# Intellectual capital measuring methods

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## Abstract

Generally, two main methods exist for valorization of a company based on the financial statements (balance sheet) of the company or based on the market value. Nowadays the gap between these two values has increased so much and often the value is much higher than the book value of the companies. One the main reasons for this gap is the intellectual capital of the companies which are not considered in financial statements of the companies. Due to the perception and determination of actual monetary value of the company, the value of profits and financial related factors and intellectual capital should be estimated. In fact, this estimate should include three components of strategic analysis, financial statements analysis and anticipation of future development. In this article, 17 models of intellectual capital measuring models are surveyed.

**Keywords:** Intellectual capital, Human capital, Organizational capital, Customer capital

## Introduction

Generally, two main methods exist for valorization of a company based on the financial statements (balance sheet) of the company or based on the market value. Nowadays the gap between these two values has increased so much and often the value is much higher than the book value of the companies. One the main reasons for this gap is the intellectual capital of the companies which are not considered in financial statements of the companies. Due to the perception and determination of actual monetary value of the company, the value of profits and financial related factors and intellectual capital should be estimated. In fact, this estimate should include three components of strategic analysis, financial statements analysis and anticipation of future development. Basically in knowledge-based organizations, the book value may only present one small part of the future real value. These companies often have few physical assets, while their competitiveness is significantly based on their intellectual capital. Thus, the value of these companies in market is estimated under actual, unless they could prove their actual values, or even their abilities in reflecting the monetary value of intellectual capital could help them in providing external financing (Halshi and Haji Eydi, 2007).

## Main groups of different measuring methods

Based on William's (2002) idea different methods could be divided into four main groups:

A) Direct intellectual capitalmethods: Including estimation of monetary value of intangible assets or intellectual capital through detecting their different constituent elements. According to this methods once the value of elements is calculated one by one and then total value of different classes indicate the related asset value. The main disadvantage of these methods is that it is not possible to easily relate their results to the financial results.

B) Methods of investment market (marketcapitalizationmethods) calculating the difference between the market value of the company (based on the stock market prices) and adjusted equity for inflation or cost of replacementare considered as the value of intellectual capital or intangible assets. This method has some strengths and weaknesses: these methods emphasize on the financial figures that despite their incompletion they are auditable. Also they try to present a realistic evaluation from the organization. Their main advantage is that they can be used for simple comparison between the active companies in one similar industry, but they will give very few details to the financial analysts.

C) Return on assets methods: Calculating the mean of previous earnings from the company several years' tax

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and dividing it on the mean of company tangible assets in those years, the result of this calculation is called return on assets rate which is further compared with the mean of industry. The difference between these two varieties is multiplied by the mean of tangible assets in order to obtain the mean of annual incomes resulted from the intangible assets. Then this mean of earned income is divided to weighted mean cost of capital or interest rate in order to obtain an evaluation from the value of intangible assets or intellectual capital.

D) ScorecardsMethods: These methods are based on the identification of different elements of intangible assets or the intellectual capital and acquired indicators and measures regarding the scorecards and their report as a graph. These methods are similar to the direct intellectual capitalmethods,

and their only difference is that in scorecards methods there is no evaluation of the monetary value of the intangible assets or the intellectual capital. One of the disadvantages of these methods is that the indicators used in them are the kind of content indicators, which means that they can be different for each and every aim and organization and from this perspective comparing the companies with each other, is very difficult. Another disadvantage is lack of ability to relate them to the fiscal results (Jurczak, 2008). In below table we compare the intellectual capital measuring models and survey their advantages and disadvantages.

In table below, different intellectual capital measuring models, their researchers and the way of evaluating these models are shown:

