SPF 5 and Limitations to Investing in Knowledge Management

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Abstract: This paper will continue our work concerning the strategic management of intellectual capital. Based on the Rothberg/Erickson SPF framework which balances knowledge development with knowledge protection, we continue to explore differing circumstances and their impact on IC strategy. The framework differentiates between IC that needs to be aggressively developed by the firm (or not) and IC that is vulnerable to competitive intelligence incursion and needs protection (or not). Previously, we have looked at an environment within which substantial development of IC is necessary in order to be competitive but in which those same knowledge assets are at risk from competitive efforts to appropriate them (Erickson & Rothberg 2009b). In this paper, we will develop the scenario wherein aggressive development of IC may not be useful (highly tacit knowledge, difficult to share or apply in other situations) and little competitive intelligence activity is taking place (SPF 5 in the framework). In particular, we will characterize the nature of this environment in terms of theory, identify representative firms and industries, and apply data to the framework. Where appropriate, contrasts with other SPF environments will also be made.

Keywords: knowledge management, intellectual capital, competitive intelligence, SPF framework

1. Background

The field of knowledge management (KM) is founded on the belief that greater development and use of knowledge assets (or intellectual capital (IC)) will result in competitive advantage (Marr & Schiuma 2001). Implicit in this view is the idea that more collection, more development, and more leveraging of knowledge assets through sharing is always for the good. The field of competitive intelligence (CI) also believes in the power of knowledge assets, specifically those related to the strategy and operations of a competitor (Andreou & Bontis 2007; Erickson & Rothberg 2000). If a firm can relieve its competitor of specific knowledge, information, or data, It can better anticipate an counter competitive actions. Competitive intelligence activities that access and analyse such knowledge from and concerning competitors is a growing field (ASIS 1999) and is also believed to add to competitive advantage (Bernhardt 2002; Cappel and Boone 1995).

While similarities exist between the disciplines, there is also a fundamental tension between them as aggressive knowledge management can lead to vulnerabilities in relation to competitive intelligence. Specifically, as firms codify their knowledge assets, centralizing them in a database, they are able to better collect knowledge across the firm and then leverage it by making it accessible throughout the organization (Grant 1996; Quinn 1992). Further, if it is distributed digitally to the organization and even the extended network around it, the knowledge can be useful to many more individuals and entities. And though codification is usually associated with explicit knowledge, genius systems and other methods of better managing tacit knowledge can also lead to growth in knowledge assets and higher organizational performance. More knowledge in more hands is viewed as unambiguously good in most KM applications. Collecting knowledge as much as possible and then spreading it as much as possible is an implicit goal of the field.

From a competitive intelligence standpoint, however, the same things that provide potential value instill potential vulnerability (Liebeskind 1996). Collection of the knowledge assets in a central location (or at least through a centralized system), especially in digital form, available to more and more individuals throughout the network spells exponentially more opportunities for competitive intelligence infiltration. Operatives are free to look for the weak point in the network, and that weak point is much more likely to have access to much more data, information, and knowledge than would be the case if a KM system was not in place. The result of these two opposing viewpoints is a dilemma. An organization needs to develop knowledge in order to keep up with competitors doing the same. A failure to develop knowledge to its fullest extent has the potential to leave a firm at a competitive disadvantage in terms of KM. So there are definite pressures to develop knowledge assets aggressively. On the other hand, greater development makes it harder to defend those same assets from competitive incursions. If knowledge does slip into competitive hands, the firm may again be at a competitive disadvantage, this time in terms of CI This

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tension in developing vs. protecting knowledge has been depicted in the following graph (Rothberg & Erickson 2005). "Capital Management Risk" refers to the risk of not developing knowledge assets (intellectual capital) to the same degree as competitors. More knowledge development (investment in KM systems) decreases this risk. Competitive Intelligence Risk has to do with leaving intellectual capital open to competitive incursions. Less development and sharing reduces this risk, as knowledge assets are then easier to protect. As shown, these risks move in opposite directions as KM development increases ("amount of knowledge sharing"). Strategists should assess each and try to determine the optimal level of knowledge development, the "sweet spot" that minimizes total risk.

