Business Value of Knowledge Management: 
Return on Investment of Knowledge Retention Projects

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ABSTRACT

The impacts of current economic conditions, organizational downsizing, internal and external terrorist attacks, as well as a reduction in personnel through retirement, resignation, or death have increased recognition of the importance of managing corporate knowledge. This recognition has reinforced the concept of Knowledge Management (KM). Although the business value of Knowledge Management continues to be debated, it is evident that organizations need to manage their valuable corporate knowledge from a practical standpoint. While some companies report substantial benefits from KM, others report that KM has not had an impact on the bottom-line. The need for a systematic investigation of the impact of KM has become increasingly essential. An investigation of the relationship between measuring the impact of KM on the facets of business value is reported in this research. The results suggest that KM investments in different types of knowledge retention projects have begun to show positive results with respect to the organization.

Keywords:  
Business Value  Knowledge Harvesting
Competitive Advantage  Knowledge Retention
Intellectual Assets  Return on Investment
Knowledge Management

ISRL categories:  
AC04, AI, FA, DA08, IB01, EI
It has been claimed that an organization’s most valuable resource is its knowledge. Many researchers and practitioners agree that Knowledge Management (KM) must be defined in terms of business objectives. Once these goals are defined, organizations can determine what corporate knowledge should be harvested, organized, managed, shared and measured. “Successful KM begins with hard decisions about what knowledge is worth managing” (Rossett & Marshall, 1999). Although the business value of Knowledge Management continues to be debated, it is evident that organizations need to manage their valuable corporate knowledge from a practical standpoint. Organizational resistance to KM efforts is attributed to the lack of evidence that KM implementations are effective and can be measured, resulting in a positive impact to the bottom-line. The difficult question, however, remains of how to measure this valuable resource.

Organizations continue to be perplexed as they search for a methodology that can be used to assess the effectiveness of KM within the organization. Successful KM programs can demonstrate clearly defined links to bottom-line business benefits. Therefore, it is essential that managers establish a substantive method to measure the return on investment of KM. This study addresses the issue of KM effectiveness by proposing a methodology that demonstrates a quantifiable and substantial return on investment of knowledge retention projects within the organization.
BACKGROUND

A manager’s major concern should be centered on the knowledge required to perform the organization’s critical processes and tasks, while attempting to facilitate improvement and change as well as evaluate KM impacts within the organization. Organizations, recognizing this need, are now striving to establish knowledge management measurement systems to reveal the impact of KM in the dynamic business environment. Furthermore, a principle value of communication is to establish a way to improve knowledge transfer or sharing (Nonaka & Takeuchi, 1995; Davenport & Prusak, 1998); thus, an effective KM plan must address organizational memory management. The lack of effective management of knowledge could be because most organizations are still struggling to comprehend the KM concept (Holsapple & Joshi, 2002); therefore, managers must analyze and understand the workflow and business process of the organization to effectively manage the intellectual assets of the company, (Bixler, 2002).

Knowledge Management

“Knowledge Management (KM) is the discipline that focuses on capturing, organizing, filtering, sharing, and retaining key corporate knowledge as an asset” (McManus & Snyder, 2003, p.89); while "managing the leadership, organization, technology and learning aspects of internal and external intellectual assets through retention and collaborative sharing of knowledge for the purpose of improving performance and inspiring innovation throughout an enterprise" (Bixler, 2002, p. 18). KM is a practice that finds valuable information and transforms it into necessary knowledge critical to decision-making and action by integrating techniques from the
fields of organizational learning, performance management, and quality management (Kirrane, 1999).

Institutionalizing knowledge sharing and implementing systems to capture valuable knowledge are examples of KM-oriented activities. Knowledge retention is one type of KM activity. For example, human resource professionals or knowledge management personnel may perform these retention actions. HR-oriented knowledge retention activities may include career succession planning, managing phased retirements, contracting with consultants, reinventing the recruiting process, and outsourcing. A KM system must be implemented to capture and retain the knowledge gained from these activities. The relationship between managing organizational improvement and conducting retention projects can be achieved by applying the knowledge harvesting process, as illustrated in Figure 1.

Knowledge Harvesting

Knowledge Harvesting\(^1\) is a mature methodology for rapidly converting top-performer expertise into knowledge assets that improve the organization’s performance. User organizations are protected from knowledge degradation resulting from personnel losses, employee defections, and unavailability of needed experts at the right time and place. These knowledge assets also contribute to corporate competitiveness, profitability and valuation. The examples cited in this research are knowledge retention

\(^1\) Knowledge Harvesting is a registered trademark of Knowledge Harvesting Inc.
projects, which employed Knowledge Harvesting as the approach for eliciting and organizing vital know-how.

Knowledge Harvesting is an integrated set of processes whereby the hidden insights from top performers are converted into specific, actionable know-how that is able to be transferred to thousands of employees via software (Snyder & Wilson, 1998). The Knowledge Harvesting (KH) Framework presented in Figure 2 depicts this process (Snyder, Wilson & McManus, 2000).

The KH framework can assist managers in their efforts to harvest and preserve essential knowledge surrounding the organization’s key processes. The first step, **Focus**, is to determine the existing explicit knowledge and implicit (tacit) knowledge that is needed for the focal process. The second step consists of finding top performing people and their critical activities. Once identified, an understanding of these activities will be **elicited** from the key individuals. The activities of the top performers are **educed** and logically mapped in the knowledge harvesting process.

