

# How To Make Investors Understand The Value Of IP Assets

BY BERND FABRY & HOLGER ERNST\*



## 1. Introduction<sup>1</sup>

In 2000, the market for M&A transactions reached an unexpected peak of approximately US\$ 3,500 billion, which was followed by a plunge of approximately 40 percent within a few months (cf. Fig. 1). In the meantime, transaction volume has been increasing again, yet a level similar to the one before the world economic crisis is still in the distant future. Mergers and acquisitions are being carried out with more caution, the number of stock market flotations has been declining, and postponements or even cancellations are not uncommon because of missing interest. All of this indicates that both institutional and strategic investors have become more cautious, and that they are examining

their investments for chances and particularly for risks more carefully than in the past.

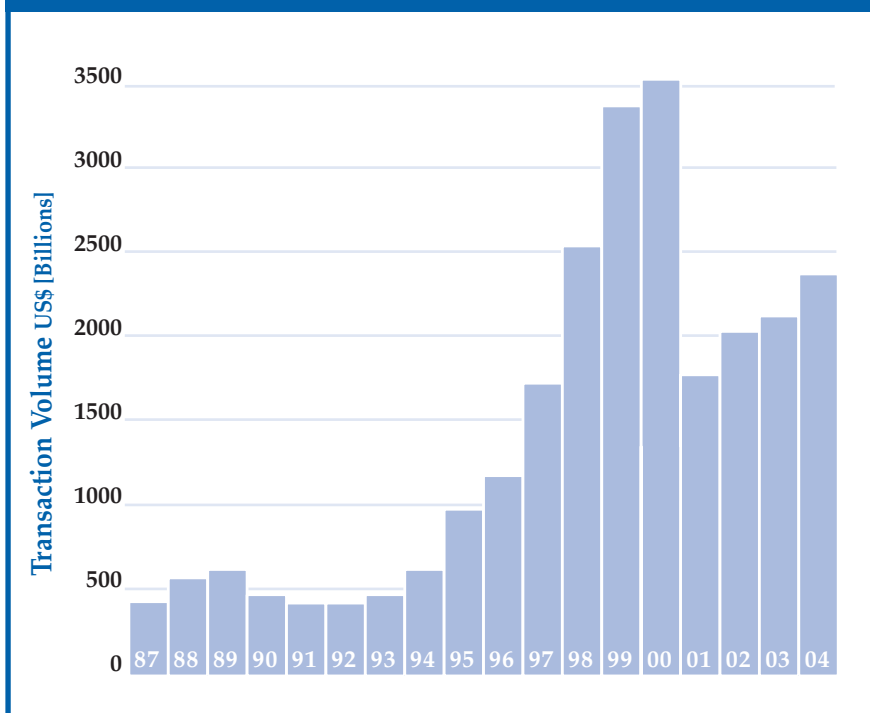
A company that requires external capital, e.g., because it wishes or needs to sell a part of the company or requires the money for investments, needs to comply with the legal duty of providing detailed communication to potential investors of, on the one hand, only sustainable information on the prospects for profit, and, on the other hand, on any risks, also on those that may be of a potential nature. This may, for example, be realised by issuing investor prospectuses before going public, or within the scope of an M&A Due Diligence. It would lead too far at this point to list the multitude of aspects that are of importance to the investor when

considering the chances and risks. However, it is a fact that—starting in the U.S.A.—the area of Intellectual Property protection has enjoyed increased attention in the past years. Nowadays, a company can hardly evade advertising its patent and trade mark position, and needs to provide evidence that no danger is to be expected from that side. Intellectual Property protection is getting ready to abandon the image of the outmoded science from the ivory tower and to merge with business management in its border areas. This is a trend that many a specialist would have considered impossible in Europe only a few years ago.

## 2. Potentials and Risks of IP Assets

Irrespective of considering the issue from the perspective of an investor or a capital-seeking company, it makes sense to get a clear idea of the potentials and risks that are associated with the patent and trade mark situation and, respectively, with the

Fig.1. M&A transactions 1987 to 2004



1. Extended version of a presentation given at the IBC Conference "Valuation of IP and Intangible Assets," London, April 27, 2005.

\*Dr. Bernd Fabry, European Patent Attorney, Director Intellectual Capital at Cognis Deutschland GmbH & Co. KG and lecturer for Intellectual Property at WHU – Otto Beisheim Graduate School of Management, Burgplatz 2, 56179 Vallendar, Germany.

Prof. Dr. Holger Ernst, Department of Innovation and Technology Management, WHU – Otto Beisheim Graduate School of Management, Burgplatz 2, 56179 Vallendar, Germany.

IP portfolio of a company. We are attempting to illustrate this on the basis of three assumptions and three particularly dramatic examples.