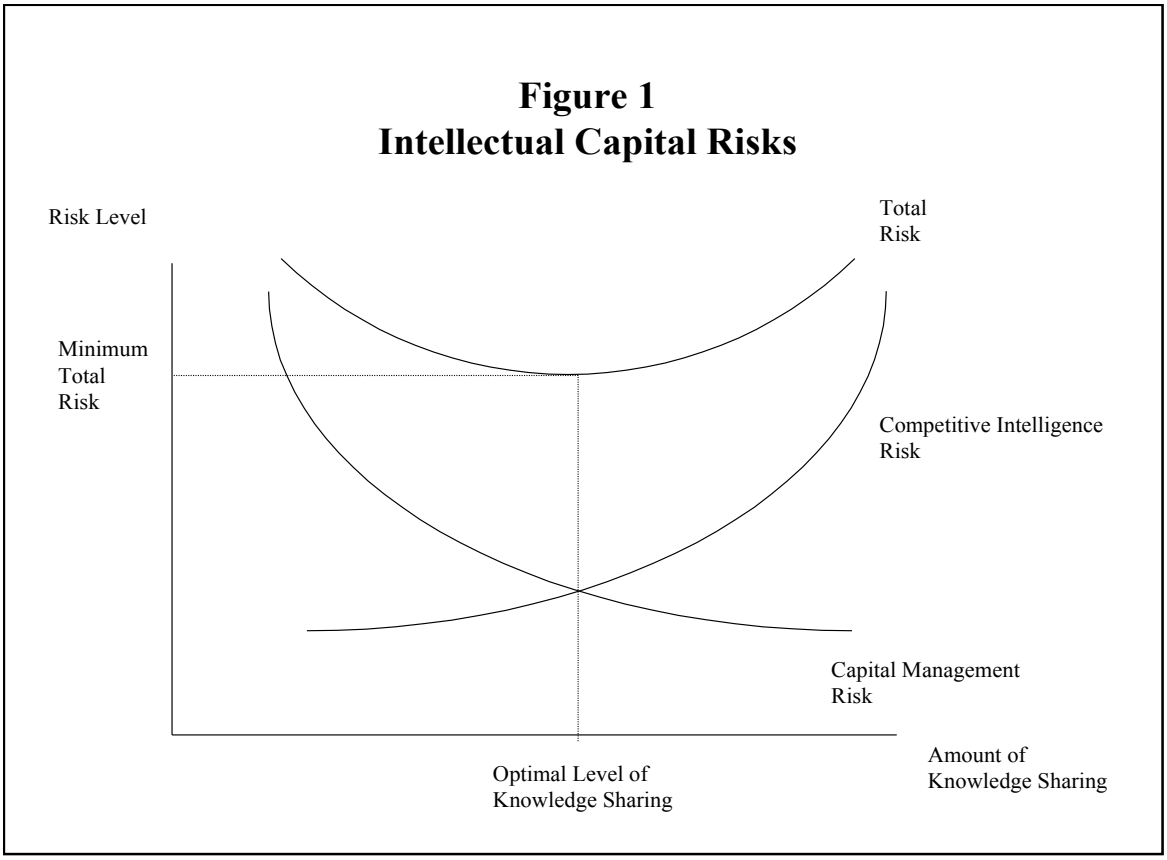

Figure 1: Risk in the SPF fFramework (Rothberg & Erickson 2005)

The work behind the graph (Rothberg & Erickson 2005) suggests that the competitive environment on the national, industry, and firm level will vary and analysis will help to determine the specific circumstances of the firm, and how these risks impact it. The curves depicted here are generic. In reality, they could be all sorts of shapes and in all sorts of locations. The key point is that the very nature of the trade-off suggests that circumstances differ. In some situations, knowledge development will be much more critical and there may be little risk of competitive incursion. In other situations, little may be gained from further knowledge development while the action may lead to unacceptable competitive intelligence risks. The task of the manager is to determine what those circumstances are, how far to develop knowledge assets, and how much to invest in protection of the same assets.

2. Conceptual framework and methodology

The Rothberg/Erickson SPF framework that flows from Figure 1 provides different risk scenarios and some specifics of each. As noted, the curves in the figure could be at all sorts of levels depending on circumstances, resulting in the optimal risk level being anywhere in the graph. Specifically, the framework breaks down four basic scenarios, with relative position illustrated in Figure 2:

- SPF 45: High KM Risk/High CI Risk
- SPF 15: High KM Risk/Low CI Risk
- SPF 30: Low KM Risk/High CI Risk
- SPF 5: Low KM Risk/Low CI Risk

