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Patent litigation by private inventors - case Finland

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Abstract

Private inventors are active patent applicants but lack the skills to prosecute their IP rights. While patents and patenting are studied immensely in the last decades, we have found the role of private inventors less covered. Our research focuses on private individuals' involvement in patent prosecutions in the Finnish courts of law. We study the actions of private inventors to protect and enforce their intellectual property, and the types of legal actions they get dragged into. This paper uses a literature review and patent litigation data retrieved from the Darts-IP database and combined with patenting data from the Finnish patent and trademark office (PTO). Based on a conducted analysis we find that private inventors have high success in patent ownership disputes and low success in administrative hearings. In other types of cases they fare about as well as corporate litigants. This is somewhat surprising, as private inventors are usually thought to perform poorly in patent litigations. Our research, to our knowledge for the first time, provides empirical evidence of private inventors' involvement and performance in patent litigations, in Finland and provides new insights to technology and innovation management in the intersection of judicial research. The results of this work are useful for academia, as well as for private inventors, entrepreneurs and small company managers for making knowledge-based decisions on inventions, patents and patenting.

Keywords: Patent, Litigation, Judicial, Law, Inventor, Invention

1. Introduction

Private inventors are often thought to be disadvantaged in protecting and appropriating their inventions. Their abundance to file patent applications is high, but they lead to granted patents less frequently, as compared with corporate applicants. Inventors with technology background are usually less aware and considerate about the ultimate judicial nature of patents. Estimating risks and probabilities of legal disputes is very difficult without legal expertise and understanding of judicial processes. Thus, the fear of legal disputes with high costs and other consequences is an important source of discomfort for private inventors.

Our research focuses on private individuals' involvement in patent prosecutions in the judicial instances, or courts of law, in Finland. We study their actions to protect and enforce their intellectual property, and on the other side, the types of legal actions they get dragged into. This is, to our knowledge, the first study providing empirical evidence of private inventors' involvement and performance in patent litigations, in Finland.

This work contributes to the existing literature on the patent litigation system and innovation and knowledge management combining the judicial nature with the technology management approach. The results of this work are useful for academia, as well as for private inventors, entrepreneurs and small company managers for making knowledge-based decisions on inventions, patents and patenting.

While patents and patenting are studied immensely in the last decades, we have found the role of private inventors less covered. Our research focuses in the intersection of technology management and judicial research. Most of the research in this field focuses on the US patent system. European studies include comparisons of patent litigations across several European jurisdictions, which provides us a sounding board against which to reflect our findings.

While private inventors are involved in a number of legal disputes, we are lacking a deeper understanding about the types of processes, the other parties involved, and the nature of demands or claims made. To increase our understanding of how private inventors fare in prosecuting patents, we need to ask a rather broad question:

RQ 1: In what types of patent litigations are private inventors a party?

Private inventors often have a scant understanding of the judicial functioning of the patent system. They are unprepared for legal challenges and reluctant to initiate, let alone get dragged into one. Their capability to efficiently appropriate their inventions is restricted by lack of understanding of the factors affecting law suits and their outcomes. This leads us to our second Research Question:

RQ 2: Are patent related judicial processes involving private inventors in balance with their patenting activity?

Fear of legal actions and respective financial consequences deter inventors from entering the patent regime and we assume that private inventors are mostly losing their cases in the patent courts. To validate or debunk these fears, we will study how private inventors prevail in patent litigations. By finding their success rate, we can tell if their fears are justified. This now leads us to our third Research Question:

RQ 3: How successful are private inventors in their patent litigation processes?

The remainder of this paper is organized as follows: The next chapter presents the research framework with literature background and data. Chapter 3 presents our empirical findings and chapter 4 discusses these findings and provides recommendations. Chapter 5 is a conclusion to our research.

2. Research framework

This empirical-descriptive research is based on the need to generate an understanding of the judicial processes in patent courts from the viewpoint of technology management.

2.1 Private inventors

Private inventors are individuals applying for a patent in their own name, instead of naming a company as an applicant. We use "private inventor" to indicate that no company is named as a patent applicant, but the application is filed and prosecuted by one or more private individuals. Some scholars use near-similar terms with slightly different meaning. Gaudry (2012) talks about pro-se patent applicants, meaning that they choose to represent themselves while pursuing a patent application, without any help from patent attorneys or patent agents. Singh and Fleming (2010) makes use of "lone inventor" to describe individuals who work alone on their invention(s), instead of collaborating with others. And yet, Meyer (2005) talks about independent inventors and individual inventors, meaning essentially private individuals trying to protect, patent, and utilize their inventions.

