

Intellectual Capital Philosophy in Accounting and Financial Engineering and Applied Models

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ABSTRACT

Measuring the intellectual capital is one of the most important issues in the field of knowledge management. One of the main problems of traditional accounting systems is their inadequacy and inability to measure the value of intellectual capital in corporate financial statements. The present age is the age of knowledge economy in which the role and importance of knowledge capital in the economy and business have changed a lot and the importance of it is increasing day by day. This has led to the importance of intellectual capital as a research and economic category. In the complex and evolving business environment of the organization's lives, the introduction of new products is the creation of innovation and the provision of value-added processes based on modern knowledge. For this reason, managers are required to measure intellectual capital as an important measure for increasing the business performance of organizations. In fact, traditional financial accounting is not able to calculate the true value of companies. It only measures the financial sheet and tangible assets. Intellectual capital brings a perfect new model for observing the real value of organizations and it can be used to calculate the future value of companies. Banks are no exception to this category, and like participating in the calculation of their true value and accounting, they need to measure their financial balance sheets and their assets.

Keywords: intellectual capital, financial performance, value-added coefficient of intellectual capital

INTRODUCTION

Today, one of the main concerns of managers is the understanding of the company's future horizons and the process of creating value, and because of this, they are trying to use the information of intangible assets in decision-making activities. In fact the evolution of accounting for the evaluation and reporting of intellectual capital or intangible assets is considered a necessity, because intangible resources such as research and development, communication, skills, and capacity have created value, and the cornerstone is the competitive advantage of companies and their superior business performance to the point where Edwinston replaced the invisible brain of the famous metaphor of Adam Smith from the market, the invisible hand (Hemmati, 2011). In today's knowledge-based communities, the importance of the return on the intellectual capital used is much higher than that of

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financial resources; this means that in comparison with intellectual capital, the role, and importance of financial capital in determining the sustainability of profitability has decreased significantly (Anvariostami, 2005). But since the accounting principles and accounting standards developed in the last century for reporting information that is reliable and proper reliance, the reflection of intangible resources based on these principles is not feasible and this information is not available in the balance sheet and other financial statements. Therefore, considering the value of these assets, measuring their recognition and control can eliminate the common objection of accounting, i.e., the lack of reporting and reflection of intellectual capital, (Hemmati, 2011), and by combining these assets, we can really calculate the value of the stock market of companies in real terms; because it is believed that there is a direct relationship between the extent to which companies enjoy the intangible assets of their companies and their true value of their intellectual capital (Anvariostami, 2005). In fact, intellectual capital provides a perfect new model for observing the true value of organizations and by using the company's future value can be calculated. Because of this, the tendency to measure and incorporate the true value of intangible assets of intellectual capital has become more and more popular among companies, shareholders (investors and other interest groups). In the meantime, institutions and organizations do not exclude our perception of our passion; they need to use the intellectual capital of their organization in line with other organizations and to increase their competitive power in the domestic and global arena. The tendency toward the privatization of the economy, as well as the country's desire to join the World Trade Organization followed by increased competition in the domestic economy, the need for the organization's perception of intellectual capital, is felt more than ever. Surveys show that two-thirds of all American companies are looking for new ways to compile and provide non-financial information including the intellectual capital. Statistics indicate that relying more on non-financial measures will lead to more accurate forecasts of future earnings. Intellectual capital is the birthplace of science and knowledge. Still, this term is in its genesis.

METHODOLOGY

Elements of intellectual capital

According to the studies and definitions, intellectual capital is consisting of:

- 1- Communication capital (customer)
- 2- Human capital
- 3- Structural capital (organizational)

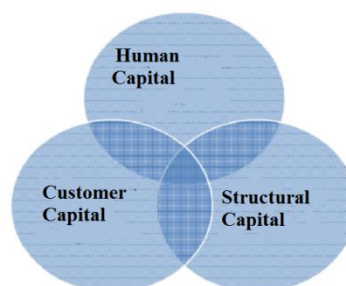


Figure 1 The interaction between intellectual capital components in the value position

Communication Capital (customer)

The main topic of communication capital is an existing knowledge in the marketing channels and customer relationship, and the main determining factor in the conversion of intellectual capital into market value and consequently the business performance of the organization. Bontis (2000) argues that the customer-related capital is a subset of the communication capital. According to him, the firms have knowledge that begins with suppliers throughout the value chain. Knowledge in the form of marketing and sales information in relation to the customers is the only part of the integrated value chain.

