationery, school supplies, gifts and accessories and is best known for the Hello Kitty® trademark. Other trademarks include Pochacco®, a white dog with black floppy ears, often dressed in athletic attire, and the slightly naughty Badtz-Maru®. Sanrio was founded by Shintaro Tsuji, who created a line of character merchandise designed around gift-giving occasions. Sanrio Company Ltd. is based in Tokyo and has distribution throughout Japan and Southeast Asia, the Americas and Europe. The well-known face of Hello Kitty and other Sanrio characters are now plastered on 22,000 different products and sold in about 40 countries. Merchandising often relates to fictional characters such as Hello Kitty, personalities and sporting events.

IPR USE IN SPORTS

The sports industry has a growing impact on the world economy, creating jobs, investing in public infrastructure and mobilising resources. The global revenue of the sports industry—comprising sponsorships, gate revenues, media rights fees and merchandising—is expected to grow from \$354.96 billion in 2021 to \$501.43 billion in 2022 at a compound annual growth rate (CAGR) of 41.3% (Businesswire, 2022). A significant portion of the value created in the sports industry is generated through IP-protected activities. Patents encourage technological advances that result in better sporting equipment. Trademarks, brands and designs contribute to the distinct identity of events, teams and sports equipment. Copyright-related rights generate the revenues needed for broadcasters to invest in the costly undertaking of broadcasting sports events to fans worldwide. Through IP protection, sport generates incomes for both, athletes and organisations in several ways. IP rights are the basis of licencing and merchandising agreements that earn revenue to support the development of the sports industry. For example, a sports shoe may be protected by several IP rights (WIPO, n.d.):

- patents protect the technology used to develop the shoe
- designs protect the look of the shoe
- trademarks distinguish the shoe from similar products and protect the “reputation” of the shoe (and the company making it)
- copyright protects any artwork and audio-visual creations used to publicize the shoe (WIPO, n.d.).

The WIPO’s international trademark registration system, known as the Madrid System, enables trademark holders to file a single application for registration in up to 85 countries and to maintain and renew a trademark through a single procedure. Some athletes may use IP rights to control the use of a specific image with which they are associated. The IP system and trademarks play a pivotal role in safeguarding the unique character of sports events such as the Olympic Games and their identifications, including the Olympic symbol, Olympic emblems, the flag, the torch and the anthem.

The academic studies in sports IP are still relatively few in number and mainly explore the topic from the legal perspective (see, for example, the recent book by Spengler et al., 2022, Chapter 9). However, with the most

recent development of the sports industry, including esports as a part of the entertainment industry (Holden & Baker, 2019) and the growing popularity of mega sports events as an entrepreneurial tool and its potential positive effects on the economy (Hayduk, 2019; Maennig & Zimbalist, 2012), this research needs more attention.

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The Evaluation of IP and First Steps in Strategy Formulation

Abstract This chapter discusses how IP is used by businesses, markets and consumers and what impact this has on pricing and revenue. We will see how IP affects markets in different contexts and how it can create market entry opportunities and competition.

Keywords Intangible assets • Intellectual capital • Competition • IP value chain

THE VALUE OF IP ASSETS

IPRs are a part of a company's intangible assets, and the value of these assets can be significant. IP and intangible assets produce economic benefits when integrated within a business enterprise. This fact is reflected in the company valuation by financial markets. Extant research documents that knowledge capital, measured with the stock of R&D expenses and patents, is valued by stock markets: R&D capital and IP capital explain firms' market values (Ben-Zion, 1984; Hall et al., 2005; Hsu et al., 2013). Converting IP into revenues, profits and stock value requires a framework of integrated complementary business assets or resources. Complementary tangible assets are often required to convert IP into a product. These assets are also needed to produce the product, package it, sell it, distribute

it, collect payment and implement the many other business functions required for running a business. IP is an integral part of all these functions.

All these business functions take part in converting intangible assets into business value. The R&D activities can be directly attributed to IP, such as patents and trade secrets, as this function is responsible for the invention of innovative activities undertaken by organisations in developing and designing new products and services and improving existing ones. Here, engineers and scientists develop new and use existing technology to create products. The IP and intangible assets in this business segment include patented and licensed technologies, a workforce of knowledgeable employees, and the tangible assets used by these staff (such as laboratory buildings and equipment) to leverage innovations. Manufacturing and operations (in service industries) departments are responsible for the integration of new technologies developed by R&D departments into products and services and their successful delivery to the market. The manufacturing and operation departments use tangible assets (such as manufacturing buildings and machines, materials, as well as the workforce operating these machines) and materials, along with IP, to produce goods and services. The IP used in manufacturing can include patents related to new technologies integrated into products and unique production methods. Sales and marketing departments use companies' trademarks and brands to promote their goods and services. They employ tangible assets, including office buildings, along with intangible assets other than IP, such as databases of existing and potential customers, big data collected from social media, and relationships with distributors and retailers. Administration includes finance, legal, IT and other departments that support another three business segments. For example, the financial department can be involved in the financial assessment of potential and existing IP, invoicing of licencing and franchising revenues, and calculating profit and losses relating to the financial position of business units, departments and, overall, the company's balance sheet. The legal department reviews legal documents and laws relevant to IP assets and undertakes negotiations, occasionally arbitrations or litigations protecting IP assets. Providing administrative functions requires a knowledgeable workforce and significant investment in the company's tangible assets, such as office buildings and equipment.

In balance sheets, the value of intellectual assets is disclosed under the section on intangible assets (Table 5.1). However, due to their intangible

Table 5.1 The value of intellectual assets on the balance sheet

<i>Assets</i>	<i>Liabilities</i>
<i>Current assets</i>	<i>Short-term liabilities</i>
Cash	Accounts payable
Accounts receivable	Unearned revenues
Inventory of finished products	Short-term bank debt
Raw materials and intermediate inputs	...
<i>Non-current assets</i>	<i>Long-term liabilities</i>
Property, plant & equipment	Long-term bank debt
Goodwill	Bonds outstanding
Intangible assets (Intellectual property)	...
...	<i>Equity capital</i>
	Retained earnings
	Stock

Source: Author

nature and difficulties associated with proving their real value, intangible assets and IP, although present in business, often do not even appear on a company's balance sheet. This asset category might include (Parr, 2018):

- assembled workforce
- contracts
- designs
- customer lists
- software and operating systems
- marketing programmes
- research programmes
- supplier/distributor relationships
- trademarks
- patents
- copyrights
- trade secrets

Case study. Nokia's IP in the Annual Report 2020.

As of 2021, Nokia Technologies is one of the company's four business groups responsible for monetising and growing the value of Nokia's IP and licencing revenue. The company achieves it by investing in innovation, expanding its world-leading patent portfolio, and pursuing other licencing opportunities. The 2020 Annual Report discloses general trends

in IPR licencing as one of the top industry trends—in general, there has been an increased focus on IPR protection and licencing in the market, and this trend is expected to continue. As such, new agreements are generally a product of lengthy negotiations and occasionally through arbitration or litigation, and therefore, the timing and outcome may be difficult to forecast. Due to the structure of patent license agreements, the payments may be infrequent, at times may be partly retrospective, and the lengths of license agreements can vary. In addition, there are regional differences in the ease of protecting and licencing patented innovations. Some licensees actively avoid making license payments, and some licensors use aggressive methods to collect them; both behaviours have attracted regulatory attention. Nokia expects the discussion on licencing regulation to continue at both global and regional levels. As the company predicts, some of those regulatory developments may be opposite to the interests of technology developers and patent owners, including Nokia.

Source: Author based on Nokia (2021) and Nokia (n.d.).

Substantial differences between company book values and market values indicate the presence of assets not recognised and measured in company balance sheets. Intellectual capital assets account for a significant proportion of this discrepancy. Currently, the legislation does not require that companies report on intellectual capital assets, which leaves the traditional accounting system ineffective when measuring the true impact of such intangibles (Brennan & Connell, 2000). However, we know that such assets exist because there is a difference between the market value¹ of a company at a stock exchange and the book value, which is the company price on the balance sheet. For example, International Accounting Standard (IAS) 38 on intangible assets requires companies to value intangible assets at a cost: either at the purchase price (when bought in the market) or at a cost directly attributable to the asset's creation (when created in-house). IAS38 also requires that intangible assets are recognised in company accounts if they are likely to generate future revenues for the company.

The theory has classified IC into three components: human capital, structural capital and relational capital (e.g., Bontis, 1999; Sharabati et al., 2010). Human capital includes employees' competencies, skills,

¹The market value of shareholders' equity is computed by multiplying a share price by the number of shares outstanding at the end of the accounting year.

experience and intellectual abilities. Customer (relational) capital is a type of intellectual capital made up of knowledge in groups and networks of knowledge resources embedded within, and derived from, the relationship between organisations and customers. Structural capital consists of processes, methods, brands, IP structure and other intangibles owned by the entity but hidden in the statement of its financial position. Structural capital includes three elements—innovation capital, protected capital (otherwise known as IP) and process capital. Innovation capital is considered a direct consequence of a firm’s culture and capacity to create new knowledge from existing knowledge. Protected capital includes intellectual assets that are covered by legal protection. Process capital is defined as workflow, operation processes, specific methods, business development plans, information technology systems, and collaborative culture within business organisations (Anifowose et al., 2017).

