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Towards a Taxonomy of Approaches for Measuring Organizational Knowledge

Steffen P. Raub & Bhushan Sthapit

Abstract

None.

Peter Drucker in 'Managing in a Time of Great Change' lucidly portrays the arrival of the knowledge economy. According to him, knowledge has become the key economic resource and perhaps the only source of competitive advantage in this new environment. The knowledge economy has a dramatic impact on the way in which firms compete today. It affects every aspect of modern business – from a corporation's strategy to its products, from its processes to its organization and, last but not least, its people.

Everyone is grappling to come to terms with the new situation. Many have been carefully mapping out new strategies and business models that make most sense in this new economy that is centered around knowledge. Some smart and agile businesses have been widely successful while some of yesterday's giants have perished miserably. The new knowledge economy is creating quite a stir around the globe. It is pervasive and it brings a lot of new challenges. Human resource professionals may be uniquely positioned to take advantage of the challenges the knowledge economy brings and to act as pathfinders in the knowledge jungle. In this paper we will argue that a solid understanding of the measurement issue in knowledge management will have a significant impact on both a corporation's chances of success in the knowledge economy and the human resource profession's influence on corporate knowledge journeys.

1. Knowledge Management

The term "knowledge management" has come to describe almost everything that goes on inside an organization – from organizational learning to change management, from document management tools to corporate intranets. The buzz is palpable. Nevertheless, the sustained interest in KM is justified by the widespread realization that knowledge has become the principle source of sustainable competitive advantage. Only by managing and leveraging corporate knowledge assets will survival in the new economy be possible. This, in turn, requires linking information, people and processes in order to spawn continuous innovation and corporate renewal.

Effective KM requires more than simply having the right software systems on board. It requires corporate leadership that views collective knowledge sharing and innovation as the fulcrum of competitive advantage. This poses a huge challenge in organizations where employees have been notorious for hoarding knowledge due to its association with power. In the past, organizations have had a tendency to reward people who possess knowledge and not those who are willing to share it. KM, on the other hand, compels employees to share their knowledge and instigates management to value those who do. A true knowledge-aware organization is one that is able to react quickly to external demands by leveraging internal resources intelligently and anticipating external market directions and course changes.

KM surely is perceived and understood in a variety of ways, depending on the particular viewpoint of the observer. Organizational theorists like to define it in terms of change management and organizational dynamics. Information technology people prefer to view KM from a technological angle and relate it with state-of-the-art IT infrastructures. Similarly, a large number of organizations have their own company-specific or product-specific definitions to suit their marketing ploys. Due to the fact that knowledge has a domain that is large enough to subsume anything that a person or organization does none of the above definitions can be convincingly refuted, and therein lays one of the problems that KM is facing today.

The many KM definitions that one can find in the literature may at first glance appear to be disparate. However, upon careful comparison it is possible to identify certain elements that most concepts have in common:

- KM refers to a certain 'process'; it is a means and not an end in itself

- data, information, knowledge – and sometimes wisdom – are elements to be found in most definitions of KM
- frequent reference is made to the usage of the above mentioned elements to secure superior performance, or increased business value
- technology is commonly cited as an important enabler for KM
- people and organizational issues are mentioned either explicitly or implicitly

In essence, KM is about the delicate balance and synergistic interaction between technology, people and the organization in order to gain and sustain competitiveness in highly discontinuous environments. In more practical terms, KM is about the process of managing the flow of knowledge within an organizational setting by capturing, creating, synthesizing, organizing and disseminating knowledge so that day-to-day decision-making is made more efficient and effective and ultimately greater value is delivered to customers.

In the realm of management practice, the acceptance of new concepts depends to a large degree on their ability to show in a convincing matter how they can make a contribution "to the bottom-line" - a predicament that human resource managers in many organizations are painfully aware of. For a long time, HRM itself has had to fight for its right to occupy space in corporate budgets and academic curricula. Today's widespread acceptance of HRM as an essential function in modern management has been achieved through advances in research and through the increasing professionalization of HRM managers. It is fair to assume that advances in the measurement of human resources activities (e.g. Fitz-enz, 1995; Phillips, 1991) have served as an important catalyst in this process.

KM is faced with a similar challenge. There is a substantial amount of skepticism amongst researchers and practitioners alike, that early excitement about KM may turn into just another passing fad. Two events could contribute to prevent this from happening. First, it would be useful if a somewhat more unified definition and approach to KM could be chalked out and embraced by a large number of researchers and practitioners. Second, proponents of KM could gain credibility by finding new and better ways of demonstrating how KM really contributes to organizational effectiveness.

