Measuring Effectivness of KM Projects

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In today's ever changing global economy organizations are finding it difficult to stay competitive. Under these circumstances it is no wonder that organizations are considering Knowledge Management (KM) as one of the possible solutions. The success stories and benefits reaped by some organizations through effective Knowledge management luring others to impalement one or the other KM systems. It is difficult to determine if a particular KM project is successful or not, as many of the benefits are cumbersome to quantify and subjective in its nature. Also, some organizations leave the projects midway as they fail to see financial benefits of the implementation.
In this paper we discuss various methods and metrics to monitor KM project implementation and to develop a methodology to determine impact of KM project on financial results. We categorized these metrics into Three groups; first group of metrics focuses on measuring Knowledge acquisition (the amount of information), second group on measuring effectiveness of KM systems (easy to access, system response time) and third group of metrics focuses on measuring success of overall project. In the process of developing methodology to identify impact of KM on financial results, we proposed a methodology similar to Event Study methodology used to measure abnormal stock returns caused by firm specific as well as economy wide events.

1. Introduction

At the very beginning of this article we give basic definitions of terms which will be used: **measure** is "*A reference standard or sample used for the quantitative comparison of properties, e.g., the standard kilogram is maintained as a measure of mass*", while **metric** is *"A system of related measures that facilitates the quantification of some particular characteristic".* It is obvious that measure with no comparison gives very little or no information at all, thus this paper will deal with metrics for Knowledge Management (KM) initiatives.

Before tackling questions on KM we must give definition on **Intellectual Capital (IC)**. In recent years many scientist are challenged to give standardized definition of IC as it became necessity of modern business. According to the definition given by Steven M.H. Wallman, SEC commissioner, IC are *"assets currently valued at zero on the balance sheet"* and represents not only human brain power, brand name or trademarks but also assets bought long ago, booked at historic price but during time transformed into prime real estate. Another definition of intellectual capital is given by Brooking (1996). *"Intellectual capital is the term given to the combined intangible assets which enable the company to function."*

In today's ever changing global economy many companies rely on intellectual assets in order to generate revenue, like software companies where products are developed and delivered electronically. Therefore, now days it became obvious that company's balance sheet shows only part of company's value. Having said this, it is clear that tangible assets are loosing their dominance in front of intangible assets and importance of proper measurement of their value is raising many accounting questions, especially in the field of brand names, production process, distribution channels, trade secrets etc.

Business writer William Davidov (The Virtual Corporation) says: *"There's a need to move to a new level in accounting, one that measures company's momentum in terms of market position, customer loyalty, quality,etc. By not valuing these dynamic perspectives, we are misstating the value of a company as badly as we were making mistakes in addition."*

2. KM metrics

Process of measuring intangible assets (IC) is connected with KM initiatives, as it is assumed the outcome of KM initiative has impact on IC.

Impact of KM initiative can be decribed by different approaches, such as:

1. House of Quality, (Hauser & Clausing 1988)
2. Benchmarking approach (American Productivity Center (APQC))
3. Balance Scorecard, (Kaplan and Norton 1996)
4. Intangible Asset Monitor (IAM), (Karl-Erik Sveiby 1986-87)
5. Scandia Navigator, (Edvinsson&Malone 1997)
6. IC Index (Roos, Dragonetti&Edvinsson 1998)
7. Technology Broker (brooking 1996)
8. Citation-weighted Patents (Hall, Jaffe&Trajtenberg 2000)

Some of these methods will be disscuses here, while others are beyod the scope of this paper.

House of Quality is presented in a form of matrix with a shape of a house, where roof of house represent relationships while walls characterize processes.

Left wall of the house, which are outcomes of KM initiative, represents goals and objectives whereas right walls of house stand for weights of the outcomes. Center of the house stands for correlations between the metrics and the performance outcomes. By analyzing those correlations management can decide on which areas of KM to focus in order to achieve highest results and influence overall performance of the company.

