

Qualitative Analysis of Israeli SME IP Strategies

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1	Background and Study Goals	2
2	Previous Quantitative Research Findings	3
3	Methodology	4
4	Findings – Co-Authored with Adv. Gil Dagan	6
4.1	SME Profile	6
4.1.1	Sector Profile and Patent Filing Trends	6
4.1.2	Employees	7
4.1.3	Development Stage	7
4.1.4	SME Funding Sources	7
4.1.5	Investment Rounds	8
4.2	Approaches to IP of Companies without Patent Applications	8
4.3	Funding as a Pre-Condition for Patent Filing	10
4.4	Patent Filing for Investment Attraction	11
4.5	Company Alternatives to Knowledge Management through Patent Filing	14
4.6	Perceptions of the IP mechanism	15
4.7	Perceptions Regarding the Patent Filing Process	22
5	Summary of Findings	23
6	Appendix A – Interview Guide	26

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1 Background and Study Goals

The importance of Small and Medium-Sized Enterprises (SMEs) for economic growth should not be underestimated. SMEs are key players across countries at all levels of development, providing employment, promoting sustainable industrialization and fostering innovation.¹

Intellectual Property (IP) rights play a central role in today's economy, especially for SMEs. They do so by providing a competitive advantage, usually through patent registration, to ensure ownership rights on inventions and knowledge.² The fundamental principle of the IP system is that developing innovative products is an expensive and risky activity. However, the results of this activity – the innovative products, are sometimes easy to copy.³ Therefore, IP rights protect the owners from copying while enabling them to recoup their investment in the product development and commercialization process. In other words, the standard theory explaining why inventors or firms file for patents assumes that patents generate more returns on the patented products by preventing others from utilizing these products.⁴

Nonetheless, reality shows us that many more variables play a significant role in SME decisions regarding whether and how to protect their knowledge and products.⁵ To date, empirical data about SME IP management strategies has relied, for the most part, on either qualitative information based on surveys, questionnaires and interviews, or quantitative data, both primarily U.S.-based.⁶

¹ ORG. FOR ECON. CO-OPERATION AND DEV. [OECD], ENHANCING THE CONTRIBUTIONS OF SMES IN A GLOBAL AND DIGITALISED ECONOMY (2017); ORG. FOR ECON. CO-OPERATION AND DEV. [OECD], SME AND ENTREPRENEURSHIP OUTLOOK 2019 (2019).

² Paola Belingheri and Maria Isabella Leone, *Walking into the Room with IP: Exploring Start-Ups' IP licensing strategy*, 55(6) MANAGEMENT DECISION 1209 (2017).

³ Stuart J.H. Graham, Robert P. Merges, Pam Samuelson & Ted Sichelman, *High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkley Patent Survey*, 24(4) BERKLEY TECH. L. J, 1255, 1259 (2009); Sichelman & Graham, *Why do Startups Patent?* 23(1) BERKLEY TECH. L. J. 2 (2008).

⁴ Sichelman & Graham, *id.*

⁵ Sichelman & Graham, *id.*

⁶ Graham, Merges, Samuelson & Sichelman, *supra* note 3; Belingheri & Leone, *supra* note 2., Ted Sichelman and Stuart J.H. Graham, *Patenting by Entrepreneurs: An Empirical Study*, 17 MICH. TELECOMM. TECH. L. REV. 111 (2010); Celia Lerman, *Patent Strategies of Technology Startups: An Empirical Study*, INTELLECTUAL PROPERTY: PATENT LAW EJOURNAL (2015).

This study was commissioned by the World Intellectual Property Organization (WIPO) at the initiation of the Israel Patent Office to examine utilization of the IP mechanism among Israeli SMEs. The study presents rich qualitative data regarding IP strategies among Israeli SMEs founded in 2014-2015, focusing on four sectors: industrial technologies, agriculture and food technologies, digital health and medical technologies, and cleantech. This study is a direct continuation of a previous study that focused on a quantitative examination of IP strategies of Israeli SMEs and was based on patent data analysis. Both studies seek to present a comprehensive picture that can shed light on how SMEs operate in the IP field, focusing on the Israeli arena. Furthermore, the combination of both quantitative and qualitative approaches can also assist in identifying barriers to adopting efficient SME IP strategies, which can then facilitate formulation of a suitable policy to encourage and promote innovation among SMEs.

The research methodology and findings are detailed below.

2 Previous Quantitative Research Findings

The first stage of the study quantitatively examined the IP strategy dynamic of Israeli SME (ISME) activity, focusing on four different sectors: industrial technologies, agriculture and food technologies, digital health and medical technologies and cleantech.

A review of the findings reveals that nearly half (46%) of the 392 active ISMEs have not filed a patent application and 36% filed only 1 or 2 applications. Among the ISMEs that did not file a patent application, 71% are active companies. This finding raises the question as to whether these companies are indeed active. If so, this may indicate that these companies are not dependent on proprietary knowledge protection for their continued activity, such as recruiting investors. At the same time, the study shows that among most of the ISMEs with granted patents (88%), 81% of these granted patents are still valid.