The knowledge must be arranged in an organized coherent or systematic form. The determination of how to properly **package** the knowledge so that it can be available when and where needed is a necessity. These knowledge processes are recorded in a database that is accessible through a software package. **Sharing** allows for the distribution of captured knowledge throughout the organization to individuals or groups that may require this relevant information. The purpose of a KM system is to allow people other than the key players to use or apply the same decisions rules; thus,
employees can seek assistance from the database of knowledge that has been gained and stored from the experts of the organization. **Evaluation** must be performed in order to determine the effectiveness of the applications. The KM system must incorporate the ability to adapt to new knowledge so that it can be refreshed. By instantly recording all input information generated during the learning sessions, these processes increase the organization’s ability to make effective use of all harvested know-how.

Although organizations view knowledge as one of the most important assets, it is typically recorded as an expense, (Grayson, 1996). “Since managers are interested in capturing relevant knowledge about the key processes of their firms, it is now apparent that this should be part of the strategic goals of the company” (Snyder, Wilson & McManus, 2000). It has been argued that KM is the process through which organizations extract value from intellectual assets; thus, investments in KM should create business value. While many organizations are discussing the value of KM systems, few have determined the best methodology to measure this perceived value. The proposed methodology in this research provides a means of calculating the economic benefit of knowledge retention projects.

A review of the literature suggests that there have been numerous attempts at quantitatively measuring knowledge capital; however, intangible knowledge within the organization is very difficult to measure. The purpose of this research is to extend the first step of the KM process, with a priority on developing an effective measurement strategy for calculating return on investment.
KNOWLEDGE RETENTION PROJECTS

A well-defined KM process should provide a foundation for the organization to understand its knowledge resources and activities, resulting in a defined method of organizational measurement. To extend the first step, Focus, of the KM framework, Figure 3 depicts the three aspects of measuring KM value for organizational projects; specifically knowledge retention projects, through project documentation.

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Insert Figure 3
About Here

Project Plan

Project plans provide the design and scope necessary to define the requirements needed for the work process. The plan includes steps for documenting, implementing, and maintaining the KM system, with an emphasis on structure and return on investment indicators that are accepted by the stakeholders.

“Discussing the usefulness of a project plan is a first step in managing free-wheeling employees and a project plan is an investment of time and money. If a manager decides to use a plan, reviewing the project variables will help provide ideas on the best project plan mechanics to use to control the project.” (Rosenwinkel, 1995).

For the knowledge harvesting process, project plans should be aggregated into three-month groups and should always be determined prior to measuring ROI. These project variables can be broken down into people variables and project variables. (Rosenwinkel, 1995). The project plan will have a milestone schedule, project-costing information, and responsibility lists. It is our contention that the project plan is prepared prior to knowledge harvesting and specifies the measures required to report ROI.
**Value Proposition**

Value proposition states how KM can help the organization achieve its goals better, faster, or cheaper. Value is considered to have worth in usefulness or importance to the possessor. In determining the best methodology for assessing the value of KM, managers must consider measurable process improvement, cost savings, business enablement, and risk reduction. We focus on measures of process performance as the best place to demonstrate the efficacy of KM.

A knowledge project should focus on a specific business problem that can be quantified, in terms of what the problem costs the company. The measurement for value is the most important thing. A knowledge management strategy based off of a fact-based business case that shows it will create value for the organization is vital, (MacSweeney, 2002, p. 44).

"Value is often associated with some form of measurement. Today we have slowly learned to value immeasurable things like knowledge but to value even more intangible things like tacit knowledge is unusual “(Haldin-Herrgard, 2000, p. 362). It is our contention that the impact of knowledge is measurable and the impact of elicited tacit knowledge (implicit) should be measurable.

**Return on Investment (ROI)**

Return on Investment (ROI), a traditional financial measure, has been identified as a financial indicator for measuring KM. The problem for measuring productivity for knowledge workers is that much of their output is intangible; hence, surrogate measures may be misleading. Performance measurement provides the organization with a “device through which to focus and enunciate accountability” (Sharman, 1993) and “an objective, impersonal basis for performance evaluation” (Sloma, 1980).

A recent study reported “that only a very limited number of organizations have a mechanism to track the return on investment in knowledge-based competencies or related intangible assets” (Chong, Holden, & Schmidt, 2000).
Measurement techniques should be applied to develop a method for generating a class of information that will be useful in a wide variety of problems and situations (Zairi, 1994). Some firms attempt to measure KM by estimating the value of the tangible assets, such as software or trained employees. Traditional financial methods, such as economic value added, total cost of ownership or balanced scorecard may be very effective with measuring tangible assets, but not intangible assets. Until organizations determine an effective way to measure their intangible KM benefits, they will continue to have constraints that will prevent the adoption/proliferation of the KM process. Therefore, we present a methodology to measure the impact of elicited tacit knowledge; specifically, return on investment for knowledge retention projects.

