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Intellectual property protection in startups

Ochrona własności intelektualnej w startupach

Key words:
startups, intellectual property, success factors

Abstract: In recent years, there has been a sharp increase in startups. This enables the rapid development of technology and technological innovation. Many inventors and innovators create intellectual property that is not always adequately protected. When observing the life cycles of startups, it can be noticed that large number of these startups become inactive within the first three years of operation. The aim of this article is to answer the questions: what factors influence startup successes and failures? Is the lack of intellectual property protection one of such factors, and if so, how can startups secure their inventions or innovations? What strategies can be applied to protect intellectual property? What does intellectual property protection look like in Polish startups?

Desk research was used as the research method in the article. The literature on the subject was analysed along with the reports and studies of research companies, institutions associating startups and the websites of patent attorneys and law firms that help startups in the protection of intellectual property.

Research has shown that, in most cases, startups see the need to protect intellectual property, which is of particular importance in high-tech sectors. Many factors can contribute to the failure of a startup at various stages of its development. It is important that the intellectual property is protected at the initial stage of the startup's development, and that the company has created and applied an appropriate intellectual property protection strategy.

Słowa kluczowe:
startupy, ochrona własności intelektualnej, czynniki sukcesu

Streszczenie: W ostatnich latach odnotowano gwałtowny wzrost liczby startupów. Umożliwia to szybki rozwój technologii i innowacji technologicznych. Wielu wynalazców i innowatorów tworzy własność intelektualną, która nie zawsze jest odpowiednio chroniona. Obserwując cykle życia startupów, zauważyć można, że duża ich część kończy swoją działalność w ciągu pierwszych trzech lat funkcjonowania. Celem

tego artykułu jest znalezienie odpowiedzi na pytania: jakie czynniki wpływają na sukcesy i porażki startupów? czy brak ochrony własności intelektualnej jest jednym z takich czynników, a jeśli tak, to w jaki sposób startupy mogą zabezpieczyć swoje wynalazki lub innowacje? jakie strategie mogą w tym zakresie zastosować? jak wygląda ochrona własności intelektualnej w polskich startupach?
W artykule jako metodę badawczą zastosowano *desk research*. Przeanalizowano literaturę przedmiotu, raporty i opracowania firm badawczych, instytucji zrzeszających startupy oraz strony internetowe rzeczników patentowych i kancelarii prawnych pomagających startupom w kwestiach ochrony własności intelektualnej.
Badania wykazały, że startupy w większości przypadków zauważają potrzebę ochrony własności intelektualnej, która w sektorach *high-tech* ma szczególne znaczenie. Wiele czynników może przyczynić się do porażki startupu w różnych fazach jego rozwoju. Ważne jest, żeby własność intelektualna podlegała ochronie już w początkowej fazie rozwoju startupu, a następnie przedsiębiorstwo wykreowało i stosowało odpowiednią strategię ochrony własności intelektualnej.

JEL:
L21, L25, L26

Introduction

The world today is characterised by many trends. Undoubtedly, one such trend is the rapid development of technology and the desire to create innovative products, processes and services. The development of technology is to facilitate solving the problems of the modern world, especially those that are the most important today, i.e. those related to ensuring sustainable development. Governments are trying to create an economic and political foundation to facilitate the innovativeness and competitiveness of the economy. Sometimes it is done with varying results. The development of scientific activity and the stimulation of entrepreneurship are becoming increasingly important in the strategies of countries. Large, innovative companies are leaders in patenting and implementing a sizeable amount of innovation. It is difficult for small companies however to compete due to a lack of experience, resources, and sometimes knowledge.

In the 1950s, startups appeared in Silicon Valley, which became a response to the needs of the economy and the world [Ester, Maas 2016, p. 21–24]. Since the 1990s, startups have been popular not only in the western world but also in East Asia where a large number have been created. The global startup economy is worth over $ 3.8 trillion [Startup Genome, 2021]. Only in the Indian Patent Office in the last five years startups filled out 5 253 patent applications and were granted 513 patents. It is estimated that 6.5 million entities of this type are launched each year only in the United States [Startup Genome, 2019].