**Table 1. Comparing the intellectual capital measuring models (Namamian, Gholizadeh, & Bagheri (2011)**

| Tools | Main rationale | Advantages | Disadvantages |
|---|---|---|---|
| Human Resource Accounting | According to the financial terms, value of human capital is considered as one item of capital, not one item of cost. | Calculation with financial terms should be in a broad balance sheet for using the internal sources of special services | It is subjective. There are lots of data |
| Economic Value Added (EVA) | The aim of one company is to maximize the value of shareholders and also to maximize the effective use of capital. This should be reflected in all of the decisions of all levels of company. | It is well correlated with stock price. It is related to Budgeting, financial planning, goal targeting, and incentive compensation | Complex modulation schemes, net assets against the market value of assets, weak explanatory power, acceptance of a monitoring structure only in favor of shareholders |
| Balanced scorecard | Companies need a system of conducting and delaying indicators (internal & external) | Strong rationale, clear correlation between the financial indicators and performance, developed and compatible literature | Dry, inappropriate attention toward human assets and processes of knowledge creation, static and non-dynamic, lack of possibility to use external comparing |
| Intellectual capital | A huge part of the value of a company is caused by intangible resources, thus these resources should be followed up the same as physical resources. | Flexibility, dynamic model, possibility to use external comparison to some extent, applicable for state companies | Complex and vague literature, development of few indicators are still in initial stage, too much focus on reserves instead of flows |

Different models of measuring intellectual capital:

1- Skandia (Edvinsson) router pattern
2- Roos&Roos categorization
3- Model of Intellectual Capital
4- Brooking'stechnology model
5- Monitoring pattern of intangible assets
6- Economic value added pattern (EVA)
7- Sveiby's model
8- Balanced scorecard pattern
9- Tobin's Q pattern
10- Sullivan's pattern
11- Mcelvar's model
12- Human resources accounting
13- The invisible balance sheet
14- Human resources accounting and costing
15- Market value to book value
16- Value probe
17- Methods for measuring the intellectual capital of technology server model

Below we describe these 17 models of types of measuring patterns.

**Table 2. Patterns for measuring the intellectual capital (Sveiby, 2008)**

| Pattern | Researcher | Approach | Description of evaluation |
|---|---|---|---|
| Patent | Bontis (1996) | DIC | Calculates the factor of technology based on the number of organization patents taken place. The performance of intellectual capital is measured by the effect of a set of indicators such as number and also cost of patents. |
| Comprehensive evaluation method | McPherson (1998) | DIC | It uses ranking by the use of weighted combination of indicators which on that the focus is on the relative values and not the absolute values.Intangible value added + monetary value added= combined value added |
| Value probe | Anderson Vetison (2000) | DIC | Calculating value is conducted through detecting 5 types of intangible assets including: 1- initial assets and inventories, 2- skills and tacit knowledge, 3- social values and norms, 4- technology and explicit knowledge, 5- main and management processes. |
| Valuation of Intellectual Property | Sullivan (2000) | DIC | A method for evaluating the value of intellectual property |
| Total Value Creation | Anderson &McLin (2000) | DIC | A design that uses the discounted cash flows for retesting the effect of events on the planned activities. |
| Accounting For the Future | Nash (1998) | DIC | A method for discounted cash flows, in this method the difference between accounting value (for the future) at the end and in the beginning of a period is considered as the value added of the period. |
| Tobin's Q | Stewart (1997) & Bontis (1999) | MCM | Tobin's Q is the ratio of market value to the registered value (book value) of assets. Stewart put the cost of replacement of tangible assets in the place of book value of tangible assets. Change in Tobin's Q offers an indicator for performance measuring. In long-term it is expected to see this ratio tends toward one. Book value/market value= Tobin's Q |
| The market value determined by the investor | Stand field (1998) | MCM | Interpreting the actual value as the market value of asset, and dividing it to tangible capital, true intellectual capital (immovable), erosion of intellectual capital, and sustainable competitive advantage. |
| Ratio of market value to book value | Stewart (1997) & Luthy (1998) | MCM | Surveys the value of intellectual capital in comparison with the market value and registered value. Intellectual capital + registered value= market value |
| Human resource accounting and pricing | Johansson (1996) | ROA | Calculates the invisible effect of costs related to the human resources on the loss of profits of economic unit. Intellectual capital is measured through calculating the contribution of available human assets divided by costs of investment on manpower (salaries and profits) |
| Valuation of human capital | Libovitz& Write (1999) | ROA | It is based on the pricing actions, and it uses true cost accounting convention which is able to valuate unified human capital by the use of traditional accounting patterns. |
| Calculated intangible value | Stewart (1997) & Luthy (1998) | ROA | It calculates the return of excess physical assets and then puts it as a base for determining the rate of return attributed to Rial intangible assets. |
| Knowledge capital revenue | Lou (1999) | ROA | It estimates the knowledge capital revenue as the normalized receipts in addition to the receipts attributed to registered assets. |
| Intellectual Value Added Coefficient | Polick (1997) | ROA | Measuring the amount and efficiency of intellectual capital and the value created take place due to the used capital based on three main components of: 1- used capital, 2- human capital, 3- structural capital |
| Human capital intelligence | Jack Fitzenz (1994) | SC | The same as accounting and pricing of human resources, it collects a set of human resources indicators and evaluates them. |
| Scoreboard value chain | Lou (2002) | SC | It forms a matrix of non-financial indicators in three categories with development procedure, which means discovery and learning, implementation and commercialization. |