We have earlier reported two reasons for private inventors not to involve a company in the patent application process (Talvela, 2016):

1. The company that they were affiliated with when the invention was made were not interested or did not claim the ownership of the invention. The inventor then decided to exploit the invention himself.
2. The inventor felt that inventing had become a sort of hobby, and patents were sought for most inventions, considered useful.

Registering and prosecuting a patent application at the PTO is the one and only patent litigation that all patent applicants are involved in. The decision taken by the PTO on the patent application is the first adjudication in an administrative patent litigation process. Administrative litigations involving an administration as the other party may be appealed against by petitioning an appellate level court, which, for IPR disputes in Finland, is the Market Court. Decisions by the Market Court may be appealed against at the Supreme Administrative Court, pending leave to appeal.

To receive a patent, an applicant must file an application with the PTO and convince an examiner that the application meets statutory patent requirements. The examiner considers the application's merits and communicates with the applicant through Office Actions. During the prosecution the applicant may, at any time, withdraw the application, or stop responding to Office Action requests, or skip statutory payments, causing effectively the patent application to be withdrawn or abandoned. After all Office Actions are duly prosecuted, the application is either allowed or rejected.

Civil litigation cases are disputes between two (typically) private parties. All patent related civil litigations are concentrated in the Market Court, established in September 2013 as a specialized intellectual property court in Finland. It is the exclusive first instance for all intellectual property related civil litigations. The Market Court's civil litigation decisions may be appealed against at the Supreme Court, pending leave to appeal (Mikkola and Nurmisto, 2016).

The typical action types in patent litigations are:

Administrative hearings

Opposition action

Invalidation action

Infringement action

Actions related to employee inventions

Actions related to patent ownership

Actions linked to a contract

2.2 Literature

Patent litigation is considered one of the most complex forms of civil litigation (WIPO, 2018; Helmers, 2018) resulting in complicated and costly lawsuits. Therefore, it is no wonder that typical inventors are poorly aware of the legal functioning of patent rights. In the US, the District Courts in Delaware or Eastern Texas are specialized in patent trials, processing about half of all US patent litigations (Anderson, 2015). Research by Cremers et al. (2017) compares patent litigation systems in Europe finding differences by jurisdictions in the outcomes of cases. Germany has by far the highest number of cases heard.

Marco, Miller, and Sichelman (2015) and the Council of Economic Advisers (2016) report that the ratio of the number of patent litigation cases to the number of in-force patents is ca. 1,7 %, in the US. Also, the cost of patent litigation is highest in the US, where Bader (2005) reports an average growth of cost from \$400,000 in 1999 to \$499,000 in 2001 per single case and judicial level. Menell et al. (2016), Bissler (2010) and Graham & van Zeebroeck (2014) estimate the median of patent litigation cost range from \$530.000 to \$5,9 million.

Outcomes from patent litigations are difficult to foresee. According to Allison, Lemley and Swchartz (2014, 2015) about 42% of all patent invalidation lawsuits and 25% of infringement lawsuits were successful. Zingg and Elsner (2018) introduced a patent quality term, a function of both broadness and definiteness of the patent and tested it in three largest patent-granting European countries – Germany, France and the United Kingdom – between 2008 and 2012. They find a positive correlation between the patent quality proxy and the litigation outcome. While most patent cases are eventually settled before, or during court proceedings, differences in the parties' views of expected outcomes hamper reaching a settlement. Cardella and Kitchens (2017) argue that there is empirical evidence of substantial variation across courts in awarding compensations to winning parties. This effects the likelihood of reaching a settlement, instead of seeking an adjudication. They argue that if adjudicated award is predictable, probability of a settlement is larger.

Several researchers study the legal aspects of patents and patenting in small and entrepreneurial companies. Lanjouw and Schankerman (2004) find that a risk patent litigation is much higher for patents owned by individuals and firms with small patent portfolios. Bjuggren, Domeij and Horn (2017) interviewed Swedish SMEs with experience of Swedish patent litigation. They report that companies considered the legal proceedings too slow and costly and the whole litigation difficult and disruptive. Hu, Yoshioka-Kobayashi and Watanabe (2017) report that an SME's propensity to apply for new patents decreases after having been a plaintiff in a patent litigation. They suggest that high litigation costs might effect adversely to the companies' subsequent R&D activities. Somewhat surprisingly, they also suggest that a patent litigation is a good learning event for SMEs, leading them to improve the quality of their future patent applications. Somaya, Williamson and Chang (2007) emphasize the importance of IP expertise, arguing that in-house patent law expertise is a significant predictor of a firm's patenting performance.

