Chapter 1
Parameters of Knowledge Management Success

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Introduction

The effectiveness of an organization is a function of the resources that it has at its disposal, how those resources are used, and characteristics of the environment in which it finds itself. It is commonly understood that an organization has four basic kinds of resources: human, material, financial, and knowledge. How an organization’s knowledge resources are used is a focus of the knowledge management (KM) discipline, which is also concerned with related matters such as the nature of knowledge resources, the interplay between knowledge and the other organizational resources, and the impacts of environmental phenomena on an organization’s management of knowledge (and vice versa). Knowledge management success contributes to, or can even drive, an organization’s success.

Success and failure are two sides of the “effectiveness coin” and, at the edge, we have gradations where the two meet. At an organization level, two common ways for thinking about effectiveness are performance and competitiveness – each of which is a way gauging the outputs emanating from the organization’s activities and four-fold assets. Success, then, has occurred when results of organization actions meet criteria for effectiveness, while simultaneously maintaining an
alignment with its mission, vision, and values. Failure has occurred when results of organization actions do not meet criteria for effectiveness, or they fall out of alignment with the organization’s mission, vision, or values. There are, of course, degrees of success and failure, where the two blend as we assess the organization results. Notice that an output or result can be directed in an inward and/or outward direction.

Performance is concerned with measures of how well something is done relative to criteria established for effectiveness. These criteria may be established by the organization itself (e.g., average customer-service representative score in excess of 4.20 on a 5-point scale), or imposed by external forces of its environment (e.g., government-mandated miles-per-gallon level for a new vehicle model). From another angle, we can distinguish between performance criteria with an inward orientation (e.g., production defect rate of under 1%) and those with an outward orientation (e.g., same-store sales boost of 5% compared to prior year). Yet another angle recognizes short-run versus longer-run performance criteria (e.g., quarter versus annual). No matter the source of criteria, the orientation of criteria, or the temporal scope of criteria, KM can play a role in successfully meeting them.

There are many case studies describing KM initiatives that enhanced the performance of specific organizations in terms of criteria dealing with such features as cost reduction, greater responsiveness, improved processes, new revenue streams, higher customer loyalty; examples include investigations by Leonard-Barton (1998), Rubenstein-Montano et al. (2001), Smith & McKeen (2003), O’Dell et al. (2003), Wolford & Kwiecien (2003), Oriel (2003), and O’Leary (2008). Each such performance measure can serve as a gauge for assessing the degree of success achieved by a KM initiative.
More directly, and on a larger scale, we can ask whether superior KM can predict superior performance by a for-profit organization, as a whole (Holsapple & Wu 2008a; Zack et al. 2009). For instance, can KM be performed in ways that predict superior bottom-line numbers, such as a firm’s earnings per share and other financial ratios? Or, can it be performed in ways that predict superior market performance for the firm, such as price-to-book ratio? There is empirical evidence, based on analysis of archival data, that the answer for each question is “Yes” (Holsapple & Wu 2008b, 2011; DeFond et al. 2010; Wu & Holsapple 2013). Now, the question is: What are the parameters that deserve attention when striving for KM success or superiority? We suggest an answer to this later in the chapter.

Aside from performance, competitiveness is another way of looking at an organization’s effectiveness. Competitiveness is related to performance, in the sense that higher performance is often associated with higher competitiveness. For example, a firm that has superior performance in cultivating supplier relationships may well have an edge over competing firms that are not so well attuned with the organizations that supply its needs. Note that development and maintenance of supplier relationships is a knowledge-intensive endeavor whose success contributes to competitiveness of a purchasing firm (Chen et al. 2015). In other words, how knowledge management is conducted can contribute to organization’s competitiveness (Holsapple & Singh 2000).