- *Failures in patent protection reduce prospects for profit.* In 1974, Stanley Cohen and Herbert Boyer developed a method for the recombination of DNA which is being employed by virtually every biochemist until today. These two researchers, however, were so keen to be the first to publish in this hard-fought scientific area that they did not even think of the possibilities that might result from a protection of their method. Today, the total amount of lost license income is estimated to be US\$ 15 billion.

- *Timely patent protection secures market shares.* The dispute between Medtronic and Siemens in the field of pacemakers is a classic example for the significance an early achievement of a patent position has for the monopolisation of the market. While the U.S. company had already started to develop these devices in the early 1970s, and their basic patents dated from the years 1978/79, Siemens only turned towards this business in the beginning of the 1980s.

What followed was a fierce fight for market shares of 15 years, which decisively involved playing off the patent positions against each other. Although Siemens had succeeded in outnumbering their competitor in the course of time because of their sheer number of protective rights, in the end Medtronic proved to be successful in court, which resulted in Siemens' payment of US\$ 75 million of belated license fees and the company's disappointed abandonment of the business.

- *Disregard of patent protection may have catastrophic financial consequences.* Literature repeatedly cites the case of *Eastman Kodak vs. Polaroid*, which gained fame by the highest sum in damages ever imposed in a patent infringement case. Ignoring the respective Polaroid patents, Eastman had developed their allegedly own instant camera which challenged the competitor to file several patent infringement actions. After 12 years of trial, the proceedings ended with a devastating defeat for Eastman who had to pay US\$ 873 million in damages. In fact, the actual total damage for Eastman accumulated to more than US\$

4 billion as they had to repurchase hundreds of thousands of cameras still in circulation, close a factory, lay off approximately 300 employees and, last but not least, princely remunerate their attorneys.

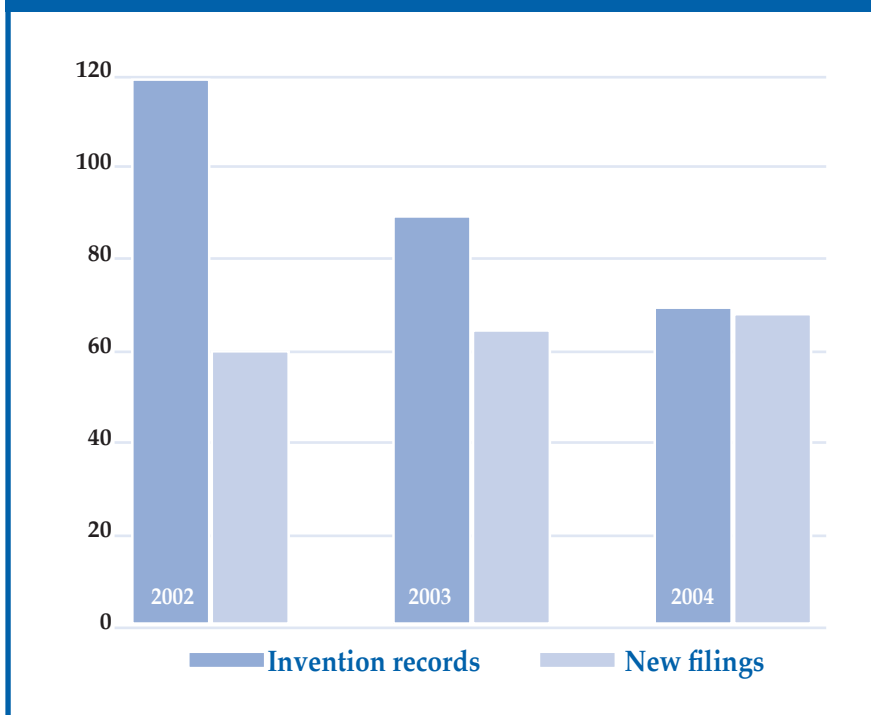
These examples illustrate that both the observation and the enforcement of intellectual property rights are pivotal for a company. An investor must pay adequate attention to these issues.

### 3. Evaluation Of IP Portfolios With The Aid Of Key Success Indicators

Intellectual property rights, namely patents and utility models, are granted for technical inventions. Inventions constitute innovations. So, theoretically, he who files many patents is particularly innovative. This equation is rarely satisfied. First of all, we need to find out which definition may be applied to the term "innovation." From an empirical standpoint, this word is used almost exclusively in a pragmatic sense: innovation is everything that the customer rewards by additional profit ("Innovation is when the market is cheering").<sup>2</sup> In this connection, people usually do not make a difference whether it is a pioneering invention or just an incremental improvement. This, however, is of great significance because the former one, at least in a colloquial sense, is much closer connected to the term "innovation," yet it seldom requires less than 10 years to be realised in the market. Contrarily, incremental improvements usually succeed rapidly and, therefore, generate a ROI much more quickly.