The issue of measurement in KM is a highly contentious issue. The often huge investment required for a KM initiative in a company begs serious questions regarding its return on investment. But issues of measuring the value added by such initiatives have often been thought to be elusive and somewhat hard to quantify. It seems that, for a number of reasons, HR professionals are in an ideal position to fill this gap. HRM has by now collected a substantial amount of experience in measuring "soft factors" with the help of a variety of qualitative and quantitative indicators. HR managers have traditionally found themselves to be in a position where they have to justify their activities before an audience inclined to more quantitative, "number-cruncher" approaches of efficiency and productivity measurement. Finally, HR managers often serve as catalysts of change and internal promoters spearheading innovative management approaches. Taken together, these could be sufficient reasons for HR to take control of the KM issue and promote it with a strong focus on knowledge measurement. This paper is intended to provide an overview of the current state-of-the art of knowledge measurement, which may serve as a starting point for this endeavour.

2. Towards a taxonomy of knowledge measurement

Attitudes towards the issue of knowledge measurement can broadly be classified in two groups. On the one hand are those who believe that the result of measuring knowledge is hardly worth the effort it requires. They discourage any attempts to measure knowledge or knowledge-related processes. For them, knowledge is something intangible and they argue that the outcome of knowledge processes or initiatives will also be something intangible. Hence, measuring the impact caused by knowledge initiatives is not going to be a worthwhile effort. Proponents of this perspective contend that KM should be looked upon with a mixture of faith and belief and with an implicit assumption that it will bring positive transformations and result in increased organizational effectiveness.

Contrary to the above line of argument, there are those who strongly voice the need for incorporating knowledge-related measures into traditional accounting. According to them, the traditional balance sheets have serious inadequacies in today's knowledge-intensive world. Their major drawback is the backward-looking focus of most indicators, which are unable to predict or forecast the future of the organization. Moreover, the traditional balance sheets or accounting methods put a lot of emphasis on financial measures whereas a balanced set of measures, which encompass various aspect of the organization, would be more appropriate in today's environment. Hence, thinkers at this end of the spectrum strongly insist that this realization should be deeply engraved in today's business environment and gradually this should result in implementation, incorporation and widespread acceptance of knowledge measurement.

In this paper we aim at providing a brief overview of the measurement efforts in contemporary KM. It is not our purpose to provide an in-depth coverage of specific methods. Rather, we would like to compare different approaches and philosophies in measuring knowledge. As a result of an extensive literature review, the various approaches have been classified according to four major foci:

- **Benchmarking focus** – The Knowledge Management Assessment Tool (KMAT)
- **Performance measurement focus** – The Balanced Scorecard
- **IC measurement focus** – The Intangible Asset Monitor (IAM), The Skandia 'Business Navigator'

- **Value focus** – EVA, MVA and Knowledge Value Added (KVA)

Table 1 provides an overview of the four different categories types of approaches and summarizes some of their key characteristics as well as their major strenghts and weaknesses.

Table 1
An overview of knowledge measurement approaches

	Benchmarking focus	Performance measurement focus	IC measurement focus	Value focus
Key ideas	• knowledge processes and enablers • compare KM activities internally and externally	• combine financial and non-financial indicators • translate strategy into easy-to-comprehend measures	• IC consists of human, structural and relational capital • measure growth of IC via a set of indicators	• guide and evaluate BPR efforts • value of a process defined by the knowledge added
Main strength	• rapid assessment of current practices	• balanced perspective on performance	• clearest focus on knowledge	• disciplined methodology
Main weakness	• no true measurement of organizational knowledge	• no direct measurement of knowledge	• indicators need refining	• limited to pasts of the organization
Examples	• KMAT	• Balanced Scorecard	• Intangible Asset Monitor • Skandia's Business Navigator	• Knowledge Value Added (KVA)

In the remainder of the paper we will illustrate in a concise manner some examples for the different measurement foci. We will begin with the simplest and gradually move up to more complex approaches.