### Skandia router pattern

Skandia is a Swedish financial service company which successfully measured its knowledge assets for the first time and inserted them in form of attachments to the traditional accounting of the company. In this method, we could consider the whole market consisting of two financial capital components (recorded in financial statements) and intellectual capital. Yet, these two kinds of capital could not be summed for acquiring the market value. Also it is not possible to claim that the difference between the financial capital and market value is in a specified period of time the same as intellectual capital of the company. But from the conceptual perspective the financial capital revealed in financial reports and intellectual capital which does not have this feature are viewed as two main drivers of organization value (Halshi, & Haji Eydi,2007). In plan of value of Skandia, Edvinsson and Malone offered the intellectual capital in two components of human capital and structural capital (figure 1) (Fotras & Touradj Beigi, 2009).
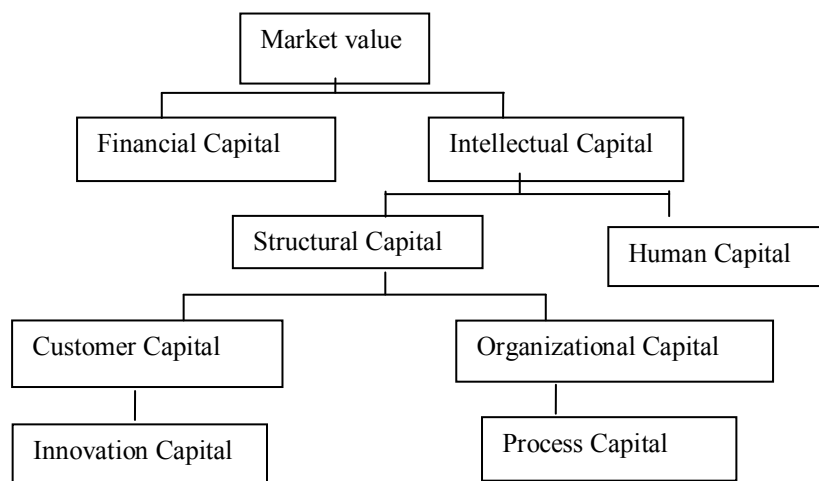


**Figure 1. Components of intellectual capital in Skandia's pattern (Edvinsson and Malone, 1997)**

Hierarchical pattern of Skandia's intellectual capitals:

Intellectual capital + book value= market value

Structural capitals + human capitals= intellectual capitals (Namamian, Gholizadeh, & Bagheri, 2011).

### Roos and Roos categorization

Roos and Roos categorization is very similar to Skandia's hierarchical pattern. In this pattern, the organizational capital is divided to two following sections of current business process management capabilities, and development of new businesses capabilities and the difference between this model and Skandia's model is in segmentation and details (Rashidpour, 2010).

### Model of Intellectual Capital

This model was suggested by Roos *et al.* (1997) and it is considered as one of the approaches of scorecards. The aim of this indicator is visualization and transfer of intellectual capital and value derived from those. The indicator of intellectual capital belongs to the second generation of intellectual capital measuring methods which remove the shortcomings of the previous methods. This pattern gathers all of the components of intellectual capital in one organizational indicator. In this fusion, the importance of impact coefficient of each of the indicators is shown. This indicator directly enables the managers to diagnose and judge about the organization intellectual capital status. Also, it provides the context for comparing between organizations and economic units (Halshi and Haji Eydi, 2007). Roos *et al.* (ibid) divide the intellectual capital to human capital, organizational capital and communicational capital. Organizational capital also covers renovation capital development and process capital (figure 2) (Fotras, & Touradj Beigi, 2009).