In its most fundamental sense, competitiveness is about survival. As a raw baseline, survival is an indicator of competitiveness (excluding instances where an organization’s existence is protected by some external force in its environment). But, as organizations strive to achieve the same thing (e.g., high market share, product innovation, excellent customer service, low-cost provider, control...
of a resource), some fare better than others – they are more competitive. Just as higher
performance often leads to higher competitiveness, greater competitiveness can lead to higher
performance. Within this reinforcing cycle of organization effectiveness, KM holds a key for
success. The extent to which this key works depends on the way it is shaped, designed, and
operated relative to features of an organization’s four-fold resources (FR), its environing conditions
(EC), and its defining principles (DP) embodied in its vision, mission, and values. A knowledge
management key that works for one organization may not work so well for another, depending on
its fit with the foregoing features.

A starting point for thinking about configuring a KM key to unlock an organization’s potential is
to identify design parameters that need to be considered. Here, we examine a collection of such
parameters that exist independent of any particular organization. Formally, the effectiveness (E) of
organization i is a function of n parameters (P1, P2, ...., Pn), given the state of that organization’s
resources, environing conditions, and guiding principles:

\[ E_i = f (P_{1i}, P_{2i}, ..., P_{ni} \mid FR_i, EC_i, DP_i) \]

This relationship is visualized in Figure 1.
Collectively, the knowledge management parameters comprise a sort of “control panel” that contains the levers/knobs that every KM initiative needs to consider and properly set (i.e., instantiate), in order to enhance likelihoods of success and reduce possibilities of failure. The “proper” settings are with respect to the organization’s FR, EC, and DP, which are constraints and enablers for what can be accomplished. As previously explained, E can be regarded in terms of performance and/or competitiveness. In the discussion that follows, we refer mainly to competitive success, when examining the KM parameters.
Foundation

As referenced above, there is ample evidence that an organization can design and perform knowledge management in ways that contribute to its effectiveness. Those “ways” involve particular instantiations for the collection of KM parameters. To understand and appreciate the parameters, some background is needed: a characterization of knowledge and the conduct of knowledge management.

Knowledge

Renowned cognitive scientist Allen Newell (1982) explains that when a system, be it human-based or computer-based, possesses and can use a representation of “something (an object, a procedure … whatever), then the system itself can also be said to have knowledge, namely, the knowledge embedded in that representation about that thing.” Following Newell, we adopt the characterization of knowledge as that which is conveyed in a usable representation. A representation is some arrangement in time/space. There are many kinds of representations, including: a physical item (e.g., a printed page, document, report), a physical image or movement (e.g., animation), spoken words (e.g., a conversation, lecture), displayed behaviors (individual or collective), mental patterns or images (e.g., a mindset, an idea, a procedure, a rule), digital patterns (e.g., files, databases, programs), and so forth.

According to Newell, a representation does not convey knowledge unless it is usable. Usability is the capacity to take action (Sveiby 1997). The notion of usability implies the existence of processors who do the using, processors that can take the actions. A processor can be human-
based, machine-based, or a hybrid. Many, if not most, representations are not usable by some processors; for those processors, the representations do not convey knowledge. Put another way, knowledge does not exist apart from at least one processor that perceives or possesses a representation that it finds to be usable in a circumstance it is facing.

We can consider an organization’s knowledge resource in terms of two classes: schema and content (Holsapple & Joshi 2004). The schematic portion of an organization’s knowledge resource does not exist apart from the organization’s existence. Indeed, we might say it defines that organization’s existence, including purpose (mission, vision), strategy (direction, path), culture (shared assumptions, norms, beliefs), and infrastructure (roles, relationships, regulations). If an organization ceases, so does its purpose, strategy, culture and infrastructure. In contrast, the content portion of an organization’s knowledge resource can come and go. It has an existence independent of the organization in which it presently found. The content knowledge resource is comprised of participants’ knowledge and knowledge conveyed in/by artifacts. The former is knowledge belonging to a processor (e.g., from human mental representations or computer digital representations); it also belongs the organization, but only insofar as the processor functions as a participant in the organization. In contrast, an artifact is an object that has no innate knowledge-processing capability (a document, for instance), yet is (or holds) a representation of knowledge that may be usable to at least one knowledge processor in the organization.

