Measuring Knowledge Management Performance

Rifat O. Shannak
Chairman of MIS Department, Faculty of Business, University of Jordan
Amman, Jordan
E-mail: rshannak@ju.edu.jo
Tel: +962777427177; Fax: +96265829977

Abstract

This is a theoretical paper that has the purpose of reviewing previous experiences based on surveying the extant literature with the aim of delving into the subject of Knowledge Management (KM) Performance. It is an attempt to try to identify performance indicators for measuring KM systems. The paper presents important works related to direct KM performance and another way of evaluating KM performance based on the use of KM strategy. It discusses the different experiences of the large international companies in assessing KM performance and proposes a categorization matrix that classifies the performance indicators for potential use in KM performance measurements. Based on the revealed finding, the paper proceeds to present suggestions for future research in the area.

Keywords: Knowledge Management, Performance, KM Performance, KM Experiences, KM Systems

1. Introduction

Knowledge Management (KM) has been the subject of much discussion over the past decade. Organizations are told that they will not survive in the modern Knowledge era unless they have a strategy for managing and leveraging value from their intellectual assets, and many KM lifecycles and strategies have been proposed. (Arthur, 1996)

As the term "Knowledge Management" has been applied to a very broad spectrum of activities designed to manage, exchange and create or enhance intellectual assets within an organization, there is no widespread agreement on what KM actually is. IT applications that are termed "KM applications" that range from the development of highly codified help desk systems to the provision of video conferencing to facilitate the exchange of ideas between people. (Hagie and Kingston, 2003)

“As it can be thought that KM is the deliberate design of processes, tools, structures, etc. with the intent to increase, renew, share, or improve the use of knowledge represented in any of the three elements [Structural, Human and Social] of intellectual capital.” Seemann, et.al., 1999)

This justifies the existence of KM projects. The challenge lies ability to assess a person’s individual knowledge and make sure it is fully taken advantage of, and that an environment is created to encourage people to take part in the sharing process.

Therefore, and in order for organizations to best utilize their KM systems, they should be able to measure their performance; a subject that also has been both discussed and emphasized (Strassmann, 1999). This is easy if one knows the current performance level, and by checking if it is increasing or not, then it becomes possible to track the changes. As also knowledge is comprised of the soft (human
and culture) and the hard (technology) aspects, it is the integration between both that is critical to optimize the effects of KM.

2. Purpose of the Paper
The following figure shows the sequence of how this paper is divided; this paper will answer the two questions as shown in the figure 1.

Figure 1: Research Questions Related to Performance Indicators

<table>
<thead>
<tr>
<th>Which performance indicators should be used when measuring performance of activities in knowledge management systems?</th>
</tr>
</thead>
<tbody>
<tr>
<td>What constitutes a knowledge management system?</td>
</tr>
<tr>
<td>How is performance of a knowledge management system measured?</td>
</tr>
</tbody>
</table>

2.1. What Constitutes a Knowledge Management System?
A study conducted by Davenport et al (1999) identified four broad types of knowledge management projects depending on what the project emphasises:

2.1.1. Creating Knowledge Repositories
Here, major emphasis is put into trying to capture knowledge and to treat knowledge as an entity separate from the people who create and use it. One way of doing this is taking documents with knowledge embedded and storing these in a repository where it can easily be accessed.

2.1.2. Improving Knowledge Access and Transfer
Projects of this kind put emphasis on activities providing access to knowledge or facilitating its transfer between people. The difficulty lies in finding the person with the desired knowledge and then effectively transferring it from that person to another. Also, such depends on increased technological capabilities.

   The activities in this types of projects are communities of practice; either online-communities or face-to-face communities, workshops, seminars, desktop videoconferencing systems, document scanning and other sharing tools.

2.1.3. Enhancing Knowledge Environment
This kind of projects involves activities to establish an environment contributing to a more effective knowledge creation, sharing and use. Activities involved are trying to build awareness and cultural attention to knowledge sharing. These include behavioural changes and incentives to share knowledge.

2.1.4. Managing Knowledge as an Asset
Projects of this kind focus on treating knowledge like any other asset on the balance sheet. Its intangible identity makes it very difficult to transform and estimate in financial terms.
As of today, there are a few methods for such measurements; Balanced Business Scorecard, EFQM (European Foundation for Quality Management) and the Skandia Navigator. These methods give some attention to knowledge related items such as innovation, patents and intellectual capital.