### Brooking's technology model

Brooking planned the figure (3) pattern in 1996 for determining the value of intellectual capital. His pattern is one of the direct intellectual capital methods. Brooking evaluated the value of organization intellectual capital through fault detection analysis, and analyzed the organization reaction toward twenty ques-

tions about four components of intellectual capital. In brooking's model market assets are items such as: commercial brands, channelsof distribution and business cooperation. Human-centered assets include education, knowledge and competency of the organization individuals. Intellectual property assets include patent, royalty and trade secrets. Finally, infrastructural assets are also subsets of management processes, information technology systems, network connections and financial systems (Setayesh and Kazemnejad, 2009).
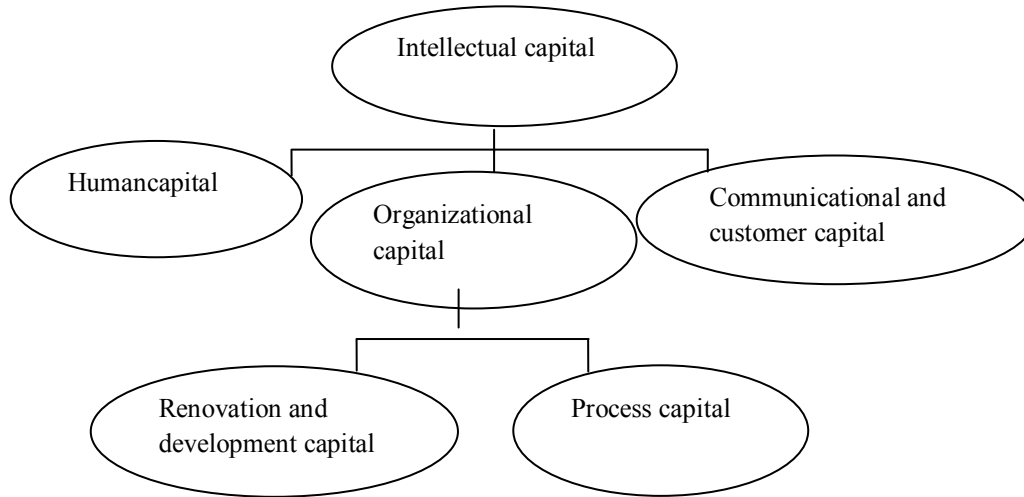


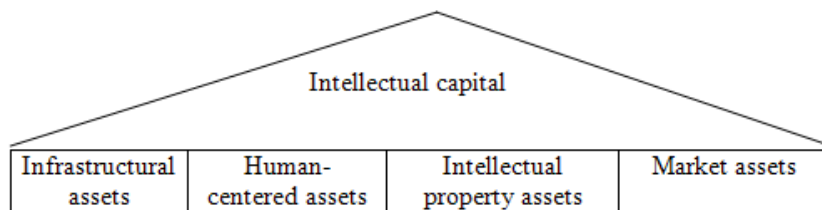**Figure 2. Model of intellectual capital**



**Figure 3. Brooking's technology model [9]**

In this model the intellectual capital consists of the below components and it recognizes the intellectual property as the embedded component in balance sheet (Rashidpour, 2010).

Intellectual capitals: 1- structural assets 2- Intellectual property assets 3- Human-centered assets 4- Market assets (customers)

*Monitoring pattern of intangible assets*

This pattern is one of the scorecard methods offered by Sveiby based on his experiences as a manager of a financial weekly magazine in 1997. Sveiby considers that the market value of the organization includes tangible assets and 3 types of intangible assets (Table 4) (Setayesh and Kazemnejad, 2009).

**Table 4. Monitoring model of intangible assets**

| Market value of organization | | | |
|---|---|---|---|
| Intangible Assets | | | |
| | | Knowledge capital | |
| Net tangible assets | External structure | Internal structure | Individual competency |

### Economic value added pattern (EVA)

This method is the latest method in company performance evaluation, which has focused on the maximizing of shareholders' wealth, and calculates the real economic profit of the company. EVA helps managers in better decision makings about investments such as investment in KM systems, detecting opportunities for advancement, paying attention to the short-term profits as well as paying attention to long-term profits. It is effective in measuring the quality of manager's decision making, since it is always shown as an amount of dollar, the positive continuity of EVA increases the company value and negative EVA implies depreciation [2]. EVA shows the real profit against the anticipated profit. The anticipated profit is the calculated unrealized profit: the unrealized profit is caused by keeping the items that their market values have increased.

