# Knowledge Asset Potential vs. Vulnerability: Balancing Risks

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**Abstract**: The intersection and common elements of the fields of knowledge management (KM) and competitive intelligence (CI) are receiving growing attention, particularly in the latter discipline. Not only are the two areas similar in terms of managing knowledge resources, albeit of different types in most cases, but the presence of competitive intelligence activities begs the question of how widely knowledge assets should be developed and shared, as well as how and whether said assets should be protected. One framework for developing a strategy to balance knowledge development with knowledge protection suggests that there are specific risks (knowledge management or KM Risk and competitive intelligence or CI Risk) that move in alternate directions as knowledge is developed and shared more widely. Previous work has measured KM potential/risk and CI risk in a variety of industries, theoretically providing industry participants with a tool to more strategically develop and protect knowledge assets. This paper continues that work, including not only the industry evaluations but in-depth analyses of firms within those industries, allowing for even deeper insights concerning optimal KM/CI strategies. These insights are drawn from evaluation of the circumstances surrounding each industry and representative firm, including the nature of the knowledge assets (explicit/tacit), their complexity, and their specificity (stickiness). In a sense, this is an illustrative study, providing a template for how an individual firm can evaluate its own circumstances and better manage its knowledge assets. This paper provides another step forward in establishing a framework to help firms in discovering optimal strategies for developing and protecting knowledge by extending the discussion from industries to specific firms. Continuing to draw on the same framework that defines the KM and CI tradeoff, this paper examines illustrative firms in each KM/CI situation, reviewing their circumstances and their relative place in the industry vis a vis KM and CI. From this result, we can continue to develop and refine theory and practice concerning how and when KM is practised as well as how and when CI activities are deployed and defended.

**Keywords**: intellectual capital, knowledge management, competitive intelligence, risk, strategy

## 1. Background

Knowledge as a source of competitive advantage is a concept core to the fields of knowledge management (KM) and intellectual capital (IC). But while better management of knowledge assets can certainly aid organisational performance, spreading those assets too widely can also leave an entity open to losing valuable proprietary knowledge to competitors. Our Strategic Protection Factor (SPF) framework (Rothberg & Erickson 2005) looks to identify and assess the risks involved in developing vs. protecting knowledge assets, and here we add to the evidence supporting this framework. In doing so, we can better understand the circumstances surrounding an individual firm's decision on how far to develop its IC as well as the steps it should take for IC protection.

As noted, the KM/IC field is built on the concept that more knowledge development and better distribution of knowledge can lead to competitive advantage (Stewart 1997; Grant 1996; Quinn 1992). As a result, organisations benefit from managing their knowledge assets better than do their competitors. If they can identify, develop, capture, and leverage their intellectual capital more effectively than the competition, they should see better organisational performance and better financial results (Marr & Schiuma 2001). From a slightly different perspective, any given firm must develop and share its knowledge assets to their fullest potential if it is to keep up with competitors actively engaged in KM. Managing knowledge assets to potential is becoming increasingly necessary to ensure competitiveness.

But there is a flip side to this. Both centralisation of knowledge and the subsequent distribution and wide availability of knowledge make it more vulnerable to competitors. Competitive knowledge can itself be a valuable knowledge asset (Andreou & Bontis 2007; Erickson & Rothberg 2000), so other firms, unsurprisingly, are constantly looking to obtain proprietary knowledge from competitors and built their own knowledge stores concerning those targeted competitors. Consequently, organisations


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need to attend not only to building but also protecting their own valuable proprietary knowledge assets (Liebeskind 1996; Zander & Kogut 1995). Competitive intelligence (CI) activity is growing (American Society for Industrial Security 1999) and just as KM can lead to competitive advantage, so also can better CI, by either obtaining competitive knowledge or defending one's own knowledge from those competitors (Bernhardt 2002; Cappel and Boone 1995).

The result is a dilemma for firms committing to knowledge management strategies. Not developing and/or not leveraging knowledge assets to the fullest degree could leave an organisation at a competitive disadvantage to other firms doing a better job at KM. Alternatively, developing and leveraging knowledge assets beyond the capabilities of the firm to protect them could leave an organisation at a competitive disadvantage to competitors with advanced CI operations. Where is the optimal balance between knowledge asset development and knowledge asset protection?