Since the share price reflects the company’s perceived value, the value in IP is also perceived, i.e., based on someone’s evaluation of the merits of an IP. Value is the representation of all future economic benefits of IP ownership. Both buyer and seller (when selling) or the owner and shareholders (when creating) consider the future economic advantages of owning the property rights and agree on their present value. Over time, the sale transaction price never changes, and the cost remains the same. The rights market value, however, is subject to continual change as the future benefits increase or decrease over time. As a result, an opinion of value can be expressed only relative to a given moment or “as of” a specific date (Parr, 2018).

IP AND MARKET STRUCTURE

A broad scope of IP rights can create opportunities for entering a new market, innovation and competition. To understand how IP affects markets, as a first step, we need to define existing market structures. In a standard textbook on microeconomics or industrial organisation, the economic discipline suggests that there are four main market structures:

- *perfect competition*: is a market structure where many firms sell similar products and profits are virtually non-existent due to fierce competition.
- *monopolistic competition*: characterises a market in which many firms offer similar products or services but not perfect substitutes.

- *oligopoly*: a market structure in which a few firms dominate
- *monopoly*: can be considered an extreme case where an entity has total or near-total control of a market.
- in *perfect competition*, companies sell identical products, supply and demand set prices, market share is spread to all firms, buyers have complete information about products and prices and there is low or no barriers to entry or exit. In the real world, there is no such thing as perfect competition. Most likely, markets are represented by imperfect competition, which occurs when at least one condition of a perfect market is not met.

Chapter 3 discussed the public good, the nature of knowledge and innovation, and its association with market failure arising from the inefficient distribution of goods and services in the free market. A market failure (like in the case of public goods) is often the reason for self-regulatory organisations, governments or supra-national organisations' interventions to 'correct for market failure'. IPR and antitrust laws² are the forms of government intervention to correct certain types of market failure. Antitrust and IP are perceived as complementary bodies of law that work together to bring innovation to consumers (Oliveira & Fujiwara, 2007). Antitrust laws ensure robust competition in the marketplace, and IP laws protect the ability to earn a return on the investments necessary to innovate (US Department of Justice and the Federal Trade Commission, 2007).

Concentration within an industry can be defined as the degree to which a small number of firms make up for the total production in the market. If the concentration is low, it simply means that the top firms are not influencing market production, and the industry is highly competitive. High concentration means a monopolistic market and weak competition. The effect of concentration on innovation follows an 'inverted U' shape. Too little competition or too much competition hinders innovation (area A in Fig. 5.1 indicates the market structure where innovation and competition move together, and firms have a considerable level of market power). Increasing competition, for instance, by lowering barriers to entry, encourages innovation (Aghion & Griffith, 2005; Bennett, de Bijl,

²Antitrust laws ensure that new proprietary technologies, products and services are bought, sold, traded and licensed in a competitive environment. They are designed to foster competition by prohibiting anticompetitive mergers, collusion and exclusionary uses of monopoly power (US Department of Justice and the Federal Trade Commission, 2007).

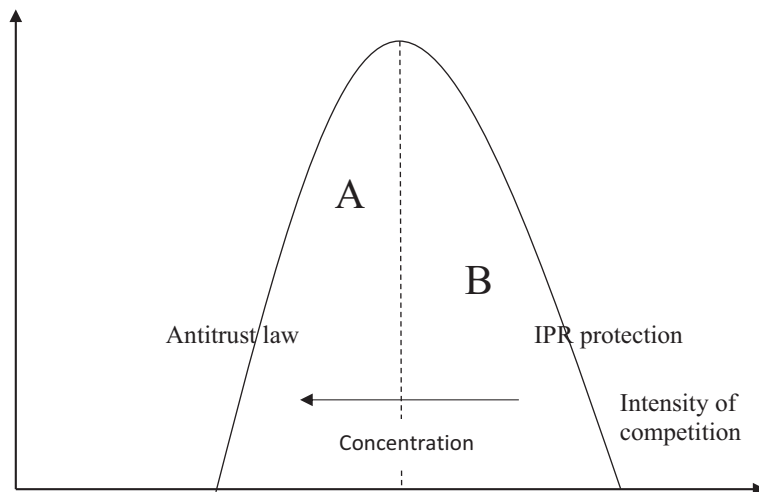


Fig. 5.1 Competition over innovation. (Source: Author adapted from Bennett, de Bijl, & Canoy (2001))

& Canoy, 2001). Barriers to market entry can be structural barriers that have to do with fundamental industry conditions such as cost and demand. Structural barriers may exist due to conditions such as economies of scale and network effects. Another type of entry barrier is a strategic one, which has something to do with tactical actions taken by incumbent firms, such as exclusive dealing arrangements. Competition agencies conduct factual and flexible case-by-case examinations of entry conditions. If the concentration in the market increases, a competition agency becomes concerned about possible anticompetitive effects. It can take action to lower entry barriers because competition will not be lower if new firms are able to enter easily, quickly and significantly (OECD, 2007, 2019). In Fig. 5.1, area B indicates a trade-off between competition and innovation in a market structure where firms compete and face strong price pressure. When competition becomes too intense, the price reduces, and firms extract less rent, which means that business becomes less profitable. Firms engaged in this type of market structure are typically unable to support the investment needed for innovation (Bennett, de Bijl, & Canoy, 2001).

IPR does not create monopolistic power since it grants powers over specific products and not whole relevant markets. It can be argued that

IPR and competition policies are complementary if IPR does not create “too little competition” or hinder competition, i.e., if IPR holders reach beyond the boundaries inherent in IPR. While IPRs are in the interest of IP producers adopting very stringent IPR regimes may not be attractive to consumers who cannot afford the high price of the protected goods. An optimal level of IPR protection is tailored towards managing the delicate trade-off between producers and consumers of knowledge (Asongu et al., 2018).

Let us consider how companies do it in practice with the example of Avery Dennison Corporation, a packaging company from California, USA.

Case study. Avery Dennison Corporation exploits new market opportunities with IPR

Patents can also give companies patent-protected entry into profitable new markets, as was the case with the \$7-billion Avery Dennison Corporation. In 1994, one of Avery’s R&D business units developed a new film for use in product labelling. The film unit had already won a principal contract to provide the labels for Procter & Gamble shampoo bottles, and corporate managers thought the film unit had considerable growth potential. However, an analysis of patent activity indicated that Dow Chemical (one of the three largest chemical producers in the world) was also beginning to move into the business. Should Avery Dennison commit the significant resources needed to exploit the market opportunity for the film unit, especially when it looked like Dow Chemical might become a formidable competitor? Avery Dennison saw that they had more fundamental patents in this area and strengthened them with additional patent filings. They then informed Dow Chemical that they could not manufacture that film anymore. As a result, Dow Chemical had to shut down its team and withdraw the product from the market. Thanks to the strength of Avery Dennison’s patents—and to their CEO’s willingness, based on that IP strength, to bet their resources on building the film unit, they were able to pull Dow Chemical out of the market and keep it all to themselves. As a result, that new unit became one of the fast-growing departments in the company.

Source: Author based on (Rivette et al., 2000).

FIRST STEPS IN STRATEGY FORMULATION

A business model displays the picture of a company's resources, which are grouped and arranged in a process aimed at producing value for the customer and earnings for the company. The business model thus solves an elementary sense of company existence in general, namely that revenue exceeds the cost, and it earns a profit. Every company has a functioning business model recognised explicitly or developed intuitively. The theme of the business model has recently received increasing attention, mainly due to a rise in information technology and the Internet. These have transformed company resources and processes considerably so that new sources of revenue have emerged. The business model is the basis on which business strategy is developed. A business strategy maintains, strengthens and improves a company's position in the industry in which it operates. The business strategy leads a company through the business environment to their targets, which are performance or survival, and provides guidance when confronting or avoiding competitors (Štefan & Branislav, 2016).