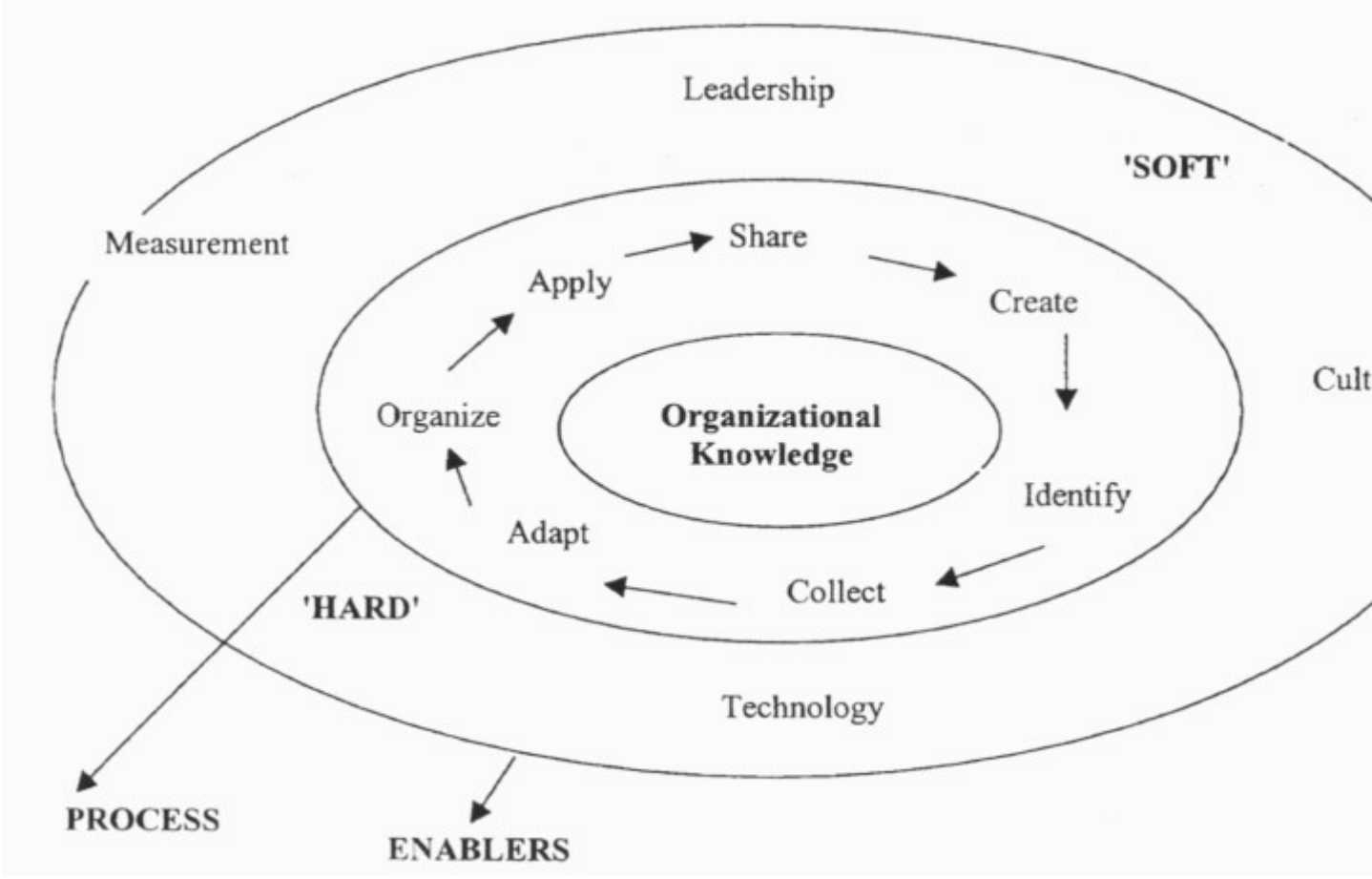
2.1 The benchmarking focus

Strictly speaking, benchmarking models do not represent an approach to knowledge measurement per se. They focus on assessing knowledge management activities rather than measuring the level or the degree of change in organizational knowledge. Our reason for including this type of approach in our overview is that they represent one of the first systematic efforts at making knowledge management a less intangible concept. The dominant benchmarking model is the Knowledge Management Assessment Tool (KMAT), which was jointly developed by Arthur Andersen and the American Productivity and Quality Center (APQC).

The Knowledge Management Assessment Tool (KMAT)

The KMAT represents a collaborative and qualitative benchmarking tool, designed to help organizations make an initial high-level assessment of how well they manage knowledge. Completing the KMAT can direct organizations toward areas that require more attention and help identify knowledge management practices in which they excel. The tool is based on an organizational knowledge management model that illustrates how four so-called enablers (leadership, culture, technology and measurement) can be used to foster the development of organizational knowledge through a typical knowledge management process. The model, which is illustrated in Figure 1, places the major knowledge management activities and enablers together in a dynamic system.

Figure 1
The KMAT – An example of the benchmarking focus



Each of the five sections of the tool – leadership, culture, technology, measurement and knowledge processes – encompasses a set of knowledge management practices. Organizations can have their performance rated and benchmarked with those of other organizations for each of 24 practices.

Leadership – Leadership practices encompass broad issues of strategy and how the organization defines its business and uses its knowledge assets to reinforce its core competencies. This assumes that knowledge management needs to be linked directly to the way the organization is managed.

Technology – Technology practices focus on how the organization equips its members for seamless communication with one another. It also encompasses the systems used to collect, store and disseminate information.

Culture – Culture practices reflect how the organization views and facilitates both learning and innovation, including how it encourages employees to build the organizational knowledge base in ways that enhance value for the customer.

Measurement - Measurement practices include not only how the organization quantifies its knowledge capital, but also how resources are allocated to fuel its growth.

Knowledge Management Processes – The knowledge management process layer encompasses the action steps the company uses to identify the knowledge it needs and the manner in which it collects, adapts and transfers that knowledge across the organization.

