



# Investigating the management of knowledge for competitive advantage

Investigating the management of knowledge

## A strategic cost management perspective

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Received 27 April 2005  
Revised 18 August 2005  
Accepted 27 August 2005

### Abstract

**Purpose** – The purpose of this paper is to develop and apply a framework that examines the effectiveness and efficiency of managing knowledge in organizations for competitive advantage.

**Design/methodology/approach** – Reviews knowledge management and strategic cost management literatures to identify key elements that determine and facilitate the enhancement of competitive advantage. Develops a cost-knowledge management (CKM) framework that integrates these elements and enables the analysis of how knowledge utilization in organizational activities can be made more effective and efficient.

**Findings** – The CKM framework is usefully applied to a sample of four Italian firms operating in the mechanical industry. Both the results of applying the CKM framework and the insights that are generated are discussed.

**Practical implications** – The CKM framework allows organizations to analyze the activities performed in terms of cost structure and cost drivers, value created, and knowledge utilized, the latter in terms of knowledge specificity and type. The framework can also be used to highlight specific areas of effectiveness improvements in terms of identifying which activities should be leveraged and how knowledge can be better mobilized. In addition, the framework enables an assessment of the non value added but required and waste elements of organizational activities and the specific drivers of costs in these activities, thereby enabling an identification of efficiency improvement opportunities.

**Originality/value** – This paper integrates strategic cost management and knowledge management perspectives to examine how organizations can usefully analyze and improve the effectiveness and efficiency of managing knowledge for competitive advantage. Thus far, this integration has not occurred in either literatures.

**Keywords** Competitive advantage, Knowledge management, Strategic objectives, Budgetary control, Asset valuation, Activity based costs

**Paper type** Research paper



### 1. Introduction

In developed economies, information and knowledge are seen as the principal drivers of value-creation (Pralhalad and Hamel, 1990; Zuboff, 1996), outstripping physical infrastructure and financial capital in their importance. More broadly, intellectual capital (IC) comprising human, structural and relational elements (Edvinsson and

Journal of Intellectual Capital  
Vol. 7 No. 3, 2006  
pp. 309-323  
© Emerald Group Publishing Limited  
1469-1930  
DOI 10.1108/14691930610681429

Malone, 1997; Stewart, 1997; Sveiby, 1997; Guthrie and Petty, 2000) is viewed as central to the sustenance of competitive advantage (Penrose, 1959; Barney, 1986; Spender, 1994; Collis and Montgomery, 1995). While the importance of intellectual capital has been well-established (Petty and Guthrie, 2000; Marr *et al.*, 2003; Andriessen, 2004), there has been a concern in recent times with the efficacy of IC management (Caddy, 2001; Roslender and Fincham, 2004; Cuganesan, 2005). Concurrently, a number of models have emerged which aim to make explicit the value creation consequences of intellectual capital (for example, Baum *et al.*, 2000; Lev, 2001; Fernstrom *et al.*, 2004; Marr *et al.*, 2004). How to effectively manage knowledge, which "... as a function, describes the act of managing the object, intellectual capital" (Petty and Guthrie, 2000, p.159), remains a highly topical and critical issue for investigation.

This paper contributes to the effort to improve knowledge management processes. It presents a novel perspective on the issue by adapting strategic cost management (SCM) techniques to the examination of knowledge and its organizational impacts. An analysis framework is presented that enables the identification of the main activities of an organization, the knowledge that is utilized in these activities, and the subsequent impacts on value creation. Grounded in a SCM perspective, this framework facilitates not only an understanding of how effective knowledge management is within the organization, but also identifies opportunities for efficiency improvements. As such, both strategic and knowledge management insights are provided.

The next two sections of the paper overview the role of knowledge management in conferring competitive advantage, and the SCM perspective respectively. The integrated cost-knowledge management (CKM) framework that enables the effectiveness and efficiency of knowledge activities to be analyzed is then presented in the fourth section of the paper. The application of framework is subsequently illustrated through empirical analyses of four Italian firms operating in the mechanical industry. The paper ends with a synthesis of the insights of the CKM framework and implications for future application.