The study also examined the patent family size filed by the Israeli SMEs.⁷ The analysis shows that most of the active companies (63%) filed patent applications that included a maximum of 3 family members (excluding PCT applications), and 21% filed patent applications with only 1 family member. As the size of the patent family, which indicates the geographical scope of protection of an invention, is a common indicator of the economic value of the patent, this finding may suggest that in these cases the filing of a patent application does not necessarily reflect the overall commercial value of the company's products.

The study also examined the ISME funding and product development stages. The findings showed that 108 companies were still in the seed stages (35%) and another 70 companies (22%) were active companies that went through several investment rounds (A, B or C). Among the companies that never filed a patent application, only 23 of the 141 companies (16%) reached advanced investment rounds (A, B or C) or were publicly supported, while 97 of the 141 companies (69%) were in the pre-seed and seed stages, or bootstrapped companies.

3 Methodology

The current study aims to present qualitative data reflecting the IP strategies used by Israeli SMEs, based on semi-structured interviews. The research methodology included three stages: in the first stage, an updated Israeli SME database was established to define the research population and to identify potential interviewees.⁸ In the second stage, 61 semi-structured interviews were conducted by the research group with the SME representatives, with each interviewee representing a different

⁷ Patent families are an array of patents (or applications) in several countries that share identical priority data that are related to each other. In other words, in the case of a patent application that has been filed in several countries - all the applications filed in the different countries will be merged into one family, with identical priority data. See OECD PATENT STATISTICS MANUAL I on page 110.

⁸ The original database was used for the first part of the study, see Sharon Bar-Ziv, Quantitative Analysis of Israeli SME IP Strategies (September 2020).

company. Finally, in the third stage, the qualitative data was collected, coded and analyzed using ATLAS.ti software. The various research stages are as follows:

In the quantitative part of the research, the Israeli SME database was established using Start-Up Nation Central's Start-Up Nation Finder.⁹ Start-Up Nation Central is an independent, non-profit organization that aims to promote Israeli innovation by facilitating connections between the business sector, government and NGO leaders worldwide. Start-Up Nation Finder is a free online platform that contains data about Israeli start-ups, investors, hubs, multinational corporations and academic technologies.¹⁰

The initial database included 1761 Israeli SMEs located in Israel and founded between 2014-2015. The aim was to examine SMEs which had presumably reached the suitable maturity level in terms of product development and to be certain that their patent data was available given the characteristics of the patent registration process. After completing the database setup, specific focus was given to four activity sectors: industrial technologies, agriculture and food technologies, digital health and medical technologies, and cleantech. Other sectors, such as: security and safety technologies, fintech and eCommerce, education and knowledge technologies, social media and advertising, were excluded from the sample, assuming activity in these sectors is mainly based on software, and that policy differences across jurisdictions regarding software patents may complicate examination of relevant patent data.

The final sample of Israeli SMEs included 392 SMEs and constituted the study population.

We updated the database in the qualitative part of the research, identifying companies that were no longer active since the original database was created in July 2020. In February 2021, we

⁹ <https://finder.startupnationcentral.org/>

¹⁰ https://finder.startupnationcentral.org/who_we_are

completed the updating stage and found that 270 SMEs were still active, out of 310 active SMEs as of July 2020.¹¹

We then went on to collect the contact information of the identified companies. We mostly collected LinkedIn profiles of the company founders as well as the company contact details and website.

We initiated contact with each of the founders of the active companies in the database by various means: e-mail, a personal message on LinkedIn or a telephone call to the company offices. As of August 2021, we completed 61 interviews with 61 interviewees, each representing a company from among the 270 active companies.

Every interview was conducted by a research group member based on the interview guide.¹²

4 Findings – Co-Authored with Adv. Gil Dagan

4.1 SME Profile

4.1.1 Sector Profile and Patent Filing Trends

The interviewees represent companies from four different sectors as follows: (1) 21 interviewees from 21 different industrial technologies companies - 19 companies filed at least 1 patent application, and 17 of them filed PCT applications; (2) 26 interviewees from the digital health and medical technologies sector - 22 of the companies they represent filed patent applications and 20 filed PCT applications; (3) 11 interviewees from the agriculture and food technologies – 9 companies filed patent applications and 6 filed PCT applications; and (4) 3 interviewees from the cleantech sector - all the companies filed patent applications, specifically PCT applications. In

¹¹ It is important to emphasize that we only included companies that were officially reported as non-active. The database may have included companies that were officially active, but in practice there was no activity in the company.

¹² See Appendix A.

other words, the findings indicate that most of the companies filed patent applications (53 out of 61), and most filed PCT applications (46 out of 53).

4.1.2 Employees

The majority of interviewees (59 out of 61) were willing to share information about the number of employees in their company. Most of the companies (33) employ 1 to 10 employees, 16 companies employ 11-50 employees and 4 companies have more than 50 employees. The company with the highest number of employees has 70 employees. 6 companies do not have any employees.

4.1.3 Development Stage

With respect to the development stage of the companies' products or services, it appears that 10 companies are still in the research and development (R&D) stage; 4 companies are in the alpha stage¹³; 6 companies are in the beta stage¹⁴; 9 companies are in the clinical trial stage¹⁵; and 31 companies have already released their products or service. In other words, most of the interviewees represent companies that have already released their products or service, or are in advanced development stages.