Three types of comparison reports can be generated using the KMAT. External benchmarking compares an organization with the overall (multi-industry) KMAT database or a smaller customized group. Internal benchmarking compares an individual or division within an organization with a group of their peers who have also responded to the KMAT.

2.2 The performance measurement focus

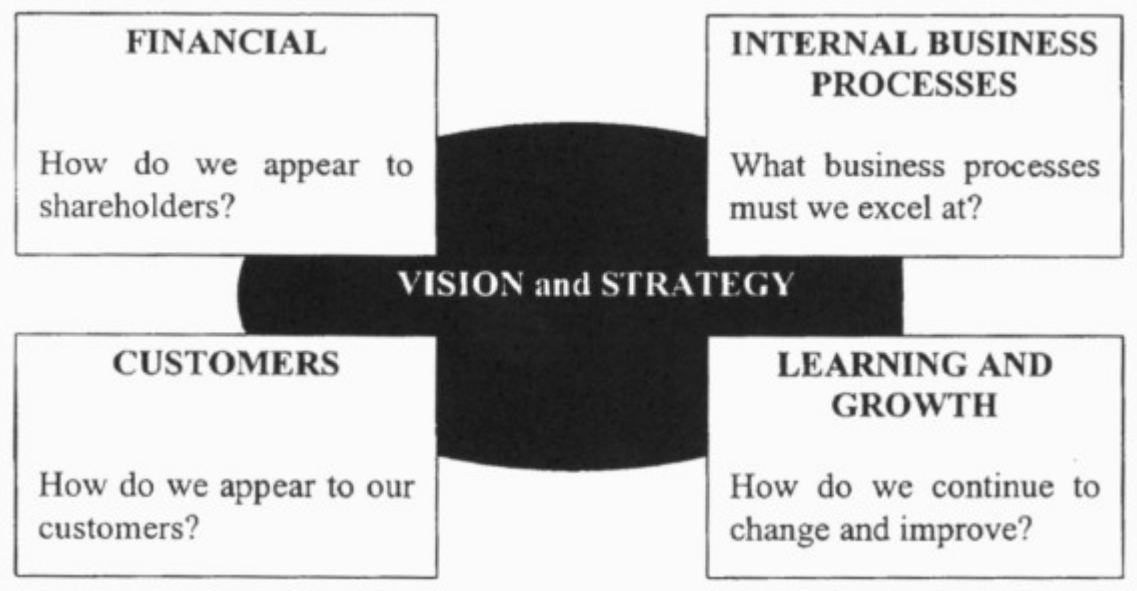
Performance measure systems go one step further than benchmarking approaches in that they attempt to measure - at least indirectly - the development of organizational knowledge over time. Historically, the focus of performance measurement has been financial in nature. Recently, however, many have criticized the exclusive use of financial measures in business. They argue that short-term financial indicators lead businesses to focus on equally short-term financial gains at the expense of long-term value creation activities - such as, for instance, investments in intangible and intellectual assets. There is growing recognition that traditional accounting measures like return-on-investment and earnings-per-share can provide misleading signals for continuous improvement and innovation activities that today's competitive environment demands. What is needed is a balanced set of measures, which, along with the financial health, reflect other important aspects of an organization's current situation.

The Balanced Scorecard (BSC)

Kaplan and Norton (1992) have proposed a new measurement system that provides managers with a comprehensive framework to translate a company's strategic objectives into a coherent set of performance measures. The BSC has been immensely popular in the corporate arena and many organizations are already using the BSC in one form or another to measure organizational performance.

The four perspectives of the scorecard create a balance between short-term and long-term objectives, between outcomes desired and the performance drivers of those outcomes, and between hard, objective measures and softer, more subjective measures. It provides a framework or a language to communicate the mission and strategy and it uses measurement to inform employees about the drivers of current and future success.

Figure 2
The Balanced Scorecard approach



The BSC allows managers to look at the business from four different perspectives by asking the following questions:

- How do customers see us? (Customer perspective)
- What must we excel at? (Internal perspective)
- Can we continue to improve and create value? (Innovation and learning perspective)
- How do we look to shareholders? (Financial perspective)

The different perspectives of the BSC and the types of measures and drivers for each of the perspectives are complementary.

Financial perspective - Financial performance measures remain important because they are able to indicate whether a company's strategy, implementation and execution are contributing to bottom-line improvement. Financial objectives typically relate to profitability - measured, for example, by operating income, return-on-capital employed or, more recently, economic value added (EVA). Alternative financial objectives can be rapid sales growth or generation of cash flow.

Customer perspective - Managers identify the customer and market segments in which the business unit will compete. These market segments represent the sources that will fulfill the aim of the financial perspective. Core outcome measures include customer satisfaction, customer retention, new customer acquisition, customer profitability, and market and account share in targeted segments. The customer perspective also covers specific measures of value propositions that the company will deliver to customers in targeted market segments (e.g. short lead-time, on-time delivery etc.).