## 2. Knowledge management and competitive advantage

In recent years, significant effort has been devoted to understanding and emphasizing the role of knowledge in conferring competitive advantage. Central to this is the notion of "a fundamental shift in the corporate value system, away from physical and financial assets (now commoditized) towards the creative exploitation of a nexus of intangible assets, quasi-assets and competences – mainly in the form of distinctive capabilities deriving from knowledge intangibles" (Eustace, 2003, p. 590). As noted above, knowledge management is seen as the process of managing the intellectual capital of an organization. Given, that in most cases, the economic and productive capacity of an organization "lies more in its intellectual and service capabilities than its hard assets" (Quinn, 1992, p. 241), it is increasingly recognized that the performance of any organization, private- and public-sector, is substantially dependent upon the knowledge of its employees, the application of that knowledge to the structures of the organization, and its relationships.

Within strategic management, for instance, the focus has recently been on the comprehension of "what" an organization currently knows, "what" it needs to know in order to be competitive and "how" it should align its capabilities to those ones required (Grant, 1991; Zack, 1999a). It has been argued that knowledge acquisition, integration

and dissemination needs to be a dynamic process (Teece *et al.*, 1997), and should span the boundaries of the firm (Cohen and Levinthal, 1990; Lorenzoni and Lipparini, 1999). As such, alliances, partnerships and other forms of inter-firm relationships have been prescribed as effective choices for gaining, leveraging, or developing new competencies and resources (Kogut, 1988; Westney, 1988; Hagedoorn, 1993; Mowery *et al.*, 1996). In related fashion, an information technology perspective emphasizes the development of infrastructure for a knowledge-based organization. IT applications allow firms to better capture, storage, retrieval and share documented knowledge (Zack, 1999a). Specifically organizations are implementing decision support and expert systems, database management, on line document systems repository, internet, intranet and extranet applications in order to enable managers to route, share and distribute information and codify knowledge (Zack, 1999b).

Similarly, human resource management (HRM) has emphasized the development of "strategic HRM" practices (Rodwell and Teo, 2002), given the importance of the organization's employees as "the source of innovation and renewal" (Stewart, 1997, p. 76). More broadly, the development of intellectual capital statements that measure and report on the knowledge resources and flows across the organization, thereby facilitating the management of intellectual capital, has been prescribed (Guthrie and Petty, 2000; Mouritsen *et al.*, 2003; Mouritsen, 2004). Overall, practices across a variety of management disciplines have been advocated on the basis that these enable the development and dissemination of knowledge.

In examining the role of knowledge in supporting competitive advantage across the various disciplines, the possession of unique knowledge sets is seen as determining the extent to which competitive advantage can be sustained (Barney, 1986; Prahalad and Hamel, 1990). Collis and Montgomery (1995), for example, pose several tests in assessing the impact of an organization's capabilities (and, presumably, the underling knowledge sets): is the capability hard to copy? How durable is the capability? What is the ability of the organization to retain ownership and appropriate the benefits of the capability? How easily is this capability substituted? The specificity of the knowledge possessed thus represents an important influence in the ability of the organization to achieve and maintain higher levels of performance *vis-à-vis* its peers, on the grounds of its greater potential to provide competitive differentiation and the difficulties associated with its imitation and replication elsewhere (Grant and Gregory, 1997).

In addition to being characterized as important for organizations, the problematic nature of managing knowledge for competitive advantage has also been recognized. Illustrating this, Cuganesan (2005) illustrates how one organization struggled to create economic value through the management of its IC resources and knowledge processes, largely due to the fluid nature in which IC resources transform each other and the utilization of these resources through business processes. In similar fashion, Caddy (2000, 2001) describes how IC resources can have negative value consequences, giving rise to intellectual liabilities or, alternatively, orphan knowledge if these resources are sidelined and under-utilized in organizational activities. In this, the characterization of knowledge type in terms of tacit versus explicit is informative (Polanyi, 1966; Nonaka, 1994). Tacit knowledge (Zack, 1999b, p. 46) "is subconsciously understood and applied, difficult to articulate, developed from direct experience and action, and usually shared through highly interactive conversation, story telling and shared conversation. Explicit knowledge, in contrast, can be more precisely and formally articulated".

