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ABSTRACT

This paper identifies the practical requirements for building a successful KM implementation process. We propose Value Creation Cycle (VCC) as an integrative framework of KM implementation. The VCC framework includes four stages: Defining KM Value Proposition[1], Developing KM Infrastructure, Enabling Learning, and Assessing Value. The temporal relationship between these stages addresses two critical issues. First, the articulation of two critical factors: KM Infrastructure and Learning Routines, and second, the articulation of KM as a strategic value adding activity or process. VCC is supported by the findings of a case that studies KM implementation at one of the Most Admired Knowledge Enterprise (MAKE) Global Award winners for the year 2003.

Keywords

Framework, KM implementation, capabilities.

INTRODUCTION

Organizations are fast realizing that effective management of one's knowledge assets is critical to achieve competitive sustainability (Dierick & Cool 1989; Gold, Malhotra, and Segars 2001; Winter 1995). But mere realization that knowledge is critical does not ensure a smooth road to success. A better understanding of the complexity of knowledge management (KM) projects in organizations is required. What factors need focus in a successful KM implementation? Are they related in a distinct pattern, or are they overlapping? If the former is the case, what routines connect them and how; if latter, then what is the nature of the overlap? And most critically, how do their inter-relationships guide actual leverage of firm's knowledge assets and the creation of value?

KM research in the past has tried to answer these questions by focusing on the process and consequence of KM in organizations. The process view considers the factors influencing a successful KM implementation (Argote, et al., 2003) including the firm's KM implementation strategy (Hansen et al., 1999), its culture (DeLong & Fahey, 2000), and its technological infrastructure (Purvis et al., 2001; Zack, 1999b). The second stream of KM research focuses on conversion of firm's knowledge assets for competitive advantage (Holsapple & Jones, 2003; Lee & Choi, 2003). Despite a critical mass of KM literature, our *knowledge* of KM implementation lacks integration across the different components of KM research. It lacks the cohesion or an understanding of how KM elements interact with one-another.

To fill this research vacuum, we propose the Value Creation Cycle (VCC) as an integrative framework of KM implementation. The VCC discusses factors that hinder, assist, and ensure a successful conversion of firm's knowledge assets into value, and the subsequent assessment of that value.

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[1] Modifying Keeney's (1999) definition, the term 'KM value proposition' would refer to the bundle of attributes of a KM program. It consists desired KM services, organizational channels through which they are delivered, and post-delivery interactions with the end users.

An Integrated Framework of Knowledge Management: Need Assessment

Table 1 compares previous framework efforts across the dimensions of the Value Creation Cycle. Summarizing previous studies begets some insights. First is the conspicuous absence of an integrated framework. An integrated framework not only legitimizes the field and standardizes the terminology, but also help evolves a stream of empirical research. The VCC framework correlates various issues as well as their inter-relating routines to propose a logical gestalt of a framework.

Second, value creation as a result of the KM program has received little attention. The VCC proposes that successful KM firms direct their KM efforts towards improving their value proposition for the purpose of creating value in the marketplace.

Theoretical Effort	Focus	Dependent Variable	Firm's KM Value Proposition	KM Infrastructure	Learning Routines	Creation of Value as a KM Objective
Nonaka (1994)	Knowledge Creation	N/A	No	Yes	Yes	No
Hahn & Subramani (2000)	Knowledge Management Systems (KMS)	N/A	Yes	Yes	No	No
Alavi & Leidner (2001)	KMS/ KM Processes	Knowledge Management	No	Yes	No	No
Grover & Davenport (2001)	KM Processes	N/A	No	Yes	Yes	Yes
Becerra-Fernandez & Sabherwal (2001)	Knowledge Creation	KM Satisfaction	No	Yes	No	No
Kemp et al. (2002)	KM Framework	N/A	No	Yes	No	No
Khalifa et al. (2001)	KM Structures	KM Effectiveness	No	Yes	No	No
Holsapple & Jones (2003)	KM Activities	Organizational Competitiveness	No	Yes	Yes	No
Kulkarni & Louis (2003)	KM Maturity	KM Maturity	No	Yes	No	No
Lee & Choi (2003)	Knowledge Creation	Organizational Performance	No	Yes	No	Yes
Gold et al. (2003)	KM Capabilities	Organizational Effectiveness	No	Yes	Yes	Yes

Table 1. A Comparative of Previous Literature

Third, there is little agreement about the roles of various factors that influence KM implementation. The multiplicity of roles has led to inconsistent terminology, and more seriously, imprecise treatments. For example, factors hindering the KM implementation have been discussed as 'barriers to KMS deployment' (Alavi, 2000); 'frictions' (Davenport & Prusak, 1997); and 'obstacles' (Zack, 1999a). Factors assisting the KM program have been discussed as 'priorities' (Ruggles, 1998), 'KM context' (Zack, 1999b), and 'enablers' (Lee & Choi, 2003). A clear classification of these factors is required.