Human Capital

The human capital of an organization includes skills, expertise, and problem -solving ability and leadership styles. Human capital as the basis of intellectual capital results in improved performance and profitability for the company. According to the definition of this capital cannot be transcribed by other companies, so it is a resource that has a durable competitive advantage. Human capital is the source of innovation and modernization of an enterprise. An enterprise does not own or control its human capital, but employees using creativity, experience, skills, knowledge and personal co-operation provide an opportunity for the firm to gain business value.

Structural Capital (organizational)

Structural capital includes databases, organizational charts, process execution instructions, strategies and executive programs. Structural capital comprises all tangible and intangible assets. At first glance this is inconsistent. But when understood as a basis for knowledge, it is understandable. Structural capital is a thought-based value that when employees leave the firm.

Measuring the economic value of customers in economic enterprises

One aspect of intellectual capital is customer-related capital. If an economic firm is interested in maintaining current customers and wants to attract new customers, on the other hand, it should be worthwhile for them. Creating value for customers through product quality, service quality and value-based prices that are compatible and meet the expectations of customers is possible. Customers create operational cash flows. These cash flows provide an economic value to the firm and resources innovation and satisfy the needs of other stakeholders (such as shareholders, suppliers, employees, and society). So it's not surprising that firms spend significant resources to create more value for customers. In fact, management information systems should be customer-oriented in order to consider the value of corporate customer value (EVCO). There are two distinct approaches to calculating customer value. The first approach supported by management accountants in this period is called CPA (Customer Profitability Analysis). This approach is a form of activity-based costing. The second approach is called Valuation Customer Life (CLV) and a kind of analysis of cash flows has been discounted. Market research writing is a proactive approach to the second approach.

Studies conducted in a management accounting show that some customers create economic value to others. That is some customers have more profitable than others. In the past EVCO management accountants calculated very approximated. In this regard, profitable the customer was determined to sell by allocating public and administrative expenditures. For example, if a net customer accounted for 30% of the total sales revenue 30% of the public and administrative expenses were attributed to the gross margin generated by him. These allocations are not sensitive to the real level of customer resources used by the public and administrative expenses they spend. While in the customer cost analysis (CPA) method which is now popular in accounting management literature and uses activity-based costing, the customer profit margins are attributed to the differences in the public and administrative expenditures consumed by them. Specifically, CPA is looking for finished price and for more accurate measurement EVCO tracks customer-related activities such as purchasing, distribution, accounting, and product management .

The Customer Satisfaction Analysis (CPA) measures the EVCO business value in two steps: In the first stage expenditures are attributed to products. As a result, customers who buy high-end products will incur more expenses. In the second step, expenditure is attributed to customers on products offered in the marketing and sales process. This cost is compared to the customer-generated revenue stream to find the customer profitability.

Valuation of customer life

The authors of the marketing literature use life value estimation approach to explore the economic value of customers to an organization (EVCO). In this method, the current value of future cash flows is measured and it is expected that these flows will be reached within a time when the customer has a relationship with the firm. The following four steps are used to calculate the CLV: First, customers are identified, Second, their current profitability is evaluated, Third, the current profitability is estimated to estimate future cash flows Fourth, these expected cash flows are reduced based on the planning horizon of the firm to meet the net present value of customers for whom make a net present positive value economically valuable to the organization .

1. Return methods on assets: Economic value added - Intellectual value coefficient — Estimated intangible value — Knowledge return on investment
2. Market Investment Methods: Intangible Balance Sheet - Market Value to Office — investor assigned market value — Tobin's Q.
3. Direct Investment Capital Technologies: Technology Broker - Registered Privileges human resource cost accounting — comprehensive Valuation Method — Accounting for the Future Human Resources Declaration Value Finder — Intellectual Property Value Creation of Absolute Value — Financial method of intangible asset measurement
4. Scorecard methods: Balanced Scorecard — Human Capital of Humanity — Scandia's Guide — Intellectual Capital Index — Intangible Assets Display, Knowledge Audit Schedule — Mortar Guides — Value Scoring Card — Knowledge Guides — IQ

Here's a brief summary of some of the methods:

The Ratio of market value to book value: Market value to book value is one of the commonly known methods for measuring intangible assets and intellectual capital. This value is calculated through the difference between the market value and the company's book value. Despite the simplicity of this method, it has some problems in measuring and interpreting the results. The book value depends on the national or international standard on which the accounts are ready which may in practice change the book value. On the other hand, the stock market value is always changing which makes the results valid only for a short time when we plan to measure the intellectual property of a company in comparison with other competitors in the industry.