Arguably, tacit knowledge is more difficult to mobilize in the activities of the organization, possibly resulting in difficulties in value creation. Thus a second key factor in determining the extent to which knowledge management confers competitive advantage comprises the knowledge types embedded in organizational activities.

In summary, a key question for organizations in attempting to utilise knowledge for the creation and sustenance of competitive advantage is an understanding of which resources and activities an organization should focus on in the development of capabilities, specifically considering the knowledge specificity and knowledge types (tacit versus explicit) that are utilized in organizational activities. In order to examine these issues and the effectiveness and efficiency of knowledge management more broadly, a SCM perspective on organizational activities is employed, as discussed in the next section.

### 3. The strategic cost management perspective

SCM emerged within the management accounting discipline with the aim to use cost information (Shank and Govindarajan, 1989; 1993), provided from several and often heterogeneous sources, to create a competitive advantage. Within this framework, it is argued that cost analysis and cost management must be approached with an explicit focus on the firm's strategic positioning, its overall value chain, and the full set of cost drivers for the firm (Shank and Govindarajan, 1993). Key issues for organizations thus comprise the firm's position in the industry value chain, the activities that should be performed, and the potential for cost compression and value enhancements. Recent developments in the SCM discipline have further investigated the relationship between the costs of the firm and the value the firm provides to its customers, and its importance in shaping the ability of the firm to reach its profit potential (McNair *et al.*, 2001a, b). The specific techniques of value chain analysis, cost driver analysis and value creation analysis are central to the SCM perspective and are described below:

- *Value chain analysis.* SCM requires that attention be devoted to understanding the overall value generated by an industry or a network of firms, and to grasp how value is distributed between the various actors that contribute to its formation (Shank and Govindarajan, 1989; 1993). The final outcome of analysis is to identify those phases of transformation that achieve the best return within the "value system", towards which financial resources should consequently be addressed. In a growing number of businesses, value is progressively shifting towards activities that are "intangible", are located further "downstream", and involve a high degree of interaction with the customer (Slywotzky, 1996, Wise and Baumgartner, 1999). For example, both General Electric and Coca Cola have significantly enhanced their performance by focusing managerial and financial resources on these end-stages (Slywotzky and Morrison, 1997). Similar trends have been witnessed in the US automobile industry, where car marketing services like finance, insurance, maintenance and servicing are highly profitable, whereas manufacturing and sales remain less so (Gadiesh and Gilbert, 1998). As such, a downstream shift closer to the customer has also occurred in this industry, informed largely by a focus on where value is generated within a broader industry chain of activity.
- *Cost driver analysis.* Within the SCM framework, competitive advantage presumes a good understanding of the causal factors that drive cost incurrence. Costs, indeed, are caused by many interrelated factors. Some factors are implicit in the firm's choices about its underlying economic structure (structural cost

drivers). They include strategic choices concerning: scale (size of investment to be made in manufacturing, research and development, marketing areas), scope (degree of vertical integration), experience (number of times the firm has already done what it is doing again), technology (type of process technologies used at each step of the firm's value chain) and complexity (product or service line breadth). Structural cost components can be managed (up or down), but only by changing the fundamental economic elements of how the business competes, and are far from easy to implement. Also, in general, structural factors are not monotonically scaled. That is, one can have too much scale, or complexity, as well as too little. This makes optimization difficult.

Costs also are driven by the firm's ability to execute successfully within its given structure (executional drivers). In particular, executional cost drivers include work force involvement (commitment to improvement), total quality management (Kaizen and zero defects approaches), capacity utilization, plant layout, product configuration, and linkages with customers and suppliers. In general, executional cost drivers are monotonically scaled, so that more is always better (Riley, 1987). Lower costs and improved efficiency can be achieved either through redesigning the firm's value chain, reassessing the coherence of current activities compared with the customers' business requirements, reconfiguring the structural business model, or better executing within that model.