Taking cue from knowledge-based view of the firm, the VCC discusses these factors in terms of 'capabilities' that a firm has to develop for successful KM program. Taking this approach clears the haze surrounding these factors and helps identify practical approaches to develop the capabilities.

The following section reviews the literature relating to KM implementation. Section 4 discusses the VCC framework being presented in this paper supported by a case study. Finally, section 5 explores VCC's implications for research and for practice.

Although case-study research has been core to VCC's development, the paper will not have the capacity to elaborate extensively upon each of the cases underlying this research. KM activities at one of the case sites – Infosys Technologies, Ltd., will be used to help illustrate the VCC. Infosys, an Indian IT services giant, formalized its KM program in 1999 and within a short span of four years has emerged amongst the Global Most Admired Knowledge Enterprises (MAKE). The company provides IT services and consulting to its Fortune 1000 clients located in the North American, European, and Asia-Pacific regions.

FOUNDATIONAL LITERATURE

A Successful KM Implementation and its Objectives

Most definitions portray KM as strategic identification, leveraging, and development of collective intellectual capabilities within and outside of the organization, aimed at reaching organizational goals (Ruggles, 1998; von Krogh, 1998). Defining a 'successful KM implementation' can be an ambiguous task. A major hurdle is to identify its objective. Based on past research, we propose that the objective of a successful KM implementation is to help firms create value (Kogut & Zander, 1993; Davenport et al., 1998; Grover & Davenport, 2001). KM value can be defined as the competence a firm develops to extract current profits from existing knowledge, and in the new knowledge it creates for future commercialization (Allee, 1999).

Knowledge-Based View of the Firm

The last decade has seen the emergence of a knowledge-based view of the firm (Nonaka & Takeuchi, 1995; Spender, 1996). It has roots in the resource-based theory that defines a firm as resource bundles of capabilities and knowledge (Penrose 1959; Barney 1991; Conner 1991). The knowledge-based view posits that a firm's responsiveness to change is a result of the strategic leverage of its knowledge resources to counter that change (Gulenic, 1998; Grant, 1996a). KM implementation can be studied through a combined lens of the knowledge-based view and the concept of 'capabilities' (Gold et al., 2003). VCC proposes that firms should develop specific capabilities, human as well as infrastructural, to improve its responsiveness to change. These capabilities, once developed, help firms strategically leverage knowledge resources to create value (Teece, 1998). In other words, development of such capabilities is but the process of KM implementation.

Conceptually then, *knowledge management implementation can be visualized as developing an array of organizational capabilities involving firm's human and infrastructural assets to leverage knowledge resources and create value*. Successful KM programs are characterized by:

- Development of specific capabilities and their related routines (Purvis et al., 2001; Demsetz, 1991; Spender, 1996a).
- Execution of combinations of these capabilities and related routines in an overlapping yet temporal sequence for the purpose of creating value (Brown & Eisenhardt, 1997; Massey et al., 2002).
- Development of value-assessing mechanisms to gather feedback from both internal and external sources to further strengthen their capabilities (Wheeler, 2002).

To summarize, successful KM firms develop and execute specific capabilities and related routines in a temporal sequence, thereby enabling conversion of a firm's knowledge resources to value.

VALUE CREATION CYCLE

The VCC Theses

> For a pre-defined *value proposition*, *KM infrastructure* enables knowledge availability and *learning routines* enable knowledge consumption and creation to generate *value*.

