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How Patent Analysis provides Intelligence for Strategic Decision Making: the Case of a Medium Sized Italian Company

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Critical business decisions involving corporate strategies must be based on timely and accurate information. Systematic data gathering, study and analysis of the market, competitive and operating environment is currently called Market and Competitive Intelligence. When technological factors and capabilities drive a company's growth, a natural complement to market information is the observation of technological aspects. In this context, patents have been often mentioned as an extremely rich source of technical information. Conversely, patents are seldom used as a source of information by non-technical people, even if they offer information that can be observed from a market perspective. After explaining how patents can be exploited with this aim, the paper focuses on the information that can be extracted from patents and the implications and insights that they provide about the competitive environment, if read with a strategic eye. The presentation of the case of an Italian medium sized company that almost accidentally started a process of Patent Intelligence offers the practitioner's experience in the field of Patent Intelligence. The case provides the context for explaining the reason why the activity started, the methodology applied and the results achieved. In conclusion, Patent Intelligence can provide a company with a wealth of strategic and competitive knowledge. Intelligence activities realize their full potential when those with technical, legal and market knowledge perform joint analysis corroborating each other's assumptions.

1. Introduction

In today's interconnected world companies need to stay abreast with the evolution of their competitive environment. Things move very fast and keeping track of all the events that influence the performance of a company is an extremely difficult task. Activities that are currently known as Market and Competitive Intelligence (M&CI) - the process of gathering, organizing, analysing and disseminating actionable information about the market and competitive environment of a firm - have been suggested since the '70s as an effective way to anticipate threats and identify early warning signals that otherwise would remain covered by the surrounding noise.
As Stevan Dedijer, who is deemed the father of business intelligence, recommended in 1975 *"Intelligence today is about using the collective knowledge of the organisation to reach an advantageous position in industry"*. M&CI analysis provides insights into marketplace dynamics and challenges in a structured, disciplined, and ethical manner using published and non-published sources. Emphasising the ethics issue, Didijer continued, *"Spying is dying - only idiots resort to these kinds of shady activities. Only companies with an inadequate intelligence capability and with inferior knowledge-acquisition strategies seek to obtain information by illegal or unethical means"*.
The collective knowledge of an organization or a company is composed by all the know-how, expertise, experience and skills stored in the brains of each member of the organization. Members can contribute at best to the intelligence process with the knowledge that pertains to their functions. This is why intelligence activities have to be planned and structured in an efficient way that copes with the organization's characteristics.

In the design of a M&CI process, the choice of the sources of information plays a fundamental role and is tightly connected to the company's DNA. Information sources have to be relevant in terms of type of information and have to speak the same language of the company.
Technology driven companies are bound to include a broad base of technical/technological sources in their intelligence process, since they need to be aware of the development of technology in their industry. The reason why Technology Intelligence (TI) takes on great importance for these companies is that it provides insights, in order to make strategic decisions about how to be or not to be part of specific technological path. In this perspective, *"Technology intelligence provides a means for organisations to monitor developments and to look for new technologies and to then pass this information to the decision-makers or planners in the organisation"* (Kerr, Mortara, Phaal and Probert, 2006).
With respect to technical information, patents offer a wealth of data that often does not see the light in other forms than that. It is undeniable that the analysis of patents provides information about specific aspects related to the technological development, but this is just one facet.
When we look at patents from a non-technical point of view, we notice that they can highlight elements pertaining to the market situation, allowing to track competitors' activity and detecting, or even anticipating, technological and market trends.
The role of patents in the Technology Intelligence (TI) process (Manzini, Chiesa, Mauri and Rovati, 2015) or in strategic technology planning (Park, Kim, Choi and Yoon, 2012) has been widely described in literature.
The significance of patents as source of information for Market and Competitive Intelligence is probably less evident. The reason why can be searched in the fact that M&CI is mainly an occupation of marketing people, who are often reluctant to deal with patents because they are technical documents with a legal value, hence hard to understand for those who are not technicians or lawyers.
Basing M&CI on patents (activity recognised as Patent Intelligence or Patent Competitive Intelligence) is possible and brings out valuable support to strategic decision making even outside the technical domain.