Internal business process perspective - Companies typically develop the measures in this perspective after they have done so for the financial and customer perspectives. This sequence enables companies to focus their internal-business-process metrics on those processes that will deliver the objectives established for customer and financial perspectives. The measures locus on the internal processes that will have the greatest impact on customer satisfaction and on achieving the organization's financial objectives.

Learning and growth perspective - This relates to the infrastructure that the organization must build to create long-term growth and improvement. As in the customer perspective, employee-based measures include a mixture of generic outcome measures - employee satisfaction, retention, training and skills - along with specific drivers of these generic measures, such as detailed, business specific indexes of the particular skills required for the new competitive environment.

In summary, the BSC translates vision and strategy of an organization into objectives and measures across a balanced set of perspectives. The scorecard includes measures of desired outcomes as well as processes that will

drive the desired outcomes for the future.

2.3 The IC measurement focus

Intellectual capital approaches come closest to a true measurement of organizational knowledge. There are a variety of terms for describing the organizational wealth of knowledge, such as, for instance, knowledge capital, knowledge assets, intangible assets, intellectual capital, invisible assets etc. The notion of the 'organizational stock of knowledge' is often extended to include intellectual property such as patents, trademarks or copyrights. The conversion of knowledge (a raw material) into something valuable (a product of knowledge) has come to be known as an intellectual asset or intellectual capital. According to Klein and Prusak (1994) "we can define intellectual capital operationally as intellectual material that has been formalized, captured and leveraged to produce a higher valued asset."

Several classification systems have been proposed in order to organize the different components of intellectual capital into useful categories. Many agree with Sveiby (1997) who suggests that IC consists of three major elements:

- *Human capital* - which includes the know-how, capabilities, skills, and expertise of organization members
- *Structural capital (or Organizational capital)* - which includes the systems, networks, policies, culture, distribution channels, and other "organizational capabilities" developed to meet market requirements as well as intellectual property and
- *Relational capital (or Customer capital)* - which includes the connections of outsiders with the organization, such as customer loyalty, market share, rate of new customer acquisition etc.

Another, slightly different distinction, has been suggestedby Brooking (1996). According to her, intellectual capital is composed of the following assets:

- *Market assets (or customer assets)* - all market-related intangibles, including brands, customers, customer loyalty, distribution channels, backlog, etc.
- *Human-centered assets* - skills and expertise, problem-solving abilities, leadership styles and abilities and everything that is embodied by the employees
- *Intellectual properly assets* - know-how, trademarks and patents, and any intangible that can be protected by copyright
- *Infrastructure assets* - all the technologies, processes and methodologies enabling a company to function

Stewart (1997) summarizes a number of methods for measuring IC. He divides his overview in measures that attempt to capture IC "as a whole" and those that focus on its components. Measures of the whole include:

- *Market-to-book ratios* - which simply compare the difference between published historical cost book value and the market value of the firm
- *Tobin's Q* - which relates the market value of the company to the replacement cost of its fixed assets and defines the difference as the value of IC and
- *Calculated intangible value (CIV)* - which computes the value of the intangible assets by a comparison between the company's performance and an average competitor that has similar tangible assets

Some companies have their own specific categorization for evaluating knowledge assets. However, it is starkly evident that there is not much of a difference between each of those classifications. The general practice that one can observe is that most companies categorize their knowledge assets (intellectual capital) into one of the four areas and devise company specific metrics or indicators to measure the state of the knowledge assets in each area over time.

The so-called 'Konrad track' is at the origin of several different knowledge measurement efforts. Its followers consist of managers who use primarily non-financial indicators to monitor and publicly present their intangible assets. The 'Konrad track' is based on a concept originally brought forward by a working group consisting of members from several Swedish knowledge companies, the so-called 'Konrad Group'. The results of this work have been summarized by Sveiby (1988, 1989). Based on the concept of the Knowledge Organization (Sveiby, 1986) the Konrad track outlines a theoretical framework for public reporting of intangible assets and has coined the concepts 'Structural Capital' and 'Human/Individual Capital'. Its principles have been further developed in practice by companies like WM-data, Skandia and KREAB and via Skandia' s 'Business Navigator' they later found their way into the USA and Canada. We will briefly illustrate two of the most popular applications of IC-based indicator systems for knowledge measurement.

