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MEASURING THE EFFICIENCY AND VALUE OF INTELLECTUAL CAPITAL IN INDIAN KNOWLEDGE COMPANIES

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Abstract *Intellectual capital is becoming the most important resource for creating value and competitive advantage in today's economy. The aim of this study is to investigate the correlation between the performance of a company's intellectual capital and the value of intellectual capital at a particular time. This study is conducted on 50 software and pharmaceutical companies operating in India. Annual reports, especially the profit & loss accounts and balance sheets of the companies have been used to obtain the data. Necessary data were also collected from official website of BSE and NSE. Value Added Intellectual Coefficient (VAICTM) method is applied for measuring the Intellectual Capital performance of the company. Monetary value of IC is calculated by applying Calculated Intangible Value method. The value creation efficiency of intellectual capital and value of intellectual capital also compared on the basis of rank. Findings from the empirical analysis indicate that the relationships between the performance of a company's intellectual capital and value of IC at a particular time are significantly related. The empirical findings suggest that the efficient management of company's intellectual capital can enhance its IC value. Intellectual capital is an area of interest to numerous parties, e.g. shareholders, managers, policy makers, institutional investors. This paper provides new insights related to the management and measurement of IC, since two specific measurement methods (CIV and VAICTM) were implemented in practice.*

Keyword: *Intellectual Capital, Human Capital, Structural Capital, VAICTM, Calculated Intangible Value*

INTRODUCTION

Economies move from one revolution to another to enhance the business productivity and the competitive edge also. For centuries ago world economy depended on agriculture where man interacted with nature and physical labour was the primary assets. In industrial age where man interacted with machines and companies created value depending upon tangible assets, then companies used tangible assets to produce tangible products. Technological advances in data processing, communication and transportation moved the economy into information age where man interacted with knowledge. In this new economy tangible assets are fast becoming secondary assets as companies rely primarily on intangible assets like employee capability and competency, management philosophy, culture, innovative process, and customer loyalty etc. to create value.

The knowledge economy has changed the business process as innovation becomes the main enabler of business success particularly in case of manufacturing companies, but in case of service companies, knowledge assets are used as capital (stock of assets) to earn profit. As a result the role of employees also changed. Employees in the knowledge economy are required to do brainwork to incorporate knowledge into new applications and innovative new products, processes and services. Customers in the knowledge economy are creating more demand for knowledge intensive products.

However, all invisible assets which are employed in the business are collectively called as intellectual assets or intellectual capital. Companies, in the emerging economy, have been encountering a real challenge in respect of valuation and reporting of the intangibles including the intellectual capital in the annual financial statements, which do not adequately reflect them. The conventional performance measurement techniques fail to measure and monitor multiple dimensions of performance. They concentrate only on financial aspects of the organisation. Benefits of intangibles are difficult to define, measure, and quantify. This suggests that traditional measures of a company's performance, which are based on conventional accounting principles, may be unsuitable in the new economy in which competitive advantage is driven by intellectual capital (Edvinsson & Malone, 1997; Pulic, 1998). The use of traditional performance measurement techniques may lead investors and other stakeholders to make inappropriate decisions when companies have a large proportion of their investment in intangible assets (Firer & Stainbank, 2003). Reporting of information about investment in intangible assets is very much essential in the emerging markets where companies use intangible assets as strategic assets. This

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practice may guide present and potential stakeholders about the real strength of the company.

The present study is a modest attempt to examine whether the value of intellectual capital is commensurate with the intellectual capital performance or not. The analysis is based on a sample of 50 software and pharmaceutical companies operating in India.

INTELLECTUAL CAPITAL

Oxford Advanced Learner's Dictionary defines intellect as the ability to think in a logical way and understand things, especially at an advanced level. The word intellectual is described as "connected with or using a person's ability to think in a logical way and understanding things" and capital as "wealth or property that is owned by a business or a person. IC researchers use the term intellectual capital to include inventions, ideas, general know-how, design approaches, computer software and all other non-physical resources of an organisation. Like any new and emerging concept the term intellectual capital is described in different but similar terms. Few definitions of intellectual capital are presented below.