2. Patents as a data source for Market, Competitive and Technology Intelligence

Speaking about technical information, patents offer an incomparable wealth of data: they are in the public domain, published in a standardized format and are available at low or no costs at all.
Virtues and limits of patents as a source of information for TI are constantly under discussion among academics and practitioners: there is no doubt that patents play a supporting role that needs to be integrated by other information sources. IP professionals and technical people are prone to consider patents for their legal or technical value, hence providing analysis that highlight these aspects. An intelligence activity based on patent data is an effective technique for assessing a company's own intellectual property as well as that of its competitors.
When companies try to gain insights about a competitor or an industry or market, they need to put together pieces of information from the most diverse sources. Only in this way, they can cover most of the elements that have an influence on the competitive scene.
One type of information supports the other providing a different angle of observation: the analysis of patents in the light of a specific market situation will bring out results that are not the same of the case when patents are analysed by themselves. Vice versa, the analysis of market information following the creation of an industry patent landscape will contemplate technological key factors that might be determining a specific market scenario (Figure 1).

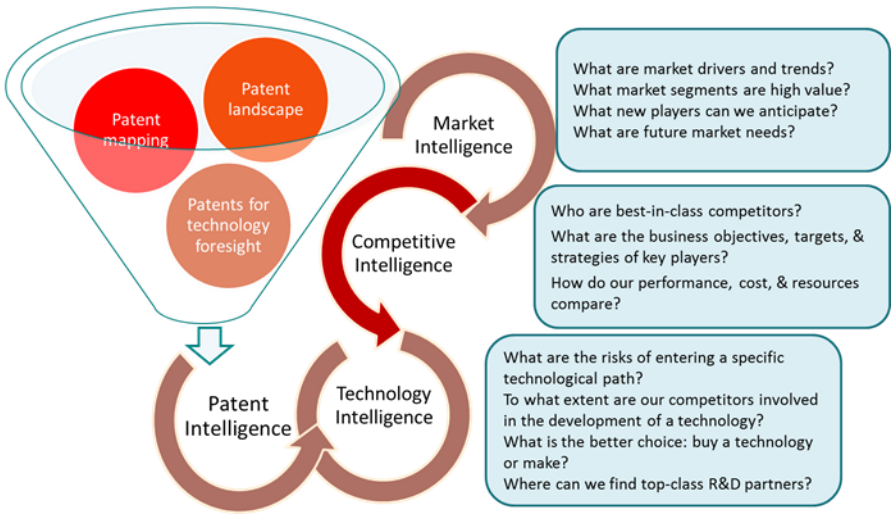

Figure 1. The convergence of different intelligence activities

In this perspective, just like other information sources, patents contribute to building the base of data for intelligence, beyond their technical intrinsic meaning. Their multifaceted aspect can help answer an array of questions and stimulate discussion on wider topics.
In the authors' experience with companies implementing Market, Competitive & Technology Intelligence (MC&TI), the authors have often ascertained that patents - and more in general Intellectual Property (IP) - and competitive intelligence do not go together. Many organizations have a department dedicated to competitive intelligence where IP is typically considered as something that sits within the legal department, or as something that R&D staff have to take into account in the product development and innovation process.
Without technology intelligence, an organization cannot develop a realistic picture of the positioning of its current technology or an achievable vision of its future technology success. Yet many companies neglect this powerful tool.
Despite of this, some fundamental features of IP testify the fit into MC&TI (Simmer, 2001). IP is an instrument to protect price and market share, insuring that the owner of the right and no other takes advantage of the technology advancement or idea; an insurance to mitigate the risk of infringement; a financial asset generating revenues or being leveraged for strategic alliances, in which technology is licensed or held to keep competitors out of the market.
These three purposes have everything to do with MC&TI, product development and innovation activities.
To an outsider looking at a new market or industry, patents give clues about what technologies an organization has been working on, the patents behind the products and the trends that are emerging. Furthermore, patents allow to uncover unknown competitors with a disruptive technology, find out if a technology is evolving, assess how far behind or ahead companies are against competitors and determine R&D efforts and direction.
Analyzing a large number of patents all together allow to highlight relationships and trends that would be undetectable working with single patents separately.
There are various patent intelligence approaches that can help understand what happens in the competitive context; an example is the Competitive Patent Landscape, a useful exercise when the technology is known but it is not completely clear who the actors are (except from the obvious ones). It can provide answers to questions like:

- Who are the players or the leaders in a technology space?
- Are there small yet visionary companies, or new entrants?
- What are the trends geographically, by company?
- Are there emerging areas of technology or innovation?