- *Value creation analysis.* A recent development in the SCM discipline is to more explicitly link value created by the firm to the individual activities performed by the firm and the costs of doing so. One such model is the value creation model (McNair *et al.*, 2001b), which seeks to understand the trade-off between what the customer is willing to pay for a product/service bundle (value) and the cost the firm bears to provide what the customer desires. Specifically, the value creation model (VCM) defines the firms' cost structure in terms of value added (directly related to the reason why the customer purchases the product), non value added but required (an essential support activity such as administration, personnel management and maintenance, for example), and waste activities (those activities that are not directly valued by the customer and do not support the activities of the organization). In relation to this, evidence from the field shows that a large proportion (over 50 percent) of total activities cost are non value added but required, and waste, implying that firms struggle to reach their profit potential (McNair *et al.*, 2001b). In general, making visible the level of alignment between activity costs and the value generated enables the commencement of actions to emphasize value added (VA) activities, make non value added but required (NVA) activities more efficient and eliminate waste (W).

In summary, the SCM discipline offers a means of examining the value chain of a firm, the cost drivers that underpin such activities and the value created from performing this mix of activities. Overall, the examination of the efficiency and effectiveness of a firm's value chain is enabled. It is submitted that a SCM perspective can be usefully applied to examine the management of knowledge and its effectiveness and efficiency in particular. Furthermore, it is considered that doing so is both timely and informative given both the importance of and problematic nature of managing knowledge for competitive advantage, as outlined earlier in the paper. To examine the effectiveness

and efficiency of knowledge management, a CKM framework is developed. This analysis framework is described in the next section.

#### 4. The cost-knowledge management framework

The broad approach of the CKM framework is to integrate the insights outlined thus far in the paper from examining both the knowledge management and SCM literatures. From the knowledge management literature, recall that the knowledge specificity and knowledge type (tacit versus explicit) is important for value creation, and require examination. From the SCM perspective, the value chain of activities, cost drivers (executional and structural) and value creation consequences of activities require analysis. The CKM framework integrates both sets of requirements as illustrated in Figure 1 and outlined below.

The CKM analysis framework comprises the following steps:

- (1) Apply SCM to an analysis of firm's performance, examining profitability, value chain positioning and cost structure (in terms of VA, NVA and W). Developing the required information requires both activity-based costing to be conducted to determine the costs of the activities performed and a value creation analysis to be performed to classify these activities and their cost structure in terms of VA, NVA and W.
- (2) Examine the knowledge that is embedded in the activities. Specifically, the purpose at this stage is to understand the activities in terms of:
  - *The degree of knowledge specificity.* Applying Stewart (1997), knowledge is differentiated into "commodity skills" (abilities that are not specific to any particular business and readily obtained), leveraged skills" (knowledge that is not specific but valuable to a particular company) and "proprietary skills" (company's specific and distinctive skills). Two levels of knowledge specificity are then defined: low specificity (commodity skills) and high specificity

