



Balancing Knowledge Management and Competitive Intelligence, Initial Insights

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ABSTRACT: This paper reports on a large-scale study of how industries balance knowledge development with knowledge protection. In particular, we look at specific industries and the competitive imperatives to increase knowledge assets (or not) and to conduct competitive intelligence activities (or not). This analysis is based on our previously established SPF framework, though we have developed new measures and a new database that more reliably establish industry conditions. The paper explains the different results seen in different industries by examining four markedly different SPF environments. Based on these different environments, we can begin to explore some of the possible explanations for the differences (characteristics of relevant knowledge, Value Chain insights, life cycle stage, etc.).

KEYWORDS: Competitive intelligence, intellectual capital, knowledge management, strategy, SPF framework

1. Background

The intersection of knowledge management (KM) and competitive intelligence (CI) is an area ripe for exploration. In the past few years, we have firmly established that different conditions exist concerning the need or wisdom to aggressively pursue knowledge management and the growth of a firm's intellectual capital (IC), especially when different conditions exist concerning the need to protect knowledge assets from competitive incursion. We developed a framework for examining these different conditions some years ago and have attached data to the framework in a piecemeal manner in more recent work.

We have even more recently constructed a new, full

data set classifying firms by the imperative of knowledge management development in their industry (standard IC levels of the industry, presumably what is necessary to compete) and by the level of competitive intelligence activity in their industry (representing the competitive threat to their IC). With this database, we are able to classify firms according to these conditions, providing guidance to managers about appropriate levels of investment in KM development and protection. More to the point of this paper, we are also able to analyze the database in more detail, with the aim of uncovering the specific variables that might give even more insight into when a firm should pursue aggressive knowledge development (or not) and when it should pursue CI activities or counterintelligence (or not). These results can be classified into four broad categories, the SPF

Framework, we have developed (Rothberg & Erickson 2005). These categories are based on relative high/low values of required IC and relative high/low threats due to CI activity.

A full overview of the database will be available soon (Erickson & Rothberg 2012). In this paper, we present some instructive examples of firms and industries illustrating the key combinations of circumstances that can be instructive to both scholars and practitioners.

2. Literature review

Our full database is founded on the idea that knowledge assets can confer competitive advantage, but the nature and value of that competitive advantage can vary by circumstances. This conceptual basis is strongly established in the literature, albeit in diverse disciplines.

Knowledge management (KM) and intellectual capital (IC) are related concepts concerning the store of knowledge assets within an organization. IC is the stock concept, referring to the amount of knowledge in the organization, something beyond simple data or information (Zack 1999b; Zander & Kogut 1995). KM refers to attempts to better manage these knowledge assets, distributing them, growing them, or otherwise better identifying and applying them.

Interest exists in these fields because more and more scholars and practitioners are seeing them as potential sources of competitive advantage. While the view of knowledge as a competitive weapon has been with us for a long time (Schumpeter 1934), it has grown in sophistication and detail in the past couple of decades. Penrose (1959) had discussed the value of an organization's knowledge stock. Nelson & Winter (1982) extended the thought with the concept of knowledge flows leading to knowledge growth and superior performance. Better management of intangibles or organizational knowledge, then, would be a path to competitive advantage (Winter 1987). This view fits in well with the resource-based view of the firm, with knowledge as the key organizational resource. From that perspective, knowledge becomes a unique, defensible competitive differentiator (DeCarolis & Deeds 1999, Grant 1996, Gupta & Govindarajan 2000a, Zack 1999a).

As a result, the aspects of measuring and managing knowledge drew interest. Once again, the distinction between stocks and flows (Dierickx & Cool 1989) was important, with the idea that the identified stocks could be managed more strategically, adding to the flow of knowledge to the organization (Teece 1998). Techniques such as

the Balanced Scorecard (Kaplan & Norton 1992) helped to measure the knowledge assets more precisely while methods to better manage them also developed apace (Davenport & Prusak 1997, Edvinsson & Malone 1997, Stewart 1997).

To better understand the nature of these knowledge assets, researchers also worked on classifications, with the idea that different types of assets may have different impacts and may need to be managed differently. Within the field, the categories of human capital, structural capital, and relational capital (Bontis 1999, Edvinsson & Sullivan 1997) became standard. Human capital is about job-related knowledge, structural capital about persistent organizational knowledge assets such as corporate culture or organizational form, and relational capital about knowledge concerning external parties (customers, partners, regulators, etc.). Competitive capital, knowledge about competitors, is also discussed in some variations (Rothberg & Erickson 2002).