Itami (1991) states that intangible assets are invisible assets that include a wide range of activities such as technology, consumer trust, brand image, corporate culture and management skills.

Hall (1992) defines 'intangible assets' as value drivers that transform productive resources into value added assets." He splits IA into two categories:

(1) Intellectual Property (IP); and

(2) Knowledge Assets.

According to Smith (1994) intangible assets are all the elements of a business enterprise that exist in addition to working capital and tangible assets. They are the elements, after working capital and tangible assets that make the business work and are often the primary contributors to the earning power of the enterprise. Their existence is dependent on the presence, or expectation, of earnings.

Brooking (1997) identifies IC as "market assets," "human-centred assets," "intellectual property assets," and "infrastructure assets" that when combined with an organisation's other productive resources will eventually lead to value creation.

Edvinsson and Malone (1997) opine that IC is not an objective thing, but is a relationship issue and a debt item, which is borrowed from the customers and employees. By combining IC with these items, an organisation can become more productive.

According to IC theorists' intellectual capital is made up of three main components; human capital, structural capital, and customer or relation capital.

Human Capital: Human capital is an organisation's combined human capital for solving business problems. Human capabilities are inherent in people and cannot be owned organisation. Utilisation of human capita also depends upon how effectively an organisation uses its employees' knowledge, skills, experiences etc. as measured by creativity and innovation.

Structural Capital: It consists of everything in an organisation that supports employees (human capital) to work. That is, structural capital is the supportive infrastructure that enables human capital to function. It is owned by an organisation and remains within an organisation when employees leave. Organisation's image, information system as well as management philosophy, database etc. are components of this capital.

Customer or Relation Capital: It is the value of an organisation's relationships with the people with whom it does business.

INTELLECTUAL CAPITAL AND COMPANY PERFORMANCE

It is widely recognised that corporate value is primarily created from the investment in intangibles or intellectual capital rather than tangible capital. Several researchers significantly proved that intellectual capital influences to the organisational performance. The study results of Hitt, Bierman, Shimizu, & Kochhar (2001 proved that the role of intangible capital more dominant as compared with tangible capital. Pulic's research (1999) result shows that intellectual capital can be used to add value to the organisation. Teece (2000) states that intangible assets of the firm and its IC are the keys to gaining sustainable competitive advantage and considered as the drivers of the economic growth. Researchers like Riahi-Belkaoui (2003), Mavridis (2004), Najibullah (2005), Chen, Cheng, and Hwang (2005), Tan, Plowman, and Hancock (2007) etc. have reported a positive association between intellectual capital of the firms and their respective financial performances. Kujansivu and Lonnquist's (2005) study shows that value of intellectual capital and value creation efficiency of intellectual capital of Finnish companies are somehow related.

In our previous studies it has been empirically examined that Indian software and pharmaceutical companies' financial performances are significantly related to profitability only (Ghosh & Mondal, 2009). In our another study on Indian nationalised and schedules banks it is revealed that banks which are operating in India are efficient in utilisation of their intellectual capital for the purpose of creating value (Mondal

& Ghosh, 2009b). The study results of intellectual capital and financial performance of Indian hotel and financial companies reveal that sample companies intellectual capital is significantly influence the financial performances in most cases, (Mondal and Ghosh, 2009a). Some empirical results of various countries are presented in the following table.