IP-based business models are linked to the firm's ability to create, own, market and sell IP. Building an IP portfolio can be a serious expense for a young company operating on limited investment capital. Because of the crucial role of IP for a company's potential value, companies need to ensure that their investment in IP will yield a strategically targeted IP portfolio. According to Barrett and Crawford (2002), common reasons why companies fail to build a strategic IP portfolio include a lack of the following:

- an IP strategy based on sound competitive IP intelligence
- alignment between IP investments and business strategy
- organisational knowledge of IP concepts and tactics
- internal business processes for extracting, evaluating and capitalising on IP

To solve these problems, Barrett and Crawford (2002) suggested envisaging a company's IP processes in terms of a value chain. A value chain is a series of strategically relevant activities in which each new step adds incremental value to the one before, and an organisation continues to operate and create value for its customers (Porter, 1985). The IP value chain starts with the inventor's original idea adding value by a series of

steps that ultimately yields a legally protected asset (e.g., a patent or a trade secret). Without a strategic effort to develop an integrated IP value chain, most companies will instinctively follow a non-integrated approach to IP portfolio creation and experience the problems mentioned above. The choice of the IP strategy is contingent on the business model applied and can imply formal and informal IP protection at different levels (Bonakdar et al., 2017). The next chapter will discuss the development of an IP-based strategy.

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Building an IP Strategy

Abstract This chapter discusses cost structures, licencing and revenue streams, how IP strategy supports generating revenue stream(s) from a business idea, and funding sources in IP-based start-ups.

Keywords IP revenue • Marginal cost • Venture capital • Strategy levels • IP landscape

IP AND REVENUE STREAMS

Osterwalder & Pigneur, in their book *Business Model Generation* (2010), suggest seven ways a company can generate revenue streams:

- *asset sale*—(the most common type) involves selling the ownership rights of physical goods. An example is retail corporations.
- *the usage fee*—money generated from a particular service. An example is a service company, a courier delivery, like UPS.
- *subscription fees*—revenue generated by selling access to continuous services. An example is Netflix.
- *lending/leasing/renting*—giving the exclusive right to an asset for a particular period: An example is a company leasing cars, e.g., Europcar.

- *licencing*—revenue generated from charging for the use of a protected IP. An example is McDonald’s, franchising their business to third parties.
- *brokerage fees*—revenue from an intermediate service between two parties. An example is a real estate broker selling a house for commission.
- *advertising*—revenue generated from charging fees for product advertising. An example is the British advertising agency, WPP.

Licencing is the most relevant revenue generation approach for IP-based businesses. However, in practice, companies use a combination of ways to generate revenue. Let us look at Nokia’s Annual Report and consider one of the four business groups, Nokia Technologies, responsible for generating income from the company’s intellectual assets. But in what other ways does the company generate revenue? What revenue streams suggested by Osterwalder and Pigneur (2010) can be identified from the information provided in Nokia’s Annual Report? Page 82 of the Annual Report for 2020 provides the following information:

Nokia offers mobile and fixed network hardware, software and services to communication service providers (CSPs), enterprise customers and web scales. Our comprehensive portfolio of products, services and licensing enables the infrastructure for 5G and the Internet of Things.

On page 10, the company discloses information about other revenue streams generated by the company:

We provided industry-leading cognitive network services to improve network performance, operational efficiency and subscriber experience and develop service business models to open new revenue streams for Communication Service Providers.

According to Osterwalder and Pigneur (2010), what revenue streams does Nokia plan to open in the future?

Licencing is the way to generate revenue streams relevant to the use of intellectual assets. This revenue stream is generated by permitting customers to use protected IP in exchange for licencing fees. Licencing allows rights-holders to generate revenue from their intangible property without the need to manufacture a product or commercialise a service. Licencing

is usual in the media industry, where content owners retain copyright while selling usage licenses to third parties. Similarly, in the technology sector, patent holders grant other companies the right to use patented technology in return for a license fee (Osterwalder & Pigneur, 2010). It is also a popular way of generating revenue in the pharmaceutical industry and includes in- and out-licencing. In-licencing is a contract that allows another firm to provide capital for use in the drug development and launch process, thus taking on financial responsibility. This licensing process is popular with small biopharma start-ups to get their drugs to begin to operate. Out-licencing encompasses finding a partner, or partners, who will help identify a target market and assist the pharma company in getting the product into the right hands. The process may include working with marketing or legal firms. In this licencing contract, the financial arrangements differ from in-licencing (Two Labs, 2018).

IP AND COST STRUCTURE

Cost structure refers to the main costs incurred under a particular business model. Creating and delivering value, maintaining customer relationships, and generating revenue incur costs. Such costs can be calculated relatively easily after identifying key resources, activities and partnerships. Some business models, however, are more cost-driven than others. Budget airlines, for instance, have built business models entirely around low-cost structures. Businesses try to minimise costs in every business model. However, operating at a low cost is more important to some business models than others. Therefore, it can be worthwhile to distinguish between two broad classes of business model cost structures: cost-driven and value-driven, even if many business models fall between these extremes. The difference in cost structures is evident in the income statements, also known as the P&L statement.

Table 6.1 illustrates a fundamental difference between the cost structures of a traditional business and a mature company with an IP business model. Mature business in this context means a company that has already developed its business model and is successfully executing it by generating revenue. The difference can be attributed to the cost of revenue (CoR): in the traditional model, they are associated mainly with the cost of sales, the total of all costs used to create a product or service. The CoR refers to the total cost of manufacturing and delivering a product or service, including salaries of the manufacturing and service personnel in the case of a

Table 6.1 Nokia's traditional versus IP-based cost structure

<i>Indicator</i>	<i>Traditional business model</i>				<i>IP-based business model</i>			
	<i>2020</i>	<i>% of net sales</i>	<i>2019</i>	<i>% of net sales</i>	<i>2020</i>	<i>% of net sales</i>	<i>2019</i>	<i>% of net sales</i>
<i>For the year ended December 31</i>								
				<i>Year-on-year change %</i>				<i>Year-on-year change %</i>
Net sales	16 852	100	18 209	100	1 402	100.0	1 487	100.0
Cost of sales	(11 108)	(65.9)	(12 632)	(69.4)	(9)	(0.6)	(28)	(1.9)
Gross profit	5 744	34.1	5 577	30.6	1 393	99.4	1 459	98.1
R&D expenses	(2 908)	(17.3)	(2 943)	(16.2)	(149)	(10.6)	(111)	(7.5)
Selling, general and administrative expenses	(1 745)	(10.4)	(1 929)	(10.6)	(81)	(5.8)	(101)	(6.8)
Other operating income and expenses	(156)	(0.9)	(40)	(0.2)	1	0.1	(8)	(0.5)
Operating profit	935	5.5	665	3.7	1 164	83.0	1 239	83.3
				41				(6)

Source: Author's compilation from the Annual Report

services-based business. In an IP-based model, the CoR is much lower. In a traditional business model, the CoR in the 70% to 80% range is usual. High CoR leaves only 20% to 30% of revenue as gross profit to cover all other operating expenses. Therefore, the operating profit margin is usually in the high single or low double digits range. Compare this with the IP-based business model: a well-managed IP business unit can have a CoR below 1%, which leaves 99% or more of each revenue pound as gross profit. Low CoR results in an operating profit margin of more than 80%. The revenue, costs and profit results, of course, may vary from business to business and depend on the quality of IP management in the company. Major IP management areas that hold significant cost-saving potential are IPR filing costs, costs of administrative and law services, costs of software tools, and IP staff salaries.

As was outlined above, IP-based business models are characterised by low marginal cost—the cost of adding one more user, because the use of IP by one person does not reduce the value of its use by another. The marginal cost of IP is, in some cases, zero, and it can even be a negative—for example, the cost of a copy of computer software or a McDonald’s restaurant for a franchisor. Access to a copy of the software can be granted to a new user over the Internet for free. And the cost of building a new McDonald’s restaurant is covered by the franchisee. Low marginal cost is unusual in traditional industrial businesses. The change to IP-friendly institutional environments in the last 40 years has enabled this phenomenon to grow and become a significant part of the economy and companies’ P&L accounts.

The situation is different for IP-based business models: due to low marginal cost, once the company breaks even (see Fig. 6.1), i.e., when total revenue exceeds total costs, every additional pound drops straight to the bottom line. Nevertheless, even small costs related to the protection and enforcement of IPR can be a barrier to a formal IP system by, for example, SMEs. In their budgets, besides the costs related to application, publication and maintenance, other costs need to be considered, such as those for the preparation of the applications (legal costs) that can be relatively high. The problem of costs may affect SMEs in the EU, where the cost of patenting is higher than in the United States or Japan. These elevated costs are mainly attributed to translation expenses and patent protection fees. IPR-related costs are perceived by many SMEs as far exceeding the prospective benefits that can be derived from protection, especially when

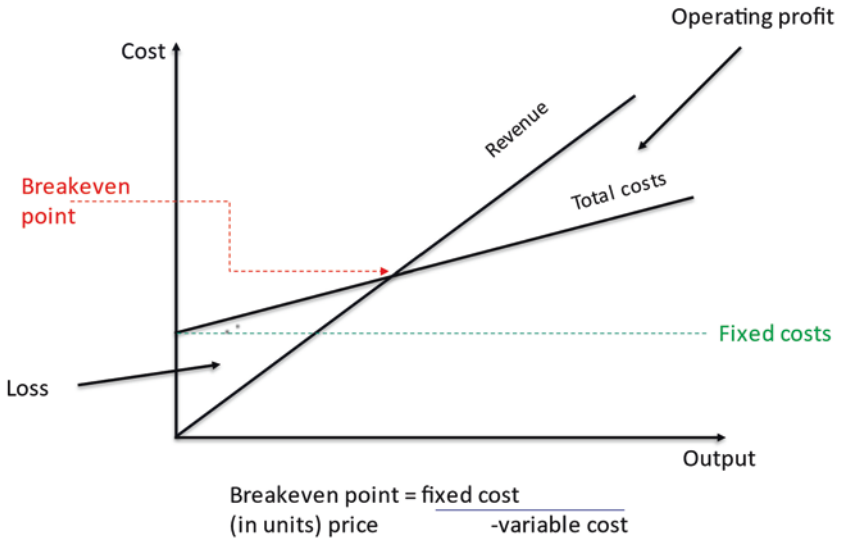


Fig. 6.1 Breakeven point. (Source: Author's drawing based on economic literature)

considering that most of these costs incur before the product reaches the market and thus before the realisation of any income or profits (European Commission, 2008).