Startups are desirable because they are a manifestation of entrepreneurship and creativity, contribute to the growth of jobs, and thus contribute to the development of the economy. In many cases, it is young people who start this kind of business. The areas of their activity may be different, but research shows that most startups are related to the technological area. They are created in the area of artificial intelligence, FinTech, life sciences, healthcare, educational technologies, and cybersecurity [Taylor Economics, 2021; Statista, 2022].

Most technology startups operate in the US and Europe. More than half provide software, infrastructure and IT tools (55%), and a quarter provide solutions in the field of telecommunications (26%) [Kovacova et al., 2021, p. 3]. Some of the emerging startups require time-consuming and capital-intensive scientific research as a result of which inventions or innovations are created and require the protection of intellectual property.

According to the Small Business Administration and other sources, 90% of startups fail within the first three years of existence. Such a situation provokes reflection. The aim of this article is to answer the questions: what factors influence startup successes and failures? Is the lack of intellectual property protection one of such factors, and if so, how can startups secure their inventions or innovations? What strategies can they apply to protect intellectual property? What does intellectual property protection look like in Polish startups?

In order to obtain answers to the above questions, the desk research method was used. The literature on the subject was analysed along with the reports and studies of research companies, institutions associating startups and the websites of patent attorneys and law firms that help startups in the protection of intellectual property.

Startups

Startups are defined in many different ways. For example, investors from China expect a startup to have a ready-made product, sales and a team. However, in the case of investors from Europe or other parts of the world, there are no such requirements. Many researchers have undertaken the systematic research of the definition of a startup [Scala, 2017; Kulej, 2018; Kowalewski, 2018; Laszuk, 2017]. The analysis of the literature shows that startups can be characterised by many features, which include:

- Early stage of development,
- Use of advanced technologies,
- An innovative idea that will be or is already commercialised and may change market paradigms in the long run,
- Limited internal resources,
- Educated staff,

- Uncertain or nonexistent demand,
- Activities in a market niche,
- High-risk activity,
- Rapid development and rapid growth.

Undoubtedly, the common denominator of startups is the use of advanced technologies. On the basis of such technology, the team works on the development of an innovative product or service. This is a process that may take different time periods depending on the technology used. A team conducting research in the field of biotechnology or nanotechnology will need more time to create and introduce an innovative product to the market than a team using IT solutions. For this reason, certain phases of startup development may be of different length. Some startups will develop faster while others will take a little longer to do so.

Each startup goes through various stages of development [Tomczuk, 2018, p. 45–47; Halt, Donch, Stiles, Fesnak, 2017]. This can be illustrated by the example of biotechnology startups [Wymer, 2022]. The first phase, in this case, is the early phase of the business, where there are no customers, no employees, and no target product yet. There are, however, ideas for the product and how the intellectual property will be secured. Scientific research is conducted, the clinical significance of a future product is recognised and activities are undertaken to protect intellectual property. Trade secrets are secured and inventions are protected through patents. At this stage the key personnel is selected and the market for the future product is identified. In the case of biotechnology startups, this phase may last up to 3 years. The work on an idea (scientific research) is financed from grants or other sources (crowdfunding, venture capital, business angels or other sources). Cash flow is negative.

The second phase is the growth phase of the company. The market or markets for the product are already well defined. The team has developed a prototype of the product, employees are hired, product research is conducted (e.g. a drug is tested on patients). This is the phase in which the company looks for partners to whom it can sell intellectual property (e.g. a patent) or sell a product license. In this phase, financing is largely provided by venture capital or business angels and, in some cases, industry investors. Cash flow is neutral or positive.

The last phase is the so-called late startup phase. Here the product is already launched on the market. Sales from product or licensing are increasing, cash flow is positive. This is a stage where initial public offerings (IPOs) and other investment instruments are imperative. The company is growing.

Factors influencing the success or failure of startups

Economic practice shows that many startups are successful, but it must be remembered that a startup may fail at any stage of its development. When analysing scientific articles, websites devoted to startups, and research reports, it can be noticed that the most frequently indicated factors of startup success are:

- an idea,
- a team,
- a business model,
- funding,
- timing,
- a business plan,
- market research,
- competition analysis.

J. Santisteban, D. Mauricio, O. Cachay having conducted a critical review of the literature and having analysed the responses of representatives of 125 technology startups, presented in their article a list of critical success factors that directly or indirectly contribute to the success of startups [Santisteban, Mauricio, Cachay, 2020, p. 8–10]. According to their study, success is indirectly influenced by:

- technology surveillance,
- knowledge absorption capacity,
- perceived performance,
- quality of the product and/or service.