The Intangible Asset Monitor (IAM)

Sveiby, who pioneered the intangible asset monitor, started its development based on the observation that in knowledge-intensive companies the value of intangible assets far exceeds the value of tangible assets and that this gap increases continuously. According to him, intangible or invisible assets can be categorized as being of three types:

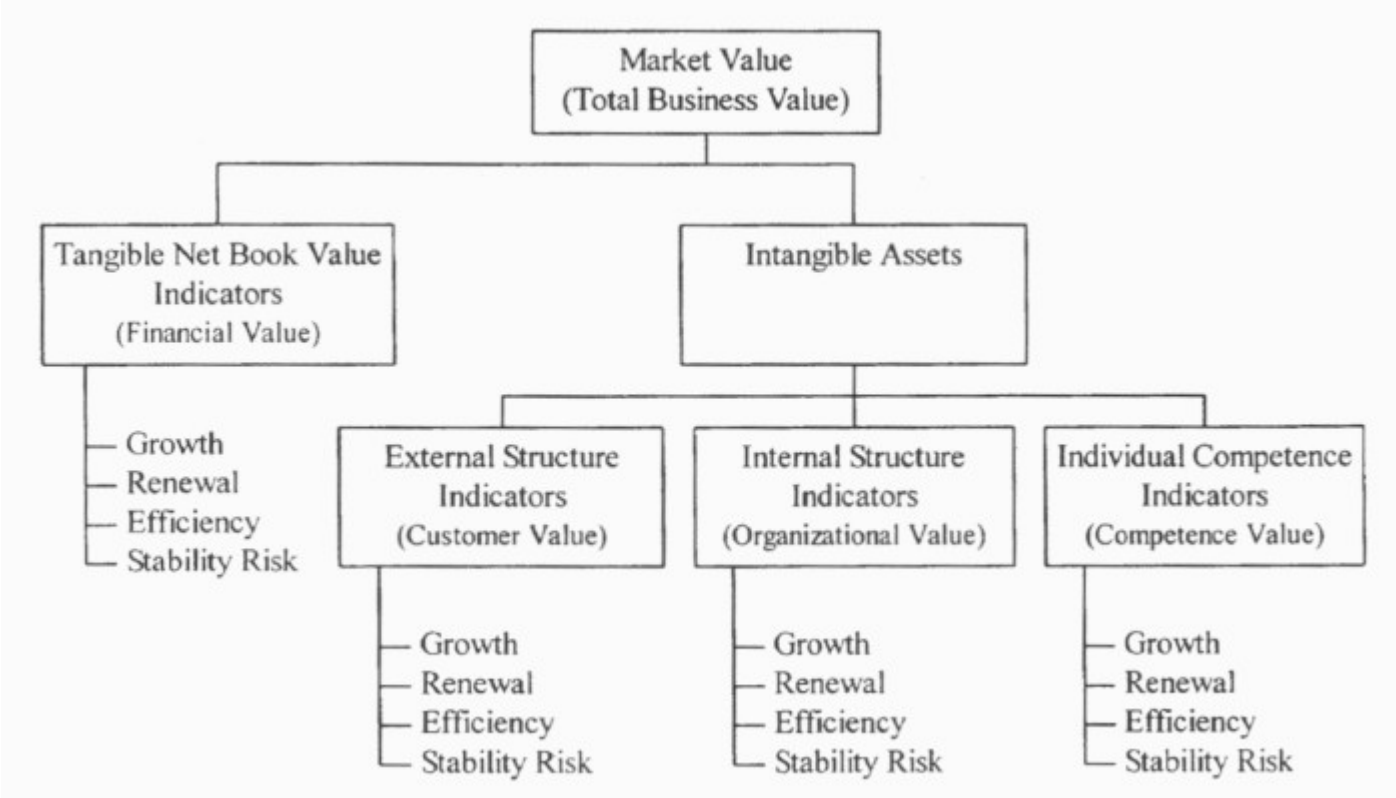
External structure - refers to assets that depend on relationships outside your organization, for example customer and supplier relationships and the organization's image

Internal structure - includes patents, concepts, manuals, systems processes, models and computer and administrative systems that are part of the organization

Employee competence - refers to the capacity (education, skills, experience, energy and attitudes) of employees to act in a wide variety of situations

According to Sveiby, KM is the art of creating value by leveraging the above intangible assets. Following up on the above categorization and adding some indicators to it, Sveiby comes up with a model known as the Intangible Asset Monitor (IAM) that can be used as a management information system for the intangible assets of a company. It can also be used to conduct an audit. The indicators in the diagram shown below are for the purpose of finding out whether there has been a change in the intangible asset value over time. The indicators are developed in such a way that they provide the necessary insight into how both the tangible and the intangible assets are developing.

Figure 3
The Intangible Asset Monitor



The indicators that Sveiby believes to be more relevant, are the ones that are able to tell whether the intangible assets of a company are growing or not, whether they are being renewed, how efficiently they are utilized and how stable they are. Hence there are the four dimensions of growth, renewal, efficiency and stability risk in the IAM diagram. Moreover, different values are assigned to each of the four assets, which determine the Financial Value, Customer Value, Organizational Value and Competence Value respectively.