2.2. Technological, Human and Financial resources based Measurement of the Performance of a KM System

As mentioned in the introduction, if one knows the current level of performance, then it is possible to control it. It can be simply stated that KM systems and their effects are justified to top management by tracking the progress on these projects.

One view states that in order to ensure an overall organizational performance, the organization needs to manage and measure its technological, human and financial resources. Measuring this performance validates if the effort was worth the while or not. (Tseng and Lee, 2009)

This point of view states that KM projects have both tangible and intangible results; the first lends itself to quantifiable measurement, while the latter results in valuable outcomes that are not readily quantifiable which makes them really difficult to measure. (Arthur, 1996)

The traditional methods of measuring the performance of a KM system have been financially based. Measurement regarding competence, employee satisfaction and technological development, to mention but a few, do not seem to be used as frequently as measurements of financial areas such as cost effectiveness, product efficiency and distribution of sales. (Bontis et al., 2003)

It has been argued that this result does not stem from the organization's lack of interest, but rather the fact that organizations have not yet been able to develop metrics that adequately fit qualitative areas. As often measurement in such areas involves limited information and impaired judgement. It is probable that the organizations attempt to measure these areas, but because of insufficient measurement systems, it appears as if they are focused on the financial areas.

The need therefore is dire for having what is called performance indicators, which may not necessarily show an improving overall organizational performance, but they do show whether the knowledge activity is increasing or not. These determine the status of the project and whether it has established a level of satisfaction or it needs for some actions for improvement. (Robertson, 2003)

A performance indicator is a variable, parameter, measure, statistical measure, a proxy for a measure, and a sub-index among others. Generally, there are four ways to express the performance indicator:

1. An indicator of how many times an event takes place,
2. A ratio, i.e. how many times an event takes place compared to how many times it could have taken place in the given time period,
3. A percentage,
4. A Boolean variable, i.e. did the indicator generate what it was supposed to generate or not.

There are some features which should exist in the performance indicators; for example they should have relevance for project goals, and provisional, since there may appear a need to eventually change the performance indicator. The indicator also needs to be understandable, valid, sufficiently flexible, and in line with the organization and its business goals, as well as the purpose it was developed for.

In addition to this, the indicators may also be qualitative or quantitative. Qualitative indicators indicate improvements by measuring attitudes, beliefs and culture. Quantitative indicators, on the other hand, indicate participation, for instance the number of communities or the number of people using a database.

2.3. Strategy based Measurement of KM System Performance

Another point of view of how to measure the effect of a KM system stresses the fact that a KM strategy should be first drafted. This section will highlight the types of strategies to be drafted, in order to make
the measurement easier. Linking this knowledge with the items drafted in the strategy is of high
essence in measuring the performance of the KM system. (McAdam, R and McCreedy, S, 1999;
Lopez, 2000)

Practitioners such as Nonaka and Takeuchi classify “knowledge” based on a combination of
knowledge accessibility (i.e. where is the knowledge stored or located and in what form) and
knowledge transformation (i.e. the flow of knowledge from one place to another and from one form to
another) (Nonaka, 1991; Nonaka and Takeuchi, 1995). They also have different classifications of
knowledge (explicit vs. tacit, individual vs. collective, along with knowledge transformation processes
i.e.: socialization, externalization, combination and internalization).

Wiig (1993) proposed his Knowledge Management model with a principle which states
that, knowledge can be useful if it is well organized. There are some useful dimensions to be noted in
Wiig's KM model. They are:

- Completeness
- Connectedness
- Congruency
- Perspective and purpose

Boisot (1998) proposes 2 key points they are:

1. The more easily data is converted to information the more easily it is diffused.
2. The less the data is structured requires a shared context for its diffusion, the more
   diffusable it becomes.

Boisot's I-Space model is visualised as a 3 dimensional cube with following dimensions:

1. Codified-Uncodified
2. Abstract-Concrete
3. Diffused-Undiffused

Boisot (1998) introduced an extra dimension (abstraction, in the sense that knowledge can
become generalised to different situations).