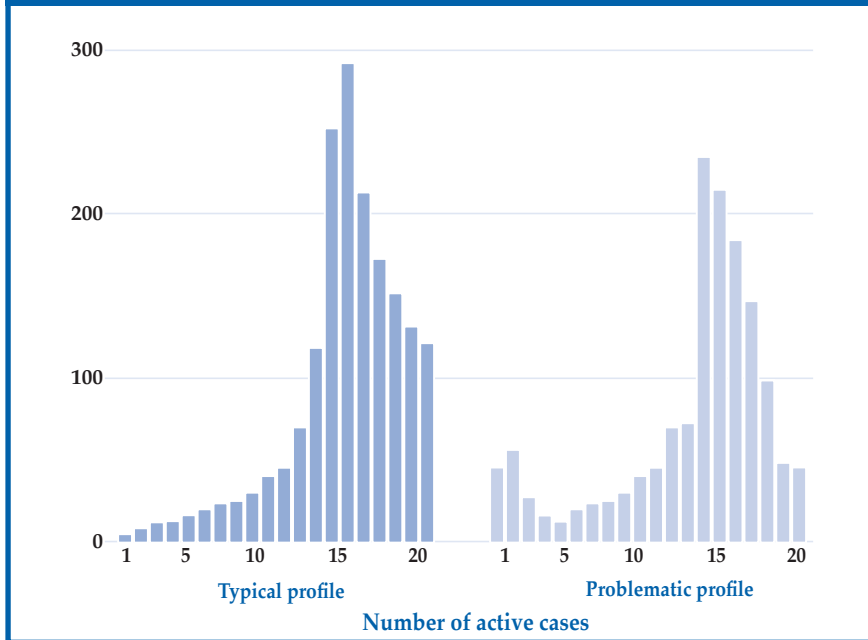
Admittedly, also a glance into scientific literature does not bring us forward with respect to this rather neutral definition of the term innovation. Gabler's "Lexikon des Technologiemanagements" (Encyclopaedia of Technology Management), for example, simply defines

Fig.2. Temporal development of invention records and new filings



2. This quotation which is "close to the market" stems from W. Umbach, former Research Director of Henkel KGaA.

**Fig. 3. Fingerprints of patent portfolios**



innovation as something “new” and regrets that a standardised, more profound definition of this term does not exist to date, although innovation research is already familiar with a multitude of contentual, subjective, processual and normative dimensions.<sup>3</sup>

Apart from the need to fill the term “innovation” with content, the next question is how innovation can be measured. For this, we may follow two approaches, i.e. the determination of so-called Key Success Indicators by

- Dynamised presentation of statistical key data, or
- Benchmarking using a portfolio analysis.

### 3.1. Identification Of Statistical Key Data

A dynamised presentation of statistical key data is the minimum requirement in business management to describe one’s own patent position, e.g., in the course of a Due Diligence. Particularly important examples of such Key Success Indicators are:

- number of invention records,
- number of filed and granted patents,
- correlation between patent and product portfolio,
- share of patent-protected products of the total portfolio,
- share of patent-protected products of the portfolio in the development pipeline, or
- share of patents of the patent portfolio with a remaining lifetime of more than x years.

Such figures certainly allow first conclusions relating to the patent situation of the company in question, however, they always need to be critically scrutinised, particularly if instead of absolute figures only relative figures are provided. Yet also absolute figures may be misleading as the following example shows. Since 2002, the considered fictitious company has been registering a decline in invention records of 25 percent, but at the same time, the number of new filings has been rising by 10 percent, respectively, due to clearing of work backlog. Without the information about the temporal development of the invention records, the message would be, “The company has been increasing

its innovative power year by year,” but being aware of the continuous decline in new inventions, the innovation potential needs to be scrutinised very critically, (See Fig. 2).