Assigning the four types of indicators to each of the value assets we get a four-by-four table, i.e. sixteen cells to fill with appropriate indicators. This table provides an overall picture of the state of the organization's assets. Measurement of all the indicators on a timely basis, can give a clear picture as to the direction in which asset values develop.

Skandia's 'Business Navigator'

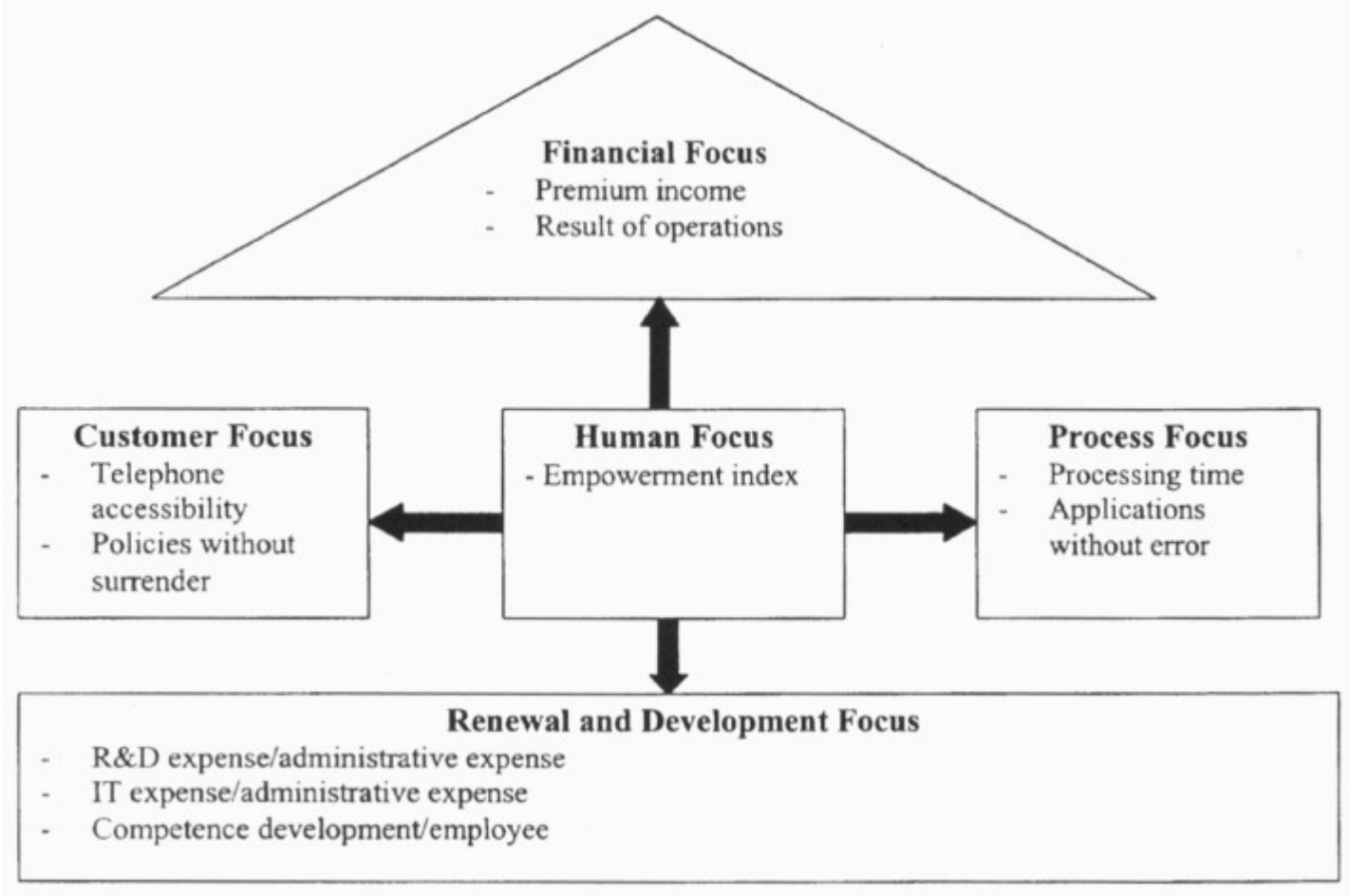
Skandia AFS, a subsidiary of the Skandia insurance group, has chosen to turn the measurement of intangible assets into a tool for competitive differentiation. The company actively and publicly promotes its 'Business Navigator', which incorporates a large number of key indicators and is one of the driving forces in the intellectual capital movement.

The report on its intangible assets issued by Skandia AFS has attracted international attention. It is the result of a program headed by the company's 'Director for Intellectual Capital', Leif Edvinsson. This program is based on the structure of concepts presented in Sveiby's Invisible Balance Sheet. Skandia has taken it several steps further by incorporating a form of presentation similar to the Balanced Scorecard and applying it to several areas.