The full theoretical development of this trade-off is found in Rothberg & Erickson (2005). The concept is illustrated graphically in Figure 1, where (Intellectual) Capital Management Risk, what we've been calling KM Risk, declines as knowledge is shared more widely. In other words, the risk of being left behind by competitors better managing knowledge assets, better realising the potential of their knowledge, will go down as a firm does a better job of managing its own knowledge. Competitive Intelligence Risk, on the other hand, increases as knowledge is shared more widely—the risk of valuable proprietary knowledge leaking into competitors' hands. More individuals with more access to more knowledge assets spells vulnerability as CI operations invariably look for the weak link. So knowledge spread can dramatically increase CI Risk. Once you have the two opposing risks, there are decisions to make based on competitive environment. From this perspective, knowledge management becomes strategic, as organisations need to assess their risk perspectives and adopt an appropriate balance between the risks in terms of their KM development and protection. For any given firm, the optimal point on the total risk curve represents an appropriate balance reflecting minimal organisational risk, some combination of the two opposing risk curves.

**Figure 1**
**Intellectual Capital Risks**

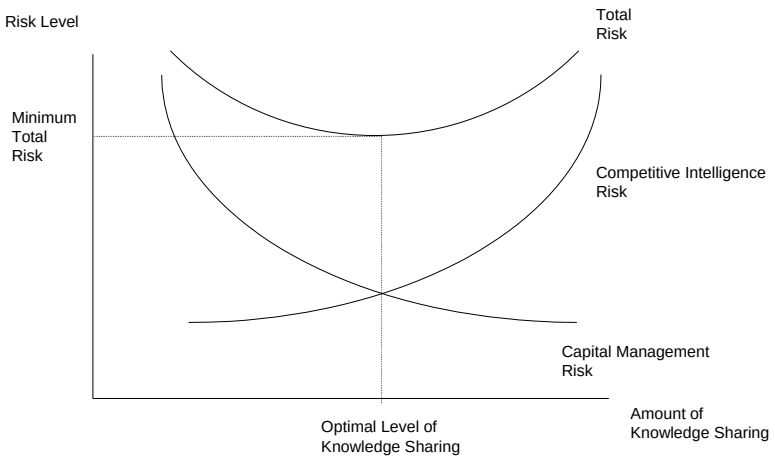


**Figure 1**: Risk trade-off (source: Rothberg & Erickson (2005)

But a key point is that this risk assessment is firm specific, unique to its environment and circumstances. In some nations, knowledge assets are more or less important and protection is easier or harder to obtain. In some industries, knowledge assets are more or less important and protection is easier or harder to obtain. And some firms have their own unique issues as well, possessing the experience and/or resources to manage this issue well or not. The result is that some firms, in given national, industry, and organisational circumstances, need to aggressively pursue knowledge development. Others don't. Some firms have particular protection concerns. Others don't. The position of the curves and the resulting optimal point can vary widely depending on the

 

environment, and organisations need to carefully assess their unique circumstances if they are to choose an appropriate, balanced knowledge management strategy.

## 2. Conceptual framework and methodology

The Rothberg & Erickson framework presents a generic representation of the risk curves, but they could conceivably be anywhere on the graphical grid. To simplify, consider four extremes, essentially the four quadrants of the grid, characterised as strategic protection factors (SPF's):

- SPF 45: High KM Risk/High CI Risk (northeast of generic optimal point)
- SPF 15: High KM Risk/Low CI Risk northwest of generic optimal point)
- SPF 30: Low KM Risk/High CI Risk (southeast of generic optimal point)
- SPF 5: Low KM Risk/Low CI Risk (southwest of generic optimal point)

High/Low has to do with distance from the origin, so SPF 45 would be in the upper right quadrant, SPF 5 in the lower left. The different scenarios are developed fully in Rothberg & Erickson (2005) and subsequent work, but in short:

SPF 45: High KM Risk/High CI Risk reflects a situation where knowledge is both critical to success and highly vulnerable to competitive intelligence. Many industries and companies in this situation are in situations where intellectual property (patents and such) and other knowledge assets are widely employed and pursued though with close attention to protection.