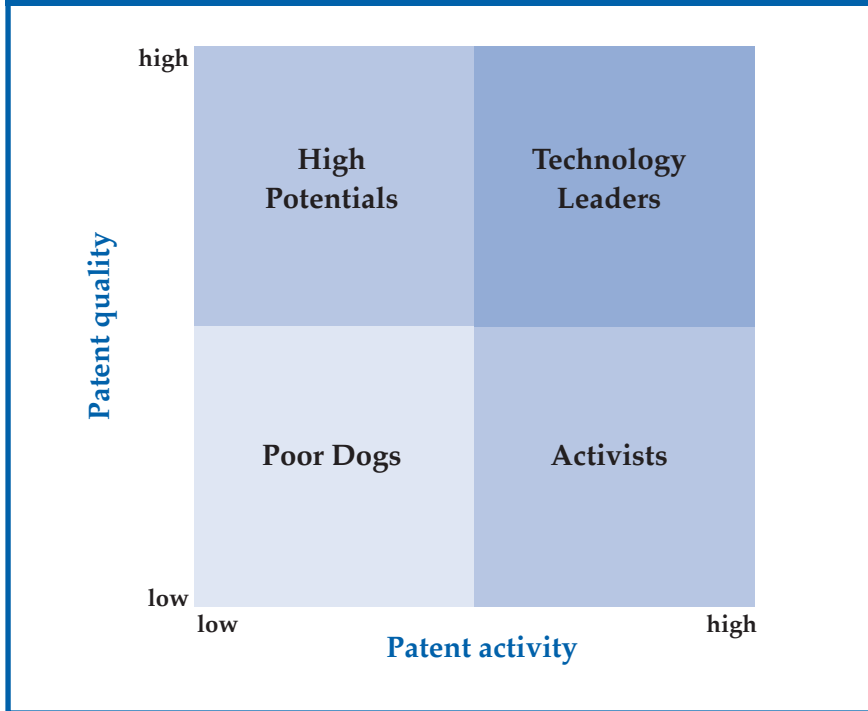
Also other apparently objective key success indicators may be misleading: for example, a high percentage of patent-protected products is far from meaning that only because of existing patents, a broad protection against imitation is guaranteed. Perhaps the scope of protection is quite narrow and allows many forms of circumvention, or perhaps the protective rights are only covering partial aspects, for example, a particular method of production or an individual application.

A last example illustrating the need to understand and, where applicable, to scrutinise statistical success indicators, how important they may be for the evaluation, is the indication of the share of protective rights in the portfolio which have a defined remaining lifetime, e.g., 10 years. In this case, the absolute number of protective rights is indicated which have the same remaining lifetime. A comparison of the two “fingerprints” shown in Fig. 3, demonstrates that in the first case there was obviously a constantly high number of new filings, and that a peak exists in remaining lifetimes that range from 14 to 18 years, which is quite typical for many industries with the exception of the pharmaceutical industry. In addition, the number of protective rights that lapse in the next five years is very low. The portfolio makes a very sound impression with a proportion of 65 percent of protective rights having a remaining lifetime of 15 and more years. Still, also in a low number of protective rights that are lapsing soon, there might be a hidden problem. This problem emerges when exactly those patents are of strategic importance to the company—which may be confidently assumed because otherwise it would not have maintained them over their total theoretical lifetime.

The second portfolio conveys a completely different impression: the number of protective rights hav-

3. Gabler Lexikon Technologie Management, D. Specht, M.G. Möhrle (ed.), Gabler-Verlag, 2002.

Fig. 4. Patent quality and patent activity



ing a remaining lifetime of 19 or 20 years—i.e., which have been filed in the past two years—is clearly lower and is at the same level as the number of patents that will lapse in the following two years. Also here we have a peak in remaining lifetimes in the range from 14 to 18 years, however, the level is much lower. This also applies to the indicator, “Remaining lifetime of at least 15 years,” which in this case is just above 50 percent. Obviously, this portfolio seems to have considerable structural weaknesses.

### 3.2. Benchmarking using a portfolio analysis

So if success factors derived from statistics are important on the one hand, but have to be critically scrutinised in their statement on the other hand, what options do we have in order to obtain more objective results? The answer is to dare a comparison with the competition.

In a simple model, this may be accomplished by observing and comparing the development of new filings with the competition over time. Undoubtedly, this has the advantage that the results are

comprehensible because they can be queried with relatively little effort from the respective data bases. Yet it is always debatable how to understand the statement derived by this method. As we have observed, a growing number of new filings, for example, may be an indicator for an increasing innovation potential, but not necessarily so. Incidentally, what does it mean if one company has a stronger position in numbers than another one? Not necessarily it is of superior patent strength, as it was shown by the conflict between Medtronic and Siemens. Indeed, empirical surveys have shown that companies who have a high patent quality but a low patent activity—so-called “high potentials”—are more successful in the long run and become technology leaders than the “activists” that have a large number of patent publications but produce more mass than class (see Fig. 4).<sup>4</sup>

A systematic assessment of patent information for the evaluation of IP positions is a discipline at the interface between Business Management and Intellectual Property Protection whose importance in the past years has been strongly increasing. Table

1 shows a number of Key Success Indicators which in the past have proven to be useful to describe the patent situation of a company.<sup>5</sup> Of particular importance is the above mentioned parameter of “patent strength,” which is defined as the product of “patent quality” and “patent activity.”