Meyer (2005) provides valuable insight into private inventors' success in protecting, patenting and utilizing their inventions. He discusses four key challenges in this respect: 1) Complexity of technology, 2) Complexity of business processes, 3) Complexity of IP protection, and 4) Resource constraints. Singh and Fleming (2010) report that private inventors who work alone, and especially those without any affiliation to organizations, are less likely to achieve breakthrough inventions and more likely to invent particularly poor outcomes. The US Council of Economic Advisers (2016) suggesting that among many options that private inventors have, to make use of their patents, even the NPEs¹ with their experience in patent enforcement could sometimes play a positive role raises an interesting thought.

2.3 Data

Darts-IP is a Belgian company, founded in 2006 and having compiled legal databases containing information on millions of Intellectual Property legal cases, worldwide. We use the Darts-IP database as the source for case-level judicial information. We have retrieved, from the database, all patent related cases in the Finnish jurisdiction and initiated between 2000 and 2017. Our initial dataset contains 1025 legal proceedings and 2074 individual adjudications (court cases). We have identified private individuals in the dataset by manually working through the data telling them apart from companies and other organization. The remaining dataset used in this research contains 153 litigation processes with 366 court cases.

From the refined dataset, we analyse case-level information and study what case types private inventors are involved. Second, we study how private inventors thrive in their judicial processes and what case types they win and lose. Finally, we relate litigation activity with patenting and make selected comparisons with the performance of corporate patentees.

We use the Finnish PTO statistics (2019) as our secondary data source for patents and patenting. We also make frequent use of patent databases Espacenet by EPO and Patinfo by the Finnish PTO, for details of litigated patents.

3. Empirical Findings

3.1 In what types of patent litigations are private inventors involved?

3.1.1 Patent validity cases

All patent applicants file and prosecute their patent applications through the examination process and leading to either a patent grant, rejection or withdrawal of the application. Once the administration concludes the process and decides to either grant or reject the application, administrative hearings and other litigation types become available. The total number of 162 private inventors are listed in the Darts-IP database for cases litigated in Finland between 2000 and 2017. Out of these, 35 names are listed as plaintiffs and 127 names (42 names without administrative hearings) as defendants.

Administrative hearings where patent applicants seek to overturn an adverse decision made by the administration are the most frequent litigation types for private inventors. Table 1 shows the numbers of patent applications, rejections and subsequent administrative hearings for private inventors and companies. The total number of administrative cases with private inventors through all court levels is 125.

Table 1: Patent applications, rejections by the PTO, and success rate for Administrative hearing cases

	2000-2008		2009-2017	
	Private	Companies	Private	Companies
Patent applications				
Filed	3957*	14030*	3248	11714
Withdrawn	N/A	N/A	N/A	274**
Rejected	36	95	34	87
Appeals				
Petitions	19	75	14	42
Cases won (%)	3 (15,8%)	20 (26,7%)	1 (7,1%)	9 (21,4%)
Judicial review				
Petitions	8	29	14	11
Cases won (%)	1 (12,5%)	3 (10,3%)	1 (7,1%)	1 (9,1%)

* While the breakdown of PTO statistics for 2000-2007 is missing we've extrapolated the total amount and estimated relative proportions of private and corporate applicants

** Total number of withdrawals assumed to be by companies

The patenting data in Table 1 are retrieved from the Finnish PTO and the litigation data from Darts-IP. The dataset content for the last three years is lacking a few rejections. Although we are confident that this gap does not change the overall view of the state of prosecution of patent applications, we would advise to use these figures with caution.

Opposition action is another case type where a patent's validity is disputed. Opposition action may be brought against any patent within the nine months opposition time, starting from the granting of the patent. During this period, a third party may register a written opposition with the PTO against a patent. The PTO then reviews and processes the opposition claim, and eventually, either revokes the patent or maintains it as is or in an amended form.