STAGES OF RETURN ON INVESTMENT METHODOLOGY

Since measuring knowledge is vital to organizations, it becomes a tool that can be utilized to evaluate, control, and improve existing systems. “Organizational culture is increasingly recognized as a major barrier to leveraging intellectual assets. Knowledge ultimately assumes value when it affects decision making and is translated into action” (DeLong, 2000, p. 126). Although many executives would agree that implementing KM practices is logical and valuable to the firm, they are faced with continued request to generate a financial report of the success of the knowledge retention projects. It is not uncommon for senior managers to focus their attention on the ROI when deciding if a project should “stay or go”. Thus, executives are more willing to calculate bottom-line impact and deliver a dollar-value (ROI) for managing knowledge. “It is argued that firms unable to manage knowledge assets will be increasingly uncompetitive in the future business environment. However, the culture must adapt to
the new environment or else the ROI will indeed not support the business case (Nash, 2002). It is important that everyone involved define ROI in the same way, while understanding the limits of the concept when used to support business decisions. Specifically, for this research, we define ROI as the percentage return made over a specified period of time as a result of investing in a knowledge retention project. Many organizations have a misconception that a knowledge retention project will not indicate positive financial results for years; however, the problem that should be addressed is the appropriate metrics for measuring ROI for knowledge retention projects. As illustrated in Figure 4, a four-stage approach for measuring return on investment is presented. The brief description of the four stages is followed by a detailed analysis of the orientation component of the definition stage, which is the focus of this research.

Definition Stage

The definition stage identifies the requirements of the project. A description of the situation will be created by eliciting information from stakeholders concerning the expected results of the proposed project. Questions will be posed to the stakeholders: “What are the driver/signals for this project; what do you expect to be delivered from this project; have you initiated similar projects in the past; and what is the orientation of the project?” The purpose of this task is to explicitly understand and document the reason for existence of the upcoming project; hence, identify the work requirements. In order to accomplish this task, apparent traits will surface that are specific to the project and will
aid in determining the best orientation for this project. During this stage, the value proposition will be created; thus, a review of the project plan is necessary to confirm the requirements set forth by the stakeholders.

**Cost Analysis Stage**

The cost analysis stage determines the costs associated with the knowledge retention project. This analysis is considered the easiest task of measuring ROI; however, it can be difficult to estimate time. The developmental labor, training costs, maintenance labor, and cash outflows associated with plant, property and equipment must be considered in this stage. Labor will be consistently divided into three categories: consultants, dedicated full time employees and dedicated part-time employees. Costs for training employees, which include compensation for trainers and training materials, must be considered. In addition, maintenance labor is the labor required to annually evaluate and adapt the knowledge asset, which may include software and hardware upgrades. Finally, any cash outflows associated with plant, property and equipment should be included in the cost analysis stage.

**Benefit Analysis Stage**

The benefit analysis stage determines the non-cash benefits. Stakeholders must answer questions: “Will you deploy the knowledge asset in phases; do you expect to receive more than one payment; or do you expect equal payments?” It is important to determine if the organization will redeploy or reduce personnel or equipment. Some non-cash benefits that would be generated from a knowledge retention project would include efficiency, such as reducing the number of customer support calls. In addition, providing free training and/or certification to customers, partners, and suppliers, which
could result in delivering more revenue-generating courses to more customers. Finally, shorter time to product deployment by shrinking training time, re-training for growth and turnover, and increase productivity time on the job. In this stage, the organization can measure intangible and tangible non-cash benefits.

The Computation Stage

In the computation stage, the stakeholders must determine what financial results can be calculated from the implementation of the project. They want to calculate cash inflows, and cost of capital. Traditional measurements would include return on assets (RONA), free cash flow (FCF), earnings before income tax (EBIT), return on investment (ROI), and net present value (NPV). It is recommended that the stakeholders create a list of candidate measures, create baselines and target measures, and determine specific details about each measure. As the stakeholders apply these measurement techniques to their projects, they will have a basis for comparison such that differing types of projects can be compared and contrasted.

The four stages of ROI are valuable to all knowledge retention projects and should be given careful consideration when initiating a new project. However, the broader realm of the four stages is beyond the scope of this paper. Instead, we focus on one component of the definition stage. Specifically, this study will focus on determining the orientation of a proposed knowledge retention project.

DEFINTION STAGE: DETERMINE ORIENTATION

In the orientation phase of the definition stage, the stakeholder must explain the rationale for the project. In order to design an effective measurement system, we contend that a process orientation should be taken from the beginning to find concrete
measures. Managers of critical company processes typically have well-established
measures of those processes and monitor them on a periodic basis. We will present six
orientations for the stakeholder to consider: efficiency, productivity, risk mitigation,
revenue, optimization and agility/ adaptability/ innovation. The following questions
represent the six orientations respectively:

- Are you trying to “move” work from one group to another in order to reduce or
  avoid cost?
- Are you trying to improve the overall level of productivity of the group?
- Are you trying to minimize risk associated with brain drain?
- Are you building a new product in order to increase or protect revenue?
- Are you trying to optimize human, technology and physical assets?
- Are you trying to enhance agility/ adaptability/ innovation?

A detail description of each orientation, presented in Table 1 and the knowledge
harvesting work presented in Table 2, is discussed in the following section.

Furthermore, the variability of ROI\(^2\) is presented in Table 1. The items were scored by
assigning a numeric value to each possible answer (e.g., narrow = 1; wide = 10).
Narrow represents high level of certainty that the project will report a specific ROI, with
limited variation. For example, an efficiency-oriented project has the potential of having
an ROI of 6:1, with minor variability. On the other hand, wide represents a high level of
uncertainty, with significant variability.