Table 1: Summary of Empirical Results

Researchers	Year	Sample / Country	Objectives	Results
Richieri	2007	1000 Brazilian companies	Examine the IC stock and flow analysis	Empirical finding suggests positive relation between IC stock and efficiency and profitability
Zhang *et al*.	2006	China		
Kujansivu and Lönnqvist	2004	20000 Finnish companies	Examines the relation between IC value and efficiency.	The study shows a strong relationship between IC value and efficiency.
Tan *et al*.	2007	150 listed companies in Singapore stock exchange	Examines the association between IC and financial performance	The rate of growth of IC is positively related to the sample company's present and future performance
Firer and Williams	2003	75 South African public companies	Examines the association between IC efficiency and financial performance	The research results show that IC efficiency and financial performance is mixed and limited.
Chen et. al.	2005	Taiwan	The paper investigates the relationship between the value creation efficiency and firms' market valuation as well as financial performance of sample companies.	Empirical results support the proposition that intellectual capital has a positive impact on corporate market value and financial performance, and may be a leading indicator for future financial performance.
Gan and Saleh	2008	IT companies of Malaysia	The paper examines the association between Intellectual Capital (IC) and corporate performance of technology-intensive companies (MESDAQ) listed on Bursa Malaysia by investigating whether value creation efficiency, as measured by Value Added Intellectual Capital (VAIC TM), can be explained by market valuation, profitability, and productivity	The findings from this study show that technology-intensive companies still depend very much on physical capital efficiency than the intellectual capital efficiency.
Ghosh and Mondal	2009	India	The paper analyze the IC efficiency and corporate financial performance of Indian IT and Pharmaceutical companies.	The findings suggest that the performance of a company's intellectual capital can explain profitability but not productivity and market valuation in India.
Makki, Suleiman, Lodhi, and Rohra	2009	Listed companies of Lahore stock exchange, Pakistan	Examines the association between IC efficiency and ROI of sample performance	The empirical results support the argument that IC contributes significantly to the enhancement of ROI.
Calisir, Gumussoy, Bayraktaroglu, and Denuz	2010	ICT companies of Istambul stock exchange.	This study also examines VAIC™, and its components' impact on company performance.	The study shows that all the companies had a relatively higher human capital efficiency than structural and capital efficiencies.
Maditions, Chatzoudes, Tsairidis, and Theriou	2011	98 Greek companies listed in Athenes stock exchange	Examines the impact of IC on firms' market value and financial performance of Greek companies.	The study finds significant association between human capital efficiency and financial performance of Greek companies.
Mehralian, Rajabzadeh, Sadeh, and Rasekh	2012	pharma companies listed in the Iranian Stock Exchange	The study examines the impacts of IC components on the traditional measures of firm performance	The empirical findings suggest that the performance of a company's IC can explain profitability but not productivity and market valuation in Iran

Researchers	Year	Sample / Country	Objectives	Results
Joshi, Cahill, and Kansal	2013	40 Finance Companies in Australia	This paper examines the intellectual capital (IC) performance of the Australian Financial Sector	The study reveals that the value creation capability of financial sector in Australia is highly influenced by human capital
Ousama and Fatima	2015	17 Islamic Banks in Malaysia	The paper examines the relationship between IC efficiency and financial performance of Islamic bank in Malaysia	the paper found that human capital efficiency is higher than the structural capital and capital employed efficiencies and IC efficiency influences the profitability of Islamic banks.
Wang *et al.*	2016	20 Chinise and 20 Indian IT companies	The study examines the extent and quality of voluntary intellectual disclosures by information technology companies of China and India	The empirical results based on comparative analysis show that Indian IT companies tend to perform better than Chinese IT companies in extent and quality of disclosures.

A cursory look into Table 1 clearly brings out the fact that the studies are conducted under various country contexts and the intellectual capital has positive bearing upon the corporate financial performance. However, empirical studies are mainly conducted to examine the impact of intellectual capital on the corporate financial performance. Limited studies are undertaken to determine the monetary value of intellectual capital.

As discussed earlier and reported in Table 1, the empirical findings are in full conformity with most of the earlier major studies. Hence, a significant positive association between the intellectual capital performance measured and the corporate financial performance is empirically established.