Figure 1 displays the number of cases for opposition action and other, civil litigation actions with private inventors acting as either a plaintiff or a defendant. During 2000 – 2017 there were twelve opposition cases brought against a private inventor's patent. From these, the inventors won seven and lost five. Thus, the opposition was successful in 42% of the time. And in the seven opposition cases where private inventors were plaintiff, they triumphed in five and lost two.

Cancellation/Invalidity action is a third case type on the validity of a patent. If a patent is not revoked in an opposition hearing, or if the nine-month opposition period is over, then the only way to seek invalidation of a patent is to file a cancellation/invalidity action with the Market Court. Apart from the two earlier administrative litigations, this is a civil litigation. The adjudication by the Market Court may be appealed against, at the Supreme Court, but only if leave to appeal is granted. Private inventors were defendant in 21 invalidity actions winning twelve and losing nine. Invalidation of their patent was successful in 43% of the cases. Private inventors raised four invalidation actions against others' patents of which they won two and lost two.

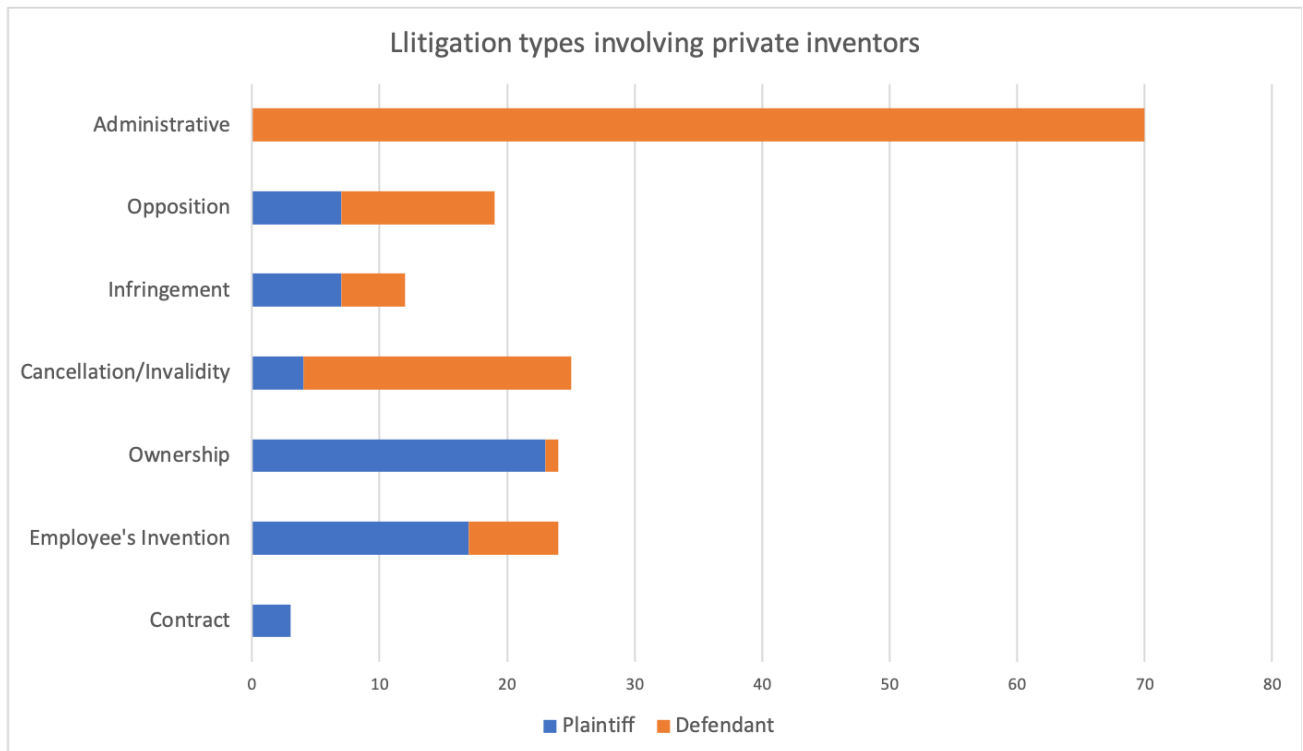


Figure 1: Number of patent First Instance litigation cases in the Finnish courts (2000 – 2017) with private inventors as plaintiff or defendant.