Patent landscapes offer a unique and valuable perspective on a technology and its commercial interests.
From a different point of view, the analysis can be done around a group of competitors or a single one, to understand who the leaders in a specific technology area are and their strengths. The results will be more like a map of the competitors positioning.
It is interesting to see how, at a certain time in history, the multiple ways to analyze patents demanded for a specific term to encompass all of them. This new term is Patinformatics (Trippe, 2002), created with the aim of providing an umbrella definition for covering different analytical methods applied to patents, i.e. patent intelligence, patent mapping, and citation analysis.
All the methods aim at discovering insights, relationships and trends, no matter how large the amount of patent information considered is (macro-level or micro-level analysis).
An important aspect of Trippe's definition is that it puts on the same level the importance of the results obtained with the analysis of a very large number of patents (macro-level) as well as a micro-level analysis, thus based on a relatively small number of patents.
It proves that even with limited resources and tools companies can perform patent intelligence and gain valuable insights about what is happening in theirs or other markets. It is something companies can do, starting small and easy.
The case of the Italian company that this paper describes further ahead is an example of micro-level analysis based on less than 150 patents, performed with no specific software tool but a common spreadsheet.

2.1 How to exploit patents contribution to MC&TI

Many technology-related decisions involve guessing about the feasibility of products and technologies. These decisions are risky by nature, and better understanding the external environment can reduce the degree of risk.
Prior to initiating every new technology or product development there are key questions that should be asked; though the answers may not be easy to give, a way for answering them is through MC&TI.
Supporting companies with patent intelligence, the authors have seen that a few elements of a patent document offer substantive information; some of them have the merit to be quickly understandable also for non-technical people and hence easy to be incorporated in a comprehensive MC&TI activity.
We are referring to:

- Registration data, such as assignee and inventor name, filing dates and countries highlight by whom, when and where the action was started.

For example, analysing inventor records for competing companies allows an assessment of the human capital that may reveal jointly held patents with Universities or other research collaborations, indicating strategic use of human resources. The distribution of a group of patents in time depicts the maturity of a specific technology. Geographical extensions (jurisdictions) show the intention of entering specific markets or preventing possible new entrants by raising IP barriers.

As Figure 2. and Figure 3. show, the behaviour of these two companies, competitors active in the same industry, looks defensive for the Japanese company and more offensive for the American one.