Total capital used * Weighted meancost of capital = Cost of capital

### Sveiby's model

In this pattern staffs are the only major trade factors and all of the assets and structures of company, whether tangible or intangible are results of performance of manpower (Rashidpour,2010). Staff competency, internal structure, and external structure.

### Balanced scorecard pattern

This pattern was designed by Norton and Kaplan in 1992 in order to convert the managers' strategies and insights to a broad set of performance measures. The balanced scorecard surveys the organization from 4 perspectives, and it develops measures and analyzes data for each of them BSC is an analysis technique designed for conversion of business strategy to clear quantifiable goals, and controlling the organization performance. BSC focuses on connection of organization strategy and subjects for measuring those 4 key perspectives (Rashidpour, 2010). This method was developed by Kaplan and Norton and it tries to balance the long-term goals, short-term goals, financial and non-financial measures, indicators before and ahead, and also internal and external aspects of the organization (Namamian, Gholizadeh, and Bagheri, 2011).
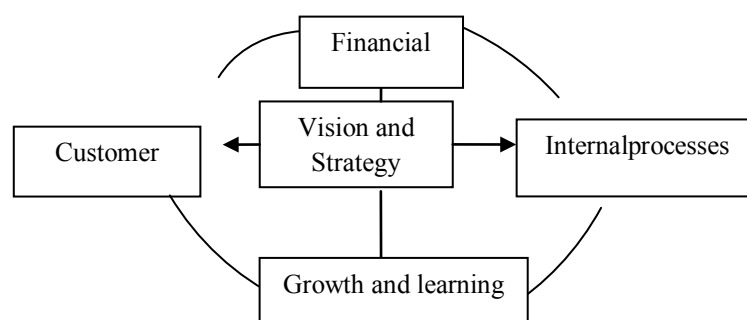


**Figure 4. Balanced scorecard pattern.**

Taking a look at the framework it is clear that the financial vision is the same as financial capital, the customer vision is the same as customer capital, internal processes vision is the same as structural capital and growth and learning vision is the same as human capital.

### Tobin's Q pattern

Ratio of q or Q of human capital value is the ratio to the replacement costs. The ratio of Tobin's Q was not developed for measuring the intellectual capital, and Alan Green Span figured out that high ratio of Q and ratio of market value to book value reflect the amount of investment in human capital and technology capital. Q= Market Value/ Asset value. Tobin's Q ratio is the same as market value ratio to the book value, which Tobin uses cost of tangible asset instead of book values in his calculations. By the use of replacement cost, some of the problems of ratio of market value to book value neutralized. Use of Tobin's Q instead of ratio of market value to book value neutralizes the effect of different policies from one company to another company or from one country to another country. The use of Q becomes more apparent when the companies are being compared with each other in a multi-year period.

### Sullivan's pattern

Sullivan's pattern is used for visualization of intellectual capitals (Rashidpour, 2010). Based on this model, the intellectual capital consists of three components: 1- human resources: these resources are

considered as organization's staff intellects and they are the source of technique, expertise and organizational memory about the organization's most important subjects. 2- Intellectual assets: It includes classified tangible knowledge and/or physical descriptions of a specific knowledge that could be claimed by organization and organization could trade it without any problem in intellectual property rights. 3- Intellectual property: a kind of intellectual asset which is legally supportable, protectable and traceable.

### Mcelvar's model

This model improved the model of value of Skandia's intellectual capitals by adding two concepts of social capital and thereunder social creativity capital. In this case, the customers' capital is considered as a subset of social capital (Rashidpour, 2010).

### Human resources accounting

Human resources accounting is one of the important and old methods which goes back to 60's and 70's AD. This method has some similarities with concept of intellectual capital and also it's measuring. Human resources accounting is one of the pioneering works in intellectual capital field which contains some of the methods for measuring the human resources value. But it seems that these methods do not have any effect on the organization performance, and it is one of the disadvantages of these methods, based on Felim Holtz's definition, 1985 (Hemmati, Keramati and Sheypourian, 2002).

### The invisible balance sheet

It is considered as one of the leading methods in the field of intangible assets, which is proposed by Sveiby in Sweden. In that time Sveiby reacted toward the disability of traditional accounting systems in order to provide appropriate information for technology valuation, and Sveiby developed a framework for reporting the intangible assets, called as invisible balance sheet. The aim of the book published by this name was to display a scientific method for reporting on manpower which is the most important resource and the initial generator of technology revenue (Jafari, Rezaeinour, and Hasanavi, 2006).