Units of Study

The Value Creation Cycle, depicted in Figure 1, includes four constructs– Defining the KM Value Proposition, Developing KM Infrastructure, Enabling Learning, and Assessing Value – which also constitute the four capabilities a firm needs to develop for a successful KM implementation. Figure 2 highlights actions for developing each capability.
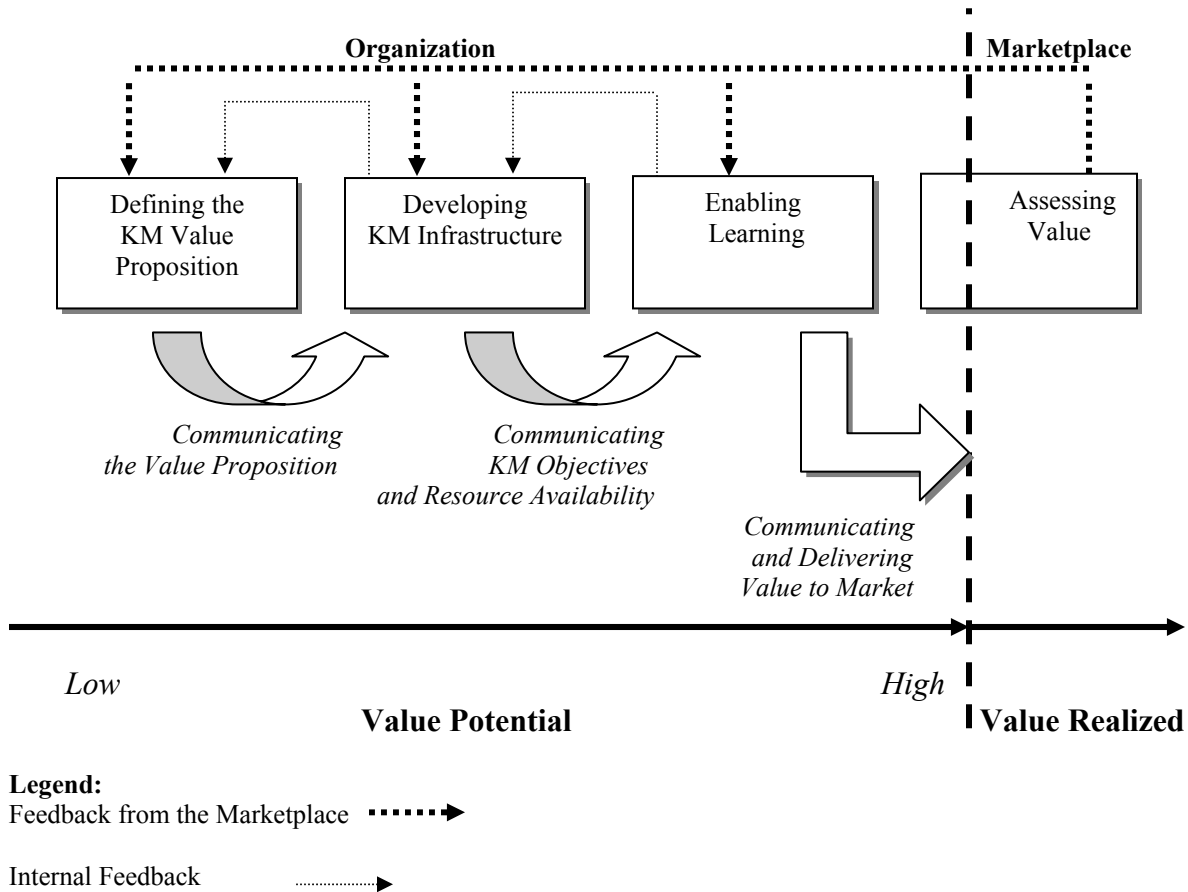

Figure 1. Value Creation Cycle

Defining the KM Value Proposition. The first capability requires that the firm define the strategic context of its KM program. As per the knowledge-based view of the firm, defining the strategic context would involve (Zack, 1999a):
- Assessing the knowledge gap by comparing the knowledge resources with the strategic opportunities,
- Identifying the available KM infrastructure and learning routines, and
- Assessing required KM infrastructure and learning routines to fill the knowledge gap.

Developing the required KM infrastructure and learning routines is firm's KM value proposition. As a capability, *Defining KM Value Proposition* sets specific goals for the KM program. The Principal Knowledge Manager of Infosys explained the firm's KM value proposition:

> Our sales and delivery functions are distributed around the globe. The initial impetus of KM was to strengthen these two. Within these two functions, we focused specifically on improving the quality of operations and enabling virtual teamwork.

Developing KM Infrastructure. The second VCC construct refers to articulating the KM implementation strategy in line with the KM value proposition. Issues pertaining to KM infrastructure need to be addressed at this stage. These issues include KM roles, KM processes, and KM technology.