IP FUNDING OPPORTUNITIES

The financial aspects are particularly relevant for IP ventures because of their novelty. However, as the amount of money needed and associated risk increase, funding choices generally decrease. Ventures that run short of funds are perceived as being at higher risk. Funding rarely occurs as a single amount for commercialisation ventures and often requires multiple sources. Some funding options include the following:

- *private venture capital companies*: venture capital (VC) companies specialised in this area are rarely interested in funding under \$1 million. As well as funding, VC companies usually contribute managerial skills, but they may demand significant equity and control in return for funding.

- *government* commercialisation grants, loans and incentives: in many countries, government grants and funding programmes are available to assist businesses in the development and commercialisation of their IP. For example, in the UK, companies can pay a reduced rate of 10% Corporate Tax if it exploits patented inventions and innovations. Universities and charities can claim R&D tax credits. In Australia, the list of grants and programmes includes Export Market Development Grants, R&D Tax Incentives, and The Entrepreneurs' Programme.
- *individuals*: 'business angels' are individuals who provide capital for start-ups in exchange for equity or an inflated profitable return on their loans. They also often offer mentorship to start-ups. Some angel investors are organised into groups or networks, so they can pool their capital and expertise to support the ventures in which they invest. Some business angels are attracted to a venture by an emotional connection to its mission more than by potential financial gain. This option can be an uncomplicated arrangement for SMEs.
- *crowdfunding*: is a practice of funding a venture by investment contributions from many people, typically via Internet platforms that bring parties together. This type of funding has recently exploded in popularity with the availability of online registries. If a company is considering crowdfunding, it must examine how well they are projecting its idea.
- *initial public offerings* (IPOs) an IPO occurs when a privately owned company raises equity capital by offering shares to the public for the first time to become publicly listed on a recognised stock exchange, e.g., the London Stock Exchange (LSE). This option is usually only appropriate for large ventures (Australian Government, 2020).

BUILDING AN IP STRATEGY

Professor Michael Porter of the Harvard Business School suggested three generic (basic) strategies that any business could implement—cost leadership, differentiation or focus (niche) strategy (Porter, 1985). The recent emergence of market transactions for technology, ideas, knowledge or information has strategic implications. Thinking in terms of strategy levels is a practical way of strategy formulation. The strategy for a large company will contrast with one for a start-up, yet the principles remain the same.

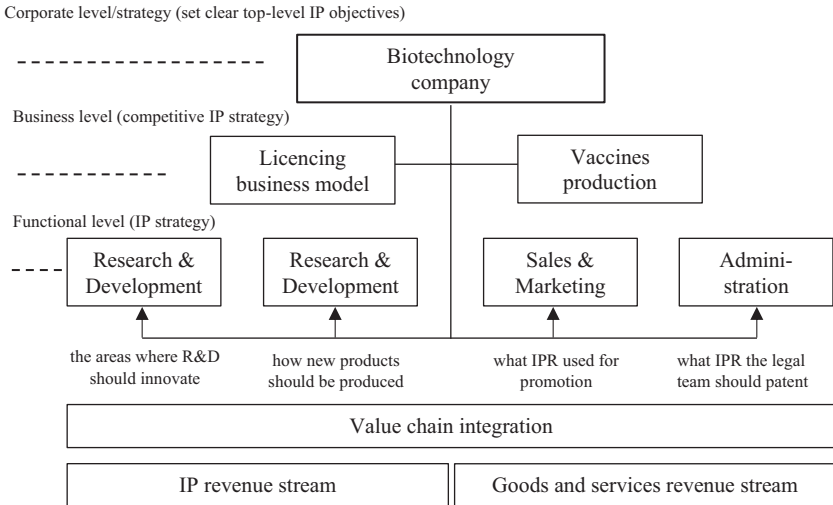


Fig. 6.2 Three strategic levels in a biotechnology company. (Source: Author)

According to Vancil and Lorange (1975), it includes three levels: corporate, business and functional levels (Fig. 6.2).

Corporate-level strategy is concerned with defining the strategic direction of the entire organisation. It will apply to an organisation with more than one business in different markets. If an organisation is a small start-up or an SME (with up to 250 employees) its corporate strategy will be the same as the next-level strategy in a large organisation, i.e., it will involve a business strategy that is concerned with market navigation for a specific business.

A comprehensive *business strategy* must guide and direct the IP value chain. The business strategy must set clear top-level IP objectives for the organisation. An IP-based business model operates in the market for technological knowledge rather than in markets for goods and services. For example, consider a biotechnology company, a start-up focused on the development of a drug that can deliver genetic material to cells with high transfection¹ efficiency. This technology may solve one of the key problems associated with developing gene therapy for the coronavirus vaccine. The business strategy may involve developing methods required for

¹Transfection is a gene transfer technology which helps to transfer nucleic acids into a cell.

production, storage, distribution and clinical administration, and the direct sale of components for vaccine production to specialised production companies. To pursue this strategy, a company may be committed to protecting its path to market by seeking worldwide patent protection across its entire product and service space. The protection needs to cover specialised reagents, production methods, intermediates, storage devices and methods, business processes related to sale and distribution, and methods and kits for clinical use. The company may also intend to licence some of the patents to production companies to create an additional revenue stream from the IP-based business model.

A competitive *IP strategy* informs a business strategy by establishing the basic framework of the *IP landscape*. This process is often referred to as patent landscape analysis or patent mapping. A company can identify information about competitors' patents through internet databases that are publicly available. A detailed understanding of the competitive patent landscape includes the analysis of patents obtained by direct competitors, suppliers and customers (and their competitors) and companies in related technology areas. Understanding the patent landscape helps a company avoid the mistake of entering an intensively patented business area. It also permits the company to develop a rational strategy if it chooses to work in a competitive arena (see the case study of Avery Dennison Corporation we discussed in Chap. 5). In addition, press publications can provide insights into the priorities and strategies of competitors and direct attention towards potential acquirers, licensors of technology and targets for merger and acquisition activity. Once a company establishes its competitive IP landscape, it can develop an *IP strategy*. *It is a clear plan that should outline the details of the IP strategy and decisions about IP investment and R&D*. The plan should indicate the areas for innovation, new products for development, application for IPR for protection, and details of licencing contracts with licensees. Finally, *IP value chain integration* ensures that those participating in the process understand how all the steps—the road-map, strategy and intelligence—fit together in the value chain and, therefore, what the management expects of them. For example, when inventors understand the relationship between patent scope and how the company can use the invention to generate value, they can design research protocols that will support broader enablement and, thus, broader patent scope (Barrett & Crawford, 2002).

With proper strategies in place, the steps of the integrated IP value chain can work together to generate IP revenue streams. The steps

presented include conception, primary documentation, capture, initial review, formal documentation, formal review, legal documentation and patent prosecution. As suggested by Barrett and Crawford (2002), the integrative approach, in comparison to a naturally evolving IP value chain, should have two additional steps—“capture” and “formal review” and should include eight steps in total. We will go through these suggested steps now to explain their purpose.

The first step is *the conception* of an invention. Inventors should learn to identify and document new inventions in a way that allows formal assessment of their future value. Companies should train inventors to recognise innovations that might be patentable. Inventors must understand the basic requirements for the protection of an invention when planning their R&D activities (see Table 1.1). Inventors should also consider other factors that help to build a strong case for patentability, such as unexpected synergistic effects of a combination of known elements. For example, a biotechnology company discussed above can benefit from the synergetic effects of using two different vaccines. Or it can improve the vaccine to reduce side effects or from a combination with vaccines developed via other technologies (in the case of Covid-19—DNA, RNA, virus, bacteria or protein subunits) and a more effective delivery route (such as the intranasal route).