Based on a dataset we have developed, numerical divisions/cutoffs are illustrated for the respective risk levels. We'll explain the basis of these shortly. But to first cover the strategic protection factor (SPF) levels, the conceptual basis is as follows, including KM factors identified in the literature such as type of intellectual capital (Stewart 1997) and knowledge characteristics (Zander & Kogut 1995):

- **SPF 45** poses a situation where both KM and CI risk are high. Firms that don't invest heavily in knowledge management will likely be left behind by competitors who do and who more productively employ their knowledge assets. On the other hand, the same knowledge assets are very attractive to competitors, who pursue them aggressively. The knowledge itself is likely to be explicit, easily shared both within and without the firm, and easily lifted by the competition. Firms must simultaneously develop IC in an aggressive manner while also taking careful steps to protect it.
- **SPF 30** includes low KM risk but high CI risk. Knowledge development may have little impact, whether because the nature of the knowledge is tacit and not easily transferred, because it is specific to the original application, or some other circumstance. But competitive intelligence risk is high because once the results of the application of knowledge are uncovered, they are easy to copy. This may sound counterintuitive, but it fits situations where there is a creative spark of innovation (hard to duplicate by others within the organization) but where that innovation can be quickly copied once incorporated into a product. Innovative investment strategies, for example, may be hard to create but are easily duplicated once competitors figure them out.
- **SPF 15** indicates high KM risk and low CI risk. Knowledge assets need to be developed aggressively. But once developed, they are hard for competitors to co-opt. Typically, there is some other barrier to competitors copying the originating firm, even if they possess similar knowledge. Wal-Mart, for example, shares its supply chain knowledge, information, and data throughout the firm and with key suppliers. Firms looking to compete with them must try to do the same or they will be at a tremendous knowledge disadvantage (as most are). There is no secret in much of what Wal-Mart does. But the strategy is hard to copy without Wal-Mart's strong brand, close relationships with partners, and massive, expensive information technology systems.
- **SPF 5** suggests low risks on both fronts, KM and CI. Knowledge assets are difficult to develop and share. They are also difficult for competitors to make much use of, even if they do uncover them. Given KM basics, these knowledge assets are likely highly tacit and specific to their original uses, thus hard to communicate and apply in different situations.