4.1.4 SME Funding Sources

Examination of the SME funding sources reveals quite a diverse picture. The majority of interviewees reported two or more funding sources. The most common funding source was a private investment, while almost half the interviewees (30) mentioned sources such as angels and private investors, venture capital funds, etc.

19 companies stated public agencies and institutions (government agencies, universities, etc.) as their funding sources. In addition, 17 companies indicated that they received grants from the Israel

¹³ The Alpha stage is sometimes also called the "proof-of-concept" stage. The objective of this stage is to test the fundamental basis of the technology of the product or service.

¹⁴ The Beta stage is the first prototype of the product or service.

¹⁵ For an expanded explanation regarding clinical trials see, for example, U.S. Department of Health & Human Services, *what are clinical trials*: <https://www.nia.nih.gov/health/what-are-clinical-trials-and-studies>

Innovation Authority. 8 companies stated that they operate based on a bootstrap model, *i.e.*, most likely based on limited capital from personal finances or company revenue. Only 6 companies mentioned sales of their services or products as one of their funding sources.

4.1.5 Investment Rounds

One of the questions (no. 10) focused on the company's number of investment rounds. From among the 61 companies, 47 stated that they had one or more investment round; 17 companies had 1 round or were towards their first round at the time of the interview; 10 companies had 2 rounds; 13 companies had 3 rounds; 3 companies had 4 rounds; 2 companies had 2 investment rounds; one company had 7 rounds and one company had 9 rounds. We also asked the interviewees when was the company's last investment round (question no. 11). The majority of the investment rounds (36) took place over the past three years (between 2019 to 2021), *i.e.*, about 4-5 years after the company was founded: 13 companies stated that their latest investment round took place in 2021 (or is currently taking place), for 12 companies the latest round was in 2020 and another 11 companies had their latest round in 2019.

For 11 companies the most recent investment was before 2019: 5 companies stated that their latest round took place in 2018, 3 companies in 2017, one company in 2016, one company in 2015 and one company noted that its latest investment round took place in 2014.

4.2 Approaches to IP of Companies without Patent Applications

The study examined the interviewee's familiarity with the IP mechanism. In this context the interviewees were asked why the company had not filed patent applications (question no. 15), and whether, in retrospect, the decision was justified (question no. 17). Only a minority of the companies (8) had not filed patent applications for their products or services. Half these interviewees (4 companies) stated that the reason was lack of knowledge regarding patent

protection relevance to their products or services. One of these interviewees (from the digital health sector) stressed that this was the case at the point in time in which patent filing was still a possibility: “Our technology involves a device, but its main feature is software-based information. There was an understanding that this probably did not justify all the investment and long-term patent protection [...]” Among the other four interviewees, two responded that their technology was not yet ripe for patent registration, another interviewee claimed that patent registration was too expensive, and another interviewee replied that the company was awaiting significant investment in order to file a patent application.

Concerning the question as to whether the decision not to apply for a patent was justified, the interviewee quoted above answered that in retrospect he thinks that patent filing should have been considered: “I was not in the company at the time the decision was made, but I tend to think we could have better protected ourselves.” A similar answer was given by an interviewee from the industrial technologies sector, who stated that the company’s product “was a primary product in the market and the world [...] and that today there are five competing companies which have developed similar products. Therefore, patent registration might have been helpful.” However, some of the other interviewees emphasized that a patent filing was not applicable for them in the past for different reasons, however they do not rule out the possibility of a future patent filing.

We then asked the interviewees from companies that had not filed patents whether they believe their company might file a patent application in the future (question no. 20). Only one interviewee responded that in the company’s current situation it is not something that should be considered. The others did mention that there is at least a remote possibility that a patent would be applied for in the future. Interestingly, they all stated that they might do so in the future in order to obtain investment funding or since they may want to receive a grant from the Israel Innovation Authority.

In conclusion, these findings indicate that only a minority of companies have not filed any patent application whatsoever. Half these companies most likely did not do so because they lacked sufficient knowledge on the topic. Also, some of the interviewees noted that in retrospect perhaps the decision was wrong.

4.3 Funding as a Pre-Condition for Patent Filing

Lack of funding resources may serve as a barrier to patent filing among SMEs. As mentioned above,¹⁶ we asked the interviewees the reasons for not filing patent applications, in cases in which no application was filed (question no. 15). From among the 8 companies which had not filed any patent application, 2 interviewees (both representing companies from the agriculture and food technologies sector) mentioned the lack of financial means to apply for patents. One interviewee stated that his company could not afford the high costs of patent prosecution. His company's funds are based on private investment and small-scale angels and had relatively small-scale investment rounds. The latest round took place in 2020. Another interviewee noted that his company has a patent application ready for filing, but the company is currently waiting for investments in order to file a provisional application. His company's funds are based primarily on private funds and a grant from the Israel Innovation Authority. Interestingly, the products of both these companies have not been released yet. These two cases point to a potential connection between funding sources and patent applications, and the dependency of these companies on large-scale investors in this regard.

A similar trend was found among 6 companies that only filed national patent applications and avoided filing PCT applications (question no. 23). Among these companies, 4 interviewees

¹⁶ Section 4.2.

mentioned the costs of a PCT application as the reason for not filing them. One interviewee emphasized that while his company had filed a provisional application, the company (whose product development is in the clinical trial stage and so far is entirely bootstrap-funded) is waiting for seed funding or investment round A before filing a PCT application. Another interviewee who mentioned the costs as a reason for not filing a PCT application represents a company in the clinical trial product stage and is revenue financed. In the case of the other 2 companies whose representatives mentioned high costs as a reason for not filing PCT applications, their products have already been released. However, their external funding sources are based on relatively small-scale investments (angels and CLA).