A second, but equally important distinction between knowledge assets related to explicitness. Tacit knowledge was described as more personal, harder to explain, codify, or transmit while explicit knowledge is codifiable and sharable (Polanyi 1967). Which of these a piece of knowledge is and will become is critical to how it is managed (Nonaka & Takeuchi 1995). Explicit knowledge lends itself to information technology applications while tacit knowledge typically involves more personal tools such as communities of practice (Boisot 1995, Choi & Lee 2003, Schulz & Jobe 2001).

Based on this foundation, the fields of KM and IC have largely focused on in-depth empirical analyses of specific firms or small groups of firms. These have included studies of best practices (Davenport, DeLong & Beers 1998, Gupta & Govindarajan 2000b, Hansen, Nohria & Tierney 1999, Zack 1999b) or bottom-up measurements of knowledge assets, including individual components such as human capital (Mouritsen, Larsen, & Bukh 2002). Conditional factors and their impact on KM have also been explored (Kogut & Zander 1992, Nahapiet & Ghoshal 1998, Zander & Kogut 1995).

What this all amounts to is a fairly good understanding of KM at the firm level, including how it might benefit an organization competitively, how to measure knowledge assets, and how to most effectively pursue knowledge growth. In our mind, this state of affairs leaves two big holes.

Initially, there is an implicit assumption that more knowledge is always better, or at least always worth the cost to obtain or grow it. Given the scholarship

suggesting that there are variety of different types of knowledge assets and an even wider variety of variables affecting how they are developed, one could make the case that there are probably some more circumstance-based choices to be made on how to pursue KM. This idea could be taken even further when we bring in the complicating factor of competitive intelligence (CI) activity (ASIS 1999, Gilad & Herring 1996). The presence of CI makes overdevelopment of KM not only of questionable impact but potentially even dangerous, as spreading the knowledge too far can leave it vulnerable to a competitor's CI operation. There is a case to be made that the degree to which to develop knowledge assets is a strategic choice, depending on competitive conditions (Rothberg & Erickson 2005).

Consequently, firms may be well-advised to develop a more strategic approach, assessing whether and how far to develop and distribute knowledge assets. But, how can we make that choice? Surprisingly, little empirical work has been done that might shed light on this question. As noted earlier, there have been some firm-specific studies on the impact of KM installations or how individual pieces of IC impact performance. But beyond some interesting case studies (McEvily & Chakravarthy 2002), whether more and better KM actually makes a difference in financial performance is one of the great unanswered questions of the discipline. And the obvious related question is whether the impact of KM will vary by circumstances, given differences in an industry or in a specific firm.

3. Strategy and knowledge assets

This paper reports on the preliminary results of a major study to address this question. Financial data on thousands of firms was collected and analyzed, specifically looking at a variation of Tobin's q (Tobin & Brainard 1977) to assess the level of knowledge assets in companies. In this case, we used market capitalization to assets (rather than replacement cost of assets) to get a sense of the value of intangible assets in each organization. These data were paired with data from a proprietary benchmarking study from CI consulting firm Fuld & Company. The Fuld & Company data indicated the level of CI activity in individual firms and, by extension, within specific industries. The level and frequency of CI operations in each industry provide a sense of the aggressiveness of CI in those industries.

Based on these data, we were able to organize industries into broad classifications regarding the necessity of aggressive knowledge development in order to compete (high-knowledge industries) vs.

the necessity to protect knowledge (high-competitive intelligence industries) (Erickson & Rothberg 2012). One might expect that these classifications would match up, with knowledge valued highly by both originator and competitor (or not). We have not found this to be the case. The conceptual foundations of other potential combinations (high knowledge development, low competitive intelligence and vice versa) were established some years ago (Rothberg & Erickson 2005) and have been fleshed out over time, including in this new study.

In the original work, we termed this the SPF framework, with the following characteristics defining the four basic categories. In this short paper, we don't have the space to fully flesh out the conceptual details or all the reasoning behind them, but the basic structure breaks down as:

- SPF 45: High knowledge development priority, high competitive intelligence activity. Knowledge is highly valued by both the originator and its competitors.
- SPF 30: Low knowledge development priority, high competitive intelligence activity. Knowledge development is difficult or unimportant for the originator but of considerable interest to its competitors.
- SPF 15: High knowledge development priority, low competitive intelligence activity. Knowledge is highly valued by the originator but of little interest to competitors.
- SPF 5: Low knowledge development priority, low competitive intelligence activity. Knowledge has little value to either originator or its competitors.