Roles: Traditional organizational roles are unable to manage the scope of a KM program (Zack, 1999b) so new roles need to be created. At Infosys, the principal knowledge manager explained:

> The KM Group was created with a principal knowledge manager and four sub-groups: content team had KM editors and librarians to manage content for IPR and confidentiality issues and place it in the organizational knowledge taxonomy; KM evangelists to conduct events to ensure the top of the mind recall of the KM program; process team to manage the core KM processes; and the technology team. At the user end, we appointed knowledge champions in each unit to coordinate its KM related activities.
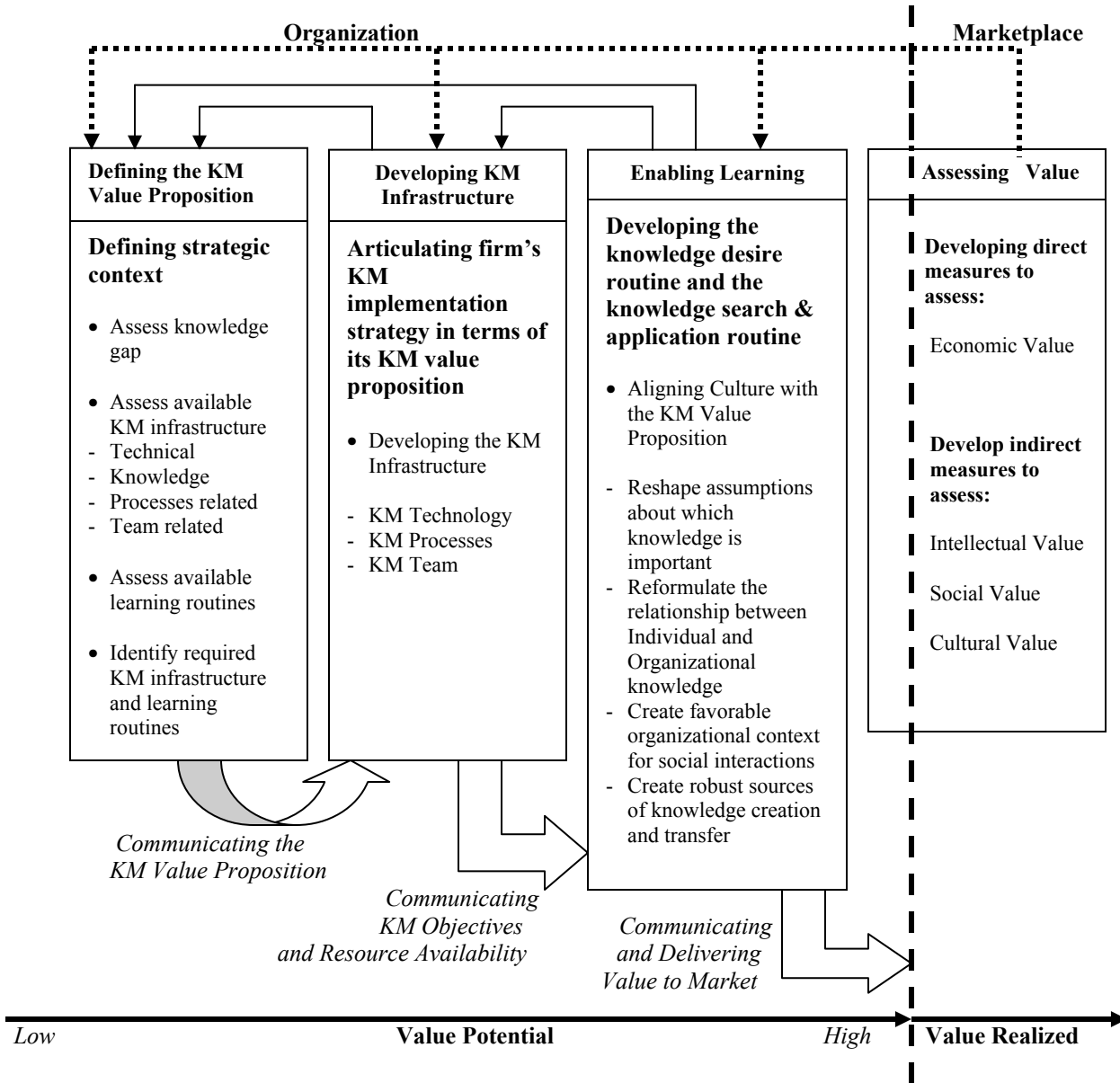