\(^2\) Return on Investment (ROI) can be calculated by using the following formula: \((\text{Total Benefit} - \text{Total Cost}) \div \text{Total Benefit}\)
Efficiency

Efficiency has been defined as the ratio of effective or useful output to total input of any system, with a goal of minimizing wasted time and effort. Managers seek efficiency when requesting that existing work be performed at lower costs or requesting a budget decrease of 14%, while maintaining the same level of output. Organizations continue to be challenged by the decision to either produce the same quality of work at a lower price or outsource the work to save money.

A knowledge retention efficiency-oriented project is one that yields the same amount of work with less cost and less time. The purpose of this project is to enhance operational efficiency and diminish the cost per transaction, while moving work from a high-cost group to a low-cost group. Typically, the low-cost group lacks a baseline process; thus, the goal is to get the process right or “doing the thing right”. An example of this orientation would be to move a highly technical expert to a service center. The captured expertise can be disseminated to the service center representatives; thus, every employee in the service center should be able to solve routine problems.

In the efficiency-orientation project, knowledge harvesting is primarily focused on guidance and support information. Guidance information is captured down to the lowest level of abstraction, which provides all target learners/performers with explicit know-how about accomplishing the requisite work. In addition, the typical ROI for the efficiency-oriented project can be estimated as a ratio of 6:1. In other words, is the stakeholder willing to spend one dollar today to potentially make six dollars tomorrow.

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3 Support information helps a learner achieve understanding by delivering information such as basic definitions and purpose statements.
4 Guidance provides information for taking action. Guidance is also known as advice, coaching, how-to information, counsel, directions, instructions, methods, procedures, processes, prompts, explanations of the work, protocol, techniques, and tutoring. Four levels distinguish guidance: process, sub-process, task and element.
Productivity

Productivity is defined as having the power to produce; specifically, the rate at which goods and services are produced especially output per unit of labor. When focused on productivity, the unit of measure is expressed “in time.” Managers realize that they must improve the productivity of their core competency, which is the most important work they can perform. They continuously strive to build on their strengths, with a target goal of ruling the market associated with their specific focus. Otherwise, failure to adequately perform critical activities of a process could jeopardize the entire business and make the organization vulnerable in the marketplace. Although capable stakeholders are available to perform a process, they have difficulty achieving excellent (expected) results (outcomes) or raising their performance level to a competent/expert level.

A knowledge retention productivity-orientation project is one in which the same amount of effort yields more work results. The purpose of this type of project is to improve the overall productivity and facilitate knowledge transfer in order to extend the abilities of others. The goal is to improve the overall average of productivity; thus, target learners are doing the same job, but better. In this orientation, the strategy is work effectiveness, while lowering cost per unit and increasing margin. A knowledge retention project strives to increase the intellectual specialization within the organization, by getting the right process or “doing the right thing”. An example of this orientation would include a more effective troubleshooting process, whereby, one person can perform the task originally requiring three to five individuals. The resulting benefit of this process is to create a knowledge matrix with individuals who have differing perspectives on
different aspects of the problem. In the productivity-orientation project, knowledge
harvesting is primarily focused on signals\(^5\) and guidance levels two and three. Finally,
the typical ROI for the productivity-oriented project can be estimated as a ratio of 10:1.

**Risk Mitigation – “Brain Drain”**

Risk Mitigation or “Brain Drain” is a term used to describe the gradual depletion
of intellectual power within the organization. This would be indicative of a gradual
diminution or drain on the resources of organizational knowledge. Corporations often
experience a natural reduction in personnel through retirement, resignation, or death.
When this natural attrition occurs, the “keepers” of the process or knowledge leave the
company increasing the risk of losing valuable knowledge. The company must
immediately address not only where the expertise loss occurs within the organization,
but also the staffing deficiency resulting from downsizing, merger/acquisitions and
attrition. Experts in these processes may prove difficult to locate or unavailable for
consultation. It is imperative that companies stop reinventing the proverbial wheel, by
creating a corporate memory to preserve vital knowledge.

A knowledge retention risk mitigation orientation project is defined as the gradual
depletion or complete loss of valuable knowledge that is essential to the success of the
organization. The primary purpose of this orientation is to sustain the current level of
productivity and mitigate any risks associated with employee migration. It has been
estimated that when companies are faced with “brain drain”, the average cost of
turnover is 1.5 times the annual salary of the job. On average, it takes 13.5 months for

\(^5\) Signal is a type of information that delivers contextual cues. It may be an issue, issue symptom,
contextual or situational variable, environmental influence, stimulus, cause, influence, event, experience,
perceptible or imperceptible trigger, change variable, unique circumstance, antecedent, or condition.
new employees to maximize their efficiency. Therefore, the goal is get a new employee
to perform the prior employee’s workload in less time. The sacrifice of efficiency and
effectiveness are results of the loss of a valuable employee.

One example would include a stakeholder group. As long as the stakeholder
group remains stable and relatively small (2-4 people), memory of the group's process
knowledge, decisions, actions, and rationales resides in the personal long-term memory
of the individuals. Individuals take with him/her the unique perspective of the group's
process knowledge that was stored in personal long-term memory; thus, difficulty arises
when someone leaves the original group and is replaced by a new person. If the entire
composition of the group turns over, eventually there is no one left who holds long-term
memory of the process, the group's history. The result is "brain drain" for the
organization. Therefore, human long-term memory is undocumented, and does not
become an organizational asset until after it is harvested and crafted into a knowledge
asset.