This matrix actually measure how customer's desires are linked to company's capabilities. Example of House of Quality is available at http://www.qfdonline.com/templates/qfd-and-house-of-quality-templates/. This method is also recognized as Quality Function Deployment (QFD) since it is using matrix to correlate customer needs with capabilities of company to satisfy those needs. More details are available at http://www.qfdi.org/ .

This tool concentrates on maximizing customer satisfaction by translating customer's needs into business processes throughout company. Furthermore, it compares with competition and optimizes features which are delivering biggest competitive advantage to the company.

Benchmarking originates from Xerox Business Systems in the late 1970s when Japanese companies where able to produce similar products with lower price and better quality, then those produced in USA. Therefore, Xerox wanted to explore if it is possible to imitate work done by competition. Two general types of benchmarking exists, one is internal and the other external. An internal benchmarking deal with comparison of departments within same organisation while external compares different companies. Essentially, benchmarking is comparison tool identifying best practices within comparable sectors and emulates them in order to achieve the highest results.

American Productivity and Quality Center (APQC) benchmarking methodology was developed in 1993 and it is known as one of leading methods for successful benchmarking. The KMAT was developed by APQC and Arthur Andersen in 1995 as a tool for self-assessment. Main idea behind this method is to classify companies to be compared with, identify strategic objectives and define which best practices can be successfully implemented.

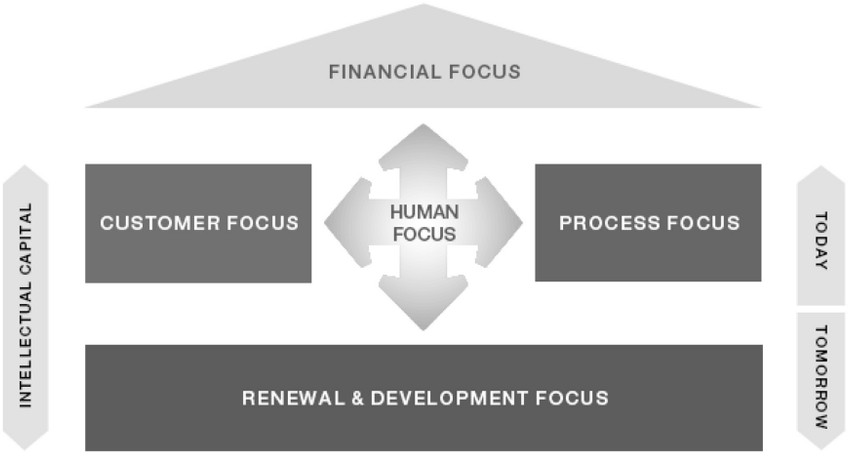
The Balance scorecard method (BSC) was developed by Kaplan and Norton in 1996 with an aim to help organisations in achieving equilibrium between their vision and real life targets, presented by performance indicators. These indicators are spread between following dimensions: Customer, Financial, Internal Business Processes and Learning and Growth. Within each dimension, further development in the area of the goals, metrics, targets and initiatives is possible. For example, if we observe financial dimension, goal can be profitability growth as a major goal to be achieved; metrics can be monitored in some specific area like change in net margin; target is particular result to be achieved e.g. growth in profit margin in amount of 3%; initiatives are projects or actions which helps achieving desired goals.

Even though this method was imagined as performance improvement metrics, it can also serve as strategic management system, since each organisation can adapt it to its own needs. Therefore, each BSC method should be "custom made" for each and every organisation. Now days some tools and templates are available to help organisations implement BSC initiative.

It is interesting to mention similar method called **Intangible Asset Monitor (IAM)** developed by Karl-Erik Sveiby in 1986-87 in Sweden, since both concepts are developed independently of each other. Similarities and differences are explained by author of IAM himself, prof. Sveiby at his website http://www.sveiby.com/articles/BSCandIAM.html. In this article we will just mention that both methods categorize intangible dimensions into four, both agree on idea that strategy must be the driver of the metrics designed, change should be measured and both approaches should improve learning and growth. On the other hand Svieby says: "*the origins and the foundations of the concepts beneath the surface are very different. I would like to think of the IAM as more of a "Knowledge Era" measuring instrument, whereas I regard the BSC as more "Industrial Era". Therefore BSC users will probably develop non-financial indicators that are different from those using the Intangible Assets Monitor."*