What seems clear from both Boisot's model and that of Nonaka & Takeuchi is that the process
of growing and developing knowledge assets within organizations is always changing. Organizations
are living organisms that must constantly adapt to their environment. This means that the KM strategy
identified as appropriate at one moment in time will need to change as knowledge moves through the
organizational learning cycle to a new phase. The rate at which this cycle operates will vary from one
sector to another, so that in some rapidly evolving sectors new knowledge is being created and applied
in rapid succession, while in some more established sectors, the cycle time of innovation is much
slower.

On another token, Wiig (1993) and the APQC (American Productivity and Quality Center)
(Vestal, 2002) identified six emerging KM strategies in a study of organizations considered to reflect
the different natures and strengths of the organizations involved:

1. Knowledge Strategy as Business Strategy; A comprehensive, enterprise-wide approach to
   KM, where frequently knowledge is seen as the product.
2. Intellectual Asset Management Strategy; Focuses on assets already within the company that
can be exploited more fully or enhanced.
3. Personal Knowledge Asset Responsibility Strategy; Encourages and supports individual
   employees to develop their skills and knowledge as well as to share their knowledge with
   each other.
4. Knowledge Creation Strategy; Emphasizes the innovation and creation of new knowledge
   through R&D. Adopted by market leaders who shape the future direction of their sector.
5. Knowledge Transfer Strategy; Transfers knowledge and best practices in order to improve
   operational quality and efficiency.
6. Customer-Focused Knowledge Strategy; Aims to understand customers and their needs and
   so provide them with exactly what they want.
Treacy and Wiersema (1994) proposed three generic "value disciplines" in their model, as a way to focus an organization's activities. Successful organizations concentrate their efforts on a particular area and excel at it, rather than trying to be all things to all people and failing to excel at anything.

A. **Operational Excellence**: Superb operations and execution often by providing a reasonable quality at a very low price. The focus is on efficiency, streamlining operations, supply chain management, no-frills, volume counts, most large international corporations are working out of this discipline.

B. **Product Leadership**: Very strong innovation and brand marketing, operating in dynamic markets. The focus is on development, innovation, design, time-to-market, high margins in a short timeframe.

C. **Customer Intimacy**: Excel in customer attention and customer service. Tailor their products and services to individual or almost individual customers. Focus on customer relationship management, deliver products and services on time and above customer expectations, lifetime value concepts, reliability, being close to the customer.

These value disciplines reflect the fact that 'value' is determined as a trade-off between convenience, quality and price.

Some organizations will concentrate on their relationship with their customers (to increase customer satisfaction and retention by better understanding the customer's needs and preferences). Other organizations will focus on their products (constantly developing new ideas and getting them to market quickly). The third group of organizations focus primarily on themselves and their internal processes (sharing best practices between different units, reducing costs and improving efficiency).

### 3. Companies Experiences in KM Performance Measurement

Generally, determining which indicators are the most useful when measuring performance of a project is mostly about judgment. Some performance indicators used by reputed large international companies which have internally developed their KM systems are presented in the following sub-sections. A brief overview on the KM system developed will be presented in the next sub-section followed by the performance indicators.

#### 3.1. Ericsson

The purpose of the KM system was to take advantage of knowledge acquired in one market to the other markets. The idea is to find supporting structures and to be able to repeat successful solutions in more than one market. The following are the performance indicators identified:

1. Number of best practices identified.
2. Number of contributions.
3. Number of contributions in the re-use database related to the total number of projects delivered in the market unit.
4. Number of contributions proven to have led to new/repetitive business.
5. Number of contributions rated as re-usable.
6. Number of individuals in the community and each individual's activity.

#### 3.2. Hewlett Packard

HP has a decentralized organization with little sharing of information across its units. The business culture supports sharing but few units have been willing to invest in efforts that do not have fast payback for the involved. There has previously been some informal knowledge transfer when employees have changed business units. In order to solve this problem knowledge management was implemented. The following are the performance indicators identified:
1. Active involvement.
2. Number of participating employees.
3. Number of postings/contributions.
4. Number of downloads.
5. Number of calls to support function.
7. Unique log-ins.

3.3. KPMG

The purpose of the KM system is to take advantage of the experience within the organization, both in Sweden and globally. The overriding objectives are to maximize value creation and realization for the organization and for their clients, by making universally and instantly available best practices, experiences, insights and connections to the right people.