Knowledge harvesting work is equally focused on capturing support
information, signals and guidance. This focus coincides with the probability that new
performers have not been placed in the deficient work area; thus, the most extensive
set of information is needed. Brain Drain is similar to the productivity scenario. It is
necessary to determine if the work should be done; as well as, determine the
appropriate time to move from the baseline to the expected performance level. In
addition, the ROI for a brain drain-orientation project is estimated at a ratio of 10:1.
Revenue

Revenue has been defined as yielding a return on investment. It is the return produced by a particular source. The company must generate additional revenue by creating new products that leverage and integrate the product’s functional uses and the customer’s requirements. Organizations attempt to differentiate their product/service in the marketplace by packaging and deploying it to their customers. The most common question to be answered by this type of project, “Where is the cash flow of the organization generated?” In a revenue-oriented knowledge retention project, the answer is knowledge. Thus, the organization is faced with how to externalize the knowledge and embed it into the new products.

A revenue-oriented knowledge retention project is one that applies Knowledge Harvesting as the means to capture know-how that will be used in a commercial information product, intellectual property, or a new product in which its major attribute is the embedded guidance. Revenue-oriented knowledge retention project managers strive to achieve the same goal of differentiating products and adding value by packaging and deploying their captured knowledge and process to their customers. The purpose of this orientation is to increase sales, while creating a new source of revenue. Usually, this happens in the context of product development. As a result of Knowledge Harvesting, a next-generation product using codified know-how as the foundation for differentiation will be produced and can best be illustrated in software.

For example, between 1993 and 1996, the American Society for Quality Control (now named, American Society for Quality) partnered with LearnerFirst to produce a series of
electronic performance support systems. These PC Windows applications were distributed to over 4,000 companies and created over $1,000,000 in total revenues.

Implicit-to-explicit knowledge that has been embedded into software makes the knowledge tangible, accessible, transferable, and saleable. Software on non-proprietary subjects has value and can be sold, licensed or traded to other organizations. Software programs and sub-modules can be mixed, matched, aggregated, and divided into similar but unique programs. E-commerce provides the ideal marketplace for software knowledge assets, while ascribing monetary values and making it possible for these assets to be included on corporate balance sheets.

Since the codified information will be sold or licensed, Knowledge Harvesting is equally focused on capturing support information as well as level-two and level-three guidance. This is due to the likely need that the producer will not be able to exactly assess nor predict the proficiency levels of the target performers. In addition, the ROI for the revenue-orientated project is estimated at ratio of 12:1.

**Optimization**

Optimization is the procedure used to make a system or design as effective or functional as possible. Stakeholders for this process work in more than one department, which has the potential of misalignment in implementing the process. They must address the barriers and obstacles, associated with this process, within the organization. Since there are distributed groups of professionals, there is a significant need to minimize the negative implications of growth.

Optimization-orientated project managers seek to establish a process that provides positive outcomes, while promoting the growth of the business. Optimization-
orientated projects seek to enhance outputs from several inter-related processes and thereby promote the growth of the business. The purpose of the project is to create a model that captures the dynamics of a plant, organization, or significant sub-organization. In the optimization-oriented project, knowledge harvesting work is focused on eliciting signals as well as level-two and level-three guidance. The ROI on this scenario is estimated as a ratio of 12:1.

Agility/Adaptability/Innovation

In this orientation, three components must be considered: agility, adaptability, and innovation. Agility can be defined as being quick or alert, such as an agile mind; adaptability is the ability to change or be changed to fit the circumstances; and innovation is the act of introducing something new. Therefore, this orientation can be characterized as changing quickly to fit the marketplace, while introducing a new product or process. Stakeholders must gain a coherent grasp of the dynamics of rapid changes in the marketplace. Thus, the primary goal may be to create new forms of work, while establishing competitive positioning and marketplace awareness through organizational leadership.

An agility/adaptability/innovation orientation project is one that creates a new process by studying and capturing rapidly changing relevant knowledge. The purpose of this project is to achieve an organizationally significant new approach for fulfilling customer needs or managing the business. Cultural adaptation and change management is required to effectively implement this type of orientation project. In the agility/adaptability/innovation-oriented project, knowledge harvesting work is focused on eliciting signals as well as level-two guidance. The ROI on this scenario is difficult to
estimate, because the project may be extremely successful with the potential of 100:1 ROI, or may be a failure with a loss. Therefore, we report the estimated ratio as being greater than 12:1, with exceptions as stated above.

It is possible to quantify, qualify and prioritize the ways KM contributes to the bottom line. We suggest that the persons responsible for KM select an appropriate orientation to capture the key processes and potential ROI of the retention project.

**ORIENTATION/SCENARIO CASE EXAMPLES**

The combination of the harvesting process and the best orientation method can significantly reduce time and result in improved performance. Real-world cases, from an international forest products company, are presented to illustrate the application approach of the six orientations.