The startup's success is directly influenced by:

- customer satisfaction,
- staged financing, support of a business incubator,
- innovation and entrepreneurship ecosystem,
- dynamic capability of entrepreneurs and innovative,
- entrepreneurial culture.

Not only the success factors of startups have been analysed in recent years in scientific research. Equally important, if not more important, is knowing the failure factors. There are also many studies in the literature covering which factors cause failure in some enterprises. T. Eisenmann believes that failures can be caused by the following problems:

- neglecting customer needs,
- false starts,
- lack of competitive analysis,
- stakeholders (employees, strategic partners, investors) who play a role in venture's downfall [Eisenmann, 2021].

Other authors conducting systematic reviews of the literature have produced much more elaborate lists of failure factors. For example, B. Akter and A. Iqbal proposed a list of 29 factors, which they grouped into the following categories: organisational, product, human, finance, market and ecosystem [Akter, Iqbal, 2020, p. 440–444]. M. Cantamessa, V. Gatteschi, G. Perboli, and M. Rosano approached the analysis using the SHALL model – software, hardware, environment, liveware, central liveware [Cantamessa, Gatteschi, Perboli, Rosano, 2018, p. 23–46].

CB Insight's research on a group of 101 startups showed that the most important factor of failure for respondents is no market needs (42%), no money (29%), not the right team (23%), out competed (19%), pricing / cost issues (18%), poor product (17%), need / lack business model (17%) [CB Insight, 2021]. It is interesting that in this and other research on startups, legal aspects are listed further on the lists of factors. In many studies, when explaining what the authors mean in terms of legal aspects, the answer is very general and it is usually about legal and regulatory issues. Few studies indicate the issue of intellectual property protection as a factor of failure and success and indicate that especially in startups, protection of the most important resources should come first.

The ranking of sectors with the most failures shows that they are mainly related to sectors using IT solutions, e.g. Social media 12.3%, software 9.3% [Cantamessa, Gatteschi, Perboli, Rosano, 2018, p. 9]. It can be said that such statistics are not surprising, since in these types of sectors the most startups are created and as previously mentioned, 90% cease to exist within three years. Fewer failures can be observed in sectors related to scientific and cost-intensive research, such as health (2%) or biotechnology (1.5%). In these sectors, inventions or significant innovations are created by scientists and the problem of intellectual property protection is raised more often.

The importance of intellectual property protection in startups

In most cases, the creation of new technologies is time-consuming and requires large capital expenditures, similarly in the case of acquiring technologies, enterprises incur huge capital expenditures to purchase a license or take over a company that owns such a technology. Therefore, in sectors, especially in high-tech sectors, the issue of protection of knowledge and its products in the form of technologies, inventions, know-how is becoming an extremely important issue of a strategic nature [Halt, Donch, Stiles, Fesnak, 2017, p. 8].

Most of the companies in the high-tech sectors are small and medium-sized enterprises and startups that face many security dilemmas. These companies often have enormous innovative potential and often do not treat intellectual property protection as a permanent element of their development strategy [Halt, Donch, Stiles, Fesnak,

2014, p. 10]. Such a state is dangerous from the point of view of keeping the company on the market and creating its competitive position. The lack of knowledge of novice entrepreneurs regarding the benefits of intellectual property protection and ways of securing it, as a consequence, may lead to many wrong decisions. The companies may neglect or deliberately abandon intellectual property protection, select inappropriate forms of intellectual property protection (time and territorial scope), or simply choose the wrong ones [Ester, Maas, 2016, p. 155].

As previously mentioned, the typical features of startups are the use of advanced technologies and the creation of innovative products / services that are to be commercialised on its basis. Having something new or unique, the creators of such an innovation idea should protect it [Weber, 2017, p. 25]. This seems to be particularly important both at the stage of concept and product development, where decisions are made on the further method of operation, and the answer to the questions: to protect or not, and if to protect it, how? determines further choices in the commercialisation process [Beverly, 2018]. In the case of new technologies, the form of protection may be different if the decision is made to commercialise [Sethi, 2016].