1. Adoption curve to see knowledge culture progression.
2. Generated business.
3. Individual contributions to the further development of the organization and its employees.
5. Number of contacts gained.
6. Attitude of knowledge sharing.
7. Efficiency & visibility on the market.
8. Employee satisfaction.
9. Re-use of information and/or experience.

3.4. Schlumberger

The purpose of the KM system is to capture, manage and share knowledge within the large and geographically spread organization. The aim of doing so is to become more productive and efficient. Schlumberger has identified nine activities to measure extent of use and the level of effectiveness of these activities which are listed in table 1.

<table>
<thead>
<tr>
<th>Table 1: Schlumberger Knowledge Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activities Used</td>
</tr>
<tr>
<td>Community of Practice</td>
</tr>
<tr>
<td>Best Practice Transfer Process</td>
</tr>
<tr>
<td>After Action Review</td>
</tr>
<tr>
<td>Lessons Learned Process</td>
</tr>
<tr>
<td>Expertise Locator Systems</td>
</tr>
<tr>
<td>Content Management</td>
</tr>
<tr>
<td>Decision-Support Systems</td>
</tr>
<tr>
<td>Technical HelpDesk for Oilfield Operations</td>
</tr>
<tr>
<td>Expert Teams</td>
</tr>
</tbody>
</table>
The following are the performance indicators identified:
1. End-user satisfaction.
3. Number of indexes related to knowledge activity.
4. Number of tickets submitted.
5. Number of views of knowledge.
6. Participation of experts in activity.
7. Revenue gained/saved.
8. Sharing Index.
10. Validation of newly shared content.

3.5. Siemens

The purpose of the KM system was for the company to focus on its most valuable assets: its knowledge base. The organization needed something to help overcome geography. As it is truly global, the employees must share their knowledge by other than (or in addition to) informal face-to-face communication. The following are the performance indicators identified:
2. Employee satisfaction.
3. Indicators for incentives.
4. Innovation index.
5. Number of entries in a database.
6. Number of knowledge-shares a year.
7. Number of orders.
8. Quality of the information.
9. Re-use of knowledge.
10. Usefulness of the knowledge.

3.6. Xerox

The main purpose of the KM system is to maintain a competitive advantage by using the collected knowledge of all employees, archives of patents and processes as well as all documents stored in various formats in all locations. The focus of the knowledge management strategy lies in creating a knowledge-sharing culture, which will lead to accelerated learning and innovation. Managers at Xerox argued that it is important to make the expertise available to everybody which makes the solution to complex problems faster. The following are the performance indicators identified:
1. Access of knowledge.
2. Arrangement of knowledge.
3. Number of calls to administration.
4. Support from management.
5. Usability.