**Credit Management Case**

In 1999, the forest products company experienced the loss of a senior manager (expert) in the area of delinquency and bad debt management. Due to a serious illness, the manager notified the company that he would be seeking medical treatment and would be leaving in two weeks. The company realized immediately that they had a critical need to capture the expertise of the manager. Two knowledge harvesters gathered information on the financial collection process over a six-week period, including follow-up interviews with the expert after his departure. During the knowledge harvesting process, the knowledge harvesters discovered that the loss of this valuable employee had the potential to negatively impact the efficiency and effectiveness of the department, which is indicative of the risk mitigation, “brain drain” orientation scenario.
The business result of harvesting the expert’s knowledge was a single source for understanding how to manage delinquent accounts and how to respond to bad debt events, e.g., bankruptcy, collections, etc. The final deliverable was an interactive tool that was developed to capture and disseminate the key decisions relating to the management and response to delinquent/bad debt events. The estimated cost of developing the project was approximately $33,000, with a recognized benefit of $150,000. The immediate benefits to the company included not only improved productivity gains due to bad debt management practices being deployed, but also the ability to move forward without replacing the senior manager. The total estimated benefit over a three-year timeframe is approximately $450,000, with a net present value of approximately $334,000. Therefore, the return on investment of this project was approximately 10:1. The company considered this project a success and made the decision to harvest the knowledge of other projects, as illustrated in the next three cases.

**Call Center Case**

Database Systems Services was challenged with maintaining and supporting an increasingly critical Call Center Management tool with only one technical expert. The company realized that they were experiencing a decreasing capacity to grow the Call Center, with a potential result of losing all ability to manage the existing volume. To address this issue, the stakeholders needed to capture the expertise of the technical expert supporting the system. The business result of harvesting the expert’s knowledge provided a single source for running the call center management tool, eGain. The
primary characteristic of this project, enhance operational efficiency and diminish cost
per transaction, indicated that it was an efficiency orientation scenario.

The deliverable captured the expertise from the technical expert and developed
an interactive tool around the key decisions relating to the call center, eGain. The
estimated cost of developing the project was approximately $12,000 with a recognized
benefit of $41,000. The total estimated benefit over a three-year timeframe is
approximately $124,000, with a net present value of approximately $89,000. Therefore,
the return on investment of this project was reported as approximately 6:1. The
efficiency gains from this project would include transferring 60% of the work from a high-
cost employee to a lower-cost employee.

Data Reference Library Case

The company was challenged with maintaining and supporting an increasingly
critical portfolio management tool with two technical experts. At best they would be
faced with a decreasing capacity to add critically needed functionality to a growing
information technology management tool. At worst, they could lose all ability to
maintain the system as it stands today. Therefore, they have a critical need to capture
the expertise of the Senior Systems Analyst supporting the system. The knowledge
harvesting process indicated that this case was an efficiency orientation scenario. The
business result of harvesting the expert’s knowledge provided a single source for
troubleshooting the IT portfolio management tool, Focus.

The deliverable captured the expertise from the Senior Systems Analyst and
developed an interactive tool around the key decisions relating to troubleshooting the
Focus tool. The estimated cost of developing the project was approximately $13,000
with a recognized benefit of $69,000. The total estimated benefit over a three-year
timeframe is approximately $207,000, with a net present value of approximately
$156,000. Therefore, the return on investment of this project was reported at a greater
than expected ratio of 10:1. Since the expert quickly adapted to the harvesting process,
it took less time for the harvester to capture his valuable information; hence, reducing
the time and cost required for the harvesting process.

Troubleshooting Case

Currently, one of the manufacturing plants spends a substantial amount of time
training shop personnel how to troubleshoot their Thermoforming process.
Troubleshooting expertise is distributed among a few process experts with no single
view of the process available. The plant is interested in developing an expert system
not only to solve problems with the thermoforming process, but also to be leveraged
across other Thermoforming process facilities. The knowledge harvesting process
indicates that this case is a productivity orientation scenario. The expected business
result of harvesting the expert's knowledge will provide a single source of
troubleshooting expertise for the Thermoforming process.

The short-term deliverable was an initial evaluation of the process to determine
feasibility, scope, and broad requirements for an initial project to capture select
Thermoforming expertise and distribute the expertise using eGain as the engine. The
expected long-term deliverable is to engage a project to capture expertise, train
individuals at the facility to "harvest" knowledge, deploy the expertise to the production
floor, evaluate/enhance the effectiveness, and establish a plan to continually
renew/refresh expertise. The estimated cost of developing the project is approximately
$64,000, with a recognized benefit of $200,000. The total estimated benefit over a
three-year timeframe is approximately $1 million, with a net present value of
approximately $734,000. Therefore, the expected return on investment of this project
was reported as approximately 10:1. If this prototype proves to be successful, the
company will implement this process across four additional plants.

In the credit management case, the firm was forewarned of the imminent
departure of one of its key individuals. The firm recognized the importance of capturing
his intimate knowledge of a critical process and proceeded to work through the parts of
the knowledge harvesting process. The success of the credit management project set
the precedence to capture more valuable knowledge as illustrated in the other three
cases. This type of procedure allows firms to build survival capabilities for the potential
loss of knowledge, while measuring the return on investment of the project.

FUTURE RESEARCH AND LIMITATIONS

While this study used “real-world” case studies, it is limited to one company’s
perspective; however, the proposed methodology was developed based upon the
experience of two knowledge-harvesting experts. Therefore, the study appears to
provide evidence that could be used for generalization of the findings. Currently, other
companies are adopting this methodology, which will be reported in future research.
This future research will provide a solid foundation for comparing and contrasting
different types of projects with differing ROI results across organizations and industries.

In addition, an important research area that needs investigation is an established
pre-measurement baseline, intervention, post-measurement methodology. This
methodology coupled with the ROI orientation methodology will provide companies with
feedback concerning the success of their knowledge retention projects.