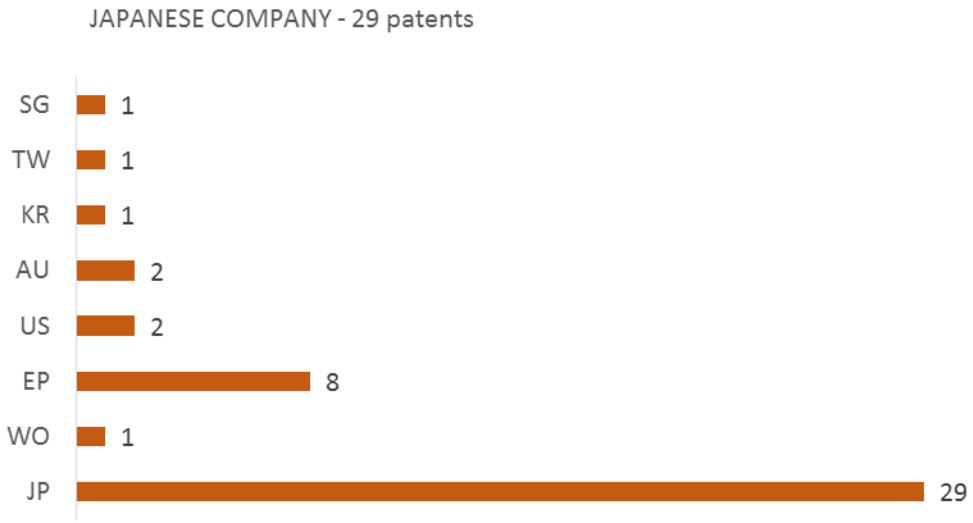

Figure 2. Japanese company - jurisdiction analysis

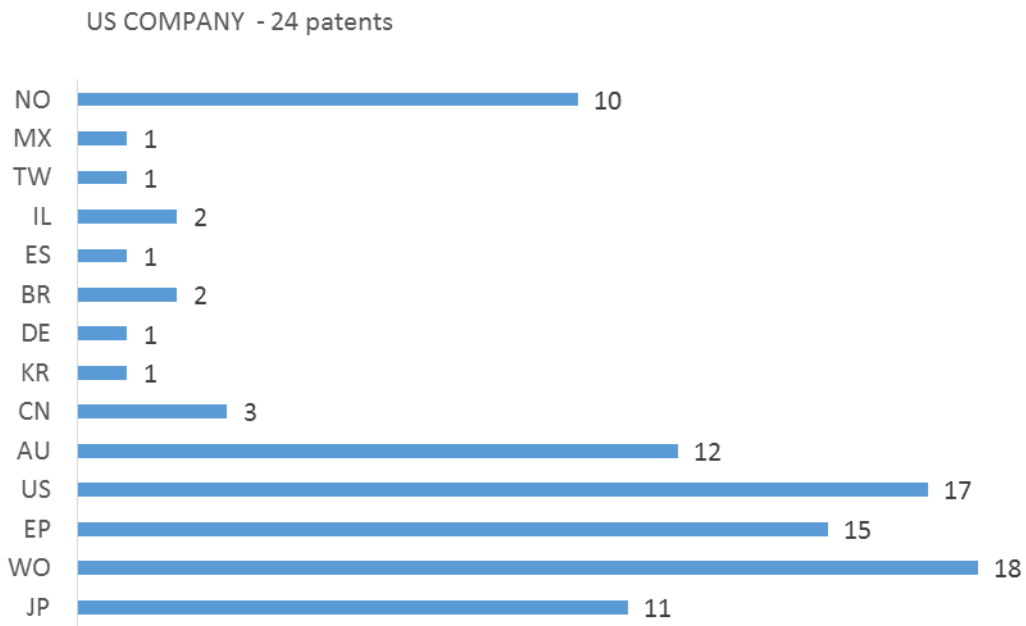

Figure 3. US company - jurisdiction analysis

- Citations. Following the thread of citations allows the detection of the first germs that started a technological path and of the main experts in the field.
- Description. Technical elements, that must be described in detail, represent the neighborhood in which others have found grounds for innovating, thus presumably worth the efforts and the costs for applying for patent protection;
- Claims of a patent coincide with the boundaries that applicants are seeking to set around their interests. Diclosure and claims provide directions to innovators in order to highlight free spaces or off-limits areas.

The analysis of these elements can help find answer to some fundamental questions, like:

- Who will share the market with us?
- When will they enter?
- What technology will they use?

Obviously, in order to provide the answers the analyst has to make sense of the data: we can consider the information derived from patents as weak signals that portend a change "*Weak signals can be singled out in several different ways, by means of speculative processes as well as multiple systematic approaches. If they are properly interpreted, they are a powerful tool for monitoring present developments and evaluating whether the latter imply a change toward a possible outcome*." (Martelli, 2007).

3. The Case of a Medium Sized Italian Company

The case presents an Italian medium sized company operating in the field of medical devices. They had developed a blood filter that allowed the separation of some of the blood components during blood collection. This peculiarity would avoid part of the usual practice of post processing blood before storage. Furthermore, the filter could deplete leucocytes in blood, meeting the current (at that time) regulation.
Having already completed the development and being ready for the industrialization of the product, the Chief Technology Officer wanted to assess the state of the art and the competitors' patent portfolios in the specific domain.
In this case, the competitors were large multinationals, mainly located in the United States and in Japan.
Determining the freedom to operate for filing a patent was not the objective of the research, but rather it was expected to provide insights to allow better control on:

- the risk of being vulnerable to a competitor's technological attack after having made a very large investment in a new development;
- the risk of choosing the wrong technology to enter a new area;
- the risk of establishing product offerings on standards or specifications that diverge from current or future industry standards;
- the risk of early product obsolescence caused by a new technology or market trends.