PROBLEMS WITH CONVENTIONAL ACCOUNTING PRACTICES

The main objective of preparing financial statement is to provide relevant and reliable information to the stakeholders for making decisions. To fulfill this purpose financial statement and balance sheet are prepared on the basis of current accounting principles or guidelines. To a large extent current accounting methods are based on Luca Pacioli's double entry booking systems developed in 14th century where tangible assets are dominate the production process, whereas in today's business world Pacioli's model is inadequate as knowledge becomes a competitive factor. Therefore firms in knowledge economy faces a real challenge for financial accounting that conventionally does not adequately reflect the investment and performance of intangibles in the financial statements. The conventional performance measurement techniques fail to measure and monitor multiple dimensions of performance. They concentrate only on financial aspects of the organisation. Benefits of intellectual capital such as management efficiency, customer relation, R&D, innovations etc. are difficult to measure and quantify. This suggests that traditional measures of a company's performance, which are based on conventional accounting principles, may be unsuitable in the new economic world in which competitive advantage is driven by intellectual capital (Edvinsson & Malone, 1997, Pulic, 1998). The use of traditional performance measurement techniques may lead investors and other stakeholders to make inappropriate decisions when companies have a large proportion of their investment in intangible assets (Firer & Stainbank, 2003).

Moreover, efficiency and effectiveness of capital markets depend on information value in published financial statements (Lev, 2001). Erroneous information leads to inefficient capital allocation, volatile market and higher cost of capital.

Research Proposition

We live in a knowledge era where large numbers of companies use knowledge and knowledge workers. It is empirically proved that intellectual capital is the most important productive assets in this millennium. The intellectual capital is considered as an asset since it possesses a potential source for present and future benefits and the success of the companies depends upon the appropriate management of intellectual capital. For the purpose of better management of intellectual capital it is necessary to measure it. But the present accounting framework is tangible assets-focused and does not have effective instruments for the measurement and reporting of the intellectual capital. Balanced scorecard, however, gained popularity as a most useful tool to measure and reporting of intellectual capital related information of non financial character i.e., qualitative in nature.

In the emerging economy, most of the companies use intellectual capital (human, structural, and relation resources) as a core asset to sharpen their competitive edge. As the companies in the merging markets earn profits and sustain

their very existence through utilisation of intellectual capital so it is necessary to report about the intellectual potential of the company to the stakeholders. This mechanism may minimise the share price volatility in the emerging markets.

In our paper we tried to measure the value creation efficiency of intellectual capital and the monetary value of intellectual capital. For the purpose of measuring value creation efficiency of intellectual capital we used Pulic's (1999) VAIC™ model (Value Added Intellectual Co efficient). Calculated Intangible Value (CIV) model is used to measure the monetary value of company's intellectual capital.

It is expected that companies with highest potential of intellectual capital possess the maximum value of intellectual capital. In other words our modest attempt is to examine empirically whether the intellectually efficient company may possess the maximum value of intellectual capital or not.

MEASUREMENT OF VALUE CREATION EFFICIENCY OF INTELLECTUAL CAPITAL

The Value Added Intellectual Coefficient™ (VAI*C*™) methodology developed by Ante Pulic (1998) forms the underlying value creation efficiency measurement basis in the present study. In his words VAIC™ is an analytical procedure designed to enable management, shareholders, and other relevant stakeholders to effectively monitor and evaluate the efficiency of VA by a firm's total resources and each major resource component. VAIC™ is the sum of two indicators. These are: (i) Capital Employed Efficiency (CEE) – the indicator of VA efficiency of capital employed; and (ii) Intellectual Capital Efficiency (ICE) – the indicator of VA efficiency of company's Intellectual Capital base. Intellectual Capital Efficiency, on the other hand, is composed of (a) Human Capital Efficiency (HCE) – the indicator of VA efficiency of human capital; and (b) Structural Capital Efficiency (SCE) – the indicator of VA efficiency of structural capital.

Equation (1) formalises the VAIC™ relationship algebraically:

VAIC™i = CEEi + HCEi + SCEi [Equation (1)]

where:

VAIC™*i* = VA intellectual coefficient for company *i*;

CEEi = capital employed efficiency coefficient for company *i*;

HCEi = human capital efficiency coefficient for company *i*; and

SCEi = structural capital efficiency for company *i*.

Pulic (1998) states that higher the VAIC™ coefficient, the better will be the efficiency of VA by a firm's total resources. The first step in calculating CEE, HCE and SCE is to determine a firm's total VA.