### Human resources accounting and costing

This method was developed by Johansson, and it calculates the costs related to the invisible effects of human resources which decrease the company profit. Intellectual capital is measured by calculation of amount of contribution of human assets divided by costs of in-vested salaries. Grujer and Johansson emphasize that accounting and costing are along with a broad range of applications: -as political tools, for showing the abuse of human resources policy, and then toward more investments or/and better management.- As educational tools for analyzing the structuring, and thus better understanding, solving personnel's problems from a practical perspective, and thus better ability to balance the applicable values against other values.- as a decision making supporter for being sure that they are more rationale from the perspective of management on human resources (Jafari, Rezaeinour, and Hasanavi, 2006).

### Market value to book value

This is one of the general known methods for measuring the intangible assets and the intellectual capital. This value is calculated by the use of difference between market value and book value of the company. Despite its simplicity, this method has some problems in measuring and also in interpretation of results. The book value depends on the national or international standard, which based on that the accounts are provided, and in practice they could change the book value. On the other hand, the value of stock in the market is always changing and that validates the results for only a short period of time (Hemmati, Keramati, and Sheypourian, 2002).

### Value probe

This method is an accounting method calculated by K.P.M.G and allocation of value to five categories of intangible assets was suggested. These five categories include: assets and gifts, skills and tacit knowledge, norms and social values, technology and visible knowledge, main process and management. This method provides an insight about the future potentiality of intangible assets by looking at cases such as: Value added for customers, competitiveness, and potentiality of accepting new opportunities, endurance power, and powerfulness .

### Methods for measuring the intellectual capital of technology server model

It is developed by Brooking. It divides the organizational knowledge into 4 categories of: human-centered assets, infrastructural assets, intellectual assets, and market assets, and it determines the organization intellectual capital value through an evaluation process. Each part of the model is surveyed by the special audit questionnaires about the variables related to the asset category (Namamian, Gholizadeh, and Bagheri, 2011).

## References

Abeysekera , I., (2001). A Framework to Audit Intellectual Capital.Faculty of Commerce. *Journal of Knowledge Management Practice*.

Brooking, A., (1996). *Intellectual capital, core assets for the third millennium enterprise*. International Thomson Business Press, London.

Edvinsson, L. & Malone, M.S. (1997). *Intellectual Capital: Realizing Your Company's True Value by Finding its Hidden Brainpower*. New York: Harper Business.

Fotras, M.H. & Touradj Beigi, A. (2009). Patterns of measuring intellectual capital with a glimpse at services section. *Tadbir Monthly Journal, 203,* 27-33.

Halshi, M., & Haji Eydi, A. (2007). *Intellectual Capital Accounting*. Master thesis, Islamic Azad University of Kermanshah, Science and Research Branch.

Hemmati, H., Keramati, F., & Sheypourian, A. S. (2002). *Models and Methods of Intellectual Capital Accounting.*

Jafari, M., Rezaeinour, J., Hasanavi, R, (2006). *Review of Intellectual Capital Measuring Models: A holistic approach*. 4th International Management Conference, Graduate School of Management and Economics of Sharif University of Technology.

Jurczak, J. (2008). Intellectual Capital Measurement Methods, *Copyright by Institute of Organization and Management in Industry, 1*(1), 37-45.

Kaplan,R. & Norton,D. (1996). Using the balanced scorecard as a strategic management system. Harvard Business Review.

Mavridis, D.G., (2004). The Intellectual Capital Performance of the Japanese Banking Sector, *Journal of Intellectual Capital, 1.* 92-115.

Namamian, F., Gholizadeh, H., & Bagheri, F. (2011). *Intellectual Capital and Its Measuring Methods*. 2nd Conference of EMBA.

Rashidpour, J. (2010). *Human Resources Accounting and Intellectual Capital.*

Setayesh, M.H., & Kazemnejad, M. (2009). Methods of Measuring and External Reporting of Intellectual Capital. *Accountant Journal, 207,* 58-63.

Sveiby, K.E. (2008). *The New Organizational Wealth: Managing and Measuring Knowledge Based Assets*. San Francisco,CA:Berrett Koehler.