The second step is *primary documentation preparation*. Since most IPRs require a formal application to be registered with the relevant authority, it is critical to prepare documentation adequate for legal purposes. The process starts with checking the primary documentation related to the enablement of the invention². Information about the invention is often distributed among various forms of documentation and even in the inventors' minds. It can remain hidden because it is virtually inaccessible to management. The following capture step can help to solve this issue.

The third step, the *capture*, involves actively gathering detailed information about inventions from primary documentation and inventors and storing all this information in a centralised database. Each invention, including potentially patentable or trade secrets, is briefly documented, along with parameters such as priority and stage of development. The capture step allows all inventions to be reviewed and managed.

² Patent law requires that a patent specification discloses the invention in such terms one skilled in the art can make and use the claimed invention (USPTO, n.d.).

The next step, an *initial review* includes the preliminary decision made by a team that includes technical, legal, and business staff. The team must select inventions appropriate for further consideration and formal documentation using the requirements for protection discussed above. The decision must align with an IP strategy. This step ensures that the company does not waste time by preparing formal documents and pursuing inventions that are not valuable enough.

The primary component of *formal documentation* (the next step) is a detailed description of an invention that includes information that can help the company make an informed decision about whether or not to invest. The steps required are to validate it, evaluate its commercial viability, estimate the cost of manufacturing, understand whether it helps the company capture steps in its value chain and collect information about related inventions and patents known to the inventors. The description should be detailed to meet the enablement criteria. This level of detail would also allow a patent counsel and management to understand and evaluate inventions, reduce the time and effort required to prepare a patent application, reduce the cost, and increase the number of successful patent applications.

Studies of IP strategies explored significant differences in IP strategies in different industries. There is a connection between innovation and IP strategies, which depends on the time that innovation requires. Scientific radical innovation requires a long time to create a working prototype and time to develop a product that reaches the market, then incremental innovation. Strategic approaches, therefore, will vary in different industries characterised by a market growth rate and a certain length of the innovation development cycle and will define the IP practice (Germeraad, 2010).

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Resourcing in the IP Context

Abstract This chapter will discuss the function of IP within organisational structures and its role in strategic management in different business contexts in terms of bringing new or licenced IPs to the marketplace.

Keywords Transformation • Leadership • Competitive advantage • Industry structure

IP MANAGEMENT: STANDARD CONTRIBUTIONS

The typical contributions of business and technology and IP professionals to IP management in an organisation, as suggested by Ghafele et al. (2007), are presented in Table 7.1.

IP managers who think and act in an interdisciplinary way from a business perspective, and leverage IP for the advantage of their organisation, can significantly contribute to company performance. The responsibilities of the IP manager are defining a strategy related to the IP assets of the organisation and putting this strategy into practice by undertaking relevant decisions. These tasks differ from those of business managers in the company. As management has the main areas of strategic management, decision making, implementation, organisation, leadership and business development, the work of the IP manager can be structured into six main areas, as shown in Table 7.2:

Table 7.1 Professional—typical contributions to IP management at business levels

<i>Management tasks</i>	<i>Business managers</i>	<i>Technology and IP professionals</i>
Strategy	Setting and communicating corporate business strategy	Aligning the company's IP portfolio with its overall business targets; identification of collaborative IP opportunities
Decision making	Valuation and portfolio analysis	Corporate technology strategy Technology and IPR life cycle concepts
Implementation	Effectiveness and efficiency considerations Definition and implementation of value chain concepts	Appropriateness of IP rights Filing strategies
Organisation	Corporate and business structuring Operational asset exploitation	IPR enforcement Cooperation
Leadership	Human relationship management	Administrative processes in the IP department
IP business development	Entrepreneurship Business planning	IPR expertise and advisory

Source: Adapted from Ghafele et al. (2007)

Table 7.2 IP management functions

<i>Management tasks</i>	<i>IP Manager tasks</i>
Strategy	Align a company's IP portfolio with its overall business targets
Decision making	Apprise an IP framework by gathering internal and market-based external information related to IP
Implementation	Develop value chains and examine the interplay between various value chains
Organisation	Design organisational structures that help a company to achieve its goals
Leadership	Explore what information on IP is needed and other business issues to manage people and earn profits
Change management	Planning, implementing and setting necessary IP-related changes, such as a new business model, technology, process, or organisational structures
Business development	Look at business development from a cross-disciplinary perspective and consider topics such as monopoly design and cost-versus-quality-based markets when designing a business plan

Source: Author adapted from Ghafele et al. (2007)

- IP functional level strategic tasks include *aligning* a company's IP portfolio with its overall business targets, i.e., managing it to create value. The IP manager also explores collaborative IP opportunities, including potential joint ventures, cross-licencing, and patent pools.
- *appraising* IP portfolio by gathering related internal and market-based external information. Managers identify direct or indirect competitors to facilitate a company's strategic competitiveness. They reveal changes in legislation that can impact the business, elicit customer demands, estimate the value of the IP portfolio and life cycle, and predict how likely competitors will invent and protect similar products.
- *implementation* tasks require the development of budgets and the application of legal and tax rules, especially in collaboration with other companies involved in the value chain; the application of international trade, commercial and IP law if partners from other jurisdictions are involved in the value creation process.¹
- *organisation* tasks assume the design of a firm's structures that help companies achieve their strategic goals, including restructuring the company if new departments need to be created or re-designed. It requires the alignment of the IP department with other departments and business units.
- *leadership* and *change management* include recruitment, motivation and retention of human talents related to IP management and leading a change where necessary.
- *business development* tasks require the ability to design a business plan that provides a direction for the IP-based business.

CHANGE MANAGEMENT AND TRANSFORMATION TO IP-RELATED STRATEGY

The formulation of an IP-related strategy is often part of the transformation of a company from a traditional business to a business related to the use of knowledge assets instead of the use of tangible assets. This situation is relevant for large companies and SMEs transforming their core business

¹Roberts (1994) defines efficiency as the degree of the economy with which the process consumes resources—especially time and money, while he distinguishes effectiveness as how well the process accomplishes its intended purpose, here again from the customer's point of view.

model (Heim & Sardar-Drenda, 2021). Nokia is a typical example of such a large organisation. In 2021, licencing accounted for about half of Nokia's profits, and the company wanted to ensure those earnings were sustainable (Pohjanpalo & Decker, 2021). The company is known for its successful application of transformation in the past. These transformations significantly changed the company's identity and led to the development of a new business model when the company moved from industrial production to telecommunications.

Case Study: Nokia's Transformations

The origins: The roots of the Nokia company go back to the nineteenth century, with the establishment in 1865 of a single paper mill operation (Nokia, 2020). This company later merged with two other companies. Three companies—Nokia Forest and Power, the Finnish Rubber Works and the Finnish Cable Works—gave rise to the Nokia Corporation in 1967 (Aspara et al., 2011). Subsequently, Nokia's strategies gradually became more technology oriented.

Focus on electronics: In the 1980s, the technology and electronics division became the focus of investment and growth. During this period, Nokia concentrated on acquisition in the electronics field. For example, there was the acquisition of the Finnish company, Televa—which was later essential for the new focus on mobile phones—as well as the founding of a joint venture company Mobira, with another Finnish company, Salora, in 1979—followed by the acquisition of this company by Nokia 5 years later. Nokia also became involved in consumer electronics by acquiring large European television and computer manufacturers in the 1980s (Nokia, 2020). However, at the beginning of the 1990s, a severe macroeconomic recession in Finland threw Nokia into a crisis (Aspara et al., 2011).

The turn towards telecommunications: Nokia's transition to its primary focus on telecommunications began in the 1990s (Nokia, 2020). The establishment of the pan-European second-generation (2G) digital cellular networks (the so-called GSM) standard proved to be a lifting force for the company. Nokia found new customers in the nascent mobile telecommunications markets (Aspara et al., 2011). In 1991, Nokia established the first GSM connection using its equipment. By 1998, its rapid growth in the mobile phone sector allowed Nokia to become the best-selling mobile phone brand in the world (Nokia, 2020).

The transition from *voice to mobile internet access:* A company created a packet-switching data service technology in the early twenty-first century.

GPRS is a technology between the second (2G) and third (3G) generations of mobile telephony, followed by 3G technology. Those innovative technologies revolutionised the internet landscape by extending the reach of the fixed Internet to connecting mobile terminals worldwide. The focus of the business started to shift from a mobile-technology supplier of voice communications to a data-driven mobile-technology one. From a technology point of view, the company moved from traditional telecom-oriented technologies to digital technologies based on the Internet. Subsequently, the company planned the transition towards a combined mobile and fixed-line phone network equipment business. For this reason, in 2007, Nokia Siemens Networks, a joint venture between Siemens Communications and Nokia's Network Business, was established. This joint venture aimed to strengthen the company's position in the market and enable them to offer converged technologies and services to its customers.