$$MTB_{it} = \frac{MVE_{it}}{BVE_{it}} \quad (1)$$

MTB_{it} : the ratio of the book value to the market value of the firm i in the financial period t

MVE_{it} : The stock market value of i in the financial period t

BVE_{it} : the book value of i stock in the financial period t

Tobin's Q:

The Tobin's Q method was developed by Nobel laureate James Tobin.

$$G.tobin_{it} = \frac{MVE_{it} + BVE_{it}}{TA_{it}} \quad (2)$$

MVE_{it} : The value of the corporate stock market. i am in the financial period t

BE_{it} : The book value of debt held by a company in the financial period t

TA_{it} : Summing up the total assets of i in the financial year t

Return on investment cash flows:

The return on investment cash flows computes the value of the total investment through the ideal value of the corporate market. This is calculated by the difference between the ideal value of the corporate market and the total amount of investments as follows:

$$CFROI_{it} = MVE_{it} - INVT_{it} = MVE_{it} - (PPE_{it} + AAD_{it} - IR_{it}) \quad (3)$$

MVE_{it} : The stock market value of i in the financial period t

PPE: property, machinery, and equipment i in the financial period t

AAD_{it} : Accumulated depreciation of i during financial period t

IR_{it} : the Company's return of i during financial period t .

Economic value added

Economic value added (EVA) is relatively one of the newest methods to evaluate the organizational performance this method is developed by Stewart and consulting firms in New York. This method concentrates on maximizing shareholder wealth. The economic value added is the cash flow generated after tax deduction by the company and minus the cost of the capital used to generate that cash flow, thus the economic value added represents the real profit against the profit on the paper. Also the economic value added is the difference between net sales and total operating costs, taxes, and capital costs. While capital costs are calculated by multiplying weighted average cost of capital in the total invested capital. In other words, the change in the standard economic value added creates a scale to determine that has the intellectual capital of the organization been effective or not? Obviously, the economic value added is an alternative to intellectual capital and provides accurate information about the impact of intellectual capital on performance of firm.

$$EVA = NOPAT_t - [(TA_{t-1} - CL_{t-1}) \times WACC_t]$$

$$NOPAT_t = OP_t \times \{1-t\} \quad (4)$$

in this equation TA_{t-1} is total assets at the beginning of each accounting period; CL_{t-1} demonstrate total current liability at the beginning of each accounting period; $NOPAT_t$ is the net operative profit after tax deduction in the accounting period t . $WACC_t$ indicates weighted average cost of capital in the accounting period t and Op_t is the gross operating profit in the accounting period t .

The calculated intangible value model (CVI)

The calculated intangible value model (CVI) is based on this assumption that the surplus income of a company, such as surplus-income divided in the average income of the industry, derives from its intellectual capital. $ROTA_t$, TA_t and EBT_t are calculated for each of the selective firms, separately. EBT_t is the earnings before tax in the accounting period t ,

$$\overline{EBT_t} = \frac{\sum_{-1}^{-3} EBT_t}{3} \quad (5)$$

TA_t is fixed tangible assets of the company in the accounting period t ,

$$\overline{TA_t} = \frac{\sum_{-1}^{-3} TA}{3} \quad (6)$$

$ROTA_t$ is rate of return of fixed tangible assets in the accounting period t ,

$$ROTA_t = \frac{\overline{EBT_t}}{\overline{TA_t}} \quad (7)$$

EBTI_t, TAI_t and ROTAI_t are separately calculated to all of industries that the selective companies are belonged to by use of the following equations. EBTI_t is the earnings before tax industry in the accounting period t,

$$\overline{\text{EBTI}}_t = \frac{\sum_{-3}^{-1} \text{EBTI}_t}{3} \quad (8)$$

TAI_t is fixed tangible assets of the industry in the accounting period t,

$$\overline{\text{TAI}}_t = \frac{\sum_{-3}^{-1} \text{TAI}_t}{3} \quad (9)$$

ROTAI_t is rate of return of fixed tangible assets of industry in the accounting period t.

In this stage, ROTA_t and ROTAI_t are compared and if ROTAI_t is surplus, the next steps will be done (rate of return of company is higher than rate of return of the industry).

$$(\text{ROTA}_t - \text{ROTAI}_t) \times \overline{\text{TAI}}_t \times (1 - \overline{\text{T}}_t) = \text{ER}_t \quad (10)$$

IC_t : intellectual capital of firm in the period t.