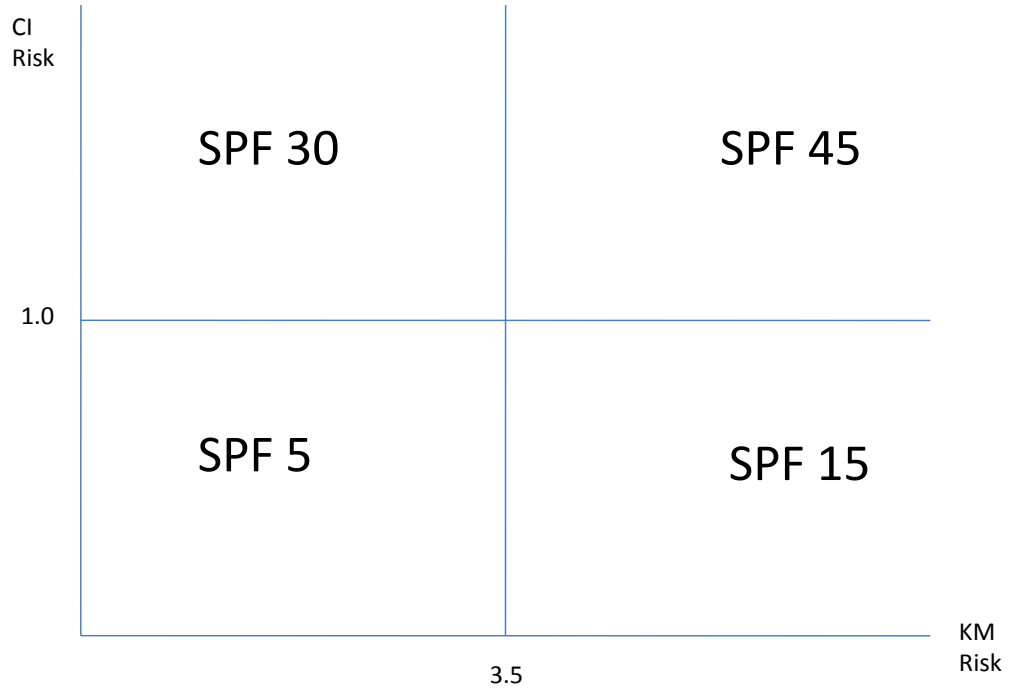

Figure 2: SPF Relationship to KM risk and CI risk

The original development of the SPF framework provides conceptual, intuitive support for these categorizations (Rothberg & Erickson 2005). Recent work has moved on to more empirical backing (Erickson & Rothberg (2009b) reports on data related to SPF 45), as is the case with this paper. Here, we look specifically at industries and firms falling into the SPF 5 category. We suggested earlier that knowledge development might be a more strategic decision than is often recognized. In SPF 5, there is little KM risk, so there is likely little reward for aggressively developing IC, little to be gained from investing in substantial IT systems for managing knowledge, and little to be gained from trying to share knowledge throughout an e-network of collaborators. A full-speed ahead approach to KM initiatives, the default assumption of the field, is likely to be disappointing and a waste of resources. On the other hand, there is little point in working hard to protect knowledge assets either, as competitors will probably have just as hard a time trying to apply them in different circumstances. If we can help practicing managers identify the circumstances characterizing SPF 5, it can aid them in better managing the balance between knowledge management and knowledge protection. If they can determine conditions when KM investment is pointless or where knowledge protection is unnecessary, that is a good thing in terms of strategy and of allocating resources effectively.

In measuring the two risk levels, there are techniques available in the literature. For IC assessment, a variety of tools exist. Many are bottom-up approaches, looking to individually measure the components of intellectual capital, usually human capital, structural capital, and relational capital. While useful in the right kind of study, this type of analysis begs for a broader measure, one that can be used across a large number of firms at an aggregate level. Numerous possibilities are available, including Tobin's q (Tan, Plowman & Hancock 2007). Here, we use a variation on Tobin's q as it is a metric with a long history and robust characteristics. We calculated the ratio of market capitalization to physical assets, a common measure of intangible assets which can also be taken as a rough measure of intellectual capital. We did this for a large sample of firms, comprised of the Fortune 500 and a number of other firms drawn from our second metric, the SCIP membership database. SCIP is the Society for Competitive Intelligence Professionals. The membership, by firm and by industry average, is a rough indicator of competitive intelligence activity. A couple SCIP members can be indicative of substantial CI differences as higher level SCIP members often supervise a sizable staff (who are not members). The database consists of almost 600 firms, including the financial figures necessary for Tobin's q and SCIP membership levels. The database covers the years 1993-1996, providing a perspective on practice at the time (and enough time passed to allow SCIP to share its membership lists). For the two categories, the respective average for the database ran around 3.5 for Tobin's q (a ratio of market capitalization to physical assets of 3.5) and 1.0 for average SCIP membership. This provided an easy and natural place to divide the four SPF categories, though this is a first pass and adjustments could be made in the future based on additional analysis.

3. Results

Tables 1, 2, and 3 present the industries and firms in the database falling into SPF 5, with KM Risk (Tobin's q) under 3.5 and CI Risk (SCIP membership) under 1.0. We included only industries with at least three representative firms so no single firm could overly skew the industry rating (though in cleaning the data, a couple of firms were dropped, resulting in some smaller industry numbers). Industries are identified by 2 or 3-digit SIC number, depending on common characteristics and number of apparently similar firms. We split the results into three tables to make them easier to view in the this paper. Industries are arranged according to level of KM Risk, from high to low.

Table 1: SPF 5 Industries and Firms, KM Risk > 2.50

Industry (firms)	KM Risk	KM Risk Range	CI Risk	CI Risk Range
26: Paper & Allied Products	3.24	14.10	0.98	2.25
Champion International	**1.04**		**0.75**	
Chesapeake	**1.82**		**0.00**	
Westvaco	**1.34**		**1.50**	
Weyerheuser	**2.10**		**2.00**	
Sunoco Products	**2.78**		**0.25**	
WR Grace	**2.04**		**1.75**	
Avery Dennison	**3.90**		**2.00**	
Nashua	**1.33**		**0.75**	
Union Camp	**1.75**		**0.25**	
James River	**1.02**		**2.25**	
Kimberly Clark	**4.66**		**0.00**	