The programmable world: In 2011, Nokia Siemens Networks announced that it would refocus its business on mobile broadband equipment, the fastest growing segment in the market. This transformation required significant investment in digital infrastructure and resulted in the restructuring, with the planned layoff of 17,000 employees, reducing the workforce by 23% (Nokia, 2020). On the other hand, working with Siemens, the company could not provide an end-to-end experience to their customers, leading to the decision to purchase their competitor in networking technologies, Alcatel-Lucent, in 2015. This acquisition made the transformation possible and allowed the company to achieve the scale and scope to strengthen its profitability by reinforcing its portfolio and market position by capitalising on the emergence of the rapid expansion of connectivity brought about by mobile sensors. Those sensors would feed data into cloud networks, enabling intelligent analysis and machine learning called the programmable world. However, Nokia needed funds for this acquisition. Financing was only possible through the mobile devices business unit sale to Microsoft in 2014 and the sale of HERE Maps to a car company consortium the year after. Those changes caused such large swaps of employees that, in 2016, only 1% of the then-current Nokia employees contingent had been employed in 2013. As Risto Siilasmaa (2018), Chairman of the Board of Directors at that time, said, swapping people out was the only way to do the transformation in a short period).

Nowadays: Nokia's technology is so widespread that from wherever in the world someone makes a phone call or establishes an internet

connection, the information will likely go through Nokia equipment or use its software somewhere along the way. Nokia's customers include service providers, whose combined networks support around 6.1 billion subscriptions and enterprises in the private and public sectors that use their network portfolio to increase productivity and enrich lives (Infradata, n.d.). The company also serves consumers by providing technology and devices (Nokia, 2020). The company decided to create its platform to continue the transformation in the situation, when large cloud provider platforms were not yet available. The aim was to move from siloed tools, which were unable to scale, and to address the increasing demand and complexity of data volume towards a cloud-compatible platform that would be able to ingest and process a significant amount of data. This platform would allow network operations automation and service assurance, cut costs, increase agility, and boost subscriber experience. The decision implied significant investment and the acquisition of new competencies through external hiring. The further evolution of cloud technology allowed Nokia to succeed in partnering with one of the web-scale companies in 2019. The partnership enabled the development of cloud technology and the business model for business analytics services.

Nokia is an interesting case in terms of leadership and change management practices. Nokia represents a unique case of the growth and fast decline of the mobile phone business and the consequent need to transform the company into a network infrastructure provider. Although most people might regard Nokia as a former mobile phone manufacturer, which was the industry leader before the appearance of smartphones, the company has become one of the top providers of digital infrastructure globally. This infrastructure includes ICT spending in areas associated with 5G technologies (such as artificial intelligence and machine learning, video analytics, sensing, robotics, etc.). Nowadays, Nokia is one of the three major telecom vendors for mobile communications, being the only vendor that develops and delivers a complete end-to-end, globally available portfolio. This portfolio consists of network equipment, software, services, and licencing. In 2019, the company had around 98,000 employees, operating in 120 countries, and had net sales of €23.3 billion.

The recent rapid technological change in the global landscape associated with the fourth industrial revolution is transforming many market segments, changing how communications service providers and telecom vendors operate. Analytics—a systematic computational analysis of data,

machine learning and artificial intelligence technologies—drives innovation and disrupts the telecommunications industry increasing pressure to implement new concepts and technologies to survive the digital transformation era. Analytics applied to telecom-related services enable a broad spectrum of innovative services that allow companies to move up the market and displace established competitors (Koski et al., 2016). For example, as a communications service provider, Nokia can help customers to ensure the deployment of 5G and 6G technologies, and all operational data are made accessible in digital form in time and of the highest quality (Siddiqui, 2021).

As a result of this technological change, Nokia and its competitors are moving fast into the new field, undertaking transformations in their service business models to expand their profitable licencing business beyond being smartphone makers. Companies in this sector are moving from traditional telecom services—related to the deployment of their network products—towards a mix evolving and including service-led ones, cloud- and analytics-based services having a high market value. These products comprise the underlying 5G and 6G networks and critical technologies that will work hand in hand with cellular connectivity technology to digitalize every aspect of a customer's operations. These products include edge cloud infrastructure, augmented intelligence/machine learning, private enterprise networks, advanced sensors and robotics (Siddiqui, 2021).

The company seeks to extend its smartphone licencing business to IoT and extensively use IPR to achieve this aim and to build a company-to-industry business, for instance, with the automotive industry. Having started seeking royalties from auto assemblers to make them pay for its inventions used in connected vehicles, Nokia is now preparing to push responsibility to the makers of other connected devices. These gadgets, which are expected to spread with the new technology, will let consumers turn on the dishwasher during their morning commute and farmers monitor crops, livestock and equipment from their phones. In doing so, they will use cellular connectivity technology that Nokia helped pioneer and continues to invest in. However, there are disagreements between Nokia and the industry on who should pay—the auto assemblers or the part suppliers (Pohjanpalo & Decker, 2021).

Organisational transformation often becomes imperative in businesses that create value through innovations. When there is a change, the outdated core values, routines, strategies, cultural imperatives, and asset endowments of an old business model become competitively inferior,

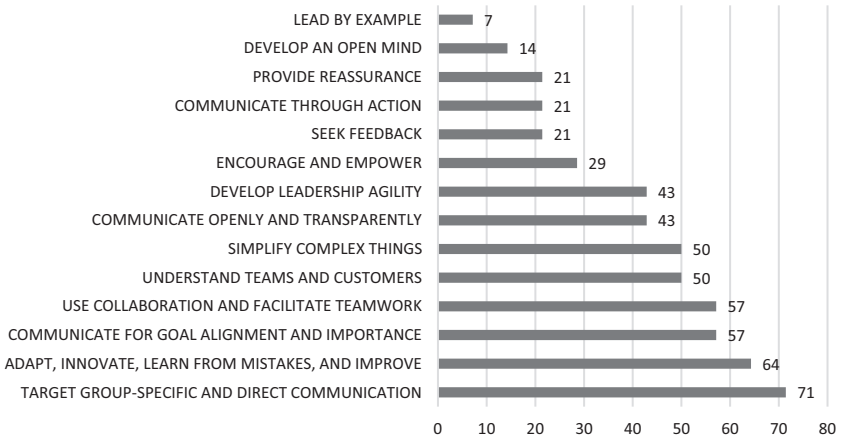


Fig. 7.1 Pyramid graph of leadership actions (top-down), % of responses. (Source: Author's illustration)

reactionary, or obsolete (Francis et al., 2003). Success in transformation requires agility (or a kindred term, flexibility), a critical business success factor that assumes that options are kept open and redundancy maintained (Teece et al., 2016). Strategic agility—the capability of an organisation to respond successfully to external changes—requires the presence of several other capabilities at the organisational and individual level, as well as relevant resources (Martínez-Climent et al., 2019; Vecchiato, 2015).

Interviews with top managers in Nokia explored the relationship between leadership actions and the ability of the organisation to transform successfully (Fig. 7.1). From a strategic management perspective, the main driver for Nokia to move from traditional telecom-based to analytics-based services was increasing revenue and service profitability and avoiding commoditisation.² Nokia wanted to reverse this trend by offering more valuable vendor agnostic services that would yield higher profit margins.

²I.e., a company's goods or services become relatively indistinguishable from the same offerings presented by a rival company.

BUILDING COMPETITIVE ADVANTAGE

What IP strategy might a company apply, and how can it be aligned with the overall business strategy? Research suggests that IP rights can help a company gain a competitive advantage in three main ways: (1) IPR can provide temporary technological leadership (incumbency), (2) IPR can protect brand names and (3) IPR can help form an industry standard (Reitzig, 2004). Combining different IP assets can better help organisations to sustain IP-based competitive advantages. The first way is more typical for pharmaceutical companies. However, due to the proliferation of modern technology, high-content screening and the wide availability of compound libraries, temporary technological leads have become rare, even in this industry. The reason is that it is just a matter of time until competitors find an alternative way of producing the same or similar drug formulas that offer a different way to treat a disease. An example of a temporary technological lead strategy is Denmark-based healthcare company Novo Nordisk A/S which built a dominant market position in Europe with diabetes drugs. Subsequently, it licences off technology for manufacturing insulin from animal sources (Reitzig, 2004). More recent research suggests that the lead time and the size of the company are critical factors in achieving a first-mover advantage or building a dominant market share (Cha & Yu, 2014). Therefore, if the lead time is short, it is hard to gain a competitive advantage (Fig. 7.2).

Brand name protection is the second way to create a competitive advantage with IPR. Since patents expire 20 years after application, a company should complement patents with a trademark that can last forever if renewed every ten years, as a German pharmaceutical company Bayer AG has done with its most popular drug, aspirin.³ It was developed in 1897 by Felix Hoffman, a scientist at the Bayer company. By 1899, Bayer had named it aspirin and sold it globally. In the US, Bayer patented it as acetylsalicylic acid (aspirin) in 1890. Although Bayer's first patent on aspirin expired at the beginning of the last century, the company still earns enormous revenues because of its high brand value. However, their rights to the trademark were lost or sold in many countries. For example, after the first World War, Britain, France, the US and Russia received the trademark as part of the reparations mandated.

