
Intellectual Capital and Financial Performance of Indian IT Sector

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In present scenario, the intellectual capital has carved a niche as an important corporate asset because the conventional performance measurement techniques are incapable to measure intangible dimensions of corporate performance. It is a challenge especially for knowledge driven firms to measure the impact of intangibles on their financial performance. This study has shown the impact of intellectual capital on the financial performance of IT sector in India. To conduct the study BSE's Finance & IT index has been taken for a period ranging from 2006 to 2015 and the VAIC™ has been used to measure the intangibility of these firms. The CEE and HCE both have a positively significant relationship with the productivity and profitability of Indian IT sector. The SCE also has a significant positive impact on profitability but not with the productivity. None of the VAIC™ components have any significant relationship with market valuation.

Keywords: - Intellectual Capital, Financial Performance, Value Added Intellectual Coefficient™, CEE, HCE, SCE, Profitability, Productivity, Market Valuation.

1. Introduction

Knowledge, information, experience etc. which are collectively termed as intellectual capital, constitute the foundation for success in the twenty-first century. In conventional management tangible assets were used as the basis for improving the performance but when these resources became harder to obtain, managers started finding new ways of gaining competitive advantage even when they have less physical capital at their disposal. We can say that the managers started working smarter and this how the knowledge based economy came into existence. The knowledge-based economy supports a business model that relies mainly on wealth creation through development, deployment, and utilization of companies' intangible assets or intellectual capital (IC) (Stevo & Bontis, 2016).

Mainly the importance of IC grew during the 1980s when the number of knowledge-intensive industries started increasing such as computer, software, pharmaceuticals, biotechnology, etc. The term came to be particularly widely accepted after it appeared in Thomas Stewart (1991) cover article in Fortune magazine. The article addressed IC in a very broad way, as the sum of knowledge, information, intellectual property, and experience held by everybody in a company, put to use to create a competitive edge and, ergo, the wealth of a company (Stevo & Bontis, 2016).

Actually the firms face a real problem in the matter of accounting for the investment and performance of intangibles. The conventional performance measurement techniques are

incapable to gauge multiple dimensions of performance because they concentrate only financial aspects of the organization. Actually the benefits of intellectual capital such as management efficiency, customer relation, research & development (R&D), innovations etc are very difficult to measure and quantify by traditional measures which suggests that these conventional accounting principles based measures may be unsuitable in the new economic world in which competitive advantage is driven by intellectual capital (Edvinson & Malone, 1997).

Firer said that the use of traditional performance measurement technique may lead investors and other stakeholders to make inappropriate decisions when companies have a large proportion of their investment in intangible assets (Firer & Williams, 2003).

It had been recognized that the intellectual capital is an important corporate asset which plays an important role for extraordinary financial performance. It forms the roots of a corporation-of a nation- that supplies the nourishment for future strength and growth and it also constitutes all factors of production which are invisible on the traditional balance sheet but decisive of a company's long-term profitability (Mondal & Ghosh, 2012)

Thus, the main goal of the paper is to reveal the existence and nature of relationship between intellectual capital and financial performance of firms in the IT industry in India. The present analysis is based on a sample of 5 companies listed in BSE IT Index.

The remaining parts of this paper include a brief summary of the relevant literature (2), a development of hypothesis (3), research design (4), data analysis (5), findings & conclusion (6) and limitations (section 7).

2. Review of Literature

The term "IC" has been defined by different researchers differently. There is no precise agreement on definition of IC. Generally, the term "IC" is used to refer to intangible assets or intangible business factors of the company, which have a significant impact on its performance and overall business success, although they are not explicitly listed in the balance sheet (if so, then under the term goodwill).