There are degrees of usability, based on a hierarchy of qualities: clarity, meaningfulness, relevance, and importance (Holsapple & Whinston 1996). Meaning requires clarity, relevance requires meaning, importance requires relevance. When a processor, confronting some task, sees levels of these qualities for a specific representation as being high, then the usability of that
representation for that task is high (i.e., the knowledge it conveys is of high utility). When a processor perceives levels of the qualities as being lower, then the representation is less usable and knowledge it conveys is of less utility for a task at hand. From a bird’s-eye-view, usability of a particular representation by a particular processor is influenced by fit between the representation and processor, the action/task being attempted by the processor, and the environment within which the action is to take place.

Three main types of knowledge are descriptive, procedural, and reasoning knowledge (Holsapple & Whinston 1996). Descriptive knowledge characterizes (i.e., describes) the nature of some world – be it historic, current, expected, hypothetical, or speculative (e.g., a narrative or portrayal). Procedural knowledge is a step-by-step specification of how to do something (e.g., an algorithm). Reasoning knowledge tells us what conclusion is acceptable when a given circumstance exists (e.g., a set of rules). A processor has these three types of knowledge at its disposal for use in recognizing and solving problems, as it seeks competitive advantage or superior performance. A processor operates with them when striving to find opportunities, challenges, disturbances, threats, and other problems. It also operates with the three types of knowledge when striving to cope with what has been recognized and to solve open problems – all in the interest of greater organization (or individual) effectiveness.

**Conduct of Knowledge Management**

The conduct of KM within an organization involves an integration of knowledge (i.e., conveyed by usable representations), processors that operate on that knowledge, and processes that organize the actions of processors and availability of knowledge. As we shall see later, the parameters P1, P2, ... Pn, are concerned with the operations that processors perform and the processes that guide
and influence them. The conduct of KM can be seen as episodic, with each episode involving some collection of processors, executing some configuration of operations on available knowledge resources, triggered by the intent to satisfy a knowledge need or opportunity, subject to schematic constraints and a variety of influences. The outcome of a successful episode is that learning has occurred – by virtue of the sensed need being satisfied or opportunity being examined.

What kinds of needs can arise in an organization’s quest for effectiveness? One clue to answering this comes from the analytics field, where we find the SPED taxonomy of problems (Holsapple et al. 2014): Sense-making problems, Prediction problems, Evaluation problems, and Decisional problems. Solving any of these kinds of problems is a knowledge-intensive effort, suggesting a SPED taxonomy for recognizing and solving problems in knowledge management episodes: Sense-making episodes, Prediction episodes, Evaluation episodes, Decisional episodes.

Now, when it comes to using KM to implement an organization’s competitive strategy, what can an organization do in its conduct of knowledge management to gain an edge relative to its competitors? Based on the foregoing discussion, several possibilities emerge:

- Build and maintain a superior knowledge base available to its processors – superior in the sense of relevance, importance, volume, variety, currency, organization, accuracy, security
- Develop a superior processor base – superior in the sense of a suitable mix of human and machine processors that can squeeze high value out of available knowledge resources
- Devise superior processes – superior in the sense of excelling in deployment and coordination of knowledge processors, in making knowledge resources available, and in learning from experiences
Integrate the utilization of a knowledge base, processors, and processes for superiority in episodes of:

- Sense making
- Predicting
- Evaluating
- Decision making

Each checkmark suggests a KM aspect that may be worthy to audit, in search of deficiencies or underperformance relative to competitors. Each also suggests a focal point for experimentation with creative ways that may result in greater success for the organization.

As for the SPED episodes, each involves a KM process that applies some mix of descriptive-procedural-reasoning knowledge and some assortment of knowledge processors to deal with a problem of making sense of a situation, or making a prediction for a situation, or making an evaluation of a situation, or making a decision about addressing a situation. In the interest of organization effectiveness, we should strive for episodic effectiveness – both within individual episodes and across the interplay among an organization’s knowledge-managing episodes. Episodic effectiveness can be examined from two angles: outcome and process. In the effective conduct of KM, efforts are mustered to succeed in producing superior outcomes via superior processes.