³ Acetylsalicylic acid is a chemical name (i.e., the name of the therapeutic class to which the drug belongs), and the more complicated generic name, monoaceticacidester of salicylic acid, for the brand name aspirin.

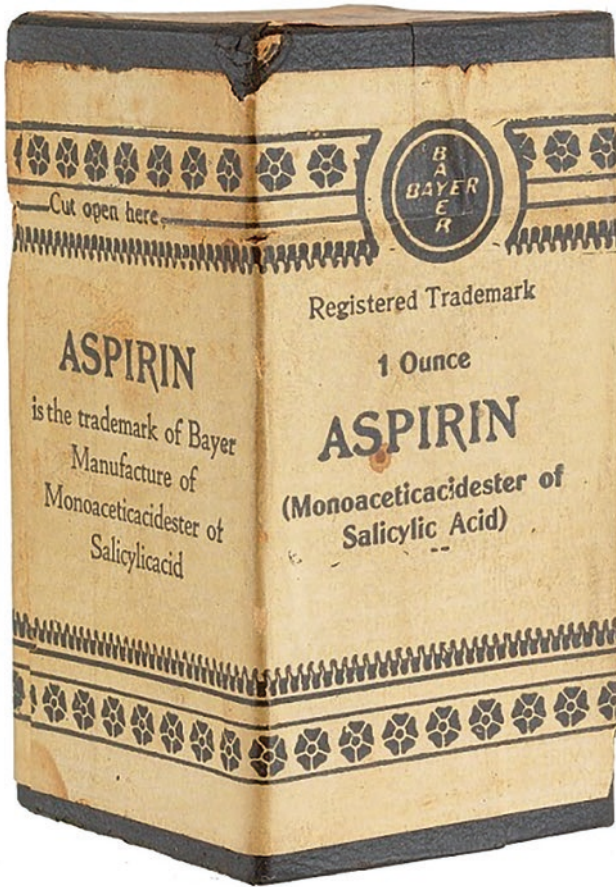


Fig. 7.2 A box of aspirin dated 1913 with the “Bayer Cross” logo. (Source: Permission to use granted by the Division of Medicine and Science, National Museum of American History, Smithsonian Institution)

Bayer managed to retain its trademark in more than 70 other nations, and in 1994, finally returned the rights in the US and Canada, the world’s sizeable market, for a price of \$1 billion and again secured worldwide rights to its name and logo (Menta, 2005). Research shows that the post-expiration patent value of a drug is enormously affected by the product’s

marketing during the time under patent protection. As trademarks can, in principle, be renewed indefinitely, managers should shift their focus from patents to trademarks (Reitzig, 2004).

SHAPING INDUSTRY STRUCTURE

In Chap. 2, we connected open innovations with the development of the knowledge economy, with inter-firm diffusion of technology intensified because of several factors. They include the following factors: (1) government cooperative research programmes such as the synthetic rubber programme in the US, (2) increasing capability of external suppliers, (3) more intensive use of licencing to earn revenues from technologies that companies do not use internally, and (4) greater mobility of skilled personnel. As a result of these changes, many markets witnessed a significant amount of entry and change in their structure, from oligopolistic to more competitive. This change influenced the IP strategies of companies, influenced the development of new organisational structures, and altered the function of IP within these organisational structures (Arora, 1997) (Figs. 7.3 and 7.4).

This trend, along with changes in IPR laws, has resulted in the development of the population of integrated firms. In the ICT, integration can be vertical, when integrating companies from different industries (Fig. 7.4), and horizontal, meaning integrating firms operating in complementary but non-vertically related markets (Figs. 7.3). Examples are vertically integrated firms such as Intel in the semiconductor industry and horizontally integrated firms such as Google in the online search and advertising

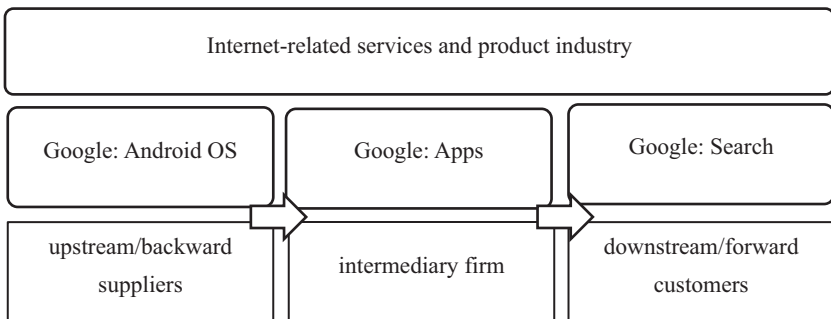


Fig. 7.3 Horizontal integration and IP: internet-related services and product industry. (Source: Author's illustration)

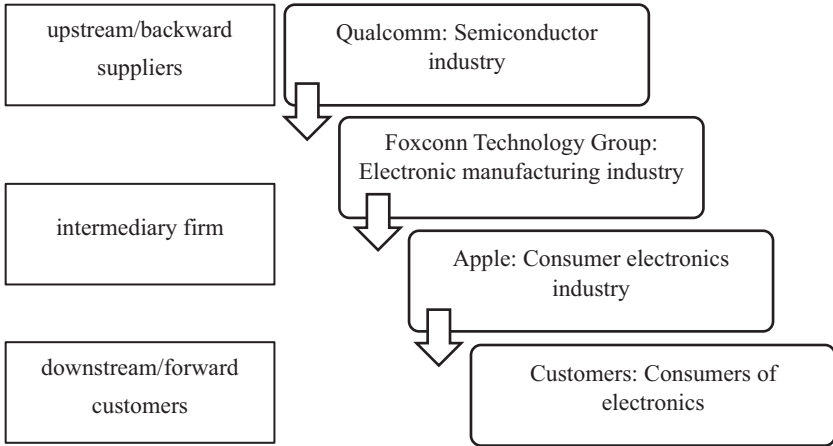


Fig. 7.4 Vertical integration and IP: semiconductor industry/electronic industry. (Source: Author's illustration)

markets, which have a rich suite of complementary excludable assets and capacities. Vertical (intra-industrial, buyer-supplier) integration is where a company obtains control of more than one stage of the supply chain, while horizontal integration (inter-industrial) is integration in the same industry. Let us consider these two examples and IP implications in greater detail.

The first case is where the strategic challenge was to develop appropriate vertical integration and complementary asset positions, given the extant appropriability regime (Pisano, 2006). Qualcomm is the world's leading wireless technology innovator. The company has consistently supported strong patent protections in its advocacy behaviour. During 2006–2016, it filed amicus briefs⁴ in five Supreme Court patent-related litigations helping a patentee in each case. Qualcomm has a portfolio of over 150 licencing agreements in industry-leading, most valuable and fundamental 5G innovations. It has the most widely licensed portfolio in the industry, which includes multi-year patent license agreements with every major original equipment manufacturer (OEM), a company producing parts and equipment marketed by Qualcomm. The company invented the fundamental technologies that make 5G work, enabling its speed, low

⁴An Amicus brief is a legal brief where someone assists a court by offering information, expertise or insights that have a bearing on the issue in the case.

latency, reliability, capacity and expansion to new industries. Qualcomm's portfolio of inventions includes wireless innovations that began years ahead of the industry—early, foundational inventions with broad geographic coverage resulting in an unmatched global 5G licencing program. Qualcomm has also developed valuable leading IP across a few areas foundational to mobile experiences—including position location, processing platform, video compression, imaging, computer vision, voice and audio technologies, Wi-Fi and artificial intelligence. This portfolio of inventions includes over 140,000 granted and pending patents across more than 100 countries and jurisdictions (Qualcomm, [n.d.](#)).

Qualcomm's vertically integrated business model relies on its patent portfolio at three critical points in its technology supply chain. First, it uses patents to disclose some of its technology to competitors and other entities that participate in the standard-setting organisations (SSOs), through which leading information-technology firms agree on the common standards for a new technology field. Second, Qualcomm relies on patents to enter contractual relationships with third-party providers of the chip-production functions that are necessary to embed a new chip design in a physical chipset. Qualcomm concentrates on chip design and enters contractual relationships with factories specialising in chip production. Third, Qualcomm relies on patents to safely enter licencing relationships with OEMs. Qualcomm requires remuneration to earn a return on the R&D investment from OEMs that integrate the chips into devices for end users, for which Qualcomm (Barnett, [2020](#)).