3.1.2 Ownership and other actions

Contract issues, employee invention and ownership actions often deal with patent ownership and the right to financial rewards from the patent right. The employee invention act defines the rights of an employer to an invention made by an employee, and the compensation that the employer should pay for the said invention. Sometimes the two parties don't agree on the amount of "fair compensation" and subsequently adjudicate the issue in the court of law. Private inventors initiated 17 cases against their employers – whether previous or current – usually demanding a better compensation for their inventions, made under employment contract. From these cases private inventors won seven and lost six cases, with four cases settled. There were also seven cases where private inventors were defendants. In these cases the plaintiff companies sought to ensure a better right to an invention made by an employee. The private inventors won two and lost five of these cases.

Actions relating to contracts and ownership actions are cases dealing with patent ownership issues, such as whether there exists a valid contract defining a transfer of patent rights. Such actions were initiated by private inventors three times, of which one resulted in win and two in losses.

3.1.3 Patent right enforcement cases

Infringement cases are the most challenging and expensive types of litigations in patent courts. Private inventors were plaintiffs in seven and defendants in five infringement suits. Of these, they won half of the cases, both as plaintiffs and defendants.

3.2 Are patent related judicial processes involving private inventors in balance with their patenting activity?

Private inventors are active patent applicants. Their average share of all national patent applications over many years is 21%. However, their respective share of granted patents is below 8%, i.e. just one out of five of patent applications by private inventors will result in a patent grant. Corporate applicants are far more successful with almost 60% of their patent applications turned into granted patents.

As seen from Figure 1, administrative hearings is the most typical action type for private inventors. Table 2 shows the share of private inventors in the various types of litigation actions, as compared to the total number of cases in the Finnish patent courts, between 2000 and 2017.

Administrative hearings, opposition action and cancellation/invalidation action are all patent validity actions. The share of private inventors of all cases is slightly higher, but yet in the range of the number of patent applications filed by private inventors.

Table 2. Total number of different types of litigation cases and the share of private inventors in them

Action type	Total # of cases	Involving PIs
Administrative hearing	259	27.0 %
Opposition action	304	20.0 %
Cancellation/Invalidity action	98	25.5 %
Infringement action	162	7.5 %
Action related to contract	16	18.8 %
Employee Invention action	24	100.0 %
Ownership action	37	64.9 %

The share of private inventors in infringement actions is 7,5%, which is close to their share of all granted patents. This implies that private inventors are just as active in enforcing their patent rights, or getting sued for patent infringement, as are company patentees.

Finally, private inventors are well over represented in actions related to patent ownership issues. Naturally, all employee invention issues involve private inventors and they are a party of most ownership actions, too.

While the overall share of private inventors in the patent court cases is case-type dependent, they are found to play an active role in the patent litigation processes. Their proportion of litigations related to patent validity issues is slightly above their frequency to apply for a patent. And their share of infringement litigations is in line with the number of patents they are granted. Finally, the proportion of private inventors in patent ownership issues is much higher, than their share of patent applications or grants.

3.3 How successful are private inventors in their patent litigation processes?

3.3.1 Patent applications and rejections

Table 1 shows that the overall rejection of patent applications between 2000 and 2017 by the PTO is 7,6%. From these, 9,7% are applications of private inventors and 7,1% those of companies. The rejection rate for time period 2009-2017 is slightly higher than for the earlier period, but the difference is not significant. Thus, a slightly larger share of patent applications by private inventors are eventually rejected, as compared to those of companies.

Further down the line, appeals against the PTO's rejections are decided in the appeals and judicial level courts. Private inventors are far less bound to prosecute their rejected applications in the courts, having brought to courts 19 of 36 rejections in 2000-2008 and 14 of 34 rejections in 2009-2017, and winning altogether 4 and 2 of their cases, respectively. Corporate applicants, at the same time brought to courts 75 of 95 and 42 of 87 of their rejected applications and were successful in overturning the PTO's rejection 23 and 10 cases, respectively

Thus, private inventors whose patent applications were initially rejected fought in the courts of law to overturn the rejection decision in 47% of cases, as compared to 64% of corporate applicants. Of those litigations, the win rate of private inventors was 18% as compared to 28% of corporate applicants.

3.3.2 Patent application prosecution time

Prosecuting a patent application with the Finnish PTO takes in typical case 30-36 months. For patent applications that are eventually rejected the prosecution times are considerably longer – 48,7 months for private inventors and 79,7 months for company applicants (see Table 3). The large variation in the prosecution time indicates that all rejected applications are dissimilar and the reasons for rejections vary by case. Also, it is obvious that the communication between the PTO and the company applicant, in defence of his application, endures significantly longer. This could result from companies having professional staff or outside service providers to manage the application process and relentlessly working towards a positive conclusion. It seems likely that rejection decisions at the PTO are not made lightly and all reasonable effort is made to avoid the rejection.