4.4 Patent Filing for Investment Attraction

Answers to the question why the company had applied for a patent (question no. 24) and how they think the patent application had benefited the company (question no. 25) revealed another aspect of investment funding as a pre-condition for patent filing. Forty-one interviewees indicated that attracting investors was a significant reason for patent filing. However, it is worth noting that some interviewees distinguished between types of investors with respect to the importance they attributed to patent filing:

In the digital health and medical technologies sector, most interviewees highlighted the significant importance of patent protection in attracting investments and funding. One interviewee answered: “in our case, it is impossible to raise money without a patent. Therefore, attracting investors was the main goal [...].” Another interviewee from the sector responded: “In the industry in which I work, the industry of medical devices and start-ups, a patent application is an integral part. The default is to file at least a provisional application before reaching out to investors [...].” Another interviewee from this sector confirmed that patent registration indeed benefits his company: “[...]”

Almost every investor asked us about patents. Therefore, I feel that the fact of having a patent already benefits us [...].”

Nonetheless, several interviewees from this sector distinguished between different types of investors and stressed that the more informed investors tended to conduct an independent and in-depth review of the patents and patent applications, rather than being content and impressed by the submission of patent applications. For example, one interviewee answered: “I can say that it depends on the sophistication of investors. From our experience with the environment in which we operate, the patent we wrote was an asset as long as it was pending, and before we received an office action. One of my frustrations – and I am not a patent attorney, but it is relevant for IP in general – is the gap between the filing date and the date it becomes known what the patent is worth. This gap is problematic for startups. When I approach investors and show them something that is written very nicely, some investors will be very impressed. But more sophisticated investors will have done their homework about the patent and will see more in-depth the challenges involved [...].”

An interviewee from the agriculture and food technologies sector gave a somewhat similar answer: “[...] Investors who lack knowledge are attracted by a patent, but professional investors will be less interested in it.”

The issue was also addressed when the interviewees were asked whether, to the best of their knowledge, potential investors think that patent protection is important (question no. 31). Again, interviewees from the medical sector highlighted the distinction between experienced investors, who will only invest in patents worthy of investment, whereas less-experienced investors might invest simply because there is patent protection for the product.

One interviewee from the medical sector gave this answer to the question: “There are experienced investors, not to mention smart ones, who understand the distinction [...] and can recognize when there is a product that should be taken seriously. And there are less experienced investors, not to mention unwise, who have a checklist, in which patent protection is one of the items. In which case they indiscriminately ask and expect a patent, which is a mistake.”

Although most interviewees from the medical sector (20 interviewees) attributed a high level of importance to patent protection among potential investors, some interviewees indicated that it depends on the circumstances and what the company offers. One interviewee answered: “The uniqueness has more to do with what you offer, and less with what kind of IP you have. Let’s just say that at least in our contexts, investors and the general public find it less and less important. For investors it is more important to see how the market reacts to the product and that it meets a need and has demand. This is the basis. And of course where you are in relation to the market is also significant.”

In the industrial technologies sector the answers indicated a different trend. According to the interviewees from this sector, investors tend to be content knowing that there are patent applications, and do not conduct due diligence, unlike the case of experienced investors in the medical sector. One interviewee from this sector stated: “The investors ask and it is sufficient for them that we have provisional applications. There is a norm that if a company has patents, it improves its reputation [...]”

Some interviewees from this sector indicated a decline in the level of importance some investors attribute to patents. One interviewee answered: “I am not sure this is what interests them the most, but I am sure there are investors who attach more importance to it than others. And of course, if it

is a groundbreaking technology product, it is probably important to investors. However, I do not think this is the investor's sole consideration."

Other interviewees mentioned investor attraction as one reason for patent filing, but not the main one. For instance, an interviewee from the cleantech sector stated: "[...] With regards to investors, I assume that it helped a bit with the investment round, when the patent was still under registration process. Not very significantly [...]." The interviewee defined the importance of patent protection among investors as medium and below: "From 0 to 5 I would say 2, meaning in the middle and less than that."

One interviewee from the agriculture and food technologies sector shared: "It is more to attract investors. We do not have money to quarrel with someone in court over a patent infringement. So it is mostly for the investors. Although I can say that they also believe less in the value of patents. These are usually foundations that have certain criteria, and therefore there must be IP, among other things. Other institutions are less strict about it, and sometimes they prefer not having any patents, but trade secrets instead. They do not want the information they invest in to be exposed."

An interviewee from the industrial technologies sector gave a similar type of answer, stating: "[...] I have built companies for 25 years, and up until now I don't know whether it helps attract investors. In the field of biotechnology, it clearly does contribute in that sense. But in the field of software, I must say that personally I am skeptical [...]."