These pose very different circumstances for managing knowledge, and decision-makers would be well-advised to make note of their environment and develop and/or protect accordingly. To help us better understand these different scenarios and also to help practitioners with understanding what contributes to a firm/industry finding itself in its particular set of circumstances, we looked at what characteristics are common to industries in the same group and which are different across groups. These results are described more widely elsewhere (Erickson & Rothberg 2012).

Here, we look at illustrative industries from each group. With a concrete example in place, it's easier to see how and why the industry finds itself classified the way it is, as well as what

characteristics might be typical of industries and firms that are in its group, as opposed to others. The results are interesting in terms of providing insights into the different circumstances that face KM practitioners as we look to provide them with a more strategic approach to shepherding knowledge assets.

4. Results

As noted, the SPF Framework broadly categorizes industries and firms by the knowledge development and competitive intelligence variables noted above. The groups' categories include:

- SPF 45 (high KM, high CI)
- SPF 30 (low KM, high CI)
- SPF 15 (high KM, low CI)
- SPF5 (low KM, low CI)

Table 1 presents illustrative industries falling into each group, along with descriptive metrics concerning knowledge development and competitive intelligence activities. Substantial differences are clear across the categories, and we'll further develop these and other characteristics of each group in the following discussion.

Table 1: SPF categorization and characteristics

	Cap/Book	Cap/Assets	Revenue/Assets (asset value in millions of dollars)	Comp Intel
SPF 45: Diagnostic/Biological Products (n = 53, 14 firms)	4.37	2.41	0.71 (\$8,443)	6 firms
SPF 30: Life Insurance (n = 41, 22 firms)	1.12	0.11	0.13 (\$147,888)	7 firms
SPF 15: Freight Transportation (n = 32, 7 firms)	4.28	2.29	2.83 (\$1,277)	0 firms
SPF 5: Paperboard (n = 29, 7 firms)	1.48	0.28	0.88 (\$6,227)	0 firms

SPF 45 (high KM/high CI) is represented by SIC 2835/6 Diagnostic and Biological Products, including firms such as Genzyme and Amgen. According to the measures we applied, this group has a high level of knowledge assets, with a cap/asset ratio of 2.41, well above the average of 1.02 for the entire data set. This characteristic is confirmed by the cap/book value ratio of 4.37, which is similarly high above the universal average of 2.68. These types of firms have valuable intangible assets that make them worth much more than the value of their physical assets, so knowledge is important in this industry and presumably critical to being competitive. Given the high relatively level of physical assets (\$8 billion per firm, on average, as represented in the table), the high ratio value is especially indicative of the importance of knowledge assets. Even from a sizable tangible asset base, the ratio of intangible assets is quite high.

The industry also has a high level of competitive intelligence activity, with 6 different firms in our database reporting some level of CI operation, with the majority possessing a fairly advanced capability. Firms competing in this industry face quite a number of seasoned CI groups arrayed

against them, all interested in acquiring other firms' knowledge assets.

Other features of this group that we notice here and in our wider database are complex operations, a wide variety of types of knowledge, multiple Value Chain activities requiring a high level of knowledge, and early maturity in the life cycle with evidence of continued innovation. While the wider database includes both manufacturing and service operations for both business-to-consumer (B2C) and business-to-business (B2B) purposes, what all have in common are complex operational processes, as is the case with this industry. Biological products, in particular have a very tricky, complicated operation with lots of variables affecting the success and the quality of the output. Most of the products and processes are regulated and so require processes to be described and approved by the Food & Drug Administration. Companies work to perfect their processes before filing the version they will then be required to follow. Knowledge here, although complex, is not specific and can often be employed elsewhere by the originating firm (or by an acquiring CI operation).

Explicit and tacit knowledge are both visible here. While some innovation and production processes may become explicit, there are also softer knowledge assets such as customer relationships (with retailers, insurers, and doctors), regulatory relationships (with the FDA), and treatment-specific competencies. Similarly, and as the previous list suggests, there are a variety of types of knowledge asset, including human, structural, and relational. The examples also illustrate how the knowledge assets are distributed throughout the Value Chain, from operations to distribution to marketing and sales, interacting at several points with support activities, particularly technology development, infrastructure, and human resources.