Table 3: Prosecution times (in months) of rejected patent applications

	2000-2008		2009-2017	
	Private	Companies	Private	Companies
First filing -> PTO rejection				
Mean value	49,9	69,5	47,6	89,3
Median value	47	49	30	72
SD	30,2	47,2	44,7	57,0
N	25	67	29	71
PTO rejection -> Appeals conclusion				
Mean value	11,8	13,6	14,8	17,4
Median value	12,5	11,5	13	16
SD	5,9	8,8	8,6	11,7
N	18	60	13	37
Appeals conclusion -> Judicial review adjudication				
Mean value	14,3	18,0	18,4	22,8
Median value	14	18	19	21
SD	2,7	6,9	8,5	7,3
N	7	28	14	10

Once the case proceeds to the appellate or judicial review level, then the differences between companies and private inventors in processing times decrease. The overall duration of administrative hearing processes can be exhaustive, passing through all three levels in about seven years for private inventors and ten years for company applicants, counting from the first filing of the patent application.

The initially longer prosecution time with the PTO of company patent applications indicates that they are more persistent than private inventors and exhaust all means available to persuade the examiner towards a grant decision. Earlier rejection of applications by private inventors speak about lower persistence or lack of means to fight effectively for the patent grant.

Success of private inventors in opposition and cancellation/invalidity actions is shown in Figure 2.

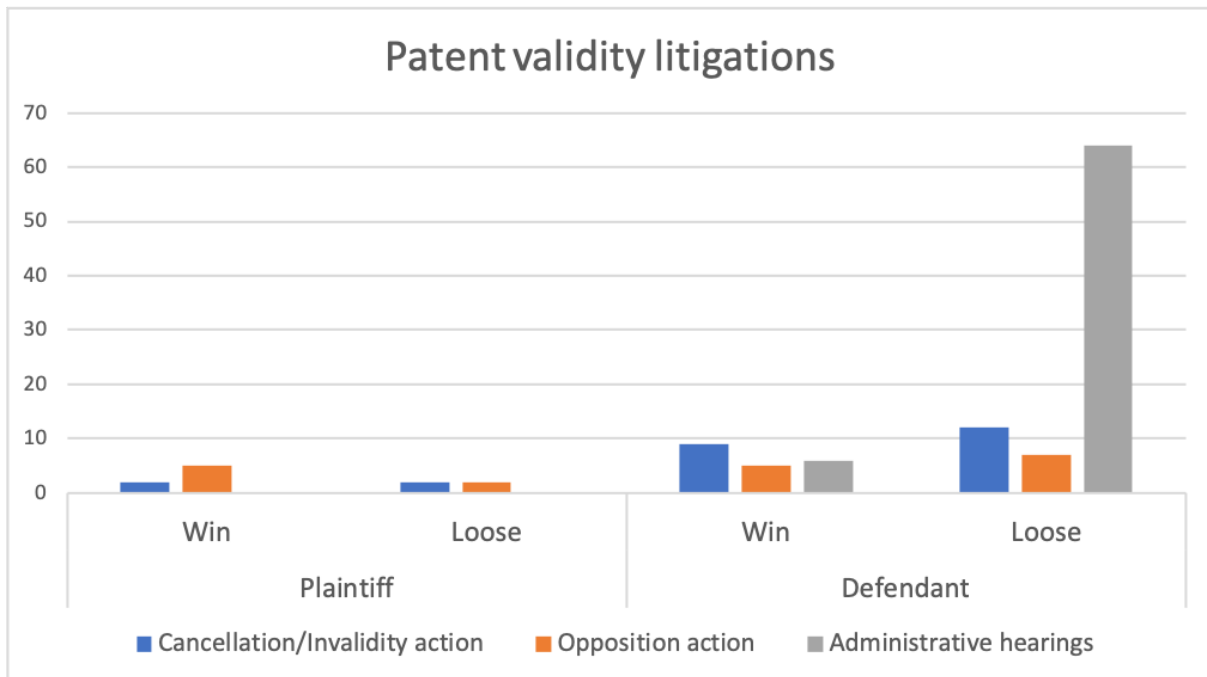


Figure 2. Win-rates of private inventors in patent validity litigations (Finland, 2000 – 2017)

We conclude that private inventors are less successful than companies in writing high quality patent applications and prosecuting them with the PTO. Applications of private inventors are dropped or rejected more frequently and more rapidly, than applications filed by companies.