The intelligence work should award useful elements for depicting the competitive scenario highlighting the toughest competitors, in order to decide how to proceed with the product and select the first market to enter.
Most importantly, in light of the insights provided the Company had to put to test the expected return on investment (ROI) of the new product and plan a strategy for the launch.

We followed a two-step methodology:

1. collection of primary information, gathered though interviews with the staff of transfusion centres and hospitals - who were the prospective users of the new filter - to estimate the acceptance and impact of the device;
2. assessment of the state of the art in this area - with a patent research - with particular attention to blood filters for leukocytes depletion, since this was becoming the standard care around the world.

We carried out the patent research in a fee-based database that offered a broad geographical and time coverage. We decided to extend retrospectively the research to the previous 5 years, having agreed with the Company that this time span was a strategic window wide enough to detect potential threats.
In addition to patents, we collected complementary information about regulations and competitors' activities in the relevant market.

A first analysis allowed to display the trend of the technology we were examining in the time span considered. (Figure 2)

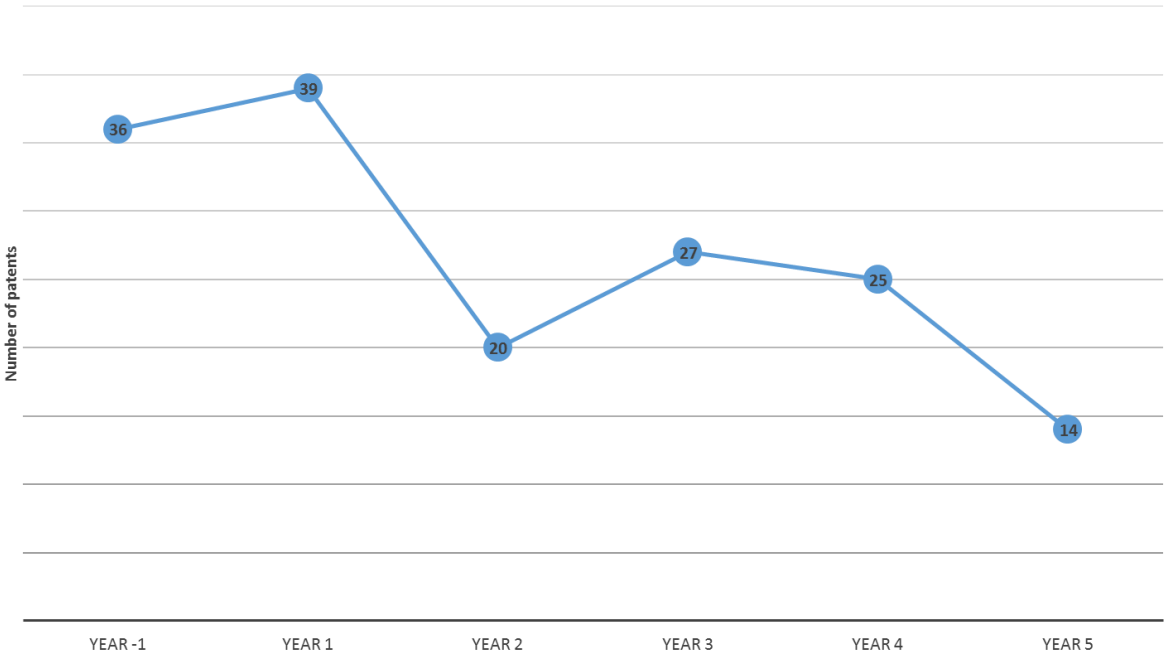

Figure 2. Distribution of patents in time

The data distribution displayed led us to state that the technology was in a declining phase of its life.
What caught our attention was the drop in Year 2 followed by a new increase in Year 3.
We looked for an explanation to this phenomenon: we immediately noticed that in the last two years there was a regular distribution of patents among companies, no matter what their size or focus in the industry. Companies A, B, C, D and E were the well-known multinationals, with a high number of patents compared to others. The curious thing was that in the last two years they had filed the same number of patents as companies that had appeared on the scene only recently. (Figure 3)