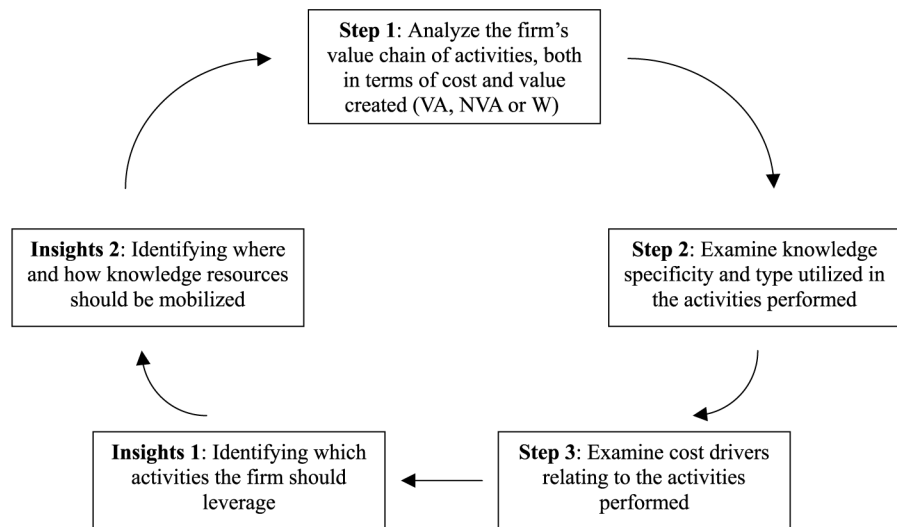


Figure 1.  
The CKM framework



(leveraged and proprietary skills). Examples of low specificity activities include filling orders, dispatching, delivery time checking, material handling, basic production phases, and payroll management. Examples of high specificity activities include activities like market demand development, research and development, customer assistance and production scheduling. More generally, high specificity activities are those where knowledge and competence play a critical role for sustaining a firm's competitive advantage.

- *The utilization of knowledge types – tacit versus explicit.* Tacit knowledge includes individual activity or routines. Specific examples of tacit knowledge activities might include customer interactions, technical problem solving, public relations management, developing marketing initiatives and new product development. Explicit knowledge, on the other hand, is related to activities that are executed by using technologies and formal procedures. Examples of explicit knowledge activities might comprise order filling, inbound logistics, supply ordering, material and product checking, quality control, production, production scheduling, and computer-aided design.
- (3) Examines the drivers of activity cost structures in terms of executional and structural drivers as outlined previously.

After performing the first three steps of the CKM framework, it is considered that two sets of insights should be attained. First, insights into which activities should be leveraged and how, and second, the resources that the firm should mobilize in enhancing and sustaining its competitive advantage. Leveraging the right activities and mobilising the right resources should enable an organization to move towards its profit potential through a more effective and efficient alignment between cost and value as mediated by the management of knowledge. The application of the CKM model and an examination of the potential insights from its use are illustrated through research into four Italian firms as outlined in the next section.

### 5. Sample demographics and framework application

The sample for this paper comprises four Italian firms[1] operating in the mechanical industry. Table I presents the demographics of the sample firms and profitability as measured by return on sales (ROS). While these firms operate in different industry sectors with different levels of competition and size, they conduct similar activities in

Company	Revenues (\$mil)	Year	No. of employees	Profitability (ROS) (%)	Industry	Stage in business life cycle
Ice-cream Co.	58	1998	350	23	Ice cream equipment	Mature
Woodwork Co.	32	1998	n.a.	12	Wood working machines	Expansion
Frangor Co.	12	1999	80	4	Agricultural equipment	Decline
Motorbike Co.	275	1999	n.a.	9	High CC motorbikes	Expansion

**Table I.**  
Sample demographics

terms of research and development, job order production and scheduling, customer assistance and material handling and storage.

Specifically, Ice-cream Co. operates in the ice-cream equipment industry on a worldwide scale with 350 employees. Ice-cream Co.'s philosophy is to make its customers (ice-cream shops) profitable and in this perspective it offers them high performance products as well as service such as training, customer care and assistance. High ROS profitability highlights a competitive advantage. Woodwork Co. is a worldwide leader in the wood working machines industry, with approximately 2,000 employees. Innovation, brand awareness and a customer focus are its main competitive advantage and it performs a large part of the value chain activities (from foundries to assembly). It has also recently implemented a significant total quality management program. The analysis was performed in a selected high growth business unit (panel and sizing and squaring machines) with a 12 percent ROS. Frangor Co. operates in the agricultural machines industry (rotary tillers, spading machines, harrows, etc.) and employs 80 people. The industry is facing a critical moment due a declining demand in the agricultural machines, and Frangor Co.'s ROS is approximately 4 percent. Frangor Co.'s most important activities are research and development, customer care, assembly and marketing and sales. Finally Motorbike Co. operates in the high-end motorcycle industry. Its revenues are increasing at a double-digit yearly rate. Motorbike Co. focuses its attention on the research and development and marketing activities, while most of the components and parts are provided by its suppliers. In the last three years Motorbike Co. has been involved in a lean management program that spans from its internal processes to the reengineering of its first and second tier suppliers.