The success rate in patent ownership litigations varies, as seen in Figure 3. Private inventors succeeded best in actions relating to patent ownership. All other actions display a performance resulting in a tie or slightly more losses than wins.

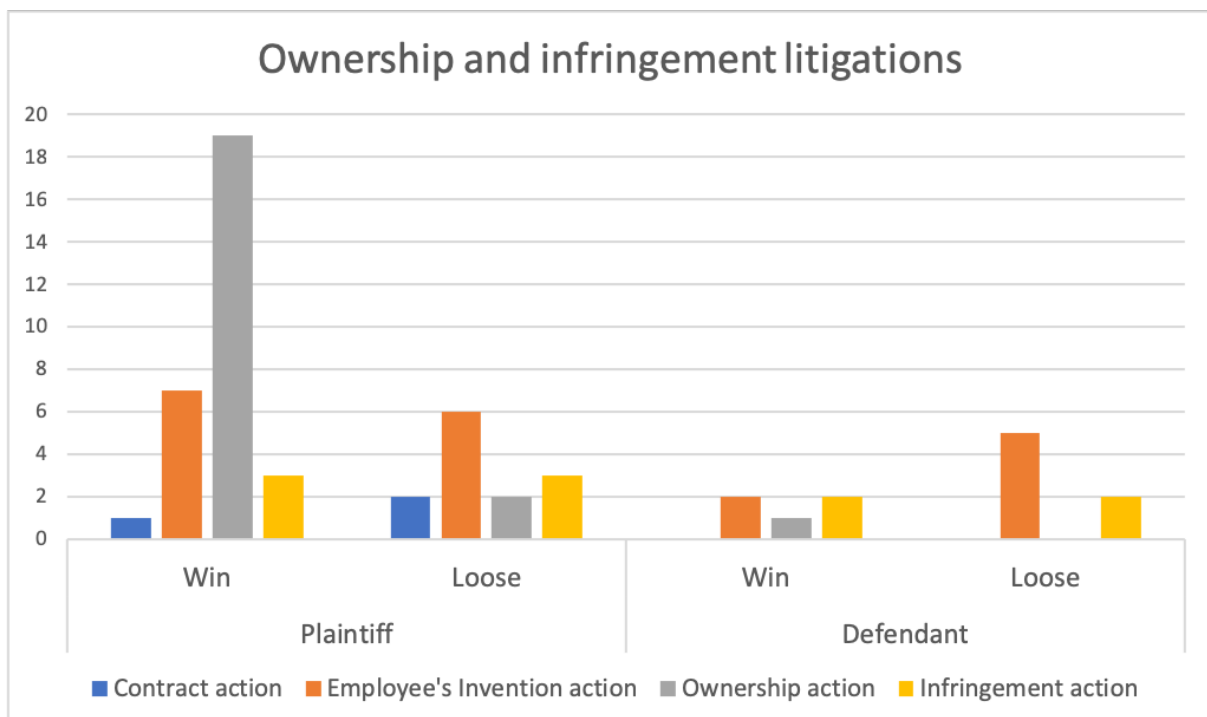


Figure 3. Win-rates of private inventors in patent infringement and ownership litigations (Finland, 2000 – 2017)

Private inventors' success rate in infringement litigations does not differ from the win rate of corporate litigants. They both display ca. 50% win rate for plaintiffs and defendants, when the case has been decided, based on the merits. Settlements are reached in ca. one third of cases for companies and private inventors, likewise. Thus, private inventors and companies thrive in infringement litigations similarly.

4. Discussion

Private inventors are active patent applicants, responsible for over 20% of domestic patent applications in Finland and Sweden (PRV, 2018). Yet, the image of their overall performance is rather grim, while they are granted less patents than companies, in relation to applications, and, as we have shown, their outcomes from patent court rulings are not particularly positive. The poor performance in prosecuting a patent application to a granted patent might indicate a lower quality of patent applications of private inventors. This is then seen in the overwhelmingly negative adjudication tendency of private inventors' appeals against the rejections of their applications. This conclusion is supported by Singh and Fleming (2010) in their finding that inventors who work outside of organizations and for inventors who work without co-authors are unlikely to come up with a breakthrough invention.