Swedish insurance company **Scandia** published in 1994, together with annual report, additional report called "Visualizing Intellectual Capital in Skandia" (Skandia, 1995) which opened new area in the field of measuring intellectual capital. This broadened form of accounting resulted Scandia's ability to transform in-

tellectual capital into financial capital. At Skandia the intellectual capital ratios are grouped into major focus areas: the Customer focus, the Process focus, the Human focus and the Renewal & Development focus, presented in the Picture 1. Reason for giving the name "Navigator" is twofold: firstly, it should guide an organization how to manage intellectual assets and secondly, it should guide people through set of measures that represent the true resources, capabilities, and future potential of an organization.



Picture 1: *Scandia Navigator*

(Source: "Visualizing Intellectual Capital in Skandia", Supplement to Scandia's 1994 Annual Report)

3. Quantifying KM benefits

Wen-der Yu et.al (Quantifying benefits of knowledge management system - A case study of an engineering consulting firm, published in ISARC 2006) developed quantitative benefit models for KM systems. These models quantify 3 types of benefits. Where in data was collected through questionnaires answered by KM system users.

(1) Time benefit – Saving of time (TB) required to solve a problem with KMS (ND_S) compared to with the time required in the traditional process (ND_T)

$TB\% = (ND_T - ND_S) \times 100 / ND_T$

(2) Man Hour benefit – Saving of man-hours required (MHB) to solve a problem with KMS (STT) compared with the man hours required in the traditional process (TTT). Traditionally the problem is solved via meeting. Where as in KMS, the problem is posted in a Community Of Practice (COP) and all members of COP participate in discussion to solve problem. Thus man hour benefit is derived from avoidance of meetings.

$MHB\% = (TTT - STT) * 100 / TTT$

$TTT = ND_T * (MP_T * OT * \Delta\%) + (MN_T * MT_T * MPN_T)$

$STT = \Sigma ORT_S + HRT_S + FAT_S$

Where,

TTT is total man hours required to solve problem traditionally

ND_T is working days required for traditional problem solving process

MP_T is number of participants in traditional process

OT average daily working hours of meeting participants

$\Delta\%$ is the average percentage of daily working hours spent by meeting participants in solving problem

MN_T is the total number of meting required to solve problem

MT_T is total number of meeting required to solve problem

(3) Cost benefit – The cost benefit measures difference of cost between traditional approach (TTC) and KMS (STC) approach.

$CB\% = (TTC - STC) * 100/TTT$

$TTC = [ND_T*(MP_T*OT* ?\%) + (MN_T*MT_T*MP_T)] * EAP$

$STC = [\Sigma ORT_S + FAT_S]* EAP$

Where,

EAP is the average hourly salary of the participants ($/hr)

TTC is the total cost of problem solving in traditional approach ($)

STC is total cost of problem solving in KMS approach

4. Estimation of ROI of KM projects

In 2003, BEI consulting developed Cost / Benefit model to evaluate Return On Investment of (ROI) of KM initiatives. Cost / benefit method divides benefits into two main categories, those are:

1. Tangible benefits like increased quantity of work, cost savings, faster product cycle time etc.
2. Intangible benefits like increased customer satisfaction, quality of decisions, employee satisfaction etc.

Tangible Costs are categorized into: Purchase cost, Implementation cost (including change management), Maintenance cost. Further these costs are subdivided into:

1. Sunk Costs (Costs expended to date on the status quo alternative that are not recoverable) the paper suggests that Sunk costs should not be included in the actual ROI calculation
2. Recurring and non recurring costs
3. Cost avoidance (cost avoidance is term used to describe those costs that are avoided by selecting a particular alternative

To summarize the model following table is prepared:

Year			1	2	3	4	5	Total
Cash In Flows	Cost Savings	Purchase						
		Development						
		Transition						
		Maintenance						
	Cost Avoidance	Purchase						
		Development						
		Transition						
		Maintenance						
	Sub Total (1)							**A**
Cash Outflows	Costs	Purchase						
		Development						
		Transition						
		Maintenance						
	Sub Total (2)							**B**
Return Per Year (1-2)								**(A-B)**