The research approach was developed to examine whether a SCM framework added insights into the management of knowledge. Due to the exploratory nature of this analysis, a multiple case-study methodology was used. The case study research method is particularly suited to the characteristics of the data analyzed and to the wide variety of sources used (Yin, 1989; Hartley, 1994.). In particular, the present work has used case studies as "instrumental cases" (Stake, 1998), where the case itself is of secondary interest, its primary purpose being the application of the analysis framework developed herein. Prior to applying the CKM framework, preliminary analysis was required, comprising a mapping of each firm's organizational units, and identifying the main activities performed by each unit.

The analysis of the firms' value chain in terms of cost and value creation, as well as cost drivers (Steps 1 and 3 of the CKM framework) was performed using an existing data set comprising cost information data collected from a number of Italian firms operating across a variety of industries (manufacturing and service organizations). This data set was built using a research protocol aimed at measuring activities and their related costs, cost drivers and value generated. In relation to the examination of knowledge specificity and type, discussions were held with management of the selected firms to ascertain this. In terms of evaluating knowledge type specifically, the nature of the activity was characterized as using tacit knowledge when it included individual activity or routines, and as using explicit knowledge when the activity was executed by using technologies and formal procedures[2]. Example criteria for explicit activities included whether the activities were conducted through inter-organizational routines, whether they were carried out observing formal procedures such ISO guidelines, and/or whether the activity was derived from the use of a specific



technology or software. The results of applying the CKM framework are presented in the next section.

## 6. Results and discussion

The results of Step 1 of the CKM framework, the analysis of the firms' activities, are presented in Table II. Table II shows the firms cost structure in terms of VA, NVA and W activities as a percentage of total activity cost and of revenues. In general, Table II highlights that a large amount of cost are related to non value added and waste activities, reducing significantly the firms' profit potential[3]. Specifically, waste activities were mainly due to redundancies, inappropriate processes, delays, poor quality, lack of information and inadequate workforce capabilities and involvement. Non value added but required activities related predominantly to those performed by support departments.

Examining the information in Table II indicates also little significant differences in the composition of VA, NVA and W activities across the four firms. Interestingly, examining the resource consumption of activities and their value effects by themselves does not provide much insight into the varying competitive positions experienced by the various firms and the performance differentials in terms of ROS[4]. To investigate this further, the knowledge utilized in the organizations' activities is examined next. Table III presents the results of Step 2 of the CKM framework. Here, activities are classified in terms of their knowledge specificity and utilization of tacit versus explicit knowledge. The costs of these activities are also compared. This provides an understanding of what kinds of knowledge are embedded in the activities performed by a firm and what are the related costs.

As depicted in Table III, there is greater variation both in terms of knowledge specificity and knowledge type. Interestingly, Frangor Co. has both the highest proportion of its resources deployed in activities where low specificity knowledge is embedded and where the knowledge type is tacit. Given this firm is facing competitive decline and reports the lowest ROS% performance, one can start investigating the

Activity cost	Ice-cream Co.		Woodwork Co.		Frangor Co.		Motorbike Co.	
	% of total activity cost	% of revenue	% of total activity cost	% of revenue	% of total activity cost	% of revenue	% of total activity cost	% of revenue
VA	44	18	48	14	47	17	43	17
NVA	32	13	40	12	32	12	38	15
W	24	10	12	4	21	8	19	7

**Table II.**  
Activity analysis

	Low specificity activities as a % of total cost	High specificity activities as a % of total cost	Tacit activities as a % of total cost	Explicit activities as a % of total cost
Ice-cream Co.	30	70	61	39
Woodwork Co.	24	76	52	48
Frangor Co.	50	50	72	28
Motorbike Co.	25	75	49	51

**Table III.**  
Knowledge specificity and type analysis

linkages between the value chain of activities it performs, the knowledge that it utilizes and the performance that it is achieving. Arguably, the knowledge it is utilizing is not yielding sufficient returns due to its lack of specificity, and/or the firm experiences difficulties in effectively utilizing its knowledge in the conduct of activities due to the large presence of tacit knowledge activities. Indeed, Frangor Co. could well be facing situations of “orphan knowledge” (Caddy, 2001).