Many studies have conducted to define and measure intellectual capital but it has been difficult to measure it successfully in economic terms. Some of the researchers have applied VAIC™ model to identify the linkage between intellectual capital and financial performance of the companies but the results were not similar in all the studies. Firer and Williams (2003) had conducted a study on 75 South African publicly listed firms and found that human capital efficiency had a negative impact on profitability, productivity and market valuation but the Structural capital efficiency had a positive impact on profitability and physical capital had positively connected with market valuation. Shiu (2006) conducted a study in Taiwan and also found the similar results as human capital had negative impact on productivity and market valuation. Chan (2009) had also conducted a study in Hong Kong Stock Exchange and found that human capital has a negative relationship with productivity, profitability and market valuation while physical capital had a significant relationship with all these factors. Bollen, Vergauwen and Schnieders (2005) all the

components of intellectual capital had an indirect relationship with the financial performance measures.

On the other hand Maditinos, Chatzoudes, Tsairidis and Theriou (2011) conducted a research on Athens Stock Exchange and found that the human capital efficiency was positively associated with profitability. Ting and Lean (2009) concluded that human capital efficiency and physical capital efficiency both had a positive significant relationship with profitability. Zeghal and Maaloul (2010) carried out a study on 300 firms in UK and found that only physical capital efficiency had a significant influence on financial and stock market performance of the firms. Chen, Chen and Hwang (2005) in Taiwan found that human capital efficiency and physical capital efficiency had a significant impact with profitability, productivity, market valuation and growth whereas the structural capital efficiency had significant impact only with profitability and market valuation. Mavridis (2004) found that the human capital efficiency is more important for the performance of Banks in Japan as compared to physical capital efficiency. Appuhami (2007) didn't find any significant relationship between HCE and the capital gains made by investors although the relationship is a positive one.

Overall, studies using VAIC have resulted in a mixture of results across different countries, industries, and years. For example, while Chen et al. (2005) conclude that IC is a driver of both firm value, and financial performance while Shiu (2006) finds only weak relationships between VAIC™ and performance. In addition to that Firer and Williams (2003) & Chan (2009) conclude that firms and investors place greater importance on physical capital over IC, but Appuhami (2007) concludes that IC is more important in the Thai financial sector. The inconsistent evidence does not lead to a compelling conclusion regarding the relationship between IC and firm performance.

2.1 Research gap identified

The importance of intellectual capital varies with the nature of firms e.g. Human capital efficiency is not as much important in a hardware industry as important it is in software industry. With the help of existing literature, it can be said that the intellectual capital research is not very much developed in India especially in context of information technology (IT) sector. Being a developing country India has a large potential of human capital efficiency and structural capital efficiency along with the physical capital efficiency. A study on the relationship between intellectual capital and financial performance of IT sector in India would be helpful in analyzing the impact of intellectual capital in the performance of IT sector.

3. Development of Hypothesis

The present study explores this issue empirically by analyzing the relationship between a relevant measure of IC and three commonly used measures of a company's financial performance, namely, Return on Equity (ROE), Asset Turnover (ATO) & Market to Book (MB) which represents profitability, productivity and market valuation, respectively.

Researchers agreed that IC is composed of human capital, structural capital and physical capital. Investment in employee capabilities has direct impact on financial performance of a firm (Becker,

Huselid, & Ulrich, 2001) . However, researchers like Youndt (1998) argues that influence of HC on organizational performance is uncertain. So it is necessary to examine empirically whether HC influences financial performance or not?

SC refers to all those resources which are left in the office premises when employees go to their home. Well trained and motivated employees can do nothing without proper resources i.e. organizational culture, rules, software, copyrights, patents etc. So, SC is also very important for organizational financial performance.

Additionally, the physical capital employed efficiency has been found to have a significant positive impact on organizational financial performance (Chen et al., 2005)

In this study author predicts a positive relationship between the financial performance as measured by ROA, ATO & MB and the components of IC performance of Indian IT sector.

H1. The higher the performance of a company's intellectual capital components, the greater will be the company's profitability.

H2. The higher the performance of a company's intellectual capital components, the greater will be the company's productivity.

H3. The higher the performance of a company's intellectual capital components, the greater will be the company's market to book value.