4. Performance Indicator Matrix

The following matrix (Table 2) consists of the performance indicators found in the literature, case studies and the ones used by different organizations. These are all considered to give some indication of performance in knowledge management projects (include both technological and human aspects). Any company applying a KM system should use this matrix and rate itself on these indicators.
<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Accesses</th>
<th>Arrangement and classification of knowledge</th>
<th>application of knowledge</th>
<th>attitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>access to knowledge</td>
<td>number of site accesses</td>
<td>if knowledge is arranged in such a way that it facilitates finding what is sought for</td>
<td>to what extent is the knowledge applied throughout organization</td>
<td>of knowledge sharing</td>
</tr>
<tr>
<td>availability of knowledge in information systems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>awareness of evaluation</td>
<td>baseline for maturity</td>
<td>calls to helpdesk</td>
<td>Channels enabling creative outlets</td>
<td>community</td>
</tr>
<tr>
<td>awareness of being evaluated may contribute to increased participation</td>
<td>comparing results to a previously set baseline</td>
<td>number of calls to helpdesk, preferably decreasing</td>
<td>to what extent the information systems enable channels for creative outlets, for instance flexible forums enabling attachments</td>
<td>number of members</td>
</tr>
<tr>
<td>readability</td>
<td>usability</td>
<td>re-use</td>
<td>re-use</td>
<td>contributions</td>
</tr>
<tr>
<td>rated by other users</td>
<td>rated by other users</td>
<td>rated by other users</td>
<td>number of re-used contrib. related to total number of projects delivered</td>
<td>number of contributions in systems/communities</td>
</tr>
<tr>
<td>best practices</td>
<td>documents</td>
<td>Individual experience</td>
<td>success stories</td>
<td></td>
</tr>
<tr>
<td>co-operation with external experts</td>
<td>culture</td>
<td>Customer satisfaction</td>
<td>Customer success</td>
<td>customer time increase</td>
</tr>
<tr>
<td>the amount of cooperation after having managed knowledge in organization</td>
<td>adoption curve to see the progression of the knowledge culture</td>
<td>to what extent the are customer satisfied</td>
<td>increased success with customers compared to previously</td>
<td>more time to spend with customers</td>
</tr>
<tr>
<td>distribution of knowledge</td>
<td>downloads</td>
<td>effect of knowledge</td>
<td>efficiency &amp; visibility on the market</td>
<td>Employee retention</td>
</tr>
<tr>
<td>Facilitated distribution of knowledge within organization</td>
<td>number of downloads</td>
<td>any effects of knowledge within the organization, for instance increased visibility or increased customer value</td>
<td>increase or decrease</td>
<td>number of employees staying in the organization compared to previously</td>
</tr>
<tr>
<td>Employee satisfaction</td>
<td>Expertise available</td>
<td>Expert participation</td>
<td>Innovation index</td>
<td>Job performance</td>
</tr>
<tr>
<td>number of employees being satisfied with their work situation compared to previously</td>
<td>the degree of expertise available in the knowledge system</td>
<td>number of participating experts within a field</td>
<td>an index showing increased innovation in organization</td>
<td>increased job performance due to managed knowledge</td>
</tr>
<tr>
<td>job satisfaction</td>
<td>Knowledge activity report</td>
<td>Knowledge shares</td>
<td>leverage effect</td>
<td>Motivation incentives</td>
</tr>
<tr>
<td>increased satisfaction with job situation due to facilitated routines</td>
<td>stating an increased or decreased knowledge activity</td>
<td>number of knowledge shares per measurement interval</td>
<td>if the project contributes to small efforts giving large effects</td>
<td>based on number of knowledge-shares a year</td>
</tr>
<tr>
<td>motivation incentives</td>
<td>Motivation incentives</td>
<td>networking with external partners</td>
<td>orders</td>
<td>participation</td>
</tr>
<tr>
<td>based on usefulness of the knowledge contribution</td>
<td>based on knowledge activity report</td>
<td>increased possibilities for networking with external partners</td>
<td>number of orders, preferably an increase due to managed knowledge</td>
<td>number of users participating in knowledge sharing activities</td>
</tr>
<tr>
<td>Profitability</td>
<td>quality of knowledge</td>
<td>query guidance</td>
<td>relationships</td>
<td>responses</td>
</tr>
<tr>
<td>new business gained, for instance stemming from contributions in knowledge base or contacts generated or by interviewing sales people</td>
<td>usefulness of the knowledge found, for instance possibilities of re-use</td>
<td>sufficient instructions in systems</td>
<td>number of relationships established due to knowledge systems &amp; networking</td>
<td>number of responses to a request</td>
</tr>
<tr>
<td>response time</td>
<td>return on investments</td>
<td>re-use</td>
<td>Revenue gained/saved</td>
<td>self assessment</td>
</tr>
<tr>
<td>decrease of response times due to facilitation of finding information</td>
<td>savings from</td>
<td>of knowledge</td>
<td>revenue gained due to managing organization's knowledge</td>
<td>estimate of how much the individual has gained from the</td>
</tr>
</tbody>
</table>
5. How to Measure Performance

The measurement in the organizations is done in two main ways; by “log in database” or by conducting “surveys”. Both users, and their participation, are tracked in a database or users are asked to participate in a survey to show results from more qualitative areas. When attempting to measure more elusive aspects, the way to do this is no other than to ask people in surveys.

It was found that Balanced Scorecard is the only established method identified to handle the result stemming from the quantitative indicators, originating from logs in databases. As for the qualitative performance indicators, they do not result in a value to put in the Balanced Scorecard, since they depend on the users’ subjective views.

There is neither in the organizations nor in literature, an established method or tool, which handles both the quantitative and the qualitative results.

From the performance indicator matrix in table 2, the technological aspects of KM are more explicit and generate a specific value, which can be used in for instance a Balanced Scorecard. These indicators are easy to measure by database logs, and since they generate specific values they are easy to compare in order to find out if the performance is increasing or decreasing. While the performance indicators related to the human aspects are a bit vaguer and often depend on a person’s subjective opinion.