SPF 15: High KM Risk/Low CI Risk is an environment where knowledge is important for competitive advantage but not particularly vulnerable to competitive incursions. The knowledge is often specific to the originating firm or highly complex and so difficult to use outside of its original environment without accompanying knowledge that it is almost pointless for competitors to bother appropriating it. Industries or companies where strong brands, installed competitive advantage with strong first-mover advantages (production or IT systems), or other barriers to copying would be indicative of this situation.

SPF 30: Low KM Risk/High CI Risk concerns circumstances where knowledge is hard to share but is extremely easy to copy once distributed. As a result, knowledge development is relatively unimportant for the originating firm, but even a little bit escaping into competitive hands can be a critical loss. While this seems an oxymoron, the situation characterises industries and firms wherein there is often a required spark of creativity for new products. This spark is difficult to share and teach throughout the firm . But those creative ideas can be extremely easy to copy once incorporated into a product that competitors can analyze or reverse engineer. Financial services, utilities, and other such industries reflect these circumstances.

Finally, in an SPF 5: Low KM Risk/Low CI Risk situation, knowledge development and protection are both relatively unimportant. There is little advantage to investing in a knowledge management system and little point in protection either, as knowledge is difficult to transfer. Any environment where knowledge is highly tacit would reflect this circumstance. Industries or firms dependent on individual creativity or genius (arts, fashion, craftsmanship) would qualify. Knowledge management systems are almost pointless, and competitive intelligence operations would have little value either. These scenarios are intuitively appealing and have some theoretical and anecdotal support. The question is whether empirical data backs up them up. In past work, we developed measures for KM Risk and CI Risk, gathered data from the Fortune 500, and combined and sorted the data by industry. We then arranged the industries according to the four proposed scenarios to see who fell into which category.

A basic measure for intellectual capital and thus a good proxy for how far knowledge assets need to be developed in order to remain competitive (i.e. KM Risk) is market to book value, or shareholders' equity. This is a variation on Tobin's q and commonly used in the literature (Tan, Plowman & Hancock 2007). A high value for the industry indicates that a high level of intangible assets is common among high-performance firms, so it is then a reasonable inference that substantial IC is necessary to compete in the industry. We chose to use market value to book value as a ratio (rather than difference) as our measure for KM Risk. A higher ratio indicated higher KM potential and thus higher KM Risk. To keep up in an industry with a high level of intangibles, a firm is well advised to develop its own knowledge assets to their fullest.

On the competitive intelligence side, CI employment is a reasonable proxy for CI activity and risk in an industry. We obtained the Society of Competitive Intelligence Professionals (SCIP) membership database and were able to pull out this information by firm. Aggregated by industry, high SCIP membership per firm value is indicative of high CI Risk for all firms in that industry (i.e. competitors, as a whole, employ a lot of CI staff). Note that even though the absolute numbers are fairly small (often just a SCIP member or two in fairly large companies), SCIP professionals will often have a substantial operation, not necessarily or even typically containing other SCIP members, working under them. So a member or two can be a sign of fairly substantial activity. An additional and alternative measure is also gathered by SCIP, the months employed by the firm on CI activity. We have included that in the present analysis as well.

Previous work included industry figures from databases for four years, from 1993-1996. We took the firm totals for market/book ratio (KM Risk) and SCIP members (CI Risk) and averaged them by industry. Given different representation in different industry segments and cases in which industries with similar SIC numbers down to three or four digits were actually very different and needed division, the actual aggregation is by 2, 3, or 4-digit SIC number, depending on our personal judgement. The results reported also include only those industries with at least four firms, minimising the impact a single firm might have on the industry results. After sorting the data by KM Risk, we divided the industries into two groups. We've used different dividing points between high and low KM Risk in different studies. For the illustrative purposes of this study, we set the dividing points at 5.0 for KM (above 5, high KM Risk, below 5, low KM Risk). For CI Risk, we set the dividing line at 2.0. These choices are not material to the analysis and could be adjusted, based on new evidence or analysis, with no change to the value of the conclusions.

## 3. Results

As noted, these details reflect previous studies reported elsewhere (available upon request). These studies have been extremely useful in identifying which industries fall into which SPF category. This specific study/analysis, however, extends the previous work and has more to do with particular firms as exemplars of the meaning of a particular SPF. Results are illustrated in Figure 2.