While “patent activity” just stands for the number of first filings in a defined segment, the parameter “patent quality” involves several factors:<sup>7</sup>

- Ratio between granted and pending protective rights,<sup>8</sup>
- International scope, usually applied to the triad of EP, U.S.A., and JP,<sup>9</sup>
- Technological scope, usually applied to the number of IPC classes a protective right is allocated to,<sup>10</sup> and
- Temporally weighted citation frequency during examination proceedings.<sup>11, 12</sup>

If this evaluation method is applied to the example of *Medtronics vs. Siemens/Pacesetter* which was mentioned in the beginning,

4. H. Ernst, “Patentinformationen für die strategische Planung von Forschung und Entwicklung, DUV-Verlag, Wiesbaden (1996).  
 5. H. Ernst, “Evaluation of dynamic technological developments by means of patent data,” in K. Brockhoff, A.K. Chakrabarti, J. Hauschild (ed.). “The dynamics of innovation strategies and managerial implications,” Berlin, Springer (1999).  
 6. H. Ernst, “Patent Information for Strategic Technology Management,” World Patent Information, Vol. 25(3), pp 233-242 (2003).  
 7. D.H. Austin, “An event-study approach to measuring innovative output: the case of biotechnology,” American Economy Review, Vol. 83, pp 253-258 (1993).  
 8. Z. Deng, B. Lev, F. Narin, “Science and technology as predictors of stock performance,” Financial Analysts Journal, Vol. 55, pp 20-32 (1999).  
 9. H. Ernst, “Patenting strategies in the German mechanical engineering industry and their relationship to company performance,” *Technovation*, Vol. 15, pp 225-240 (1995).  
 10. B. Hall, A. Jaffe, M. Trajtenberg, “Market value and patent citations – a first look,” *CNRS Working Paper No. 99004*, Paris, 1999.  
 11. J. Lerner, “The importance of patent scope: an empirical analysis,” *RAND Journal of Economy*, Vol. 25, pp 319-332 (1994).  
 12. S. Shane, “Technological opportunities and new firm creation,” *Manage Science*, Vol. 47, pp 205-220 (2001).

**Table 1. Key Success Indicators for the evaluation of the patent situation of a company<sup>6</sup>**

Key Success Indicator	Definition	Meaning
Patent activity ( $PA_{iF}$ )	Patent applications ( $PA$ ) of a company in a technological field (TF)	Extent of R&D expenditures of firm TF
Technology share*	$PA_{iF}/PA$ of all companies in TF	Competitive technological position of a company in TF
R&D emphasis	$PA_{iF}/$ number of companies ( $i$ ) total patent applications	Importance of technological field F for a company
Co-operation intensity	Number of joint patent applications with co-applicants in TF	Access of a company to external knowledge
Share of granted patents ( $Q_1$ )	Granted patents of a company in TF	Technological quality of a company patent applications
Technological scope ( $Q_2$ )	Diversity and number of IPC classes in companies patent applications	
International scope ( $Q_3$ )	Size of patent family and share of triad (US, EP, JP) patents	Economic quality of a company patent applications
Citation frequency ( $Q_4$ )	Average citation frequency	
Average patent quality ( $QP_{iF}$ )	Sum of all indicators of patent quality ( $Q_1-Q_4$ )	Average total quality of all patent applications of a company in TF
Patent strength ( $PS_{iF}$ )	Product of average patent quality ( $PQ_{iF}$ ) and patent activity ( $PA_{iF}$ )	Technological strength of a company in TF
Technology share**	$PS_{iF}/PS$ of all companies in TF	Competitive technological position of a company in TF (qualitative)
Relative technology share	$PS_{iF}/Max.$ patent strength of a company in TF	Distance of a company to the technological leader in TF

\*based on the number of patent applications \*\*based on the patent strength

one can see, that “patent quality” clearly dominates “patent activity” (see Fig. 5).

A particularly suitable presentation of the results is the spiderweb because it allows depiction of up to five independent parameters at the same time. Figure 6 below shows the following criteria taken from an earlier assessment of the market situation in the field of dietary supplements for five companies, i.e.:

- Number of first filings over a specific period,
- Average patent quality,
- Average patent strength,

- Technology share, and
- Co-operation intensity.

When making the evaluation, the highest achieved value of every single parameter is set at 100 percent, and the values of the other companies are put in relation to it. Every single graph in the spiderweb connects the five criteria for one company at a time. Ideally, a symmetric pentagram on the 100 percent line would mean that the respective company would be leading in all considered dimensions.

In the present example, this applies to the company Nestlé which is, with

respect to patent quality, behind the Abbot Laboratories—which show a much lower patent activity—and must be content to come in second.