Tambrands	**15.12**		**0.25**	
Industry (firms)	KM Risk	KM Risk Range	CI Risk	CI Risk Range
362-5: Appliances, Electronics	3.11	7.66	0.59	1.75
Emerson Electronic	**3.84**		**1.00**	
Eaton	**2.13**		**0.75**	
Ault	**1.11**		**0.00**	
Whirlpool	**2.20**		**1.75**	
General Electric	**3.87**		**0.50**	
AMP	**3.51**		**0.25**	
Hubbell	**0.55**		**0.75**	
Lamson & Sessions	**4.42**		**0.00**	
Thomas Industries	**1.27**		**0.00**	
Sony	**8.21**		**0.50**	
358-9: Refrigeration, Industrial Parts	2.70	1.53	0.63	0.75
Tennant	**2.47**		**1.00**	
Applied Power	**3.65**		**0.25**	
Parker Hannifan	**2.12**		**1.00**	
Flow International	**2.55**		**0.25**	
29: Petroleum Refining	2.53	3.06	0.63	1.25
Amoco	**2.28**		**1.25**	
DuPont	**3.71**		**0.50**	
Mapco	**2.88**		**0.25**	
Mobil	**2.21**		**1.25**	
Pennzoil	**2.49**		**1.25**	
Petro Canada	**0.65**		**0.75**	
Phillips	**2.99**		**0.25**	
Tosco	**3.10**		**0.00**	
Unocal	**2.49**		**0.75**	
Lubrizol	**2.45**		**0.00**	
50: Wholesale: Durables	2.51	2.67	0.35	0.50
Compucon Systems	**3.18**		**0.25**	
Tech Data	**3.60**		**0.00**	
Avnet	**1.64**		**0.50**	
WW Granger	**3.18**		**0.50**	
Kaman	**0.93**		**0.50**	

Table 2: SPF 5 industries and firms, 2.00—2.50

Industry (firms)	KM Risk	KM Risk Range	CI Risk	CI Risk Range
632: Accident, Health Insurance	2.48	2.30	0.88	1.25
AFLAC	**2.43**		**1.50**	
Cigna	**1.13**		**1.50**	
Pacific Health Care	**3.43**		**0.25**	
Physicians Health Care	**2.94**		**0.25**	
22: Textile Mill Production	2.33	1.65	0.92	1.50
Albany International	**2.29**		**0.00**	
Sara Lee	**3.18**		**1.50**	
Dexter	**1.53**		**0.00**	
51: Wholesale: NonDurables	2.28	2.14	0.52	1.25
Bergen Brunwig	**2.27**		**0.50**	
Chronmed	**3.65**		**0.00**	
Moore Medical	**1.70**		**0.25**	
Supervalu	**1.51**		**1.25**	
871: Engineering, Architecture	2.24	1.87	0.65	0.50
Comarco	**3.24**		**0.75**	
Jacobs Engineering	**3.18**		**1.00**	
National Technical Systems	**1.37**		**0.50**	
Stone & Webster	**1.19**		**0.50**	

Table 3: SPF 5 industries and firms, <2.00

Industry (firms)	KM Risk	KM Risk Range	CI Risk	CI Risk Range
24: Lumber & Wood Products **MacMillan Bloedel** **Georgia Pacific** **Fleetwood Enterprises**	1.74 **0.87** **2.47** **1.86**	1.60	0.50 **0.25** **1.00** **0.25**	0.75
671: Holding Offices **Banc One** **Bankers Trust** **Chase Manhattan** **Chemical Bank** **Citicorp** **Comerica** **Corestates Financial** **First Chicago** **First Commerce** **First Security** **First Union** **Fleet Financial** **JP Morgan** **Mellon Bank** **Nationsbank** **NBD Bancorp** **PNC Bank**	1.71 **2.78** **1.44** **0.80** **0.80** **1.93** **1.97** **3.38** **0.85** **1.69** **1.83** **1.80** **1.64** **1.60** **1.79** **1.73** **1.19** **1.91**	2.58	0.81 **0.75** **1.00** **1.00** **0.50** **0.50** **0.75** **1.00** **0.75** **0.25** **0.75** **1.25** **0.50** **0.00** **0.75** **1.25** **1.50** **1.25**	1.50
33: Primary Metal Industries **LTV** **Weirton Steel** **Phelps Dodge** **Alcan** **Alcoa** **Reynolds Metals** **Brush Wellman** **Kennametal**	1.70 **1.26** **3.06** **1.73** **0.92** **1.63** **1.54** **1.54** **1.95**	3.14	0.91 **0.25** **1.25** **1.50** **1.25** **0.75** **2.00** **0.25** **0.00**	2.00
72: Personal Services **Angelica** **Healthcare Services Group** **Unifirst**	1.64 **1.16** **1.40** **2.37**	1.21	0.83 **0.50** **1.00** **1.00**	0.50
45: Air Transportation **Continental Airlines** **KLM Royal Dutch Airlines** **FedEx**	1.37 **1.53** **0.61** **1.96**	1.35	0.25 **0.00** **0.00** **0.75**	0.75
40: Railroad Transportation **Canadian Pacific** **Norfolk Southern**	1.02 **0.42** **1.62**	1.20	0.63 **0.75** **0.50**	0.25