SPF 45, again, has high KM Risk and high CI Risk. SPF 45 industries include pharmaceuticals, aircraft, telecom, laboratory instruments, and a number of other obvious candidates. The level of intellectual property and affiliated knowledge required to invent, produce, and market drugs, aircraft, and other such products is evident and translates directly into knowledge management concepts. Similarly, because the knowledge is so readily defined, so explicit, it is readily copied by competitors.

As befitting this study, consider Merck (SIC 2834) as an exemplar of a firm for SPF 45. The 1996 value of our database for KM Risk in this industry is 7.74, market capitalization to shareholders' equity. The 1996 value for CI Risk is 5.07 (man-months for CI activity were 47.29). Merck's values were 6.35 and 3 (with 30 man-months). What does this indicate? For the year in question, Merck was somewhat below the industry average in terms of its success in employing knowledge (6.35 vs. 7.74). Alternatively, Merck obviously operates in an industry with extensive competitive intelligence activity (5.07 is very high across all industries, as is 47.29 man-months) so CI Risk is also very high. But Merck's own CI operations are somewhat below the industry average, with 3 SCIP members and 30 man-months

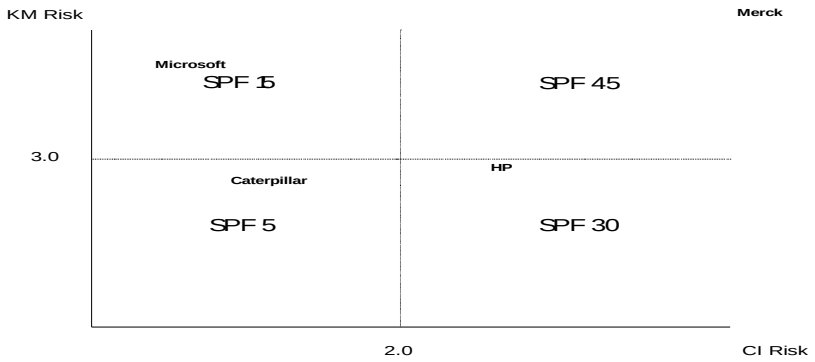


 

**Figure 2:** SPF framework and illustrative firms

From the standpoint of strategy, Merck, in 1996, would likely want to give thought to its KM strategy and operations. Working below the industry average for application of knowledge is a dangerous place to be in any industry, but particularly in one so dependent on knowledge assets. Alternatively, Merck is very at risk from CI activity while likely benefiting at a rate less than the industry average from its own CI operations. For purposes of competitiveness, the firm should consider expanding both KM and CI activities while being sure to protect its own knowledge assets.

Contrast this with an example from SPF 15. SPF 15 has high KM Risk, but low CI Risk. So knowledge is important to develop and share, but is hard to competitors to employ, even if they do get hold of it. As noted earlier, this is often because of extraneous factors such as strong brands, installed base, unique resources, or other competitive aspects that preclude other firms from effectively employing the knowledge. Software (SIC 7371-2) is a typical industry and Microsoft an exemplar firm. The 1996 KM Risk for the industry registered 4.79 while CI Risk was 0.83. So knowledge made a big difference as measured by market capitalization to shareholders' equity while competitive intelligence was fairly muted at 0.83 SCIP members per firm. For Microsoft, the values were 12.21 and 2.0. SCIP man-months were 6.43 and 13 for industry and firm, respectively. Several things are apparent within these results. KM Risk remains very high, as was the case in the earlier industry, though Microsoft compares very favourably with its industry group, having a much higher market cap to equity value (12.21) than competitors (4.79). Microsoft, not unexpectedly appears to be doing something right in terms of managing its knowledge assets relative to the industry. The threat posed by competitive intelligence activities is considerably lower compared to pharmaceuticals however, with CI Risk less than 1.0 (and man-months under 7.0). Within the industry, Microsoft actually appears very aggressive in its CI activities, with SCIP membership/CI Risk of 2 and man-months of 13. Microsoft is apparently gaining great returns from KM, including its CI operations, while having little to fear from the CI actions of others.