This computation may be done with the help of the following algebraic equation:

VAi = Ii + DPi + Di + Ti + Mi + Ri + WSi …….. [Equation (2)]

where**:** VA for firm *I* is computed as the sum of interest expenses (Ii); depreciation expenses (DPi); dividends (Di); corporate taxes (Ti); equity of minority shareholders in net income of subsidiaries (Mi); and profits retained for the year (Ri) and the wages and salaries (WSi).

Alternatively, VA can be calculated by deducting operating expenses (materials, maintenance, and other external costs) from operating revenues (Pulic, 1998).

According to Pulic (1998), CEE is the ratio of total VA divided by the total amount of capital

employed (CE) where capital employed is defined as the book value of a firm's net

asset. Equation (3) presents the CEE relationship algebraically:

CEEi = VAi/CEi …….. [Equation (3)]

where:

CEEi = capital employed efficiency coefficient for company *i*;

VAi = VA for firm *i*; and

CEi = book value of the net assets for firm *i*.

Consistent with the views of other leading IC researchers (for example, Edvinsson & Malone, 1997; Sveiby, 2001), Pulic (1998) argues total salary and wage costs are an indicator of a firm's human capital (HC). HCE, therefore, is calculated as the ratio of total VA divided by the total salary and wages spent by the firm on it employees. Equation (4) shows this relationship algebraically:

HCEi = VAi/HCi …….. [Equation (4)]

where:

HCEi = human capital efficiency coefficient for company *i*;

VAi = VA for firm *i.* and

HCi = total salary and wage costs for firm *i*.

In order to calculate SCE, it is first necessary to determine the value of a firm's structural capital (SC). Pulic (1998) proposes a firm's total 'VA less its human capital' is an appropriate proxy of a firm's *SC*. That is:

SCi = VAi – HCi [Equation (5)]

where:

SCi = Structural capital for company *i*;

VAi = VA for firm *i* and

HCi = total salary and wages spent by the firm *i*.

Based on prior empirical research findings, Pulic (1998) argues that there is a proportionate

inverse relationship between HC and SC in the value creation process. According to him, the less Human Capital participates in value creation, the more Structural Capital is involved. Consequently, Pulic (1998) suggests the following formula for calculating SCE

which is the ratio of a firm's SC divided by the total VA:

SCEi = SCi / VAi …….. [Equation (6)]

where:

SCEi = structural capital efficiency coefficient VA for company *i*;

SCi = Structural capital for company *i*; and

VAi = VA for firm i.

Recently, VAIC™ method has gained popularity among the researchers to measure intellectual ability of companies. Schneider (1999) supports the adoption of this technique as an effective method of measuring intellectual capital efficiency because:

(a) VAIC™ places an emphasis on the value of employees, a key component of intellectual capital;

(b) VAIC™ enables one to collect evidences of the intellectual capital leverage which is the key to the success of the value generating processes;

(c) VAIC™ is easy to calculate, because it involves the use of readily available accounting information which is reported in the annual reports of the firms. And

(d) The methodology used in the calculation of VAIC™ is relatively straightforward.

Measurement of Monetary Value of Intellectual Capital

We followed the procedure prescribed in 'Calculated Intangible Value' (CIV) method to calculate the monetary value of intellectual capital. This method allows us to calculate the fair value of the intangible assets. This method computes the value of intangible assets by comparing the firm's performance with an average competitor that has similar tangible assets. Steward (1995, 1997) provides a seven step process to calculate the value which is illustrated below.

Step-1: Calculate the average pretax earnings for the past three years.

Step-2: Get the average year-end tangible assets for the same three years.

Step-3: Divide average earnings by average assets to get the return on assets.

Step-4: Find the industry's average return on assets for the same three years.

Step-5: Calculate excess return. Excess return = pre tax earnings – [company's average tangible assets * industry average ROA].

Step-6: Calculate the three-year-average income tax rate and multiply this by the excess return. Subtract the result from the excess return to get an after-tax number or premium. This premium is attributable to intangible assets.