6. Conclusion

It is desirable to find performance measurements for all areas in order to see the whole picture. When measuring performance of a KM system, a number of performance indicators may apply to the system developed, which gives rise to a need to choose which measures that are the most appropriate for the project. Even though there may be a wide range of measures, it may not always be cost-effective and efficient to use all identified in the performance indicator matrix.

From here stems the importance of categorizing the indicators in the above matrix in order to simplify things. Different approaches to measuring the performance of a KM system agree on
classifying the effect of such on three main domains namely; process, human and IT. Table 3 summarizes the performance indicators as classified into a categorization matrix with the three primary categories or dimensions.

**Table 3: Proposed Categorization Matrix of Performance Indicators**

<table>
<thead>
<tr>
<th>Focus Area</th>
<th>Domain</th>
<th>Performance Indicator</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process</td>
<td>Quality of Knowledge</td>
<td>• To what extent the employees:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• consider knowledge in databases useful</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• re-use knowledge</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Number of returning users in databases</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Efficiency due to new routines</td>
<td>• Number of:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• calls to support function</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• hours spent with external experts, per month</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• employees participating in this survey</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• To what extent the employee:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• experience saved time in finding the correct information/competence due to using the databases</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• consider increased number of orders connected to solutions/success stories</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Incentives</td>
<td>• Number of distributed incentives</td>
<td>Manager</td>
</tr>
<tr>
<td></td>
<td>Knowledge Contributor</td>
<td>• Occupational title of the Contributor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Business Unit, where the Contributor is working</td>
<td>Log in database</td>
</tr>
<tr>
<td>Human</td>
<td>Knowledge Sharing Attitude</td>
<td>• To what extent employees feel:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• comfortable reusing solutions/contributions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• comfortable sharing their knowledge in order to help others</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• that they save time by using knowledge databases in their daily work</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use of Participation in Activities</td>
<td>• Number of hours the employees participate in workshops/seminars/networks or other activities, per month</td>
<td>Survey</td>
</tr>
<tr>
<td></td>
<td>Awareness</td>
<td>• To what extent the employees feel they have been provided with sufficient:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• information/education for:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• the new routines and work procedures</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• the new databases</td>
<td></td>
</tr>
<tr>
<td>IT</td>
<td>Active Involvement</td>
<td>• Number of users</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• accesses in chosen area, per user</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• returning users in databases</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• solutions contributed, per user</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• success stories contributed, per user</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• lessons learned contributed, per user</td>
<td></td>
</tr>
<tr>
<td></td>
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<td>• best practices contributed, per user</td>
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<td>• other contributions, per user</td>
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<td>• Number of employees who have registered as a member</td>
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<td>Knowledge Structure</td>
<td>• Number of communities in databases</td>
<td>Log in database</td>
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<td>• Number of topics in communities in databases</td>
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<td>• Number of taxonomies in databases</td>
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<td></td>
<td>Usability</td>
<td>• To what extent the employees consider:</td>
<td>Survey</td>
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<td>• the databases to be user friendly</td>
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<td>• help-instructions in the databases being sufficient</td>
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<td>• it easy finding colleagues with the correct competence</td>
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7. Suggestions for Future Work
Since the performance indicators found in the literature and presented in this paper are quite a large number, it would be difficult for an organization to track all these indicators (specially that many of them are intangible and depend on the subjectivity of the person measuring these indicators); it is suggested to take this matrix to a more concise level.

What is meant by the above is to develop a criterion to reduce the level of subjectivity when measuring the effect of the KM system as developed. Different weights would then be given to each element in this criterion. A scoring system should be also developed.

A fully developed matrix with a scoring system out of 100 or 1000 can be proposed in order to highlight the areas that need further improvement. This fully fledged matrix could be then uploaded on the intranet of the company so that it can automatically be filled in order to facilitate calculating the effect of the developed KM system. Certain links would need to be made.

Further developments also can be made on this matrix such as connecting it with an automatic reporting procedure which can inform the organization which of all factors is/are has/have the most impact affecting its performance, if there is a continuous increase or decrease in the performance as a noticeable trend, what should be done from previous experience,…etc.

References