4.5 Company Alternatives to Knowledge Management through Patent Filing

Among companies that had not filed patents, we examined whether they protect their knowledge and products through alternative mechanisms. Four out of 8 interviewees related to this issue when they addressed reasons for avoiding patent filing (question no. 15) or whether the company protects

its product or service development through other forms of IP protection (question no. 16). These interviewees noted that their companies protect their developments by keeping their know-how as a trade secret. One of them added that his company also had registered trademarks and software, which is copyright protected.

4.6 Perceptions of the IP mechanism

As mentioned above, the interviewees were asked about the reasons for filing a patent application (question no. 24). The most common reason mentioned was to attract investors. Two other recurring answers were IP protection and blocking competitors. Two interviewees from the agriculture and food technologies sector also stated that patents raise the value of their company in the eyes of clients and the market. The same type of answers were repeated in the digital health and medical technologies sector, where interviewees highlighted that patent filing creates value for the company.

Regarding the benefit of patent protection in practice (question no. 25), the answers varied among the different sectors. In the industrial technologies sector, 16 of the 19 interviewees who answered the question stated that patent registration does benefit them. Two interviewees responded that it does not benefit the company and one interviewee did not know whether or not it was of benefit.

Typical answers were that it contributes to the freedom to operate and to attract investors. Furthermore, three interviewees also underscored its contribution to the reputation of their respective companies. One of the interviewees however differentiated between the contribution to the company's value and inability to protect the patent in case of an infringement: "For a small company, a patent is a cumulative asset for increasing the company's value, and may provide protection in case a big firm attempts to block us. We won't incur the legal costs for patent infringement lawsuits that will eventually end with a monetary compromise."

In the digital health and medical technologies sector, only 2 of the 22 interviewees who answered the question stated that in practice a patent does not benefit their company. One interviewee noted it is still too early to determine whether or not a patent is a contributing factor. Among the remaining interviewees, common answers were that the patent attracts investors, blocks competitors and helps in receiving grants from the Israel Innovation Authority.

One interviewee stated: “The main issue is blocking competitors. I think that filing the applications benefits us in this regard, because we received a patent in the US and the other application is still alive and we are defending it. In the fields in which we currently operate , it enables us to operate without others copying the product even six years after filing the provisional [...].”

In the agriculture and food technologies sector, 6 out of 8 interviewees stated that patent registration does benefit them. However, one interviewee noted that it does not contribute to the company and he doubts whether it helps attract investors. Another interviewee responded that the question was irrelevant since the company’s application had been rejected. Typical answers were that the patent allows them the freedom to operate, create partnerships, share information about the patent and attract investors.

In the cleantech sector, 2 interviewees stated that the patents protect them when marketing the product and sharing information. One of them also noted that the patent helps them block competitors. The third interviewee said that in practice patent protection is meaningless for his company: “[...] I believe that in hardware products that are very tangible and do not have an element of software or a more abstract IP, the ability to protect is low. Our product was introduced into the market, and after two months we already saw similar competing products.”

Another question dealt with the impact of competitors on the decision whether or not to file for patents (question no. 33). The majority of interviewees from all four sectors noted a certain impact.

In the industrial technologies sector, most of the interviewees (19 out of 21) answered that the business environment does impact the company's decisions to apply for patent registration. However, several interviewees responded that there is no substantial concern that would in practice prevent them from applying for registration.

One interviewee answered: "This certainly goes into some of the considerations at the patent writing stage, since if an application is rejected, the application is published and copied when there is no protection. When you look at large companies, especially in places like the US, South Korea and Europe, they also see the significance of IP protection. Startup companies are not looking to conduct a legal battle with big companies like Apple. There is no chance of succeeding in such a battle. But it does give you the ability to tell competitors that they are infringing. Maybe they will stop doing it and maybe not, but at least it can be done. This may help with respect to large companies in that it helps increase the company's value, because they see that these people [in the start-up, S.B.Z] have the ability to test the patentability of their company's products. This is definitely something of value."

Another interviewee answered: "There is concern, but it is not significant. If the process is carried out properly, there will be a time gap between the filing date and the exposure of the technology. In addition, it is always important to be one or two steps ahead of them [competitors, S.B.Z]. If you don't file an application, you won't be able to protect the product, and if you do, you may disclose it, but you will at least have some protection."

Another interviewee responded: "[...] If you write a patent, you expose information. There is no way around it. In our case, we often prefer to keep the know-how to ourselves and not expose ourselves a lot. If there are very general patents, that maybe someone would approve, but it is hard to protect them in practice, I do not know how much they contribute to protection in practice."

In the digital health and medical technologies sector, 23 of the 26 interviewees stated that competitors do have an impact, mostly a significant competitor. However, 3 interviewees indicated that their products are unique in the market, and therefore they do not fear competition. One of them mentioned that he does not know how his company would be able to deal with infringement claims raised by large companies at this stage: “Currently we do not have competitors producing similar products. We are quite groundbreaking in the field. As I said, we filed a patent mostly to attract investors. But I have to say realistically that if Google or Apple or Microsoft make a bridge to our patent [copy the patent or infringe on the patent rights in some way, S.B.Z], I do not think we have the power to take them to court [...].”

Another interviewee stressed that while there are currently no competitors in his field, filing a patent is crucial in order to protect his company’s innovation: “Even if today there aren’t any competitors, they might come at a later stage. So it doesn’t matter whether or not they make something similar, in any case it is worthwhile applying for patent registration.”