We have shown in our earlier work (Talvela, Kässi, Karvonen, 2018) that small companies, entrepreneurs and private inventors lack awareness and capabilities in making use of the patent system. Hynynen (2013) has reached similar conclusions in his study, and Meyer (2005) discusses further the types of challenges that individual inventors come across. We consider his proposal excellent of splitting "private inventors" into different types depending on their backgrounds and status. This approach could be used in future studies to gain a better understanding of the awareness, motives and available resources of private inventors in patent litigations.

Somaya, Williamson and Chang (2007) have found that in-house patent law expertise is a significant predictor of firm-patenting performance. When considering this in the light of private inventors' rather poor performance in prosecuting their patent applications, we argue that this is partly due to their lacking of legal know-how. Gaudry (2012) has found that 76,4% of patent applications by pro-se applicants, representing themselves in the prosecution of a patent application, are abandoned. At the same time, the percentage for applications represented by a patent attorney or agent is 34,8%. He shows that the quality of the patent applications is much better, if duly represented by a capable patent professional. We argue that in order to improve their stance in patent prosecutions, private inventors should:

1. Build or outsource expertise to evaluate risks and probabilities of patent litigations
2. Build their endurance or seek expert service providers to prosecute their patent applications, in full
3. Locate and familiarize with support services for above needs in the early phase of invention process

Finnish PTO patent statistics are lacking details about the numbers of abandoned patent. While data are given for each year's total number of patent applications, patent grants, application withdrawals and rejections, there is no knowledge what share of the applications has been cancelled and abandoned. Looking deeper into cancelled or abandoned applications, a future research could shed light to the reasons why applications are not fully prosecuted, and whether the performance of private inventors is significant, in this aspect.

The number of patent infringement litigations and their outcomes is in-line with respective corporate performance. This is somewhat surprising in the light of private inventors having a restricted access to knowledge and monetary resources. As the infringement cases are the most difficult and expensive forms of patent litigations, we expected to see a weaker performance of private inventors. Also, as reported by Lanjouw and Schankerman (2004), the risk of litigation should be much higher for private inventors, than for companies with large patent portfolios. We do not see this behaviour in the Finnish patent courts. However, the total numbers are still low, and no definite conclusions should be made.

5. Conclusion

We have studied the performance of private inventors in the patent litigations, in Finland, identifying the lawsuits where private inventors were a party. Our results reveal that the performance of private inventors is inferior to that of companies in administrative patent disputes, including prosecution of patent applications. In patent ownership actions they prevail better than their corporate counterparts. In other forms of litigation

their performance is in balance or only slightly inferior to that of companies. This is a surprising finding, as private inventors are often considered disadvantaged, in this respect.

Private inventors act plaintiff mainly in disputes concerning patent ownership and employee inventions. As defendants, they get dragged into courts opposition and cancellation/invalidation actions. Infringement cases are only a few. Their relative share of legal battles is in balance with companies, in relation to their numbers of patent applications and patent grants.

The duration of legal proceedings is long and costly. Private inventors' success in the courts depends on the case type. Private inventors prevail in patent ownership cases, while they almost always lose their administrative hearing litigations. We argue that this is partly due to them being unprepared and inept in front of judicial challenges. Their endurance, interest and/or money runs out and causes them to abandon the process prematurely.

We argue that private inventors should make good use of expert services to improve the quality of their patent applications, in the first place. They would also benefit from legal advice in the face of judicial disputes to enable them to tackle through the courts more efficiently.

In the chapters above, we have provided an answer to our first research question describing what types of litigations private inventors are party of. We have listed the case types and indicated the role of private inventors as plaintiff or defendant.

In answering our second research question about the balance between private inventors' litigation and patenting activity we have shown that private inventors were a party in 16,9% of all litigation processes, in our dataset. While their patent application propensity is at 21% and patent grant propensity at 8%, the overall representation depends on the case type. In patent validation cases, private inventors are slightly overrepresented. In infringement cases they are in balance or slightly underrepresented. And in patent ownership cases they are strongly overrepresented.

Our third research question about the successfulness of private inventors is answered by case type. We have shown that private inventors mainly lose their administrative hearing cases, and mainly win their patent ownership cases. As a conclusion we can say that private inventors' performance in patent litigations is clearly inferior in cases where they fight to overturn the PTO's rejection of their patent application. In other case types the outcomes are either towards neutral or in favour of private inventors.

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