4. Research Design

4.1 Sample

The research is confined to only 5 companies of Information Technology (IT) sector for the financial years 2006-2015. All these companies have been taken randomly from BSE IT index and the data used in this study had been extracted from the CMIE's Prowess.

4.2 Regression Models

Model 1, Model 2 and Model 3 examine the relationship between ATO, ROE & MB and the components of VAIC™. To examine the impact of productivity on profitability and market valuation, ATO (measure of productivity) is also used as independent variable in Model No. 2 & 3. These models are illustrated in the following regression equations:

Model 1:

$$ATO = \alpha + \beta_1 (CEE) + \beta_2 (HCE) + \beta_3 (SCE) + \beta_4 (PC) + \beta_5 (\log \text{ sales}) + \mu$$

Model 2:

$$ROE = \alpha + \beta_1 (CEE) + \beta_2 (HCE) + \beta_3 (SCE) + \beta_4 (ATO) + \beta_5 (PC) + \beta_6 (\log \text{ sales}) + \mu$$

Model 3:

$$MB = \alpha + \beta_1 (CEE) + \beta_2 (HCE) + \beta_3 (SCE) + \beta_4 (ATO) + \beta_5 (PC) + \beta_6 (\log \text{ sales}) + \mu$$

4.3 Variable Definitions

4.3.1 Measure of dependent variables: Financial performance indicators are being considered as the best indicators to reflect the fulfillment of economic goals of a business entity. Many researchers have used different financial indicators in their studies; some of them are as follows:

Authors	Variables
Pal and Soriya (2012)	ROA, ATO, ROE, MB
Chu et al., (2011)	ROA, ATO, ROE, MB
Kamath (2008)	ROA, ATO, MB
Morariu (2014)	ROA, ROE, MB
Clarke et al., (2011)	ROA, ROE, RG, EP

To conduct the research three dependent variables ROE, ATO & MB as a proxy measure designed to capture the respective properties of profitability, productivity, and market valuation, respectively – are used.

1. Return on Equity (ROE): measured as the ratio between the net incomes (less preference dividends) divided by the book value of total equity, it shows the earnings available to the equity shareholders and is generally considered an important financial indicator for investors.
2. Asset Turnover Ratio (ATO): this is used to measure the productivity of banks which is computed by dividing income of banks by total funds employed.
3. Market to Book Ratio (MB): ratio of the total market capitalization (share price times number of outstanding common shares) to book value of net assets.

4.3.2 Measure of independent variables: The VAIC™ Pulic (2000) 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. Actually VAIC™ is a composite sum of three separate indicators:

1. Capital Employed Efficiency (CEE) - indicates how much new value has been created by one invested unit of capital employed.
2. Human Capital Efficiency (HCE) – shows how much value added has been created by one money unit invested in the employees.
3. Structural Capital Efficiency (SCE) - indicates the share of SC in the created value.

The following equation formalizes the relationship algebraically:

$$CEE + HCE + SCE = VAIC^{TM}$$

The total value added is the difference of the output and input in the organization. $VA = W + I + T + NI$

Where,

W = Wages & Salaries

I = Interest expenses

T = Taxes paid

NI = Profit after tax

- $CEE = VA/CE$

VA = Value added

CE = Capital employed

- $HCE = VA/HC$

VA = Value added

HC = Human capital

- $SCE = SC/VA$

VA = Value added

SC = Structural capital

SC = VA - HC

4.3.3 Measure of control variables:

1. Physical capacity (PC): It measures the physical intensity of the companies i.e. how much fixed assets are there in proportion to total assets. It is calculated as: $PC = \text{Fixed assets} / \text{Total assets}$

2. Natural log (Sales): It is employed as the proxy for the size of the firm: $\text{Sales} = \text{Log}(\text{Sales}) = \text{Firm size}$