**DISCUSSION AND IMPLICATIONS**

Our primary objective with this paper was to present a methodology that will assist organizations in determining their return on investment in knowledge retention projects, by focusing their efforts on the problem of measuring productivity of knowledge workers, while defining the best orientation for the project, resulting in an accurate return on investment measurement. As the ROI of knowledge retention projects, demonstrated in the case studies, are applied, stakeholders will have a basis for comparison such that differing types of projects can be compared and contrasted. Overall, there was evidence that selecting the orientation that best fits the proposed project will provide an approximate return on investment; thus, providing valuable information to the manager making the decision to initiate the project.

As represented in these cases, the goal was to produce a dependable, credible explanation of the bottom-line impact of knowledge retention projects. The value of information in a knowledge asset is a function of its capacity to aid the target learner’s understanding toward consequential results; hence, this value has some economic benefit.

**Implications**

The implications of this study are noteworthy for today’s organizations. As illustrated in the case studies, companies realize the value of their intellectual assets; however, they require specific financial reporting methods to communicate the value of knowledge retention projects. Due to the impact of the current economic conditions, businesses continue to be “squeezed” relative to financial and personnel resources.
Allocating resources and approving budgets has proven to be more difficult; therefore, managers need a methodology that allows them to effectively measure different types of projects with different returns on investment. This study can support management’s requirements to have a method of measurement that is tangible and shows results that are verifiable and “real”.

KM continues to evolve as a pivotal task for companies trying to survive in today’s competitive marketplace; however, many companies have yet to realize value or gain returns from their investments in managing knowledge (Desouza, 2003). It has become evident that organizations need to manage their valuable corporate knowledge from a practical standpoint. Thus, properly selecting an appropriate orientation method to support the knowledge retention project effort can contribute to successfully measuring ROI and to the competitive advantage of the company.

CONCLUSION

Knowledge Management has been a popular concept for several years; however, conflicting definitions and controversies about the scope, content, and measurement still cloud the issues. In this regard, we believe that the scope and measurement issues may be clarified by the delineation of measuring the return on investment of knowledge retention projects. Leaders of all KM initiative must eventually face the challenge of proving the economic value of their efforts and results; however, there is not an agreed right or wrong way to evaluate a knowledge retention project and calculate the return on investment (ROI). As demonstrated in this study, knowledge retention project development is difficult to quantify. By asking some simple questions, stakeholders can
go a long way in developing the business case to persuade their organization to invest in their people, and not just see KM initiatives as an expense.

Until such time as solid ROI measures applicable to KM are developed, the proliferation of KM as an essential component of a manager's toolkit will languish. Researchers must vigorously pursue investigations that will help develop sound and adequate measures of KM success within organizational context, if the true potential of KM is to be realized. This research is an important step in the direction of developing such measures. The degradation of valuable knowledge resulting from personnel losses, employee defections, and unavailability of needed expertise at the right time and place is inevitable; realizing the value of effectively capturing and disseminating tacit knowledge is a necessity; and the strategic application of determining the best project orientation is essential in assuring organizations that money invested in knowledge retention projects will have a positive outcome on the company’s bottom-line.
REFERENCES

Bixler, C. “Knowledge Management and the Learning Organization Converge,” 

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Figure 1: Organizational Improvement and Knowledge Retention Projects

- Manage improvement and change.
- Implement knowledge management.
- Conduct knowledge retention.
- Implement system to capture and retain knowledge.
- Apply Knowledge Harvesting.
Figure 2 – Knowledge Harvesting Framework
Figure 3 – Knowledge Retention Projects Documentation

- Return on Investment Analysis
- Value Proposition
- Project Plan
Figure 4 - Stages of Return on Investment (ROI) Analysis

- Describe the situation
  - **Determine the orientation.**
  - Review the project plan.

- Calculate cash outflows associated with labor.
- Determine costs of maintenance labor.
- Calculate cash outflows associated with plant, property and equipment.

- Determine non-cash benefits.
- Determine the nature of the benefit stream.
- Select applicable performance measures.

- Calculate cash inflows.
- Determine the cost of capital.
- Calculate Net Present Value.
- Assess impact to EBIT, FCF, RONA.
Table 1 Orientations