And while all the firms in our database are of a certain size (annual sales over \$1 billion) and so almost certainly in the maturity stage of the life cycle, firms in this industry seem to be clearly at an early stage, as growth is still possible, especially in specific treatment categories. Innovation is also extremely important, with extensive investment in R&D and new product development.

SPF 30 (low KM, high CI), on the other hand, has a similar level of aggressive CI activity but a far lower KM score. In this case, we use the example of SIC 6311 Life Insurance. Here, the CI activity is similar to what we saw in the previous case, with seven different firms reporting CI operations and almost all of those at an advanced level. CI is aggressive and notable. The knowledge score, on the other hand, is much lower. Here, the main cap/asset ratio we used to construct and analyze the database is only 0.11 (again versus a universal average of 1.02). The cap/book ratio is 1.12, also well below the database average of 2.68. Given the unique circumstances of this industry, that latter value is particularly important here, as financial services companies typically have a tremendous amount of financial assets, a fact that would tend to depress the ratio as that large value would be in the denominator when looking at cap/asset. But if we use cap/book, the biasing factor is less extreme. Most of these financial assets will be borrowed, and so with cap/book (book corresponds to assets less liabilities), that comes into play and essentially tamps down that high level of assets with borrowed assets cancelling out much of the total assets. So the fact that both measures agree that this industry has low knowledge assets is important. Knowledge is less critical to success in this industry and so aggressive knowledge development is a questionable strategy.

As would be expected, this group has enormous assets compared to others, but, again, these are usually financial assets rather than physical. In line with that, more industries in SPF 30 are services

than in SPF 45, and what manufacturing we see in SPF 30 is usually less complex. Knowledge is often explicit, with occasional tacit insights (which may be important but hard to engineer or copy), complex, but specific to particular purposes (though not necessarily specific to the originating firm). Intellectual capital of all types is present but at lower levels, and knowledge is apparent all along the Value Chain, but is not as ubiquitous—rather than appearing in many places for a single firm, it is here and there, in a more spotty manner. Insurance companies, for example, do create new products or approaches, but they are usually incrementally different, not dramatic innovations. Specific competencies in areas like marketing/sales, underwriting, claims processing, or other areas make differences for firms, but only at the margins. Much of what these firms do is similar. Those differences at the margins, however, the tacit insights that drive new approaches, are exactly what attract the interest of competitors. Difficult for the originating firm to invent, but often rapidly copied once introduced.

As would be expected, this industry is considerably more mature than what we saw with the diagnostic/biological group. Products are more commoditized, market shares more stable, and innovation more measured. There is little new under the sun, but what there is tends to be taken up quickly by competitors.

SPF 15 (high KM, low CI) is back to a high value placed on knowledge assets but now with minimal or non-existent competitive intelligence activity. The example industry here is SIC 4731 Freight Transport. The cap/asset ratio is 2.29 (far above the 1.02 average) and cap/book ratio is 4.28 (above 2.68). Physical assets are often at lower levels. Competitive intelligence activity is low. In the freight industry, there is no evidence of any CI, as none was reported by any firms in that classification. Knowledge is valuable but competitors seem to have little interest in aggressively pursuing it. Part of that may be because the valuable knowledge is right out in the open and takes no effort to procure from a competitor. But our evidence suggests other things going on as well, such as some other complication that may make it difficult for a competitor to use the knowledge in the same way.

What we see in this category are industries with complex operations, including manufacturing, natural resources, or services such as retail. Knowledge is often explicit though once again with tacit insights, complex, and specific to the originating firm. All types of intellectual capital are present, human, structural, and relational. Along the Value Chain, valuable knowledge can be found

almost anywhere but is really concentrated in processes and logistics. Industries are well into the maturity stage of the life cycle, to the degree that many of these industries, consolidation has driven competition down to a couple of large firms surrounded by a variety of smaller niche players. When the dominant firms do uncover new knowledge insights, others may have trouble copying them because of a lack of similar scale, lack of an installed base, or other blockers such as strong brands or distribution agreements. With freight transport, we have extremely complex processes involved in scheduling equipment, logistics, and moving freight from point A to point B. Providers have established relationships with customers, regulators, facilities operators (e.g. ports, distribution centers), and others that are both difficult to break into and difficult to duplicate. Providers also tend to specialize in particular products or geographical areas. Companies find ways to develop new knowledge and improve, but that knowledge is often specific to their circumstances and so of little interest to competitors, even if out in the open.