These data are also presented graphically, in Figure 3 , illustrating their position in the southwest quadrant from Figure 2.

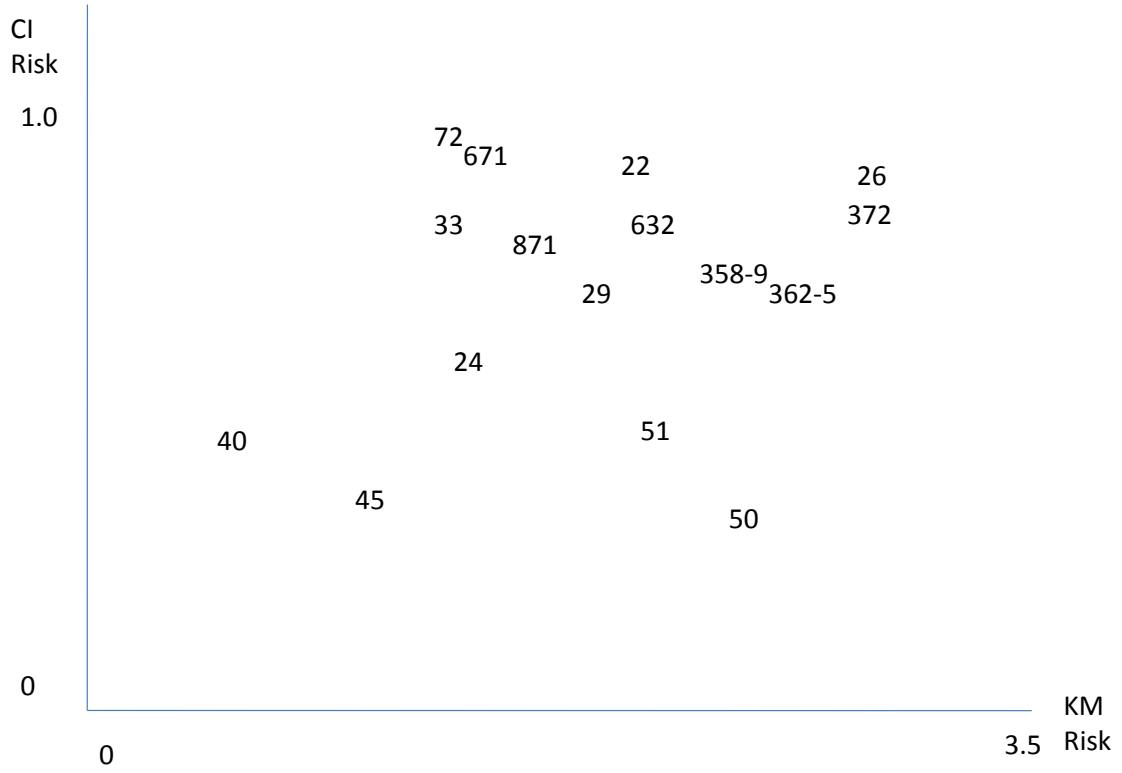

Figure 3: SPF 5 Industries

4. Discussion

So what can we say about the results? Initially, even within the category we have termed SPF 5, there is great variety both across and within industries. Industries at the top of the KM Risk measure, such as paper (3.24) and electronics and appliances (3.11) clearly have at least some firms for whom knowledge development is of some importance. Not the same level as in some other industries (pharmaceuticals, for example, has a average ratio of 5.54 by this measure), but KM initiatives should not be totally ignored. At the bottom, however, are industries in which there is apparently very little new under the sun, such as air transportation (1.37) and railroads (1.02). While the Tobin's q measure will be affected by industries with substantial physical capital, as that measure makes up the denominator, these results suggest that there is very little in these industries of value from a knowledge perspective. The companies, throughout the industry, are worth very little beyond their physical assets.