Comparing the remaining firms in Table III (which have a comparable mix of high-low knowledge specificity activities) supports prescriptions that tacit knowledge may be more relevant for competitive advantage (Grant and Gregory, 1997), with higher performing firms also reporting a higher proportion of tacit-knowledge activities. Issues here relate to whether the use of tacit knowledge in organizational activities is enabling Ice-cream Co., for example, to better sustain its competitive advantage *vis-à-vis* its peers and how this organization is ensuring that tacit knowledge is effectively utilized in organizational activities. Again, however, the small sample limits the conclusiveness of the insights.

Overall, a significant presence of activities employed in commodity skills and insufficient utilization of leveraged or proprietary knowledge might lead a firm to a decrease in its competitive advantage. A firm comparing the knowledge specificity of its activities against industry peers would gain insights into potential drivers of their competitive advantage, and by comparing their performance longitudinally, can model potential impacts of increases in knowledge specificity and/or the differences in the mix of activities, and the performance consequences of these actions. Furthermore, considering how the activities performed are reliant on tacit versus explicit knowledge *vis-à-vis* peers provides additional insights into the ability to sustain competitive advantage (through the difficulties in replicating tacit knowledge) and strategies that are required to counter any risks of retaining tacit knowledge and/or its under-utilization in organizational activities.

In relation to examining the efficiency of knowledge management in organizational activities, Table IV shows the amount of VA, NVA and W activities embedded in low knowledge specificity activities versus high knowledge specificity activities. It clearly shows that low knowledge specificity activities comprise a higher level of NVA and W costs. In contrast, high knowledge specificity activities correspond to VA activities. In terms of managing the efficiency of these activities, one can then focus on eliminating the waste across both high and low knowledge specificity activities whilst improving the efficiency of NVA activities. Doing so requires an examination of cost drivers which is the third and final step in applying the CKM framework.

	Low knowledge specificity activities			High knowledge specificity activities		
	VA activities as a % of activity cost	NVA activities as a % of activity cost	W activities as a % of activity cost	VA activities as a % of activity cost	NVA activities as a % of activity cost	W activities as a % of activity cost
Ice-cream Co.	11	41	48	58	28	14
Woodwork Co.	34	52	24	52	40	8
Frangor Co.	36	38	26	57	26	17
Motorbike Co.	26	47	27	48	36	16

**Table IV.**  
Knowledge specificity activity analysis

The final step of the CKM framework requires an identification of cost drivers related with the activities performed by the organization and, in particular, the extent to which executional and structural drivers influence the amount of resources consumed in these activities. Table V examines the drivers of cost incurrence in low knowledge specificity and high knowledge specificity activities. It shows that, generally, executional factors influence the consumption of resources irrespective of whether the knowledge utilized is of a commodity nature (low specificity) or of a leveraged/proprietary nature (high specificity). This is an important insight for these organizations, as the results indicate that reconfiguring size, scope and complexity (structural cost drivers) is less important than the ability to execute within the current firm's structure (executional cost drivers). Knowledge management programs and initiatives might benefit from this information because the comprehension of which cost drivers affect a firm's cost performance allows managers to better focus their efforts and resources.

Indeed, identifying the specific drivers as outlined allows management to decide how best to manage the efficiencies of the activities performed. For example, cost drivers at Ice-cream Co., which reported the highest ROS%, were related to total quality management and plant layout factors for low knowledge specificity activities (respectively influencing 53 percent and 25 percent of these costs), and experience and level of integration with suppliers and customers for high knowledge specificity activities (respectively influencing 31 percent and 19 percent of these costs). In terms of securing efficiency improvements, applying the CKM framework results in the identification of which specific areas of the business to focus on and the potential cost savings that can be achieved from doing so. Overall, by focusing on these cost drivers, the sample firms can improve the efficiency of these activities whilst also considering how to better utilize different knowledge types to improve competitive effectiveness.