**Superiority and the PAIR Model**

Knowledge-chain theory holds that KM can be practiced in ways that contribute to competitiveness; further, it advances the PAIR model of competitiveness, which identifies four directions in which KM can contribute: Productivity, Agility, Innovation, and Reputation (Holsapple and Singh 2001). In pondering “superiority” of KM outcomes or processes, the PAIR model is suggestive of four dimensions to consider:

- Productivity, which refers to a ratio of acceptable output to expended input.
Agility, which refers to a combination of alertness with response-ability.

Innovation, which refers to invention and adoption.

Reputation, which refers to perceived degree of dependability, integrity, quality

Each of these is a potential avenue toward competitiveness. That is, in its quest for success, an organization can build its competitive strategy around one or more of these four dimensions, and attune its knowledge management conduct toward implementing that strategy. As an example, an organization’s competitive strategy may be to have superior agility relative to its competitors – expanding its customer base by cultivating a high alertness to emerging customer needs and preferences, while also developing and executing fast responses.

Both process and outcome of a KM episode (or KM initiative involving multiple episodes) can be examined in terms of the PAIR dimensions. This results in the eight cases shown in Table 1. The top row distinguishes between a productive process (e.g., lean or efficient), an agile process (e.g., rapid awareness and response for disruptions), an innovative process (e.g., deviates into new approaches), and a reputable process (e.g., adheres to high standards of rigor, integrity, dependability, quality). KM process-superiority along any one (or several) of the PAIR dimensions can be regarded as a kind of KM success and, all else being equal, translates into a higher competitive standing for the organization.

Table 1. A PAIR examination of KM process and outcome

<table>
<thead>
<tr>
<th>KM process</th>
<th>Productivity</th>
<th>Agility</th>
<th>Innovation</th>
<th>Reputation</th>
</tr>
</thead>
<tbody>
<tr>
<td>KM outcome</td>
<td>Knowledge that aids organization’s</td>
<td>Knowledge that aids organization’s</td>
<td>Knowledge that aids organization’s</td>
<td>Knowledge that aids organization’s</td>
</tr>
</tbody>
</table>

| KM process | Productivity of a process that makes sense, predictions, evaluations, or decisions about a situation | Agility of a process that makes sense, predictions, evaluations, or decisions about a situation | Innovativeness of a process that makes sense, predictions, evaluations, or decisions about a situation | Reputability of a process that makes sense, predictions, evaluations, or decisions about a situation |
| KM outcome | Knowledge that aids organization’s | Knowledge that aids organization’s | Knowledge that aids organization’s | Knowledge that aids organization’s |
The bottom row in Table 1 is concerned with the effects of a KM process on the state of an organization’s knowledge. It distinguishes between knowledge that allows or fosters higher productivity for the organization (e.g., less waste, higher production rate, less cost per unit, greater efficiency), higher agility for the organization (e.g., better able to cope with disturbances – recognizing them early and responding to them rapidly), higher innovativeness for the organization (e.g., better able to develop and apply new ideas), and higher reputation for the organization (e.g., boost perceptions of organization as being trustworthy, ethical, and a provider of quality goods and services). Superiority of KM outcomes along any one (or several) of the PAIR dimensions can be regarded as a kind of KM success and, all else being equal, translates into a higher competitive standing for the organization.

**Parameters**

If a knowledge management process, within or across episodes, can be an important aspect of organization effectiveness, then it behooves us to understand the kinds of components that can serve as building blocks for constructing that process. Generally, a process is a systematic arrangement of activities for making something. In the KM case, we are making knowledge that satisfies a need for a sensible account of a situation, for a prediction about a situation, for an evaluation of a situation, or for a decision concerning a situation. What are these activities – these basic classes of components – that can be integrated into a KM process? This is an important question because its answer reveals parameters that can be set, instantiated, tailored, or adjusted.
in search of KM success for a given resource bundle (FR), a set of definitional principles (DP), and environing conditions (EC).