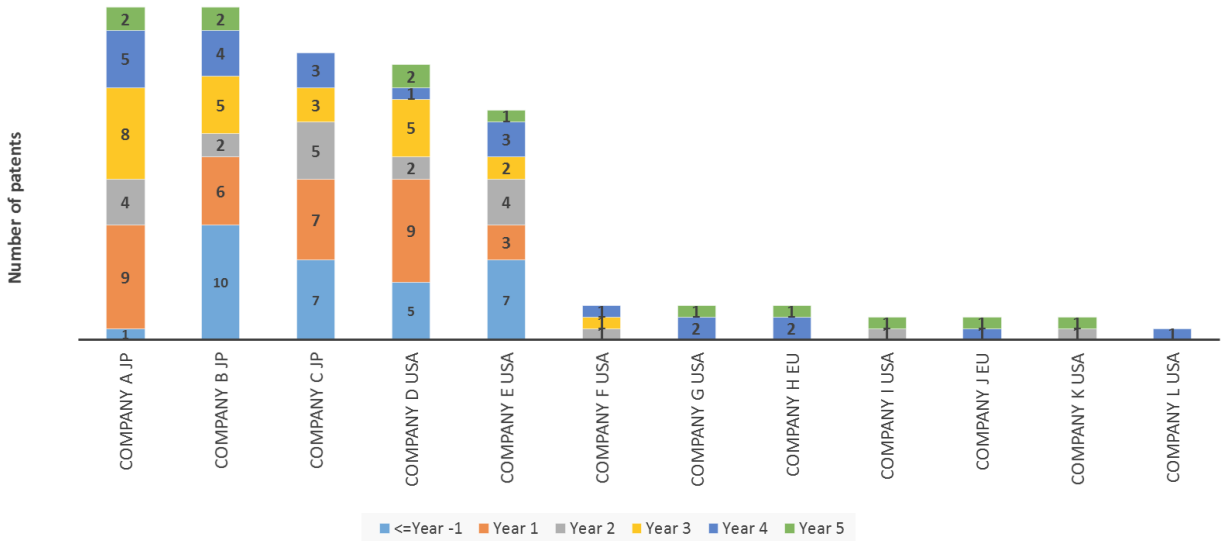

Figure 3. Distribution of patents in time - per company

Was this a sign that the technology we were looking at was no longer worth investing?
It seemed that the maturity reached by the products did not require more technological efforts: this would have meant for our Company that their investments in developing the new device would translate in a higher market price of their device compared to the existing products. Would clients accept to pay more in change of an improvement in the post processing of blood?
If things were really like this, why would new comers invest in this area?

We then scanned the list of all assignees that had filed patents in the last two years (year 5 and year 4) and saw that companies G, I, K and L were outsiders, new to our Client's knowledge and new to this industry.
More important, in some cases the patents were jointly assigned with the big multinationals that had apparently stopped investing in blood filtration technologies. (Figure 4).