#### 4. How can IP assets contribute to corporate performance?

As we have seen, the value of patent portfolios is most reliably determined by patent strength which is calculated from the product of patent activity and patent quality. Involving patent quality is of essential significance because a correlation between the patent position of a company and corporate performance could only be

determined by inclusion of the quality aspect (cf. Table 2).<sup>13</sup>

In addition, in a further empirical evaluation that was carried out in 2003 at the Graduate School of Management in Vallendar, *Ernst and Omland*<sup>14</sup> could show a direct correlation between a professional patent management, technological leadership, and corporate performance, particularly considering ROI aspects.<sup>15</sup>

13. H. Ernst, N. Omland, *ZfB-Ergänzungsheft* 3/2003, p. 95-113.

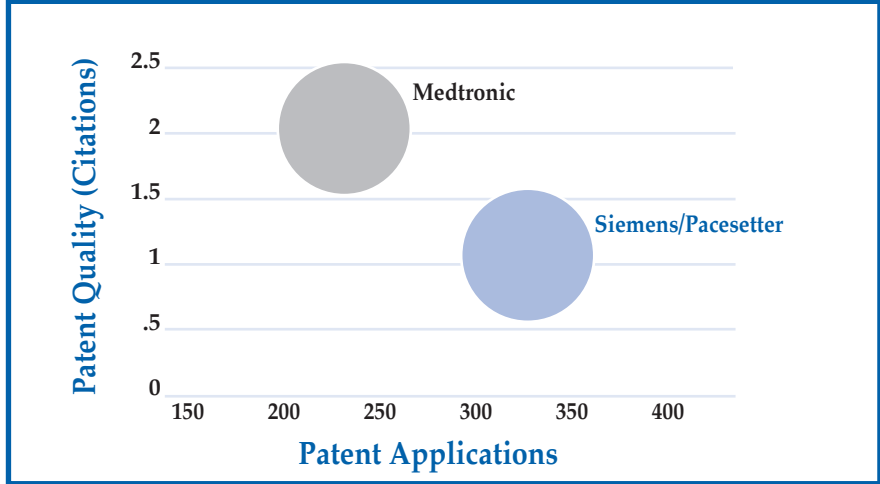
14. H. Ernst, N. Omland, "Patentmanagement und Unternehmenserfolg—eine empirische Analyse," Lecture before the Chamber of Commerce in Hamburg, 2004.

15. Also modern IP Asset Management orients itself at the classic managerial approach of strategic portfolio management (e.g., see N. Szyperki, U. Winand, *zfbf-Kontaktstudium* p123-132 (1978).

16. C. Klawitter, L. Hombrecher: "Gewerbliche Schutzrechte und Urheberrechte als Kreditsicherheiten," *WM Heft* 25, p 1213-1219 (2004).

17. C. Klawitter in *Financial Times Deutschland* dated 10. August.2004: "As financing tools, intellectual property rights are as smart as they are innovative ...therefore, (they) will rise quickly to become a new class of assets."

Fig. 5. Patent Quality vs. Patent Activity



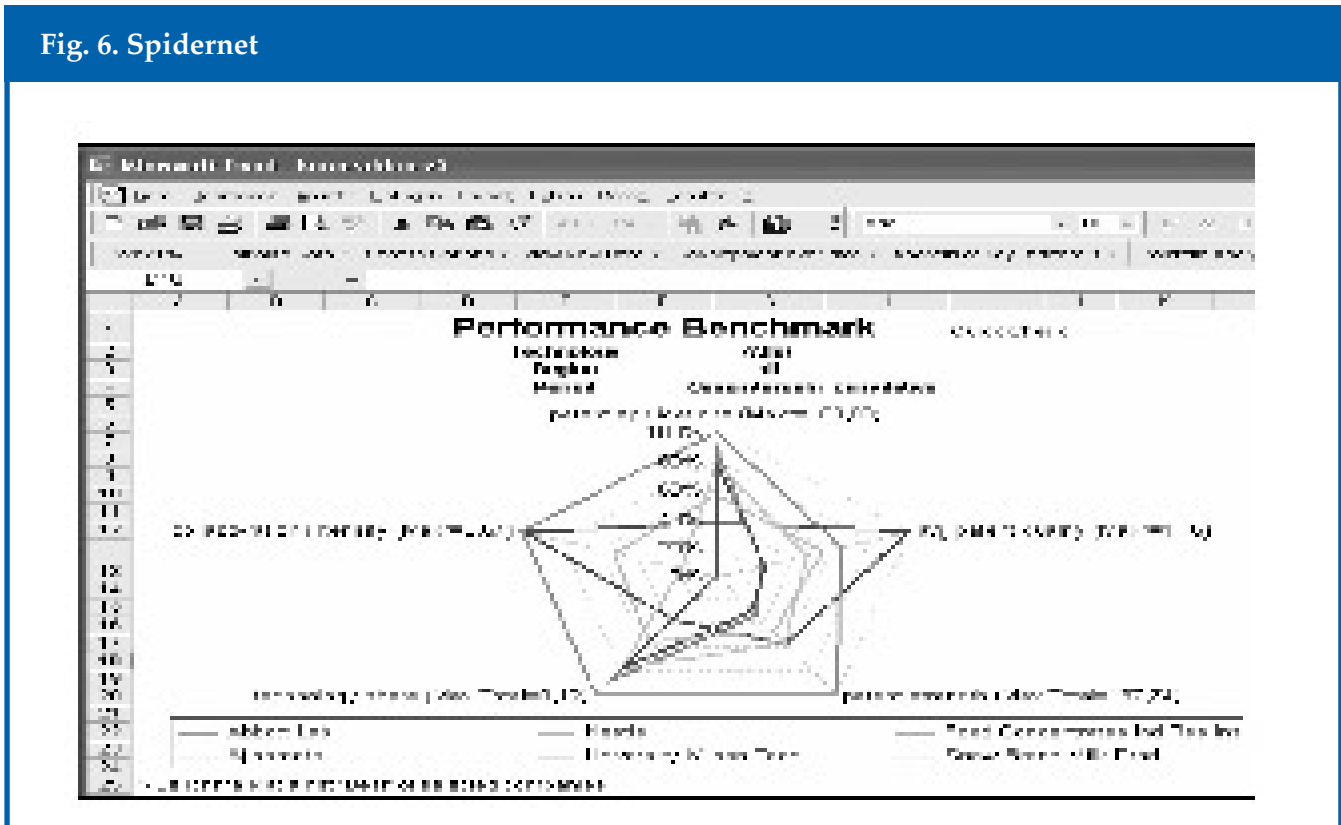
These results show that professional IP management is of great importance for corporate performance. In addition, protective rights are becoming more and more important as immaterial assets for the constitution of liens, e.g. in the financing of R&D or in M&A transactions.<sup>16, 17</sup>