The answer we examine here borrows from the knowledge chain theory, which identifies nine classes of KM activity (Holsapple & Singh 2001). We contend that each serves as a parameter (P1 – P9) in the organization effectiveness equation. Five of them are first-order activities, meaning that each operates directly on a knowledge resource, manipulating it in a fashion that is functionally distinct from the other four knowledge chain activities. The five are:

- **P1 – Knowledge acquisition**: an activity in which a processor(s) identifies knowledge in the organization’s environment, captures it, and makes it available in a suitable representation for transference to other KM activities. The knowledge source may require some compensation or commitment from the processor as a condition for identification and/or capture.

- **P2 – Knowledge assimilation**: an activity in which a processor(s) alters an organization's knowledge resources, resulting in learning. The alteration may be additive, eliminative, revisionary, or a restructuring of how the resources are organized. The processor filters, screens, and cleans the knowledge being assimilated. Assimilation includes targeting which knowledge resources are to be altered (e.g., those of a community of processors vs. a central repository), structuring knowledge into representations appropriate for the targets, and transferring these representations to their targets.

- **P3 – Knowledge selection**: an activity in which a processor(s) identifies knowledge within an organization’s existing base of knowledge resources, captures it, and transfers it in a
suitable representation to a KM activity that needs it. The organization may require some kind of security clearance by the processor as a condition for identification and/or capture.

✓ P4 – **Knowledge generation**: an activity in which a processor(s) derives or discovers knowledge in the context of existing knowledge resources, and transfers this generated knowledge in an appropriate representation to an appropriate activity. The generation results are problem definitions or problem solutions – with the problems belonging to the classes of sense making, prediction making, evaluation making, and decision making. The processor relies on available selection and/or acquisition activities to furnish the knowledge it needs. Procedural and/or reasoning knowledge is especially important in guiding or driving the generation activity. The processor also relies on its own innate skills for creating, synthesizing, analyzing, assembling, and organizing.

✓ P5 – **Knowledge emission**: an activity in which a processor(s) projects some portion of an organization’s knowledge, through an appropriate representation, into a targeted element(s) of its environment. The activity of emitting knowledge occurs subject to security constraints. The target may provide some compensation or make some commitment to the organization as a condition for emitting knowledge.

When considering how to make an organization more effective, the foregoing parameters suggest five levers that are in play. For any specific organization, there is considerable flexibility in the treatment of the five activities. For instance, which processors are involved in which activities and when, and in what episodes? What processor roles are machine-based, which are human-based, and which are hybrid processors? What protocols regulate the flows of knowledge and behaviors of processors assigned to implement one of the activities? Answers to such questions
amount to settings or instantiations for parameters P1-P5. Some will lead to greater success for a KM initiative than others.

We do not advocate a particular setting for any of the five parameters, as the settings are situation-specific. For a given set of resources (knowledge, human processors, machine processors, financials), a given environment, and a set of defining vision, mission, and values, a “good” instantiation of an activity may be “poor” under different circumstances. Here, the emphasis is on drawing attention to, and systematically characterizing, the activities that must play out in knowledge work. Their instantiations may be left to serendipity or they may be intentional, studied, and adjusted over time – with an objective of learning those that are more likely to lead to high levels of organization performance and competitiveness.

In addition to the five foregoing parameters, there are four second-order activities. Primarily, these function as managerial influences on the conduct of knowledge management within and across KM episodes. They are concerned with shaping KM processes and securing efforts from processors engaged in the knowledge work. They are more-managerial activities than those of the first order, which are more focused on manipulating knowledge in various ways. The second-order parameters are:

✓ P6 – **Knowledge measurement**: an activity wherein a processor(s) gauges the state of knowledge management within an organization. Specifically, it takes measurements (quantitative and qualitative) of the organization’s

- knowledge resources
- knowledge processors
- first-order activities
- second-order activities
- knowledge management episodes
- overall conduct of knowledge management
These measurements form a scorecard, indicating where an organization is and has been with respect to knowledge management.

✓ **P7 – Knowledge control:** an activity wherein a processor(s) strives to ensure that needed knowledge resources and processors are available in sufficient quality and quantity for executing other KM activities, subject to security requirements being satisfied. Because an organization’s resources are not unlimited, it may not be possible to have all processors and all knowledge that could conceivably be needed, in which case, the control activity strives to maintain a workable mix in the volatile face of dynamic situations. Results of knowledge measurement are instrumental to the exercise of knowledge control and, in turn, track the effects of knowledge control activity.