## 7. Conclusions

In summary, the CKM framework facilitates the analysis of a firm's activities in terms of the resources consumed (costs incurred to perform them) and the value generated through these activities (in terms of CVA, NVA and W). As a first step, this might enable a better understanding of performance *vis-à-vis* a firm's competitors. However, incorporating an analysis of the activities performed in terms of the extent of knowledge specificity embedded in these activities, and whether this knowledge was tacit or explicit, provides additional insights (the second step of the CKM framework). As best illustrated by the case of Frangor Co., firms can analyze and compare the mix of activities performed in terms of the extent that leveraged or proprietary knowledge is utilized *vis-à-vis* peers as a means of understanding competitive effectiveness. At Frangor Co., knowledge embedded in its activities was generally of a commodity

	Low knowledge specificity activities (%)		High knowledge specificity activities (%)	
	Executional	Structural	Executional	Structural
Ice-cream Co.	84	16	45	55
Woodwork Co.	70	30	52	48
Frangor Co.	57	43	75	25
Motorbike Co.	80	20	87	13

**Table V.**  
Cost drivers of low/high knowledge specificity activities

nature, consistent with the low ROS% profitability it reported. In addition, examining the knowledge type utilized enables firms to assess the durability of competitive advantage and the risks associated with tacit knowledge and how to respond. The insights generated by the first two steps of the CKM model are primarily aimed at assessing drivers of knowledge management effectiveness. Indeed, the proposed framework enhances the quality of a firm's competencies and skills assessment and allows a better understanding of "what" it should do in order to sustain or acquire a competitive advantage, both in terms of activities that need to be leveraged and the knowledge resources that require mobilization and utilization in these activities.

In relation to efficiency, Steps 1 and 3 of the CKM framework combine to provide a firm with the ability to identify opportunities for efficiency improvements. Deriving primarily from the SCM perspective employed, activities are profiled in terms of VA, NVA and W, with non value added but required and waste activities representing opportunities for efficiency improvements and activity elimination respectively. In low knowledge specificity activities, there was more potential for efficiency improvements. However, high knowledge specificity activities also contained significant levels of waste. Interestingly, in the sample of firms studied, executional cost drivers were found to be more significant in impact resource consumption than structural factors. This not only confirms the importance of knowledge for competitive advantage, but provides specific guidance as to how resources consumed in both low and high knowledge specificity activities might be reduced. In summary, linking knowledge specificity to both activities and cost provides further insights for cost management and the resource allocation decision-making process. Doing so can make effectiveness and efficiency decisions more visible and easier to evaluate.

As with any exploratory study, there are a number of limitations. First, the small sample size and the lack of comparability across firms limit any statistical analysis and the reliability of the generated insights. However, the purpose of the empirical analysis is to illustrate the viability and potential insights of applying the CKM model developed, both of which have been demonstrated. Future research could usefully compare firms within a specific industry sector controlling for important firm differences, or longitudinal analyses to understand the dynamics of improved alignment between knowledge activities, the spending on such activities and the resultant impact on the firm's cost structure, performance and competitive position. A second limitation is that the dimension of performance comprised ROS%. This is both a static and narrow dimension of performance. Future work could expand this notion of performance to consider a customer perspective (for example, satisfaction, retention or market share) and improved shareholder value metrics. In addition, it is acknowledged that there may be some overlaps in the knowledge dimensions examined (specificity and type). Future work could develop more refined categorizations to examine the utilization of knowledge in organizational activities. Despite these limitations, however, it is submitted that the need to integrate knowledge and SCM perspectives is imperative given contemporary concerns about the efficacy of current organizational practices for the management of knowledge for competitive advantage. The CKM framework developed herein is an important first step in addressing this need.

**Notes**

1. For discretionary reasons the names of the firms and some figures are disguised.
2. In many cases, activities utilized both tacit and explicit activities in roughly proportionate levels. In these situations, we classified the activities in terms of which knowledge type was seen as more important in carrying out the specific result or in achieving a specific result.
3. The result supports earlier work by McNair (1994), McNair and Vangermeersch (1998) and McNair *et al.* (2001a, b).
4. It is acknowledged that many other exogenous variables may impact ROS% performance differentials such as industry specific influences and size effects. However, the interest here is to apply the CKM model to identify potential insights.

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