5. Data Analysis

5.1 Descriptive Statistics

Table I. Descriptive statistics for selected variables

Variables	Obs	Mean	Std. Dev.	Min	Max
ATO	50	.5593963	.3006472	.0172429	1.737877
CEE	50	.303855	.3667015	-1.5625	1.017341
HCE	50	-.3170959	10.3855	-68.75	6.166667
SCE	50	.2260881	.6102426	-2.869565	1.625
PC	50	.1681987	.1307163	.0009314	.5661157
Lsales	50	5.928051	1.977779	2.282382	9.468086

Table I presents the mean and standard deviation of the dependent variables, independent variables and control factors for the whole study period i.e. 2006-2015. The result shows that the ATO has an average of 55% with SD 30% whereas the ROE has an average of only 2% with SD of 29%. The CEE and SCE both have an average of 30% & 22% with SD 36% & 61% respectively. But the HCE shows a negative average of 31% with SD 10%. In case of minimum and maximum values some variables such as MB, HCE & PC are showing a remarkable variation. Profitability and human capital efficiency are consistent whereas physical capacity and log of sales are also consistent but not very much while the profitability, market to book value and structural capital efficiency showing inconsistency. The capital employed efficiency is also inconsistent but not that much.

5.2 Correlation analysis

To have an initial analysis of whether there exists any relation between the independent and dependent variables, the correlation coefficient is estimated along with its significance and the same is depicted in Table II.

Table II. Spearman Correlations – independent and dependent variables

	ATO	CEE	HCE	SCE	PC	Lsales
ATO	1.0000					
CEE	0.7074	1.0000				
HCE	0.1838	0.7339	1.0000			
SCE	0.0010	-0.1000	-0.2005	1.0000		
PC	0.0545	0.1913	0.1969	-0.3271	1.0000	
Lsales	0.5191	0.5295	0.1904	0.2597	-0.1166	1.0000

In Table II, CEE shows a positive relationship with both ATO & ROE. It is highly correlated with ROE while moderately correlated with ATO. CEE has a negative and insignificant relationship with MB. HCE has a positive relationship with all, ATO, ROE & MB but it is highly correlated with ROE only. SCE shows a positive relationship with all, ATO, ROE & MB but it is not even moderately correlated with any of them.

CEE shows a positive relation with HCE but a negative relation with SCE. It is moderately correlated with HCE also. HCE has a negative relationship with SCE.

5.3 Multiple regression results

The following models showing the results of regression coefficients for all independent variables using each performance measure productivity, profitability & market to book value as the dependent variable. Model 1 shows the results for ATO whereas Model 2 & Model 3 is showing results for ROE & MB respectively.

Model 1.

Variables	C	CEE	HCE	SCE	PC	Lsales
Coefficient	.2660	1.0249	-.0211	-.0186	-.1220	2.3906
Std Error	.0878	.1157	.0034	.0417	.1898	.0155
t-Statistics	3.03	8.86	-6.13	-0.45	-0.64	0.00
Probability	0.002	0.000	0.000	0.655	0.520	1.000
Adj. R ²	0.7470					

The model 1 shows the impact independent variables CEE, HCE, SCE and control variables PC &

Log of sales on dependent variable ATO. The R2 of the model is 0.7470 which says that the model for ATO is explaining 74% of the variance in dependent variable. Both physical capital efficiency and human capital efficiency have positively significant impact on ATO but the SCE has an insignificant impact on the ATO. In case of control variables both PC & Log of sales have insignificant impact on ATO.

The results are based on Random – effects GLS regression which had been selected over Fixed – effects regression and Pooled OLS regression on the basis of results of Hausman Test and Breusch and Pagan Lagrangian multiplier test. Table II of Spearman correlation clearly shows that there is no multicollinearity among independent variables. According to the result of Breusch-Pagan test the data was heteroscedastic but the problem has been resolved by the help of Robust standard error. The Wooldridge test for autocorrelation in panel data has shown that the problem of autocorrelation is not present in the data.

Model 2.