Startups most often protect inventions, logos, the company name or software. As part of intellectual property protection, tools such as copyrights, patents, trademarks, design rights, trade secrets and utility models are used [WIPO Magazine, 2021]. Intellectual property rights enable inventors and creators to transform their intellectual outputs into tradable commercial assets. These rights prevent others from using an invention or creative work without authorisation and can also help in negotiating profitable business [Kotch, 2017, p. 18]. Intellectual property law allows companies to claim ownership over and derive value from the creative and innovative outputs. However, protecting intellectual property rights takes time, money and other resources. International protection can be expensive and a time-consuming process. That is why startups often put IP aside [Ester, 2017, p. 119].

There are many reasons to secure intellectual property rights in startups, for example:

- deterring other companies from unfairly profiting from the startup's material,
- presumption of ownership,
- protection from infringement suits,
- competitive advantage,
- security and investor appeal.

Without intellectual property protection, startups expose their innovation to a very high risk of intellectual property interception, and the risk of the business and development of the enterprise itself is much greater [Halt, Donch, Stiles, Fesnak, 2017, p. 28]. If the intellectual property is not protected, someone else can patent their invention and it may limit or destroy the ability to profit from the IP, leaving the company at risk of costly litigation.

Many startups fail as listed previously in this article. Maybe if startups had not made a few common mistakes, it would have been different. The group of common intellectual property mistakes includes the following [Sethi, 2016, p. 45; Beverly, 2018; Kotsch, 2017, p. 18–20]:

- intellectual property is undervalued,
- lack of communication between the creators and decision makers,
- confidentiality is not protected,
- failure to do a trademark research to see if the mark or company name is already in use,
- the intellectual property strategy does not exist or is not prioritised,
- Failure to manage and monitor IP assets.

One of the tools used by tech startups to protect intellectual property are patents. The patent allows the exclusive use of the invention or technology described in the patent to be claimed for a specified period of time. A patent is valid in a specific country (or in the case of the European Union – a region). A patent allows a company to block the use and copying of a specific technology – the problem is software patents – which, although common in the USA, for example, are currently a hotly discussed topic in Europe (mainly due to the need to adjust European solutions and American standards to each other) – currently it is not possible to patent computer programs.

A patent strategy is an important part of an overall intellectual property strategy [Gollin, 2008, p. 290; Halt, Donch, Stiles, Fesnak, 2017]. Planning a patent strategy is usually the most important part of the development process of technology-based companies. Patent strategies are a series of steps that a company takes in order to secure and position its inventions, innovations, and/or intellectual property. To develop a patent strategy, startups should concentrate on three aspects. Focus must be on products, the technology area and adding value to the business. However, patents are not for each startup so many choose the protection of know-how.

Protection of intellectual property in Polish startups

An analysis of Polish startups conducted by the Startup Poland foundation [Polskie startupy, 2021, p. 34–37] showed that half of Polish startups have been operating for up to 2 years, less than a fifth for more than 5–10 years (Table 1). The largest number of startups is registered by founders in the Mazowieckie Voivodeship – a third of Polish startups is registered in the Mazowieckie Voivodeship (over 32%). Then there are several regions with other large metropolises (Lower Silesia with Wrocław over 9%, Małopolskie with Kraków 8.7%, Wielkopolskie with Poznań 7.3% and Śląskie with

the Upper Silesian agglomeration 6.9%). The worst voivodships in registering startups are Kujawsko-Pomorskie, Opolskie and Zachodniopomorskie.

There are many areas in which Polish startups develop their activities. Most, more than one fifth, deal with AI and machine learning (22%). Slightly fewer chose e-commerce (18%). The third place was taken by medtech (13%), i.e. services in the field of medicine and health. An almost identical percentage (12%) in the survey selected the words 'education' and 'analyst, research tools, business intelligence'. Every tenth respondent pointed to 'productivity, management', and 9% to 'big data', 'industry 4.0' and 'fintech, insurtech, financial services'. The following terms were placed in further positions: Internet of Things (IoT) – 8%, smart city, martech, i.e. marketing solutions (both 7%) and sport (6%). The low rank of such terms as 'agritech', 'e-sport' or 'virtual reality' may be puzzling.

Polish startups, when asked directly about what exactly they offer, were divided into almost three equal parts – 34% offer customers a service, 32% a product, and another 34% offer solutions that are a mix of a product and services.

