

QUANTIFYING BENEFITS OF KNOWLEDGE MANAGEMENT SYSTEM —A CASE STUDY OF AN ENGINEERING CONSULTING FIRM

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Abstract: Quantifying the benefits of a knowledge management system (KMS) is a difficult job. Very little literature was found to report the rate of investment (ROI) resulted from a KMS. Quantification of returns from KMS investments involves several tasks: identification of value added knowledge management (KM) activities, identification of benefits generated by the value added KM activities, and quantifying the values of benefits. This paper is dedicated to the development of quantitative models for measuring time, man-hour, and cost benefits resulted from a KMS of an engineering consulting firm. Details of the proposed quantitative KMS benefit models are reported with a case study application to a local leading engineering consulting firm. It is found from the case study that the average time benefit (TB) is 63%; the average man-hour benefit (MHB) is 73.8%; and the average cost benefit is 86.6%.

Keywords: Knowledge management, Quantification, Benefits, Engineering consultant

1. INTRODUCTION

In the past decade knowledge management (KM) has been demonstrated; finally, conclusions are drawn and future getting more and more attention, while the assessment of works are recommended in Section 6.

returns is lagging behind. In other words, organizations

spend a lot of resources in improving their knowledge

infrastructure, both for hardware and software, while less

effort is invested to measure the results of their knowledge

management endeavors. Very little literature is found on

measuring the value of KMS due to a key problem: lack of KMS performance. The cases are on the intellectual

quantification methods for benefits resulted from KMS.

Without such quantitative models, top management of the

organization could not determine the benefits generated

from KMS, so that decision is hard to make on how much

funding should be invested and what strategies can be

adopted to improve the performance of KMS.

This paper presents the development of quantitative models

for benefits of a KMS. Three types of benefits are modeled

(1) time benefit—saving of time in solving a problem due to

the contribution of KMS; (2) man-hour benefit—saving of

man-hours in solving a problem due to the contribution of

KMS; (3) cost benefit—saving of cost in solving a problem

due to the contribution of KMS. The model development

process consists of: (1) identification the types of benefits

obtained from KMS; (2) identification of value adding (EVA) method.

activities in the problem solving process, which related to

usage of a KMS; (3) formulation of quantitative models.

KMS is developed and presented in Section 4; in Section 5,

a case study application of the proposed models to a KMS is

demonstrated; finally, conclusions are drawn and future

works are recommended in Section 6.

2. RELATED WORKS ON QUANTIFYING KMS

BENEFITS

This section reviews previous works on the quantification

of KMS performance. The cases are on the intellectual

assets to measure, the measurement approaches, and the

measuring systems.

2.1 Quantification of intellectual assets

As the value generated by a KMS is an intellectual asset,

methods for measuring intellectual assets can be adopted to

measure the value of a KMS, too. Chang and Wang [1]

categorized methods for valuation of intellectual assets into

three classes: (1) first generation indexes—including

Navigator, BSC, and Intangible Asset Monitor; (2) second

generation indexes—including Intellectual Capital Index

(IC Index), Intellectual Capital Audit (IC Audit); (3)

financial measures—including market-to-book ratio

method, Tobin's q method, and Economic Value Added

method.

For the first generation indexes, the Navigator classifies

intellectual capitals into various types and measures the

dimensions such as growth, efficiency, etc. Finally, an indicators for knowledge management solutions. The intellectual capital report is generated for the management framework consists of three stages: (1) strategic purpose. level—comprising of measures that evaluate the Both the IC Index and IC Audit approaches in the second organization's goals; (2) intermediate level—comprising generation try to relate the intellectual indexes with indicators that link the process performance indices at the financial ratios and convert into a single indexing system. In operational level to the business performance indicators in the financial measuring methods, the Market-to-book ratio the strategic level; and (3) operational level—comprising measures the intellectual assets by subtracting the tangible indicators that represent the measurable process asset value from the market value. This method is highly performance of a KMS. del-Rey-Chamorro et al.'s work can influenced by the stock price in the market. The Tobin's q is very useful for creating performance indicators of a method is based on the theory proposed by the Nobel KMS, however, their work was primarily developed based Economic Prize winner James Tobin from Yale University on the observations of KMS in manufacturing industry. The Tobin's q is defined as the market value of a firm's A recent work reported by Mezher et al. on a KMS in a assets (a firm's productive resources) divided by mechanical and industrial engineering consulting firm [4] in replacement value (current cost of replacing the firm's middle-east is closely related to this paper. Their paper assets) of the firm's assets. The EVA is a method of details the step-by-step implementation of KMS in the case Performance evaluation that adjusts accounting company and lessons learned on the benefits of KMS performance for investors' required return on investment implementation. Unfortunately, their work didn't describe Suppose a division produces a 12% return on Capital the evaluation of the performance of KMS. However, at the invested. Given the Risk of the division's business line end of the paper, the authors addressed: "(Future would have. If investors could usually require 14% on researchers) should set up some quantitative measures to capital invested, the division destroyed Shareholder value how the financial benefits of the KMS". It pointed out the by the EVA metric. The EVA measure intellectual capital importance of quantitative performance evaluation for a by the equation: "EVA=Net earning after tax-(weighted KMS.

average capital cost (total asset – liquid asset)". Even though previous work on quantitative performance All of the above methods value the intellectual assets from evaluation of KMS is rare, the similar study in performance viewpoint of the organization (or corporate) level. They can management (PM) area is quite plenty even in construction be conceived as the macro measures for benefits of a KMS industry. Bassion et al. addressed that in developing a However, the overall indexes may not reflect the actual conceptual framework for measuring business performance benefits generated solely by KMS. For instance, a strategic construction should take into account the organization's decision of top manager may cause overrun of a project business objectives [5]. They also conducted empirical which is not due to KMS. A better approach is to develop experiments on two case construction firms in UK. A specific quantification method for KMS that is not affected systematic analysis model based on IDEF0 was also by factors other than knowledge management activities developed for the proposed framework.

2.2 Measurement approaches of KMS results

Bassion et al.'s work was theoretically based on some existing performance measurement systems such as Swaak et al. [2] conducted as survey and concluded that the Balanced Scorecard (BSC) [6], European Foundation for there are two major measurement approaches related to Quality Management (EFQM) excellence model [7], and knowledge management results: (1) questionnaire Key Performance Indicators (KPI) [8]. The above systems approach; (2) multiple indicators approach. Within the provide useful indicators that can be adopted for 'questionnaire approach', a questionnaire with closed and performance evaluation in the present research. open questions, completed by participants of a KMS reveals

3. IDENTIFICATION OF BENEFITS GENERATED BY KM ACTIVITIES

the profile of an organization. Usually, the profile is used in subsequent interviews and workshops. Within this approach, major concepts are 'extent of knowledge sharing' and 'learning potential' of an organization. The 'multiple indicator approach' roughly makes a distinction between 'customer capital', 'innovation capital', 'financial capital', 'internal business processes' and 'human capital'. For each category, a large number of indicators-- mostly objective and quantitative-- is collected. Before quantifying benefits of a KMS, the types of benefits to be quantified and the knowledge management (KM) activities that really add values to the problem solving process should be identified. After determining the types of benefits to quantify, the critical value adding KM activities is analyzed and surveyed to formulate the quantitative benefit model.

2.3 Performance measurement of KMS

There are very few research reports found from literature on performance evaluation of a KMS. The most related work discovered in literature was a work done by del-Rey-Chamorro et al. in Cambridge University [3]. They expedite problem solving process and result in several developed an eight-step framework to create performance tangible benefits for the organization, such as time