It appears to be the case that companies such as Qualcomm can set high royalty rates. In this market, patent IPR and licencing decrease access costs and lower entry barriers into the downstream production market. That happens for two main reasons. First, a high royalty rate would depress the mobile phone market growth and limit the royalty base from which Qualcomm receives licencing fees. The second reason is regulatory anti-trust laws. In January 2017, the US Federal Trade Commission (FTC) accused Qualcomm's licencing agreements of being anti-competitive, mainly because their practices excluded competition and harmed competitors in the modern chip market, which, according to the FTC, violated antitrust law. The FTC is an independent regulatory body in the US responsible for antitrust laws enforcement and the promotion of consumer protection. In Chap. 5, we discussed the view that IPR and competition policies are complementary if IPR does not create too little competition or hinder competition, i.e., if IPR holders reach beyond the boundaries

inherent in IPR. We said that in highly concentrated markets, a small number of firms make up the total production in the market. The result is a monopolistic market and low competition. The smartphone market is monopolistically competitive, with a handful of device producers occupying strongly branded distribution positions in the end-user market.

Qualcomm's IP portfolio includes:

- patents to disclose some of its technology in the SSOs through which leading information-technology firms agree on the common standards for a new technology field.
- technologies disclosed to third-party providers of the chip-production functions that are necessary to embed a new chip design in a physical chipset.
- licencing relationships with OEMs that integrate the chips into devices for end users.

In some industries, the standardisation of technologies is essential. These technologies are protected by standard-essential patents (SEPs) that are essential for their industries. Patents provide incentives for R&D and facilitate knowledge transfer. Standards ensure the rapid diffusion of technologies and interoperability between products. Many standards are based on patented technologies. For example, the mobile telecommunications industry is driven by a heavy reliance on standardisation, composed of multiple innovations protected by patents (European Commission, 2020). In addition to those set by market interactions and government actions, many technology standards are established by standard-setting organisations (SSOs). For example, the European Telecommunications Standards Institute (ETSI) produces globally applicable standards for the ICT industry, including fixed, mobile, radio, converged, broadcast and Internet technologies.⁵ Usually, SSOs decide on standards by the vote of their members. Depending on the SSO, membership can consist of representatives of national governments, industry members such as companies, universities, regulators, etc., or individuals. Technology standards differ from government regulations because compliance with standards is voluntary. These standards can regulate the quality or the interoperability of technology, i.e., the compatibility of products and product components in complex technological systems that allow different products to be used

⁵ For details, see <http://www.etsi.org/about>.

together. Most of these standards are open, i.e., can be adopted by anyone, in contrast to proprietary standards that may be used to ensure the quality and interoperability of products manufactured by a single firm or by a single firm and its network of suppliers and licensees (Baron & Spulber, 2018).

However, as Pisano (2006) noted, a favourable appropriability regime is not always “tight” or characterised by stringent IP protections (but is characterised by intensive use of IP assets and models). Let us consider the case of Google/Alphabet Inc., a US-headquartered multinational technology conglomerate holding company from Silicon Valley in California. It was created through a restructuring in 2015 and became the parent company of Google and several former Google subsidiaries. Google is an example of horizontal integration in the ICT industry. Its revenue model is based on the distribution of informational assets to end users at no charge (“giveaway”) to promote sales of advertising services and associated user information to paying business users. Barnett (2020) suggests that Google offers giveaways to the following actors in the market:

- users receive search services and other Google applications (Google Translate, Google Maps, etc.) subject to the right to access and distribute user data.
- device manufacturers and telecom companies receive access to Google applications and upgraded versions of the Android operating system at zero price, subject to contractual commitments.

Google’s business model allows the company to raise entry barriers into the search market, where they operate even without the use of formal IP rights. Barnett (2020) explains that Google’s revenue model relies on distributing some of its most valuable technology assets at zero price. This model involves a cross-subsidisation mechanism in which the firm distributes valuable informational assets to end-users at no charge to promote sales of advertising services and associated user information to paying business users. To preserve its competitive position in the zero-price search market and then extract rents in the positive-price advertising market, Google deploys technological mechanisms, contractual instruments, and complementary assets (see Chap. 5). They raise entry barriers into the search market even without the use of formal IP rights (but the use of informal IPR). These assets include Google’s search algorithms protected by trade secrets that may be costly to reverse-engineer on a continuously

updated basis. Google collects data about billions of end users, advertisers, and developers visiting its website. Switching to an alternative platform may incur high costs, especially for advertisers and developers. This effect is conceptualised in economics as network effects or network externalities. The business model also includes contractual mechanisms to govern the access of device manufacturers and telecom carriers to Google's applications. The network effect refers to the economic concept that the value of a product or service increases when the number of people who use that product or service increases (Katz & Shapiro, 1985; Liebowitz & Margolis, 1994). There is simply no positive payoff for a consumer to switch to an alternative search engine. As a result, Google has over 90% share of this global market (Statista, 2022). Network effects can be observed in social networking services, including Twitter, Facebook, Airbnb, Uber and LinkedIn; in telecommunication devices like the telephone; and in instant messaging services. One of the most visible consequences of network effects on the web as a source of continual innovation is that it appears increasingly dominated by a small number of players (i.e., it displays a monopolistic market structure). Google can also be described as a multi-sided platform or, more specifically, a two-sided market and platform (Gallaughner & Wang, 2002; Parker & Van Alstyne, 2005; Rochet & Tirole, 2003). Multi-sided platforms are technologies, products or services that create value primarily by enabling direct interactions between two or more customers or participating groups. Many significant web-based businesses, such as eBay, Facebook, and Google, are multi-sided platforms and act as intermediaries, which enable distinct groups of customers (also called platform-sides) to interact with each other (Holzweber, 2017).

In 2019, to bolster wearable capabilities, Google invested \$41.1 Bln in Fitbit,⁶ the fitness tracking company with around 100 active patent families in the field of wearables.⁷ With this acquisition, the company focuses on wearable medical technology that can be used to assess the risk of heart disease. Healthcare is an emerging area where many potential ideas and IPRs are being exploited. The opportunity to strengthen its presence in

⁶The plan to buy was announced in 2019 and the deal was finally closed in January 2021.

⁷The technology is to produce smart wristbands, watches, rings and patches—collectively called “wearables”—measuring different aspects of wearers' lives (The Economist, 2022).

the wearables industry was an important consideration for Google when it decided to acquire Fitbit. Its rival, Apple, has been a leading player in the market since it launched the Apple Watch in 2015, reaping the rewards of its wearable products. Apple's wearables segment recorded sales of \$24.5 billion in 2019, almost as much as its Mac business. Huawei offers a more affordable smartwatch and has a strong presence in the Asian market. Compared to many other prominent players in the market, Fitbit featured a highly competitive portfolio of patents where the company was an original applicant, but also patents originally applied by Coin, Pebble and Hello—companies acquired by Fitbit (Diakun, 2019). Previously, Google also acquired the smartwatch IP developed by a prominent watch brand, Fossil. However, a smartwatch technology was under development, and the acquisition involved a few Fossil employees transferring to the Google team.

The prospects for IPR exploitations within the wearable technology industry are vast. Several IPR types are relevant to wearable technology: from designs to more traditional trademarks and patents. A design protects the shape and visual appearance of smartwatches, which makes them attractive to customers and different from similar devices. It also covers the configuration, patterns and decorations, and graphical user interfaces (for an app) and is complementary to trademark protection that considers their future. Smartwatch patents can be filed for different classes of goods—tech goods, software-related goods, or watches. US patent filings show significant growth in applications related to wearables and smartwatches patents. Technology that is new and involves an inventive step is subject to patenting. Combining the existing Google IPRs with Fitbit will provide complete coverage of wearable health technology and protection for the user data surrounding it.

When considering the Google business model, we should also consider an alternative view of the company's recent successes, i.e., that various states in the US allege that Google is an anti-competitive monopoly that violates antitrust laws. As a result, 17 US states brought a massive antitrust case initiated by Texas but joined by 16 other states against the search giant.⁸ The case dates to July 2021 but has been protracted as the states involved have released more details.

⁸ A detailed summary of the 236-page complaint and extracts of the most explosive accusations can be found in Forbes (Koetsier, 2022).

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CONCLUSIONS

In the upcoming years, the interest in IP will increase as the information and knowledge-based economy grows. IP will be central not only for R&D collaboration and scaling up of manufacturing but for building new business models based primarily on the use of IP assets. These business models may involve open, private-collective, or public-private partnerships or networks proliferating to whole industries to support scaling-up technologies. The role of the legal function in support of IP-based business models will remain important. At the same time, strategic management and leadership will play a paramount role in the transformation from a manufacturing-based to a knowledge-based economy. A firm's external environment examination in terms of technological, social, and institutional factors is critical for the development of IP-based business models, as IPRs remain national or territorial by nature and applicable within the territory of the state in which they are granted. The relationship between market structure and innovation and the types of industries where a firm operates also matter. A firm that wants to succeed in the IP economy should integrate legal, economic, technological and management perspectives into its business strategy by developing an IP value chain and building a targeted IP portfolio that supports its business objectives.

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