For this reason, we feel that we have to add a third approach to our considerations of the last chapter,

which is the monetary evaluation of the IP portfolio. It is certainly easy to ask what the value of a portfolio of protective rights might be, but it is difficult to find an answer to this question. The first problem is that "value" as an economic term is always the result of subjective expectations in a particular transaction:

- From the perspective of the purchaser this is the maximum price he

Fig. 6. Spidernet



**Table 2. Findings of newer studies on the effect of patent protection on corporate performance**

Authors	Sample	Essential Findings
Austin (1993)	20 Biotechnology companies (USA)	Positive influence of patent grants on market value, stronger influence of key patents
Deng/Lev/Narin (1999)	388 companies (pharma, chemistry, electronics)	Positive influence of frequently cited patents on market value
Ernst (2001)	50 mechanical engineering firms (D)	Patent applications lead to significant sales increases with a delay of 2-3 years. This effect increases for high-quality patents.
Ernst (1996)	50 mechanical engineering firms (D)	Companies with an active, systematic patent strategy and thus a high-quality patent portfolio are significantly more successful than companies with an inactive, un-systematic patent behaviour
Hall/Jaffe/Trajtenberg (1999)	4000 companies of production Industry (US)	Positive influence of frequently cited patents on market value
Lerner (1994)	535 rounds financing of 173 VC-financed biotechnology companies (US)	Patents with technologically broad patent claim increase the rating of the companies
Shane (2001)	1,397 granted patents of the MIT (US)	The existence of high-quality patents increases probability of commercialisation

is willing to pay;

- From the perspective of the vendor it is the minimum price he wishes to realise. In a world of economic uncertainty, things can not have an objectively correct value (*“Value is in the eye of the beholder”*). Ideas concerning the value, however, do much more depend on alternative investment opportunities, i.e.:

- Expectations concerning the market environment and the individual scope of action, and

- Expectations concerning the action of other market players.<sup>18</sup>

Yet this immediately highlights the full dilemma of value analyses in the area of IP protection: the result of each mathematical operation can only be as good as its input. If this input, however, is essentially influenced by “soft facts,” the final result may at best be pseudo-objective, i.e., objective under the condition of stating the boundary conditions on which it was achieved.

This leads us to the next question, which method of calculation is the most suitable. At this point, an example from science history may be allowed: when Niels Bohr formulated his atom model at the beginning of the past century, it did not only have the charm of being able to explain approximately 90 percent of all effects, it was also of a striking straightforwardness. It took more than 50 years until the orbit model provided explanations for a

18. W. Buffett in Berkshire Hathaway’s 1994 Annual Report. “What counts is intrinsic value, a number that is impossible to pinpoint but essential to estimate... We define intrinsic value as the discounted value of the cash that can be taken out of a business during its remaining life. Anyone calculating intrinsic value necessarily comes up with a highly subjective figure that will change both as estimates of future cash flows are revised and interest rates move. Despite its fuzziness, however, intrinsic value is all-important and is the only logical way to evaluate the relative attractiveness of investments and businesses.”