Variables	C	CEE	HCE	SCE	ATO	PC	Lsales
Coefficient	-.0212	.5544	.0138	.1357	-.2125	-.0365	-.0033
Std Error	.0410	.0819	.0019	.0177	.0639	.0809	.0065
t-Statistics	-0.52	6.77	6.96	7.63	-3.32	.0809698	-0.50
Probability	0.605	0.000	0.000	0.000	0.001	0.652	0.615
Adj. R²	0.9544						

The Model 2 shows the impact of independent variables CEE, HCE, SCE, ATO & control variables PC & Log of sales on dependent variable ROE. The R2 of the model is 0.9544 which says that the model for ROE is explaining 95% of the variance in dependent variable. All physical capital efficiency, human capital efficiency, structural capital efficiency and asset turnover ratio have positively significant impact on ROE. In case of control variables both PC & Log of sales have insignificant impact on ROE.

The results are based on Random – effects GLS regression which had been selected over Fixed – effects regression and Pooled OLS regression on the basis of results of Hausman Test and Breusch and Pagan Lagrangian multiplier test. Table II of Spearman correlation clearly shows that there is no multicollinearity among independent variables. According to the result of Breusch-Pagan test the data was homoscedastic. The Wooldridge test for autocorrelation in panel data has shown that the problem of autocorrelation is not present in the data.

Model 3.

Variables	C	CEE	HCE	SCE	ATO	PC	Lsales
Coefficient	468.0041	74.2625	1.7252	49.55289	-39.6758	-398.328	-64.5916
Std Error	183.3638	183.6619	4.4027	34.7507	131.1286	256.5521	31.2347
t-Statistics	2.55	0.40	0.39	1.43	-0.30	-1.55	-2.07
Probability	0.015	0.688	0.697	0.162	0.764	0.129	0.045
Adj. R ²	0.1909						

The Model 3 shows the impact of independent variables CEE, HCE, SCE, ATO & control variables PC & Log of sales on dependent variable MB. The R² of the model is 0.1909 which says that the model for ROE is explaining only 19% of the variance in dependent variable. All physical capital efficiency, human capital efficiency, structural capital efficiency and asset turnover ratio have positively insignificant impact on RMB. In case of control variables PC has an insignificant impact whereas Log of sales has insignificant impact on MB.

The results are based on Fixed – effects regression which had been selected over Random – effects regression and Pooled OLS regression on the basis of results of Hausman Test and Breusch and Pagan Lagrangian multiplier test. Table II of Spearman correlation clearly shows that there is no multicollinearity among independent variables. According to the result of Breusch-Pagan test the data was heteroscedastic but the problem has been resolved by the help of Robust standard error. The Wooldridge test for autocorrelation in panel data has shown that the problem of autocorrelation is not present in the data.

6. Findings & Conclusion

The present study measured the intellectual capital performance of IT industry in India. VAIC™ had applied on a sample of 5 indexed companies of BSE's IT Index. Corporate financial performance is measured through ATO, ROE & MB. The components of VAIC™ explain ROE the most and ATO is little lesser while they don't explain MB.

HCE has a significant positive impact on both ATO & ROE which is similar to the study of Chen et al. (2005) and against the findings of Firer and Williams (2003). This signifies that the employees are performing well and it also supports the statement that the human capital efficiency is higher than the physical and structural efficiency (Goh, 2005). The CEE has a significant positive impact on both ATO & ROE (Chan, 2009). This implies that the performance of IT sector is still being influenced by the tangible assets. That is absolutely against the argument of many scholars that the intellectual capital is more important for knowledge driven enterprises which help them in acquiring competitive advantage (Marr, 2004).