Figure 2. Expanded Value Creation Cycle With Possible Tools and Techniques Used in Each Step

Technology: Technological capabilities primarily include KM applications and information technologies to support these applications, and perform multifaceted roles (Gold et al., 2001):

- Collaborative and distributed learning technologies (like Lotus Notes and world wide web-based portals) help people within the organization to surmount structural and geographical obstacles.
- Knowledge discovery technologies (like data mining software) help organizations to configure knowledge hidden in their data warehouses.
- Knowledge application technologies (like knowledge repositories) allow firms to use their explicit knowledge resources.
- Opportunity generation technologies permit firms to monitor knowledge inputs coming from their customers, partners, or competitors.

Processes: Studies have either discussed processes as different from KM infrastructure (Lee & Choi, 2003), or as a part of KM infrastructure antecedent to KM performance (Becerra-Fernandez & Sabherwal, 2001). The VCC assumes the latter point of view. The classical taxonomy of explicit knowledge processes includes generation, codification, and transfer (Alavi & Leidner, 2001). According to Grover and Davenport (2001):

- Knowledge creation activities involve acquiring as well as developing knowledge.
- Knowledge codification involves converting knowledge into a useful and useable format.
- Knowledge distribution involves transferring to the point of its use.

Addressing the three infrastructural issues – roles, processes, and technology makes knowledge useable (Zack, 1999a), and more importantly, useful (Grover & Davenport, 2001) to the end users. These issues should be addressed in an overlapping sequence of *KM Roles→ KM Technology → KM Processes*. Without an efficient knowledge team in place, knowledge technology will not make much difference, or if the KM roles are absent, knowledge processes will not be effective (Lee & Choi, 2003).

Enabling Learning. The infrastructural elements discussed in the last section make knowledge units[2] available in a consumable form, but do not ensure their successful application (Gold et al., 2001). The Enabling capability focuses on this issue, and relates successful application to the 'willing participation' of people in the KM program (Hlupic et al., 2002). The principal knowledge manager at Infosys mentioned:

> The initial reaction from the users led us to believe that the system and incentives to participate in the program are necessary but not sufficient. Something was holding the employees back from complete participation.

Organizations, that are known to effectively manage their knowledge assets, have mature routines for creating and applying new knowledge (Cohen & Levinthal, 1990; Nonaka, 1994). Enabling learning capability focuses on developing these routines. VCC discuss two such routines. Both the routines are cultural and behavioral in nature and cannot be neatly separated. The *knowledge desire routine* refers to a positive learning attitude in people. Developing this capability requires aligning firm's culture with its KM value proposition by changing the prevailing values, norms, and practices of a firm (Zack 1999a). Figure 2 highlights possible methods firms can adopt to create this alignment and thus develop these routines (Zack 1999a). Below are some actions that exemplify these methods (Hauschild et al., 2001):

- Encouraging participative decision-making in process and product innovation,
- Setting world-class standards for process and product quality,
- Clearly communicating these standards and the KM related resources available to achieve these standards,
- Creating a separate KM role to help people understand firm's KM related expectations and resources, and to coordinate KM related activities at unit level,
- Assessing and rewarding the "knowledge pull" behavior to ensure its repetition

Infosys, for example, took a number of steps to develop both the routines. As the vice-president of operations explained:

> As a CMM Level 5 company, we have process improvement teams exist to keep a tab on quality of core corporate processes. These teams take regular inputs from people like project managers, project leaders, team members, and quality consultants to assess what further innovation in processes in possible.

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[2] The term knowledge unit refers to a formally defined, atomic packet of knowledge content that can be labeled, indexed, stored, retrieved, and manipulated (Zack, 1999b: 48).

And,

> At the beginning of every project, we attach a knowledge champion to the team. He/She makes a presentation to the project teams about the KM tools they have at their disposal and stays in touch with the team to assist them in their KM related activities. At the completion of the project, the champion helps the quality consultants audit the project team for the amount and nature of their knowledge usage. Positive knowledge usage credentials carry weight during promotions. We also have a separate monetary reward system to promote knowledge consumption at an individual level.