The Skandia Navigator is a future-oriented business-planning model providing a more balanced overall picture of operations. It represents a balance between the Past (the Financial Focus), the Present (the Customer, Human and Process Foci) and the Future (the Renewal & Development Focus). The Navigator allows the breakdown of

Skandia's operational vision and objectives into concrete factors that can be coupled to an individual's own work. Skandia believes the investments made in renewing and developing the Human, Customer and Process capital drive financial success. The Navigator visualizes this belief and forms the basis for business planning processes. Skandia's Business Navigator incorporates a total of about thirty key indicators in various areas, which are monitored internally on a yearly basis.

Figure 4
Skandia's Business Navigator with selected indicators



2.4 The value focus

A more recent approach at measuring organizational knowledge builds on concepts that have been trademarked and promoted by Stern, Stewart & Co., a New York-based consultancy. The Economic Value Added (EVA) and Market Value Added (MVA) concepts are essentially methods of measuring value creation by firms. Along this line of thinking, a recent extension of value-based knowledge measurement has been presented in the form of the Knowledge Value Added (KVA) model.

Knowledge Value Added (KVA)

KVA is a framework for measuring the value of corporate knowledge assets. The concept addresses one of the weaknesses of traditional cost accounting, namely that the latter does not address the measurement of value being generated by a specific process. KVA was created in response to the business process reengineering efforts of many organizations, which have mostly focused on cutting costs, rather than delivering value. It is designed to facilitate the analysis of value created through business process reengineering. KVA is based on the assumption that the value added by a process is the change which occurs between its input and its output and this change is caused by the knowledge value that is added in the input to output process.

The KVA methodology firstly identifies the core processes and sub-process within the activity of interest. It then allows the individual to quantify the value of each core process and its sub-processes by looking at the outputs and the inputs. Knowledge Value Added uses revenue as a surrogate for value. Allocated revenues are then divided by the costs incurred in using the knowledge required to produce the core process outputs. Since revenues are being matched with the costs incurred in generating those revenues, this methodology is consistent with the matching principle of generally accepted accounting principles (GAAP).

Instead of viewing KVA as a separate and different method, it should be looked upon as a method that complements traditional cost accounting practices. The objective of cost accounting is to determine the cost of the processing of a given product, service, or project (cost object); whereas the objective of KVA is to determine the value of each

process exercised in generating a given product, service, or project. So if cost accounting is profitability-focused, KVA is focused on determining the value that is being generated.

The Knowledge Value Added (KVA) approach emphasizes Business Process Auditing (BPA), a tool that allows managers to focus on creating value, rather than just cutting cost. A key goal of business process reengineering should be twofold: to increase process capacity while at the same time increasing demand for a product or service. There are three approaches to BPA (Learning Time Approach, Process Description Approach, Binary Query Approach) that use different methods of measuring the amount of knowledge contained in a process. When possible, a KVA team should use as many of these approaches as possible and compare the results to validate their findings.

Knowledge Value Added provides an objective method for measuring and comparing the amount of value added by a given component process before and after reengineering efforts. The seven-step methodology measures processes in terms of their Return on Process (ROP) and Return on Knowledge (ROK):

1. Identify the compound process and its component processes
2. Create the shortest description possible for each component process, using the same language
3. Count the number of process language "words" in the component output descriptions
4. Designate a time period long enough to capture a representative sample of the company's final product/service outputs following common statistical sampling practices
5. Add up the total amount of K-complexity ("words") produced by each component during the designated time period
6. Calculate the total cost to produce the output for each component
7. Compute the ROP/ROK for each component process

The essential benefit of KVA is that it provides managers with a relatively objective means of determining where and what to re-engineer in business processes. It also allows a much more refined quantification of the success of BPR efforts.

3. Conclusion

As can be observed in the above discussion, various types of measurement approaches are evident in contemporary KM practices. One of their common threads is that they are concerned with a balanced approach towards measuring and valuing the intellectual assets of a corporation. Financial indicators form only one wing of a whole set of balanced indicators. Qualitative and non-financial indicators are given equal importance in these approaches.

None of the models presented in this paper has found universal acceptance. Even though the individual attempts are highly commendable, it is felt that this movement needs more support and wider acceptance. Idiosyncratic or company-specific measurement systems developed in isolation can do little to create measurement standards that are robust enough to be adopted across diverse organizations. To overcome this, a collective approach is necessary.

Human resource managers are in a promising position to carry knowledge measurement one step further. They are directly concerned with one of the most important intellectual assets of an organization: its people. Moreover, they have gathered experience with the kind of qualitative indicators that form an essential element of most knowledge measurement models. Successful introduction of knowledge measurement models under the guidance of human resource managers could go a long way towards improving organizational effectiveness and hence further solidifying the position of HRM as a key organizational function. With this paper we hope to have contributed an incremental step towards this goal.

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