SPF 5 (low KM, low CI) includes industries where knowledge appears to have little value for either originators or their competitors. SIC 263 Paperboard is the illustrative industry here. This industry has a cap/asset ratio of only 0.28 (versus the overall 1.02 average) and cap/book ratio of 1.48 (2.68 overall average). Assets are a little heavy, as each of these manufacturers likely owns forests full of raw materials, but are near the full dataset average and not nearly as potentially biasing as those of financial services firms. There is no reported CI activity in this industry.

Industries in SPF 5 are heavily skewed toward services, especially distribution and transmission. Knowledge is highly explicit but often not proprietary, so an established base of knowledge is shared throughout these industries. Complexity is limited and knowledge is not particularly specific. Intellectual capital types vary but there is little of importance except perhaps structural capital (which, again, is universally known). Knowledge in these industries is present in the Value Chain primarily in processes and logistics. Industries are in late maturity, with established processes and competitors filling established roles. There is little new or innovative and very little valuable proprietary knowledge.

Paperboard manufacturers are in a late maturity industry. The technology behind making cardboard packaging materials is well-known and present throughout the industry. Any new innovations, such as incorporating more recycled content into some products, is easily copied by competitors with

minimal effort. There's just very little new in this industry, very little of value to be discovered (apparently), and very little to pursue from competitors, as reflected in the data.

5. Conclusions

This paper reports on a small piece of a larger study looking at the conditions under which firms develop and protect knowledge assets. Based on the idea that knowledge management is a more strategic activity than is commonly recognized, the larger product looks to classify industries and firms according to industry practices and data reflecting the importance of knowledge assets when compared to competitive intelligence threats. Based on the larger data set, we reported on four examples that illustrate the usefulness of the approach in several ways. Initially, just the basic data used to identify these industries shows the considerable differences between industries putting a high value on knowledge (ratios of 2.41 and 2.29 according to our metric) and those with lower values (0.11 and 0.28). These are, on the face, clearly different situations for managing knowledge. Similarly, there are industries with aggressive competitive intelligence activity (numerous firms with high-level operations), posing a threat to proprietary knowledge assets, and others with no apparent CI. Again, these are clearly quite different circumstances.

With this framework, we use this opportunity to try to describe more specifically what the tendencies are in each of the selected classifications of knowledge competition. By looking at asset levels, types of industries (manufacturing or service), types and characteristics of knowledge, critical Value Chain activities, and life cycle stage, we can start to get a read on circumstances and appropriate managerial responses. With a better understanding of all these facets, we can offer more guidance to practitioners on when and how to aggressively pursue knowledge assets as well as when and how to protect the same.

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References

- American Society for Industrial Security (ASIS)/PricewaterhouseCoopers. (1999) *Trends in Proprietary Information Loss*, ASIS, Alexandria, VA.
- Boisot, M. (1995) Is four firm a creative destroyer? Competitive learning and knowledge flows in the technological strategies of firms. *Research Policy*, 24, 489-506.