SPF 30 refers to a situation with low KM Risk and high CI Risk. Knowledge is often tacit and hard to share within the firm but quickly copied once incorporated into products or processes. So bright ideas come along, and firms find it difficult to effectively copy that spark of creativity internally. But the ideas are often incorporated into products that may be very easily copied if competitors can analyse them and learn their details. So a financial portfolio strategy, for instance, may be a bright new idea that rarely comes along. But if competitors learn what the investment breakdown is in that portfolio, they can quickly and easily copy the strategy. For SPF 30, Computers (SIC #3571) is an illustrative industry to discuss. The 1996 industry totals are 2.91 for KM and 2.79 for CI, with 19.86 man-months of SCIP activity. HP is an exemplary firm. HP had a market cap to equity ratio of 4.76 (KM Risk), well above the industry average, suggesting very effective management of knowledge assets relative to competitors, even though the KM potential was lower compared to other industries (recall that pharmaceuticals was 7.74). On the other hand, the firm faces a relatively high CI threat, with average SCIP membership at 2.79 (vs. 0.83 for software). Given the industry averages, however, HP appears to be quite aggressive in its CI activities, with membership at 15 and man-months at 83—high by almost any comparison, even for their relatively high industry. Given industry conditions, HP competes at an aggressive level in both KM development and KM protection but still does not rise to the level of KM development required in an industry such as pharmaceuticals.

SPF 5 refers to low KM Risk, low CI Risk industries. As before, low KM Risk implies knowledge that is difficult to leverage internally, often highly tacit. And it remains tacit and difficult for competitors to take and effectively employ as well. For SPF 5, heavy machinery (SIC #351-6) is a good example, an industry without a lot of new knowledge development. KM Risk and CI Risk are both low for this category, with values of 2.85 and 1.36. SCIP man-months for the industry are 12.29. For Caterpillar, however, an effective competitor in the category, the market cap to equity ratio is 4.48, considerably above the industry average and showing effective management of knowledge assets. This takes place in an industry environment with low CI activity, but Cat is fairly aggressive, with its own CI operation registering at 5 members and 45 man-months. As noted throughout this analysis, these numbers are appropriate to the industry but also recognize the potential of operating with a higher regard for knowledge development and protection than competitors. Given the promise from KM and CI for competitiveness, one would expect Caterpillar to benefit from its more aggressive approach to both knowledge development and competitive intelligence.

## 4. Discussion and conclusions

Understanding the circumstances of knowledge management and knowledge protection will become an increasingly important strategic challenge for contemporary firms. Developing knowledge assets can be incredibly important for success, but the degree of development necessary appears to vary widely by industry. A particular firm may want to develop knowledge to a greater degree than direct competitors, but too far beyond competitive needs may result in little marginal advantage. Similarly, firms need to be cognizant of the degree of competitive intelligence activity within their industry and operate accordingly in terms of knowledge sharing and installing protection mechanisms. Given that, however, individual organizations need to consider their own abilities to conduct competitive intelligence and construct and support a CI operation appropriate to their resources and needs.

Further work will continue to identify and define the conditions defining the potential for KM and CI success as well as appropriate strategies given such circumstances. As noted earlier, different types of knowledge and industry conditions may call for more or less development of knowledge assets. Similarly, different circumstances will call for more secure protection schemes and/or more aggressive competitive intelligence operations. The scholarly literature suggests that we may be able to better define the variables in terms of tacit/explicit, complexity, and specificity. And from an application perspective, the better we can define for individual firms how to evaluate their specific situation and craft appropriate knowledge development and knowledge protection strategies. Each step brings us closer to identifying measurable factors that can dictate knowledge strategies.

And, again, this is a step forward in advancing the concept that developing knowledge assets is not a matter of as much as possible but of strategy. Knowledge may be developed and shared to a greater or lesser degree. In some industries, aggressive development of knowledge assets is critical, in others less so. So investing in and administering substantial KM systems should be a matter of strategic intent. Similarly, pursuing knowledge assets of others and protecting one's own is a matter of environment and degree. In some circumstances, aggressive competitive intelligence is critical as is a substantive knowledge asset protection strategy. In others, both are less important. As with knowledge development, knowledge protection is a strategic decision based on circumstances. We continue to work on the theory underlying these development and protection decisions.

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