Table 1 Profile of Polish startups

Market presence in years	Up to 1 year (19%), 1 to 2 years (34%), 3 to 4 years (28%), 5 to 10 years (18%).
Age of founders	20–30 years old (37%), 30–40 years old (43%), 40–50 years old (13%), 50+ years old (4%).
Region of registration	Mazowieckie (32%), Dolnośląskie (9%), Małopolskie (8,7%), Wielkopolskie (7,3%), Śląskie (6,9%), other
Product or service character	Artificial Intelligence & Machine learning, e-commerce, medtech, education, analytics, research tools, business intelligence, productivity & management, big data, industry 4.0, fintech, insurtech, financial services, internet of things, smart city, martech, sport.
Product or service	Service (34%), Product (32%), Mix of product & service (34%).
Intellectual property protection	Know-how 77% Trademarks 52% Copyrights 41% Patents 26% Industrial designs 15% Utility models 11%

Source: Raport. Polskie starupy 2021, Starup Poland, Warszawa 2021, p. 34–37.

It is interesting that over two-thirds of Polish startups took care to protect intellectual property rights (68%). However, a third did not.

46% of startup founders in Poland believe that their technology is unpatentable. Some are still at the research stage and are about to patent (18%). Others see no value for themselves on this account (16%). Almost every tenth startup complains about

too complicated and difficult patent procedure, and 7% about too high costs associated with it.

The vast majority of Polish startups (77%) focus on protecting their own know-how. More than half protects their trademarks (52%), and 41% works subject to copyright protection. More than one third of entities indicate the issue of databases (34%). 15% and 11% of startups, respectively, use intellectual property rights in the form of industrial and utility designs. Only 26% of respondents use patent protection.

It follows from the above and it is what the survey team states, that startups are heading towards a less formalised form of protection, less costly, and at the same time effective, while maintaining its basic requirements. The vast majority of respondents choose know-how as a form of protection, which shows that it is an element of strategic management for young enterprises, which immediately allows them to gain and maintain a competitive advantage on the market.

Young entrepreneurs often consciously refuse to apply for patent protection for an invention. Know-how protection does not require filing or conducting proceedings, and no registration certificates are issued. An invention covered by a patent, after 20 years of protection, goes into the public domain, which means that anyone can use it. In the case of know-how, protection may last indefinitely, as long as there is a need to maintain it, and at the same time its mechanisms are not violated.

Know-how, however, can be disclosed at any time, thus losing the object of protection. Ensuring the security of information flow inside and outside the company should be a priority for companies that decide to protect know-how.

Conclusions

The conducted analyses show that not only worldwide but more specifically in Poland, the market of technological startups is developing dynamically and the interest of scientists in this issue is growing. Startups are specific companies that require constant contact with the scientific and business environment. The emergence of startups is associated with large agglomerations that provide them with many opportunities for development and networking, but also with universities that promote innovative and creative graduates. Most of the studies notice the need to protect intellectual property, which is of particular importance in high-tech sectors. As research shows, many factors can contribute to the failure of a startup at various stages of its development. These factors include the lack of adequate protection in the initial stages of development and the lack of a strategy for the protection of intellectual property in subsequent stages of development. This issue may become an inspiration for further research on Polish startups. The research on their ways of protecting knowledge, inventions and innovations

is still little explored but very important. The research on strategies of protecting intellectual property and their connection with financial policy of a startup may be helpful for the emerging companies. It may help to create a model of intellectual protection for different types of startups (e.g. Biotechnology startups, IT startups).

The research on intellectual property in startups (literature review and desk research) enabled the recommendation of some activities that startup teams should keep in mind when developing their idea for the business. There are different startups on the market. Some base their activity on the technology that is already known (e.g. ICT industry). This kind of startups develop the innovation that uses already known technology and adjusts it to the needs of innovative product or service. In this case, the intellectual protection strategy should be more oriented to protect know-how and protect the innovative product or service until it appears on the market (e.g. protecting trademarks).

However, there is another group of the startups – startups that provide scientific research, implement inventions or scientific innovations created by themselves. This group should keep in mind official protection by patenting. This kind of technology is capital and knowledge intensive so it has special value and may bring financial success. Protecting research results by patents may also attract the financing of investors such as venture capital or business angels.

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