Complementary to the desire routine is the *knowledge search routine*. People need to search for relevant tacit as well as explicit knowledge units must to satisfy their knowledge desires. Developing the search routine helps people understand the nature of their knowledge desires and to search for the appropriate knowledge units. It also enables them to view their knowledge desires from different perspectives and modify it to search for a different knowledge units. In addition to developing a strong knowledge desire routine, this requires a firm to create robust systems of knowledge creation and transfer – a capability already discussed in previous section. At Infosys, after four years of consolidating standalone KM systems, the KM portal has emerged as a centralized access point to the knowledge repository, various discussion forums, expert yellow pages, the project leader toolkit, client case studies, and templates of previous client presentations.

Assessing Value Creation.   VCC proposes that value creation as a result of knowledge management is a three-staged capability building process. Value is created as a result of learning accrued to people by developing KM infrastructure and learning routines in line with firm's KM value proposition. Organizations may utilize new learning to create either internal value (process innovation for example) or for external value (product or service innovation for example). The last construct of the VCC framework is the firm's capability to *Assess Value* thus created. Building this capability may involve developing direct as well as indirect measures of value assessment. Direct value measures are more convenient for assessing economic value, e.g., firms that sell knowledge as a part of their value proposition. Infosys, for example, identified 'defect rate' and 'cost of quality' as two such measures.

> The defect rate in high knowledge sharing projects was 15% less than low knowledge sharing ones. The cost of quality was around 13% lower for the high knowledge sharing projects. Users reported saving around 4 person days per person in six months as a direct result of reusing knowledge.

 Indirect measures are used to assess alternative forms of value (Miles et al., 1998). These include:
* Social value measures: Assess if value has been created in the form of a tightly coupled network with suppliers, for example.
* Intellectual value measures: Assess the appreciation of the projects, companies, clients, and patents as a result of firm's KM program.
* Cultural value measures: Assess improvements in firm's human focus, customer focus, and renewal and development focus.

Infosys' annual statement includes its Intellectual Assets Balance Sheet, which has consistently shown increments since the formalization of the KM program.

The *Assessing* activities occur both inside and outside the organization, hence must be treated separately from the previous VCC constructs. Firms must assign a different timeline for developing this capability (Fahey & Prusak, 1998). The chief operating officer of Infosys mentioned:

> We had a very clear priority of starting the KM program as a voluntary exercise for the initial years. In the later stages we would try to understand its benefits. But we would like to do it very slowly.

VCC Summary

Defining value proposition; Developing KM Infrastructure; Enabling Learning; and Assessing Value are four essential antecedents to a successful KM program. Feedback plays a critical role in strengthening these capabilities further. At Infosys, the KM program focused on 'sales' and 'software delivery' as two potential areas (*defining the KM value proposition*). As a part of firm's KM implementation strategy a core KM Group was created (*developing KM infrastructure*). The KM team worked simultaneously on putting the KM technology in place (*developing KM infrastructure*) and initiating cultural changes to involve the employees in the program (enabling *learning*). As benefit of the KM program, Infosys' sales department was able to prepare highly competitive project proposals, and win more projects (*creating value*). On the project delivery front, Infosys was able to offer better quality of IT services at costs lower than the competition thereby improving client

satisfaction, brand image, and chances of repeat business (*creating value*). The market-based feedback of clients led to further development of these capabilities.

FUTURE RESEARCH

A framework not subjected to empirical testing remains in the realm of speculation. VCC offers robust opportunities to operationalize each of its theoretical constructs to generate propositions and testable hypotheses like the one given below.

SAMPLE HYPOTHEIS 1. People's desire for knowledge inputs will be more if ambitious knowledge sharing goals are established for them.

Such hypotheses can be used to identify empirical indicators and develop valid instruments that can be acid-tested by collecting real-world data through perceptual surveys.

IMPLICATIONS FOR PRACTICE

The VCC framework:

- Helps firms realize that knowledge management is a multi-staged process rather than a single project. They can also utilize the framework to judge the current status of their KM program, and
- Proposes that a successful KM program is a cyclical phenomenon. Firm's experiences in the marketplace must be brought back to strengthen the capabilities and hence the future success of the KM program.

CONCLUSION

The VCC framework conceptualizes an organized interplay of the proposed capabilities and various communication processes that weave them into a successful KM program. As mentioned previously, a successful KM program builds sustainable capabilities to leverage knowledge assets. Firms that utilize this leverage create value in a consistent and reliable manner.

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