In both the cleantech and the agriculture and food technologies sector, most interviewees answered that the competitors strongly impact the decision as to whether or not to apply for patent registration. Only 3 out of 14 interviewees responded that they do not have competitors in their field or that it is irrelevant. Two interviewees stated that it depends on the circumstances of each case. One interviewee from the cleantech sector noted that due to heavy competition the company wrote the patent application with many details, so that it would be difficult to infringe on the patent.

Another trend that may sound trivial yet was noticeable is that the final decision regarding patent filing was an internal company decision, mainly made by the founders themselves. However, at least 13 interviewees stressed that patent attorneys were involved in the decision. In their answers to question no. 28 (which dealt with the actors within the company who are responsible for patent

filing decisions), 29 company representatives stated that the final decision was made by the founders. In 13 companies the final decision was handled by a dedicated team, including the founders, the CEO/CTO, and other position holders. In 7 companies the final decision was that of the CEO/CTO. The final decision was in the hands of the board of directors in only 5 of the companies. Six interviewees chose not to elaborate on the decision-making process in this regard.

In question no. 26 (or no. 18 for companies that did not file patent applications), we asked under what circumstances they think it is vital to apply for a patent. Typical answers to this question were: in cases in which the invention can easily be copied, when companies want the patent to serve as a defense from infringement allegations, and in cases in which the start-up's business model is based on a specific and unique product they develop.

Another answer was that patent filing is vital when it is valued in the specific industry. For example, one interviewee responded: "It depends a great deal on the market. If you are in the toy market, go ahead and sell and don't look for patents, because they will be infringed on anyway. On the other hand, in the field of car tires, for example - it is worth applying because the tire companies are suing each other. The patent today is not protective; it is mostly a statement. [...] If the industry does not value it, there is no reason to register."

Question number 27 (or no. 19 for companies that did not file patent applications) attempted to understand the opposite, under what circumstances is it less important to apply for patents.

Typical answers to this question were, in cases in which the technology can be protected by other means, *e.g.*, as a trade secret or copyright. Another type of answer referred to cases in which the patents will not be sufficiently beneficial to the company financially. For example, one interviewee answered: "[...] A patent is a tool, designed to block others. And it is an expensive tool. It also requires registering a patent, both to file and to maintain it. Thus, one has to check financially that

this is the right timing and there is enough knowledge and innovation that will enable someone to get a patent, and in terms of timing also to make use of it, to enjoy the exclusive period of product marketing.”

In question number 30 we asked the following: “Assuming there are no financing limitations, how would you define the importance of registering a patent for a start-up company, with respect to establishing the product in the market, the company's marketing capabilities, its reputation, etc.?”

Most of the interviewees (41) ranked patent registration as a vital part of their activity. The majority of interviewees from this group – particularly interviewees from the digital health and medical technologies sector – stated that patent protection is critical. One of the interviewees noted that she lacks the experience to answer the question broadly, due to the initial market stage of her company’s product. However, she added that she finds patent protection necessary to attract investment.

A minority of the interviewees who answered the question (10) emphasized that the answer depends on the circumstances, such as the specific market or product. For example, one interviewee noted: “It depends. Between 0 and 100. If your innovation is simple, superficial, functional, connects something that exists to something cool but without in-depth product innovation, the answer is 0. There is nothing to invest, it is a waste of time. And if what you developed is based on in-depth product innovation, with research and depth that has something that is not just a new application, it is very important for everyone to conduct a strategic process of understanding whether it is worth filing a patent.”

Only 9 interviewees ranked the importance of patent registration as low or non-existent. For example, one interviewee answered: “I can say that the weight of intellectual property has been declining over the years. Fewer and fewer startups put this at the forefront when introducing the

company to investors, and at the same time, fewer are asked about it during due diligence. So in my humble opinion, and considering my familiarity with the topic, it is nice to have, nothing more.”

The study also examined whether the companies pre-examined their freedom to operate, i.e., whether the product(s) or services they developed may infringe on the IPRs of others (question no. 29). Fifty-two of the 61 interviewees answered in the affirmative, and they indeed conducted such pre-examinations, either independently or by a patent attorney. Only 9 interviewees avoided such a pre-examination.

Question number 32 was somewhat similar, but focused on the impact of patent registration or IP protection on the company’s reputation. Fifty-nine interviewees answered this question. Forty-seven of them stated a significant impact in this regard. On the other hand, 9 interviewees noted that the impact was low or non-existent. Two interviewees responded that it depends on the circumstances. Only 1 interviewee stated that he does not have enough experience to respond correctly. Interestingly, in the digital health sector, almost all interviewees (25) found the impact to be significant. Only 1 interviewee from this sector did not consider the impact to be significant, how he qualified his answer to his subfield (medical devices).

In the other sectors the results were not as unequivocal. In the industrial technologies sector, only 15 of the 20 interviewees noted the significant impact of patent registration on the company’s reputation. In the agriculture and food technologies sector, only 7 of the 10 interviewees shared the same view. Finally, in the cleantech sector all 3 interviewees emphasized that the impact is not very significant. For example, one of them stated that there could be a certain impact with respect to the image, however in practice patent rights are not that impactful.