Step-7: Calculate the present value of the premium. That can be done by dividing the premium by an appropriate discount rate, such as the company's cost of capital.

Calculated intangible value is useful in a number of ways. Since this method calculates the fair value of the intangible assets, therefore CIV can be used as a benchmark for comparing the firm's performance with an average competitor that has similar tangible assets. A knowledge intensive company may take CIV with their traditional financial statements to reflect the company's true value.

RESEARCH METHODOLOGY AND DATA COLLECTION

For the purpose of the present study firstly we calculate VAIC™ and CIV of sample companies for three years i.e., 2009, 2010, 2011 and 2012. We rank the companies on the basis of value creation efficiency and calculated intangible value (CIV). Afterwards we calculate rank correlation coefficient to examine whether the rank on the basis of VAIC™ and the same on the basis of CIV are same or not. Necessary data are collected from the published annual reports of the 50 sample companies. Sample companies are selected from software and pharmaceutical industry which are listed in BSE and NSE.

DISCUSSION OF RESULTS

Table 2 depicts correlation coefficient of ranks (on the basis of VAIC™ and CIV) for the year 2009, 2010, 2011 and 2012. From the results of the table it is seen that Pearson correlation coefficients are significant in all the study periods. Therefore, rank of

Table 2: Correlation Coefficients Results

	2012	2011	2010	2009
Correlation Coefficient	0.516	0.423	0.543	0.342
Significance Level	0.0068	0.001	0.000	0.000
N	50	50	50	50

companies under VAIC™ criteria are more or less same to that of CIV criteria. Alternatively, it can be said that company's having higher intellectual potentiality may possess higher intangible value. From the results it also seems that CIV and VAIC™ measures are somehow related since, there is strong relationship among the sample companies. The study results also confirm that a company efficient in intellectual capital management has the maximum value of intellectual capital. Therefore, companies those invested enormous amount of money throughout the years to gain superior competitive advantage may report their value of intellectual capital at a particular point of time.

From the conceptual point of view the relation between the efficiency of IC and the value of IC is not clear. However, this empirical study reveals a positive relation between the two IC measurement tools. The positive correlation between IC value and efficiency indicates a strong relationship between them. Similar results were found in Finnish companies (Kujansivu & Looquist, 2007).

It is debatable whether the method employed in measuring IC efficiency and value is valid or not. But the methods employed in this study use the financial information for determining the IC efficiency and value. Though researchers opine that financial information captures only a part of intellectual capital (Kujansivu & Looquist, 2007), till now there is no perfect and well accepted model available for measuring IC value and efficiency. To make study results reliable the present study is based on large sample covering major software and pharmaceutical companies in India and four years' period. Moreover, financial information is directly collected from the annual reports of the respective company.

CONCLUSIONS

The principal purpose of the present study is to measure the efficiency and value of intellectual capital and to examine the relationship between value creation efficiency and value of intellectual capital. Intellectual capital performance of a company is measured using VAIC™ methodology and value of intellectual capital is calculated employing CIV procedure. Present study has been conducted on a sample of 50 knowledge intensive Indian companies which include software and pharmaceutical companies. Overall empirical findings, which are based on correlation between the intellectual capital performance and value of intellectual capital, clearly indicate that efficiency and value of intellectual capital is positively related. That is intellectually high efficient companies' possess high value of intellectual capital. Therefore, present limitations of financial reporting can be removed by reporting the value of intellectual capital investment. From the academic perspective the study enhances practice of the measurement and management of intellectual capital. The study enhances the knowledge of IC management and measurement by employing two popular models in practice. The study highlighted practical link of IC efficiency and value. The information presented in this paper may be useful for decision making of managers and stakeholders.

The major limitation of this paper is IC measurement model applied in this study. Here, IC efficiency is measured through Pulic's VAIC method and value of IC is measured through CIV method. Another limitation of the study is the selection of industry. Two knowledge intensive industries namely, software and pharmaceutical industries are selected for the purpose of this study. Period of study covered in this study is another limitation of this study. Therefore, further studies can be undertaken by employing different IC measurement models considering large sample companies.

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