ROI = (A-B)/B

5. Methodology to determine impact of KM projects on financial results

The earlier methods that are used to determine ROI and benefit quantification used qualitative data as input. Also these methods consider Knowledge Management projects as stand alone. As research suggest KM projects are more effective when KM project implementation objectives are aligned with overall business objectives of the firm. Keeping this concept in mind we propose a methodology to confirm impact of KM projects on financial results. Some of the terms used in the methodology are

Return on Capital Employed (ROCE): It is a ratio that indicates the efficiency and profitability of a company's capital investments. ROCE should always be higher than the rate at which the company borrows, otherwise any increase in borrowing will reduce shareholders' earnings. ROCE is Calculated as,

$$\text{ROCE} = \frac{\text{EBIT}}{\text{Total Assets} - \text{Current Liabilities}}$$

Market "Beta" (β)

Beta is a statistical measure which indicates risk of a stock. It measures volatility of individual stock with respect to the market. Beta is calculated from historical stock prices through regression analysis. By definition, the market has a beta of 1.0. A stock that swings more than the market over time has a beta above 1.0. If a stock moves less than the market, the stock's beta is less than 1.0

Assumptions

1. Knowledge management has impact on many areas of firm operation thus effects over all profitability of companies
2. Only firm wide implementation is considered as starting point for study
3. Benefits of Knowledge management can not be realized in shorter duration, thus a period of approximately 2 years to be studied
4. As Knowledge management is mostly internal affair of a company, Return on Capital Employed (ROCE) is considered as a measure instead of market price (used in Event study methodology)

Methodology

"Step - 1: Event Window"

Event window is the period during which firm's ROCE is observed. Each event widow consists of financial quarters. We selected quarter as measurement because most of the firms publish quarterly financial results. By using this legal data we can calculate ROCE. The quarter in which firm wide KM project implementation started is considered as quarter "Zero". Quarterly ROCEs before implementation is estimation window and Quarterly ROCEs after implementation is started as post event window

Event window 1 [-1, 0, +1]
Event window 2 [-2, 0, +2]
Event window 3 [-4, 0, +4]
Event window 4 [-8, 0, +8]

"Step – 2: Estimation of normal return"

Normal return is expected ROCE if the KM project is not implemented. In order to calculate normal ROCE we can use industrial average ROCE.

$ROCE_E = \beta_f * ROCE_I$

Where,

$ROCE_E$ = Expected / Normal ROCE of firm that is studied
β_f = Market Beta of firm
$ROCE_I$ = Industrial average of ROCE

"Step – 3: Calculation of abnormal return"

Abnormal returns are the returns from the capital employed because of KM implementation. This is difference in estimated / normal ROCE and actual ROCE.

$ROCE_A = ROCE_O - ROCE_E$

Where,

$ROCE_A$ = Abnormal ROCE of firm that is studied
$ROCE_O$ = Observed ROCE
$ROCE_E$ = Estimated / normal ROCE

"Step – 4: Calculation of cumulative abnormal return (CAR)

Cumulative Abnormal return on Capital employed is calculated as

$ROCE_{CAR} = \prod_{i=T1}^{T2} (1+ROCE_{Ai}) * (1+ROCE_{A(i-1)})-1]$

Where,

$ROCE_{Ai}$ is abnormal ROCE of i^{th} quarter
$ROCE_{A(i-1)}$ is cumulative product of abnormal returns of all quarters prior to i^{th} quarter

6. Conclusion

A positive CAR indicates successful KM project implementation while negative CAR shows unsuccessful KM project implementation. It is crucial to note that negative CAR does not mean that Knowledge management is leading to losses. Instead companies should focus on other means and ways to stay competitive.

This paper gives an overview of some methods known so far in theory and practice, at the same time proposing method which needs to be tested and validated by studying results of companies that implemented KM projects. Furthermore, the use of market "Beta" to calculate normal return (ROCE) also needs to be validated.

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