✓ **P8 – Knowledge coordination:** an activity wherein a processor(s) manages dependencies among the nine KM activities, the knowledge resources, the knowledge processors, KM processes, and KM episodes. Whereas the knowledge control activity strives to ensure proper availability (realizing there can be some shortages or deficiencies, due to resource constraints), the coordination activity is concerned with the connections among what actually are available. It can be regarded as dealing with mappings such as the assignment of specific processors to specific instances of KM activities, of a sequence of these activities to an episode, of particular knowledge and an arrangement of episodes to a process, and so forth. It can also be regarded as establishing current infrastructure (i.e., defining the roles that processors play, the authority and communication relationships among those roles, and the regulations that govern processor behaviors).
P9 – **Knowledge leadership**: an activity wherein a processor(s) strives to create circumstances that allow or encourage other knowledge processors to be highly effective in accomplishing the organization’s knowledge work. Just as knowledge coordination is concerned with the infrastructure for knowledge work, knowledge leadership is concerned with the culture for knowledge work. Aligned with an organization’s vision, mission, and values, the processor(s) engaged in knowledge leadership develops a culture conducive to extracting maximum efforts from the organization’s knowledge processors. The processors become imbued with an attitude that knowledge work is vital to the organization’s success. To facilitate this, the knowledge-leadership activity can create experiences for KM processors that lead to a joint conviction that there are superior ways to do knowledge management and that all need to participate in discovering or creating them.

As with the first five parameters, there is considerable flexibility in treatment of the four additional parameters. For example, one instantiation of the knowledge coordination parameter may involve a market mechanism for making processor assignments, whereas an alternative may rely on applied heuristics, and yet another on prioritized resource allocation. Or, for the knowledge control parameter, the preferred instantiation may differ, depending on whether the processor is human or computer-based. Or, for the knowledge measurement parameter, criteria for assessing processor performance can vary. How the second-order activities are instantiated in an organization will contribute to establishing the “way” in which it performs KM. This “way,” in turn, affects the degree of success for KM initiatives.

Because settings for second-order parameters are likely specific to the “givens” of the situation faced by a firm (recall the equation for E), we do not advocate a particular setting for any of them.
For a given set of resources (knowledge, human processors, machine processors, financials), a
given environment, and a set of defining vision, mission, and values, an instantiation of a second-
order activity that is “good” for one organization may be “poor” for another. As with the first-order
parameters, our emphasis is on drawing attention to, and systematically characterizing, second-
order activities that must play out in knowledge work. Their instantiations may be left to
serendipity or they may be intentional, studied, and adjusted over time – with an objective of
learning those that are more likely to lead to superior levels of organization performance and
competitiveness.

Conclusion

Summarizing, there is evidence, from many anecdotes and from scholarly studies, that knowledge
management can be performed in ways that predict superior organization competitiveness or
performance. What are those ways? One might be to assemble a superior set of computer-based
and human knowledge processors. Another might be to assemble a superior base of knowledge
resources. Here, we investigate another possibility: perform knowledge management activities in a
superior way. A starting point is to identify the classes of KM activities that are operative regardless
of the organization, its array of processors, its resource portfolio, or its environment. Here, we
describe a collection of nine generic activities, each one of which can be instantiated in multiple
ways. Thus, each of the nine serves as a parameter for a conditioned function that indicates the
degree of organization effectiveness.

The parameters provide a mental framework for thinking about the relationship between
success and the conduct of knowledge management. The nine parameters form a checklist for
auditing how KM is being done in an organization, for systematically formulating new KM
initiatives, for studying how to improve an organization’s practice of KM, and for avoiding blind spots in a search for avenues to KM success. By calling attention to the nine parameters, we seek to stimulate and provoke research into enumerations of feasible instantiations for each, effects of such instantiations on KM success, and prudence of instantiation alternatives in varying conditions. Ultimately, this may lead to a “playbook” that recommends what instantiations are well-suited for the conditions in which an organization finds itself.

References