WACC_{it}: weighted average cost of capital of ith company in the period t.

It is also should be explained that WACC_{it} is calculated according the following equation.

$$\text{WACC}_t = \frac{L_t}{L_t + E_t} \times K_d(1 - t) + \frac{E_t}{L_t + E_t} \times k_e \quad (11)$$

L_t: Total liabilities of the ith company in the period T .

E_t: Total salary of owners of stocks of ith company in the period T.

K_d: Interest rate of corporate bond issued by central bank.

$$K_e = \frac{D_0(1+g)}{P_0} + g$$

D₀: dividends per share.

P₀: the price of sale of per share of the ith company in the beginning of the accounting period T.

g: the rate of dividend growth (geometric mean of dividends)

Value added intellectual capital coefficient (VAIC) model

Value added intellectual capital coefficient (VAIC), which is stated by Pulic, three dependent variables are the basic for measuring this model.

1. Capital employed efficiency (CEE)
2. Human capital efficiency (HCE)
3. Structural capital efficiency (SCE)

Pulic (1998) states, that in a situation that the VAIC coefficient is high, value-added efficiency is better than the total resources of the company.

The formulation of the VAIC is algebraically indicated as follows:

$$VAIC_i = CEE_i + HCE_i + SCE_i \quad (13)$$

This model has advantages in compare with other models that the most important advantages are mentioned as follow:

1. This model provides a standard and compatibility basis to measure. In fact, the methods that could measure intellectual capital are limited.
2. This model is based on two aspects, evaluation of efficiency and creation of value from tangible and intangible assets in a company.
3. All of data that is used in calculation of VAIC are based on accounting and financial standard information which are commonly reported in the company's financial reports. So the calculation based on the purpose is verifiable. Almost, the methods to calculate the intellectual capitals are criticized because of these measures are mental and create a lot of problems in the measurement process.
4. This model has been used in a lot of foreign valid researches and studies.

The weakness of the intellectual capital measuring methods

The methods, which lead to monetary amounts, are useful to pricing intangible assets these methods include direct intellectual capital method or return methods on the properties. Other advantage of this method is providing the possibility of comparing the firms in an industry with each other. The disadvantages of these methods are that changing everything to monetary amount could be considered superficial a little bit. The methods of return on assets are highly sensitive to the rate of interest. On the other hand, these methods of measurement are done in organization in macro-level. These methods are not useable in the non-profit organization, internal departments of organizations and public and national organizations. The advantages of direct intellectual capital methods and score card methods are that they could present more complete picture from the organizational health in compared with the monetary methods. These methods have capable to reach different organizational levels easily. They could measure the results of events with more precision so, their reports are prepared faster and more precision than financial measurements. Because there is no need to financial measurement in these methods so they are proper for the non-profit organization, internal departments of organizations and public organizations and social and cultural goals. Other disadvantage of these methods is that they use some indexes, which are designed to special purpose or for specific organization so the comparison is difficult.

CONCLUSION

The new age is the age of information, or more precisely, the age of knowledge. In this era, economic agents value the transfer of knowledge and the use of knowledge through processes of knowledge creation. Today, traditional accounting metrics are not appropriate for determining the true value of companies, and if knowledge assets cannot be identified and measured, they can never be achieved at the firm's true value. In the age of knowledge, what convinces economic firms is intellectual capital. In the meantime, the gap between the market value of the organization and the net asset value of tangible assets, which in fact is considered to be the stock of intangible assets, attracts investors more and more day by day. In a knowledge-based organization, in which knowledge forms a large part of the value of a product, as well as the wealth of an organization, traditional accounting methods, based on tangible assets and information about the past operations of the organization, are for valuation purposes. Intellectual capital, the largest and most valuable asset for them, is inadequate. Therefore the intellectual capital approach is more comprehensive for organizations that want to know the value of their performance. In this era, management information systems should be customer-oriented in order to take into account the economic value of customers.

In the complex and evolving business environment of the organization's lives, the introduction of new products is the creation of innovation and the provision of value-added processes based on modern knowledge. For this reason, managers are required to measure intellectual capital as an important measure for increasing the business performance of organizations. In fact, traditional financial accounting is not able to calculate the true value of companies alone to measure the balance sheet and tangible assets. Intellectual Capital brings a completely new model to view the value and realities of organizations, and it can be used to calculate the future value of companies. Banks are not excluded from this category and companies in calculating their true value and accounting need to measure their financial balance sheets and their holdings.

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