- Bontis, N. (1999) Managing organizational knowledge by diagnosing intellectual capital: framing and advancing the state of the field. *International Journal of Technology Management*, 18 (5-8), 433-462.
- Choi, B. & Lee, H. (2003) An empirical investigation of KM styles and their effect on corporate performance. *Information & Management*, 40, 403-417.
- Davenport, T.H., DeLong, D.W. & Beers, M.C. (1998) Successful knowledge management projects. *Sloan Management Review*, (Winter), 43-57.
- Davenport, T.H. & Prusak, L. (1997) *Working Knowledge: How Organizations Manage What They Know*. Harvard Business School Press: Boston, MA.
- DeCarolis, D.M. & Deeds, D.L. (1999) The impact of stocks and flows of organizational knowledge on firm performance: an empirical investigation of the biotechnology industry. *Strategic Management Journal*, 20, 953-968.
- Dierickx, I. & Cool, K. (1989) Asset stock accumulation and sustainability of competitive advantage. *Management Science*, 35, 1504-1514.
- Edvinsson, L. & Malone, M. (1997) *Intellectual Capital*. Harper Business: New York.
- Edvinsson, L. & Sullivan, P. (1996) Developing a model for managing intellectual capital. *European Management Journal*, 14(4), 356-364.
- Erickson, G.S. & Rothberg, H.N. (2012) *Intelligence in Action: Strategically Managing Knowledge Assets*. Palgrave Macmillan: London.
- Gilad, B. & Herring, J., eds. (1996) *The Art and Science of Business Intelligence*. JAI Press: Greenwich, CT.
- Grant, R.M. (1996) Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17(Winter), 109-122.
- Gupta, A.K. & Govindarajan, V. (2000a) Knowledge flows within multinational corporations. *Strategic Management Journal*, 21, 473-496.
- Gupta, A.K. & Govindarajan, V. (2000b) Knowledge management's social dimension: lessons from Nucor steel. *Sloan Management Review*, (Fall), 71-80.
- Hansen, M.T., Nohria, N. & Tierney, T. (1999) What's your strategy for managing knowledge? *Harvard Business Review*, (March/April), 106-116.
- Kaplan, R.S. & Norton, D.P. (1992) The balanced scorecard: measures that drive performance. *Harvard Business Review*, 70(1), 71-79.
- Kogut, B. & Zander, U. (1992) Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science*, 3(3), 383-397.
- McEvily, S.K. & Chakravarthy, B. (2002) The persistence of knowledge-based advantage: an empirical test for product performance and technological knowledge. *Strategic Management Journal*, 23, 285-305.
- Mouritsen, J., Larsen, H.T. & Bukh, P.N. (2002) Understanding intellectual capital statements: designing and communicating knowledge management strategies, in *World Congress on Intellectual Capital Readings*, Bontis, N. ed., Butterworth-Heinemann: Woburn, MA.
- Nahapiet, J. & Ghoshal, S. (1998) Social capital, intellectual capital, and the organizational advantage. *Academy of Management Review*, 23(2), 242-266.
- Nelson, R.R. & Winter, S.G. (1982) *An Evolutionary Theory of Economic Change*. Belknap Press: Cambridge, MA.
- Nonaka, I. & Takeuchi, H. (1995) *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*. Oxford University Press: New York.
- Penrose, E.T. (1959) *The Theory of Growth of the Firm*. Basil Blackwell: Oxford.
- Polanyi, M. (1967) *The Tacit Dimension*. Doubleday: New York.
- Rothberg, H.N. & Erickson, G.S. (2005) *From Knowledge to Intelligence: Creating Competitive Advantage in the Next Economy*. Elsevier Butterworth-Heinemann: Woburn, MA.
- Rothberg, H.N. & Erickson, G.S. (2002) Competitive capital: a fourth pillar of intellectual capital? in *World Congress on Intellectual Capital Readings*, Bontis, N. ed., Elsevier Butterworth-Heinemann: Woburn, MA.
- Schulz, M. & Jobe, L.A. (2001) *Codification and tacitness as knowledge management strategies: an empirical exploration*. *Journal of High Technology Management Research*, 12, 139-165.
- Schumpeter, J.A. (1934) *The Theory of Economic Development*. Harvard University Press: Cambridge, MA.
- Stewart, T.A. (1997) *Intellectual Capital: The New Wealth of Organizations*. Doubleday: New York.
- Teece, D.J. (1998) Capturing value from knowledge assets: the new economy, markets for know-how, and intangible assets. *California Management Review*, 40(3), 55-79.
- Tobin, J. & Brainard, W. (1977) Asset markets and the cost of capital in *Economic Progress, Private Values, and Public Policy: Essays in Honor of William Fellner*, in Nelson, R. & Balassa, B., eds., North Holland: Amsterdam.
- Winter, S.G. (1987) Knowledge and competence as strategic assets, in *The Competitive Challenge: Strategies of Industrial Innovation and Renewal*, Teece, D.J. ed., Ballinger Publishing Co.: Cambridge, MA.
- Zack, M.H. (1999a) Developing a knowledge strategy. *California Management Review*, 41(3), 125-145.

- Zack, M.H. (1999b) Managing codified knowledge. *Sloan Management Review*, (Summer), 45-58.
- Zander, U. & Kogut, B. (1995) Knowledge and the speed of transfer and imitation of organizational capabilities: an empirical test. *Organization Science*, 6(1), 76-92.