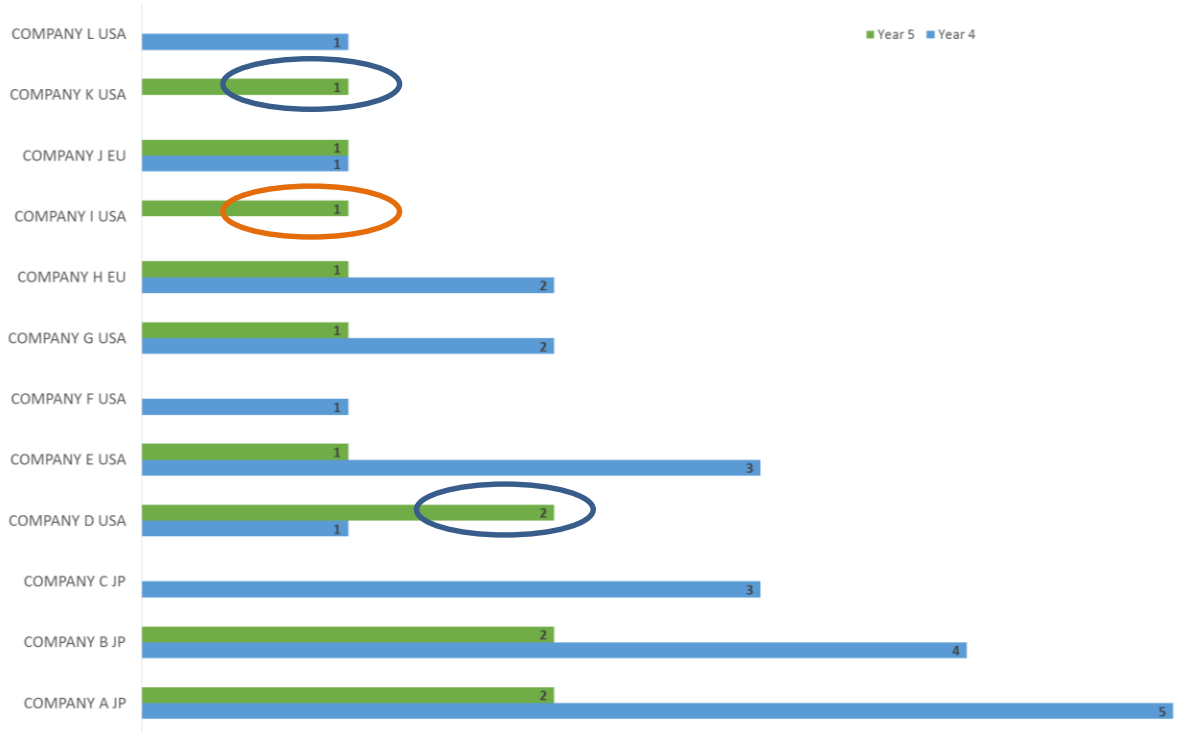

Figure 4. Distribution of patents in the last two years - per company

This evidence changed our perspective: it was crucial to understand why new companies were filing patents.
To find out what the new entrants were bringing inside the industry we had to examine the content of the patents.
At this stage, we involved some R&D staff of the Company who could knowledgeably understand the technological descriptions and evaluate the novelty of them.
It was clear that we were in front of a different technological solution for blood filtration, a new solution for the same problem: the separation of blood components and leukocytes depletion was achieved by means of biotechnological additives. The removal of pathogens occurred inside the blood collection bag. Biotech vs mechanics: 1-0.
The strategic implications of this technological leap were to be carefully evaluated: was the mechanical filter going to be dismissed completely?
How could the Company manage the situation, trying to assure revenues from a product that the new solution could quickly outsmart?
Unmistakably the Company had to accelerate the launch of its new device that was, at that moment, the most advanced among the traditional blood filters.
The new technology was poised to threaten the ROI of their device in few years, thus they had to gain revenues before the new solution could penetrate the market.
This was the defensive part of the strategy.
Evaluating the opportunity to make alliances with companies in the biotechnology area could have been the offensive part.

4. Conclusions

Beside the observation and benchmark of the behaviour of the main competitors, the study brought to light unexpected diversions of the technology that threatened to outplay in the medium term a ready to launch product.
Additional intelligence activities based on business information sources and press, as well as interviews to users and influencers corroborated the assumptions derived from patent analysis.
Despite the fact that the Patent Intelligence process was ignited at the end of the product development, it triggered further considerations on the Company's business that helped define the most appropriate way for the Company to be on the market with that product, acknowledging a possible impending threat.

Following this experience the Company considered the benefits of establishing a basic technology monitoring system, based on patents. Initially an external expert performed the surveillance, until when the company entrusted with this activity the Business Development function, supported by the IP staff.
What we can gather from this experience is that extemporaneous intelligence processes can eventually unveil valuable insights based on intuition, favourable conditions and luck.
Nevertheless, recommendations always turn to establishing a continuous and systematic process that involves the identification of the most appropriate sources. "*The need to identify weak signals in the field of intelligence is very strong indeed. Intelligence must be always active, but it must be particularly strengthened and intensified when a crisis or a strategical or tactical surprise looks like it is about to occur*" (Martelli, 2007).
It is possible to start formalizing MC&TI activities using public sources, accurately chosen among those available in the public domain. Patents are one of them, with a plus: they are official documents, validated and truthful. The analysis of patents stimulates cross contamination among different functions: marketing, IP and R&D can cooperate sharing their views and bringing multifaceted reconstructions of the competitive environment. These analyses corroborated by other types of information and by the contribution of experts inside and outside the company will provide substantive support for strategic decision making, gaining the buy in of high-level management for recognition at all levels.

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