<table>
<thead>
<tr>
<th>Orientations</th>
<th>Definition</th>
<th>Purpose</th>
<th>Examples</th>
<th>Approx. ROI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Efficiency</strong></td>
<td>Yields the same amount of work at less cost and less time</td>
<td>Move work from high-cost group to low-cost group. Intent is to enhance operational efficiency and diminish cost per transaction</td>
<td>- Processing customer orders. - Converting resources or inputs into products. - Making delivery of products or services. - Managing inventories. - Billing the customer. - Providing after-sales service. - Delivering service to the customer. - Processing finance and accounting transactions. - Managing facilities and network operations. - Reporting information. - Managing physical resources. - Managing the tax function. - Ensuring compliance with regulations.</td>
<td>6:1</td>
</tr>
<tr>
<td><strong>Productivity</strong></td>
<td>Yields same amount of effort with more work results.</td>
<td>Improve overall average of productivity and facilitate knowledge transfer to extend abilities of target learners.</td>
<td>- Monitoring the external environment. - Marketing products or services to relevant customer segments. - Planning for and acquiring necessary resources or inputs for manufacturing. - Developing human resources skills. - Developing and training employees. - Managing employee performance, reward, and recognition. - Developing and deploying enterprise support systems for information resources. - Deploying strategy to the work level. - Implementing systems security and controls. - Managing information storage and retrieval. - Managing information services. - Evaluating and auditing information quality. - Managing financial resources. - Managing external relationships.</td>
<td>10:1</td>
</tr>
<tr>
<td><strong>Risk Mitigation</strong></td>
<td>Gradual depletion or complete loss of valuable knowledge that is essential to the success of the organization.</td>
<td>Sustain the current level of productivity and mitigate any risks associated with employee migration.</td>
<td>- Monitoring the external environment. - Marketing products or services to relevant customer segments. - Planning for and acquiring necessary resources or inputs for manufacturing. - Developing human resources skills. - Developing and training employees. - Managing employee performance, reward, and recognition. - Developing and deploying enterprise support systems for information resources. - Deploying strategy to the work level. - Implementing systems security and controls. - Managing information storage and retrieval. - Managing information services. - Evaluating and auditing information quality. - Managing financial resources. - Managing external relationships.</td>
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</tr>
</tbody>
</table>
| Revenue              | Applies KH as the means to capture know-how that will be used in commercial information product, intellectual property, or a new product. | Increase sales – to create a new source of revenue.                      | - Determining customer needs and wants.  
- Developing new product/service concept and plans.  
- Designing, building, and evaluating prototype products or services.  
- Refining existing products/services.                                                                                                         | 12:1        |
| Optimization         | Yields a process that provides positive outcomes, while promoting the growth of the business. | Create a model that captures the dynamics of a plant, organization, or significance sub-organization. | - Any one of these work processes may be the focal point for an optimization-oriented.  
- Knowledge Harvesting project.  
- Determining customer needs and wants.  
- Designing the organizational structure and relationships between organizational units.  
- Developing and setting organizational goals.  
- Marketing products or services to relevant customer segments.  
- Creating human resource strategies.  
- Planning for information resource management.  
- Formulating environmental management strategy.  
- Measuring organization performance.  
- Improving processes and systems.                                                                                                           | 12:1        |
| Agility/Adaptability/Innovation | Yields a new process by studying and capturing rapidly changing relevant knowledge. | Achieve an organizationally significant new approach for fulfilling customer needs or managing the business. | - Defining the business concept and organizational strategy.  
- Developing new product/service concept and plans.  
- Selecting relevant markets.  
- Creating human resource strategies.                                                                                                          | > 12:1      |

*aEach orientation is defined as an example of APQC process framework.*
<table>
<thead>
<tr>
<th></th>
<th>Efficiency</th>
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<th>Risk Mitigation “Brain Drain”</th>
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<th>Agility/Adaptability/Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the focus well-defined or might it change?</td>
<td>Yes</td>
<td>Yes</td>
<td>Usually, yes.</td>
<td>Usually, yes.</td>
<td>Focus may change</td>
<td>Focus may change.</td>
</tr>
<tr>
<td>What is the extent of existing documentation?</td>
<td>Process documentation</td>
<td>Some process documentation</td>
<td>Some or none</td>
<td>Some or none</td>
<td>Usually, none.</td>
<td>None.</td>
</tr>
<tr>
<td>Are contributors easily identified and recruited or difficult to find and engage?</td>
<td>Contributors are easily identified and recruited.</td>
<td>Contributors are easily identified and recruited.</td>
<td>Contributors may be easily identified and recruited.</td>
<td>Usually, contributors are easily identified and recruited.</td>
<td>Usually, contributors are easily identified but challenging to recruit.</td>
<td>Usually, contributors are easily identified but challenging to recruit.</td>
</tr>
<tr>
<td>How many people will use the packaged knowledge asset?</td>
<td>Many</td>
<td>Some</td>
<td>Some</td>
<td>Some</td>
<td>Few</td>
<td>Few</td>
</tr>
<tr>
<td>What is the variability of ROI?</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>4.5</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>What is the extent of startup work?</td>
<td>Fast and easy</td>
<td>Quick, easy.</td>
<td>Some</td>
<td>Some</td>
<td>Variable due to complexity</td>
<td>Variable due to complexity</td>
</tr>
<tr>
<td>What is extent of secondary sources of useful information?</td>
<td>Readily available</td>
<td>Available</td>
<td>Usually, available</td>
<td>Some</td>
<td>Few</td>
<td>Usually, none</td>
</tr>
<tr>
<td>What should be the pace (timing of Knowledge Harvesting sessions)?</td>
<td>Rapid, in succession over days</td>
<td>Periodically planned over weeks</td>
<td>Periodically planned over weeks</td>
<td>Periodically planned over weeks</td>
<td>Periodically planned over weeks or months</td>
<td>Periodically planned over weeks or months</td>
</tr>
<tr>
<td>What type of information should be captured?</td>
<td>Equal emphasis on support information, level three guidance and level four guidance</td>
<td>Equal emphasis on support information, level two guidance and level three guidance</td>
<td>Equal emphasis on support information, level two guidance and level three guidance</td>
<td>Equal emphasis on support information, level two guidance and level three guidance</td>
<td>Signals, level two guidance, level three guidance</td>
<td>Signals, level two guidance</td>
</tr>
<tr>
<td>What is the estimated life time of the produced knowledge asset (until time that some adaptation is warranted)?</td>
<td>24 – 36</td>
<td>24 months</td>
<td>24 months</td>
<td>12 – 24 months</td>
<td>36 months</td>
<td>36 months</td>
</tr>
</tbody>
</table>