There are differences in the CI Risk measure as well, though not as pronounced. But some industries show very little interest in what competitors are doing (air transportation, 0.25; wholesaling, durables, 0.35) while others are a bit more curious (paper, 0.98; textiles, 0.92) though again not rising to levels we see in higher SPF industries. Though the level varies, there is generally not much interest in investing in a competitive intelligence operation (or a need to defend against one).

But SIC categories can also hide differences between firms essentially in the same industry (and some firms prove difficult to assign to a single SIC when they span many businesses). Even though all the paper firms fall into SIC 26, for example, Tambrands and even Kimberly Clark are in very different businesses than firms like Westvaco and Union Camp. They also have very different competitors, facing up against Procter & Gamble, for example, rather than the other firms within the SIC designation. Even ignoring such differences, however, there are marked variations in both KM and CI level within industries.

One of the key things we believe our strategic focus and methodology add to KM theory is a way for practicing managers to assess their situation vis a vis KM and CI. Going back to the paper industry, if one looks just at firms that focus on basic paper products, there are still differences. And if one is competing in that in that industry, it's important to note the relative KM success of an Avery Dennison (3.90) vs.

James River (1.02). Avery Dennison has developed knowledge assets to some degree. To compete effectively with them, another paper firm may need to up its game in terms of KM systems, even if it doesn't warrant the resources necessary in other industries. The SPF approach clarifies what is standard for an industry, what is outstanding performance, and what is lagging. It demonstrates that superior performance is found in a ratio of 3-4 while something in the area of 2 is competitive with most other firms. Similar judgments can be made about industry averages and necessary investment in CI operations.

Are there any similarities that allow us to explain why these industries and firms are in the SPF 5 category? What it appears we have here are a number of old-line industries where there is apparently little new knowledge of value. Our assumptions coming into this analysis were that industries in this category would probably revolve around individual creativity, genius, or craftsmanship that would be difficult to duplicate (hence no need to capture and share throughout the organization). That really isn't seen in the data, though the firms that compete on such a basis may not be of such a size to fall into our database.

Rather, what we see are old-line manufacturing or processing industries, often based on natural resources. In addition, we see basic services such as wholesaling, insurance, and engineering wherein little is hidden and there is little of real value added through what we consider typical knowledge assets (improving proprietary processes and such). The basics are the basics, and individual contributions through learning or innovation are muted. And if knowledge isn't overly valuable for the originating firm, there is little value for competitors either.

These ideas square well with previous theory concerning KM and CI. The conceptual basis of the SPF framework suggested that environmental factors on the national, industry, and firm level could affect a firm's need to develop and protect knowledge assets (Rothberg & Erickson 2005). At the national level, for example, regulation can impact the circumstances under which knowledge is employed. Here, there are a number of regulated industries (transportation, natural resources, financial services) that may not have incentives to innovate or find new processes. Or regulation may require or encourage sharing of knowledge across industries, again affecting if and how knowledge is developed or protected.

Similarly, factors at the industry level such as industry life cycle stage (just about every industry in this study is quite mature) or degree of competitive rivalry could make a difference. The nature of the knowledge employed in the industry (tacit or explicit, complex or not, specific/sticky or not) can also have an effect. Generally, knowledge that is tacit, complex, and sticky is harder to develop but not particularly hard to protect, though whether that is what is going on in this case would require deeper analysis and more data.

As noted earlier in this paper, the point of this type of analysis is precisely to identify when the circumstances are right to pursue knowledge development and when not. To identify when aggressive competitive intelligence is appropriate as well as robust CI defences. While these measures are not yet developed enough to trust at the margins, the results are robust enough provide compelling guidance at the extremes. Those industries and firms with markedly low KM risk and CI risk numbers clearly have little knowledge of value about them and should take care in devoting assets to knowledge initiatives.

5. Conclusions

Our intention is to continue to develop this analysis, with different parts of the framework and with ever more in-depth data. Initial results are promising in terms of identifying high-risk industries and firms and low-risk industries and firms, in all areas. As we continue this work, we continue to gain a better understanding of the circumstances within which knowledge assets are managed.

With such an understanding, management of IC can become more strategic. By knowing conditions n their industry, managers can gauge the opportunities and threats present in decisions regarding investment in KM systems, including both development and protection. As a result, KM can be pursued aggressively when circumstances call for it. Alternatively, when investment may do little good, managers can forgo both the expense and disappointment of unwise pursuit of knowledge development.

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