4.7 Perceptions Regarding the Patent Filing Process

The final question (no. 34) focused on whether and how to improve the patent registration system. The answers can be divided into three groups. More than half the interviewees mentioned the need to reduce patent registration costs through subsidies. One interviewee stated: “What impedes is the cost, because particularly in the software field the patent has to be well written. I have to commission a professional in addition to the registration cost, and it turns out to be an amount I cannot afford.”

Another common answer addressed the need to make patent registration information more accessible to SMEs. For example, one interviewee stated: “If the patent office had written guidelines for people like me, that explain how to fill the application, it would have been helpful, since after receiving the document from the patent attorney I saw that I could have done it by myself.” Another interviewee answered: “It is crucial to publish what is the best way, recommendations and the cost range, so that inventors will know where to go.”

Another interviewee suggested that the patent office offer the option of an initial consultation meeting with a patent expert who does not have a conflict of interest: “I suggest having a patent mentor who does not have a financial interest in the matter and who will give substantive advice. It could be someone from the Israel Innovation Authority, something governmental, and there are probably people who have been in this field for several decades and would perhaps be happy to sit down and talk to all kinds of young guys about ideas and see how they can help them.”

Another group of answers focused on suggestions for structural changes in the patent registration system. One interviewee stressed that in his opinion the patent system is not structured to work with SMEs, and suggested offering unique tracks that will subsidize young companies in exchange for a percentage of their future revenues, if applicable.

A minority, 7 interviewees, noted that in their opinion there is no need to make substantial changes to the system. One interviewee said: “I do not think it is that complicated today to register a patent, nor does it require a lot of financial resources. Thus, I personally think that it is quite accessible and I have no idea how to improve the process.” Another interviewee stated: “I do not know of anything that does not work properly. Of course, you could say that the cost is not small, but I do not see any way to solve this.”

5 Summary of Findings

The findings described above present a rich picture of the IP strategies employed by Israeli SMEs. The study examined the approaches to intellectual property among companies that have not filed patent applications (section 4.2), the connection between investment in the company and patent filing (section 4.3 and section 4.4), use of alternative protections to protect the company's knowledge (section 4.5), general perceptions regarding the intellectual property mechanism (section 4.6), and company perceptions of the patent registration process (section 4.7).

The 61 interviewees represent four different sectors: the industrial technologies sector, agriculture and food technologies sector, the digital health and medical technologies sector and the cleantech sector. Most of the companies (53) are active in the intellectual property field and have filed at least one patent application, including PCT applications. In fact, the percentage of companies that applied for patents among the respondents, in each sector, is higher than 80% (90% in the industrial technologies sector, 85% in the digital health and medical technologies sector, 82% in the agriculture and food technologies sector and 100% in the cleantech sector). Also, most of the companies (31) have released their products or services, or are in advanced R&D stages (alpha or beta stage and clinical trials). Furthermore, most of the companies rely on private investment

sources such as private investors or venture capital funds. Finally, 17 interviewees specifically mentioned that they had received grants from the Israel Innovation Authority.

The study examined how companies that have not filed patent applications regard the issue of intellectual property. Among 8 interviewees who represented such companies, half claimed that the company's lack of patent protection was due to insufficient knowledge about the possibility of protecting their technology through a patent, particularly with respect to software-based technology. Other interviewees maintained that their technology had not yet matured into a patentable invention. Some referred to the high costs of patent registration and the need for investment sources. Others noted that, in retrospect, the decision not to protect their technology through a patent may have been wrong, given the market in which they operate and the existence of competitors. Regarding the question as to whether the company will consider protecting its technology through a patent in the future - most of the interviewees stated that they will certainly consider it, and that it will depend on financing. Thus, we can see that in most of the cases we examined the companies did not apply for patent registration due to lack of sufficient knowledge or funding, and according to their answers, they may consider patenting their technology down the road.

The study also examined the possible connection between investment in a company and filing a patent application. The findings present an interesting picture. Apart from companies that did not file patent applications, among other things due to a financing problem, as described above, companies that filed patent applications only at the national level (4 companies), without PCT filing, similarly reported that the costs prevented them from filing a broader patent application.

Among the interviewees whose companies had patented their technology, specifically with respect to the main reasons that led to such registration and how it contributes to the company's activity,

the examination found that among many of them (41) the perception is that patent protection attracts investors. This was particularly prominent in the digital health and medical technologies sector. At the same time, many interviewees distinguished between sophisticated or experienced investors compared to less sophisticated or less experienced investors, indicating that the latter are more likely to be impressed by patent protection. In contrast, more experienced investors will often see the challenges entailed in protecting technology despite a patent. In the industrial technologies sector, the interviewees appeared to make less of a distinction between investors, maintaining that investors prefer the existence of a patent and do not conduct due diligence before the investment. Other interviewees noted what they saw as the declining importance of patent protection in the field in which they operate, albeit indicating that it is still vital.

Regarding the alternatives to knowledge management through patent protection, 4 of the 8 interviewees representing companies which have not patented their technologies addressed this issue. They maintained that their company protects its technologies as a trade secret, along with trademarks and software protected by copyright.

The study examined general perceptions regarding intellectual property. For example, interviewees were asked about the reasons for patenting technology. Many of them indicated the importance of patent protection in attracting investors and blocking competitors. Other interviewees commented that patent protection increases the company's value in the eyes of customers and the market. When asked about the contribution of patent protection to the company, most of the interviewees stated that such protection allows them the freedom to operate and contributes to the company's reputation. Finally, regarding the question as to the impact of competitors on the decision whether to protect their technology through patents, most of the interviewees, from all sectors, responded that this has a moderate to high impact.