number of effects that Bohr had not been able to explain, yet it had the disadvantage that clearness largely became lost (in the end, answers are open until today). If we transfer this scientific insight to business economics and accept that any progress in the accuracy of forecasts is bought at the price of the multiplication of complexity, very quickly the issue arises whether a more trivial approach to the calculation of the value of an IP portfolio would not be more sustainable in the end than a complex calculation having a multitude of variables which is, therefore, linked to a multitude of elements of uncertainty.<sup>19</sup>

Such a trivial approach, applied to a homogeneous group of protective rights—e.g., such concerning a prod-

19. “The same ‘approach’ problem arises, incidentally, also in the technological evaluation of patent portfolios,” S. Hofinger, Harvard Business Manager 101 (1999) p. 101-106.

uct or a group of products—could be a simple cost-benefit ratio, for example:

- $x_1$  Mm secures profits by protection against imitation.
- avoids licensing of protective rights with costs in the amount of  $x_2$  Mm.
- generates license revenue in the amount of  $x_3$  Mm.
- requires expenses for filing and maintenance in the amount of  $y_1$  Mm.
- requires further specific expenses (e.g., employed inventor compensation) in the amount of  $y_2$  Mm.

= VALUE (V)

Certainly, such value calculation may be carried out in a more differentiated manner, e.g., by applying the following formula:

$$V = (Pf \square \square \square) - C$$

Here, calculation of the value of a discrete patent portfolio (V) is also carried out starting from the profit (P). Now we could assume that the considered product portfolio, for example, consists of five products, only four of which are protected by patents. For this reason, the profit, first of all, will need to be multiplied by the portfolio factor  $f$ , a number between zero and one reflecting the share of the portfolio actually protected by patents. Secondly, we need to consider that, on the one hand, the value of the portfolio per year is not of interest, but on the other hand we cannot reasonably assume that all protective rights in the portfolio will be needed and maintained over the total theoretical lifetime of 20 years. This is corrected by the lifetime factor  $\square$ , which indicates the average life-time of the protected rights of the portfolio. While these factors are relatively objectively obtained, we have now reached the more complex part of the exercise: provided there is no patent protection at all, what would the probability be that a competitor placed a similar product on the market? Perhaps this technol-

ogy is so unique that there is no need for protective rights. This thought is allowed for by the competition factor  $\square$ , which again is a number between zero and one indicating the percentage of the probability that, if patent protection is non-existent, additional competition is generated at all. Yet there is more: let's assume that a competitor would actually enter the market with the same products, would this mean that we would lose 100 percent of our market share? Perhaps there are other parameters that are of importance besides patent protection, and corporate performance is essentially determined by price, quality, and service. This is finally considered by the market factor  $\square$ , which is also a number between zero and one indicating the percentage of the market share (and, therefore, of the profit) that would actually result from additional competition. Finally we only need to subtract the costs C from this sum, which accrued from filing, maintenance, etc.

Also if we ignore the fact that the second method for arriving at an answer suggests a higher degree of (pseudo) objectivity due to the mathematical formula, both methods suffer from the same problem: the point always is to estimate how much profit will be lost, be it due to imitation or necessary additional expenses. Estimates always have to be based on assumptions, and the more assumptions are required, the more risk the result is carrying. We could arrive at the conclusion that calculations of the value of portfolios are useless as a matter of principle because they elude objectivity irrespective of the method applied. Certainly, nobody would agree to this, the more so as whole departments of respectable companies of chartered accountants are busy allotting a book value to immaterial assets in the context of M&A transactions, but also in terms of creditworthiness. Much more it is necessary to reveal to investors

how these calculations are made and what the boundary conditions were. Transparency and intelligibility are indispensable preconditions for the acceptance of the value and, ultimately, performance.

Irrespective of that, one fact always needs to be considered: when ascertaining the value, no portfolio analysis takes into account whether the protective rights considered are legally valid and thus may be enforced in case of doubt.

## 5. Summary

The situation of protective rights has an immediate influence on the economic situation of a company, particularly with regard to ROI and profitability. Therefore, investors are well-advised to carefully look at these factors. For companies this means that they have a tool in their hands that adds to their attractiveness. For proof of evidence of a positive patent situation, success factors—so-called “Key Success Indicators” have proved to be useful. In this context, statistical data may provide valuable assistance, provided their statements are critically scrutinised. However, more efficient are success factors that allow a benchmarking of the considered company in comparison with its competitors. This purpose is best served by gathering objective information that is available to anyone from public databases, and by calculation of different parameters, particularly of relative patent strength as the product of patent activity and patent quality of a company in a considered segment. Patents and trademarks, which are often summarised as “IP assets,” constitute an immaterial asset and can therefore immediately contribute to corporate performance, provided that their value may be determined in a sufficiently objective manner. This, however, is only possible if company and investor are in agreement about the general conditions on which the valuation was carried out.