In addition, the interviewees noted that patent protection is necessary insofar as there is concern that competitors will copy the technology, when patent protection can be used to avoid infringement claims raised by competitors, or when a product is unique. On the other hand, they maintained that in situations where the technology can be protected differently or patent protection is not economically beneficial - there is no point in such protection.

Asked whether their company had pre-examined the freedom to operate - almost all respondents (52 out of 61) responded that they had done so.

The study also examined the interviewees' opinion of the patent registration process. More than half addressed the need to reduce registration costs. Many interviewees also commented on insufficient information, indicating that they would like local patent offices to guide SMEs regarding patent registration, including preliminary consultation meetings. Additional interviewees raised the need to create designated registration tracks for SMEs in order to facilitate the process and address registration costs.

In conclusion, the study sheds light on how SMEs operate in the IP field, focusing on the Israeli arena. Furthermore, it identifies significant barriers to adopting efficient SME IP strategies, such as funding and knowledge regarding the IP mechanism. These barriers should be considered in formulating a suitable policy to foster and promote innovation among SMEs.

6 Appendix A – Interview Guide

Introduction:

Hello, my name is [interviewer's name] and I am part of a study about Intellectual Property Management Strategies in Israeli Start-Up Companies, headed by Dr. Sharon Bar-Ziv (from the School of Law at Sapir Academic College). The study is conducted for the World Intellectual Property Organization (WIPO) in collaboration with the Israel Patent Office.

The study objective is to learn how the company you founded (or where you work) protects its products, as well as your familiarity with the intellectual property mechanism and its use. The study conclusions will serve as the basis for understanding the needs of start-up companies regarding these issues, in the aim of helping and supporting them.

As part of the study we are conducting interviews with representatives of start-up companies in various fields founded between 2014-2015. We would be happy to talk with you about these issues or with any other company representative willing to share their experience with us.

The study findings will be presented in a report submitted to the WIPO and to the Israel Patent Office. The findings will be summarized, analyzed and presented anonymously, and will not mention the names of the companies or the interviewees.

Thank you in advance for your cooperation. For more details you are welcome to contact Dr. Sharon Bar-Ziv.

General information:

1. Interviewee's name:
2. Interviewee's position in the company:
3. Interviewee's contact details:
4. What is the company's name?
5. What is the company's field of activity?
6. How many employees does the company currently employ?
7. What products/services does the company develop? What is their uniqueness?
8. At what stage is the company's product development?
9. What are the company's sources of funding?
10. How many investment rounds were there in the company? When were they?
11. When was the company's last investment round?
12. Has the company, or its founders, filed patent applications?
13. Did you check whether the company's product(s) are entitled to patent protection? (If not - why, if so - with whom did you consult? – (Patent Attorney/Lawyer/Investor/Other)
14. Did you check in advance the costs of registering a patent? (If you did – with whom did you consult? (Patent Attorney/Lawyer/Relied on your own general knowledge or research/Other)

If no patent applications have been filed:

15. Why have you not filed patent applications? (For example: we did not have enough knowledge, we did not have enough money, after consultation we concluded that our product is not patentable, we did not consult but assumed that our product is not patentable, we prefer to protect our knowledge another way - keep it confidential).
16. Does the company protect its developments through other intellectual property mechanisms (copyright, trademark, trade secret)?
17. At this time, do you think the decision not to apply for a patent was justified? Please explain.
18. In general, under what circumstances do you think that applying for a patent is vital?
19. In general, under what circumstances do you think it is less necessary to file a patent application?

20. Do you assume that you will consider filing a patent application at some point in the company's development?

If patent applications have been filed:

21. Have you submitted a PCT application?

22. If so - what were the reasons for submitting the PCT application (convenience, price, examination speed)?

23. If not - what were the reasons for refraining from submitting a PCT application?

24. Why did you apply for a patent? (Enjoy proprietary protection of the company's product, avoid infringements, block competitors, attract investors, grant license).

25. How do you think patent registration actually benefits you? (Freedom of action, block competitors, attract investors, grant licenses). Please specify.

26. In general, under what circumstances do you think it is vital to file a patent application?

27. In general, under what circumstances do you think it is less necessary to file a patent application?

All interviewees:

28. How are decisions regarding patent registration made in the company?

29. Was a pre-examination conducted as to whether the product(s) which the company develops may infringe on intellectual property?

30. Assuming there are no financing limitations, how would you define the importance for a start-up company of registering a patent - with respect to establishing the product in the market, the company's marketing capabilities, its reputation, etc.?

31. To the best of your knowledge, do potential investors attribute importance to patent protection?

32. To the best of your knowledge, what impact does patent registration or intellectual property protection have on a company's reputation?

33. What impact, if any, does your business environment (competitors) have on the decision whether to file a patent application? (For example, is there concern that this will reveal information to your competitors who will develop similar/complementary products that may hurt your profits?)

34. In your opinion, can and should the patent registration system be improved in order to help start-up companies in order to help start-up companies with the registration process?

Thank you for your time!