SCE also has a significant positive impact on ROE but not on ATO (Chan, 2009) which indicates that the management is not capable enough to ensure the optimum utilization of its resources. But none of the components of VAIC™ have significant impact on MB (Chen et al., 2005) which implies

that an average Indian investor doesn't consider intellectual capital while making decisions regarding investments. In this study ROE & ATO are found to be positively influenced by the components of VAIC™ in case of IT industry. From the foregoing discussion it may be concluded that the intellectual capital is not at all having impact on the market valuation (Pal & Soriya, 2012). However, a study involving a fairly large sample may be conducted to reassess those relationships. The decision makers or policy makers in corporate sector have to initiate voluntary disclosures of IC, so that the negative perception among the stakeholders regarding value creation in the firm may get even more transparent. The present study provides an gateway for further exploration in this area especially for an emerging economy like India where the IC, measurement, management, valuation and reporting are all at their nascent stages, therefore this paper adds to the existing literature and evokes interest for further research.

7. Limitations

The main limitations of this study is the time period of a decade which is very long, generally the structure of the companies keeps changing and this effects the analysis of the companies. Another limitation is the numbers of firms are less. Therefore, future study can be conducted with a different IC measurement model and large number of firms for a shorter duration of time.

Bibliography

- Appuhami, R. (2007). The impact of intellectual capital on investors' capital gains on shares: an empirical investigation of Thai banking, finance & insurance sector. *International Management Review* , 3 (2), 14-25.
- Barney, J. B. (1991). Firm resources and sustainable competitive advantage. *Journal of Management* , 17 (1), 99-120.
- Becker, B. E., Huselid, M. A., & Ulrich, D. (2001). *The HR scorecard: linking people, strategy and performance*. Harvard Business Press Books .
- Bollen, L., Vergauwen, P., & Schnieders, S. (2005). Linking intellectual capital and intellectual property to company performance. *Management Decision* , 43 (9), 1161-1185.
- Bontis, N. (1996). There is a price on your head: managing intellectual capital strategically. *Business Quarterly* , 60 (4), 40-47.
- Chan, K. H. (2009). Impact of intellectual capital on organisational performance. An empirical study of companies in the Hang Seng Index (Part 2). *The Learning Organization* , 16 (1), 22-39.
- Chen, M. C., Chen, S. J., & Hwang, Y. (2005). An empirical investigation of the relationship between intellectual capital and firm's market value and financial performance. *Journal of Intellectual Capital* , 6 (2), 159-176.
- Edvinson, L., & Malone, M. S. (1997). *Intellectual Capital: The Proven Way to Establish Your Company's Real Value by Measuring its Hidden Brainpower*. Judy Piatkus .
- Firer, S., & Williams, S. M. (2003). Intellectual capital and traditional measures of corporate performance. *Journal of Intellectual Capital* , 4 (3), 348-360.

- Gan, K., & Zakia, S. (2008). Intellectual Capital and Corporate Performance of Technology-Intensive Companies: Malaysia Evidence. *Asian Journal of Business and Accounting* , 1 (1), 113-130.
- Ghosh, S., & Mondal, A. (2009). Indian software and pharmaceutical sector IC and financial performance. *Journal of Intellectual Capital* , 10 (3), 369-388.
- Goh, P. C. (2005). Intellectual capital performance of commercial banks in Malaysia. *Journal of Intellectual Capital* , 6 (3), 385-396.
- Joshi, M., Cahill, D., & Sidhu, J. (2010). Intellectual capital performance in the banking sector:an assessment of Australian owned banks. *Journal of Human Resource Costing and Accounting* , 14 (2), 151-170.
- Maditinos, D., Chatzoudes, D., Tsairidis, C., & Theriou, G. (2011). The impact of intellectual capital on firms' market value and financial performance. *Journal of Intellectual Capital* , 12 (1), 132-151.
- Marr, B. (2004). Measuring and benchmarking intellectual capital. *Journal of Intellectual Capital* , 11 (6), 559-570.
- Mavridis, D. (2004). The intellectual capital performance of the Japanese banking sector. *Journal of Intellectual Capital* , 5 (1), 92-115.
- Mehralian, G., Rajabzadeh, A., Sadeh, M. R., & Rasekh, H. R. (2012). Intellectual capital and corporate performance in Iranian pharmaceutical industry. *Journal of Intellectual Capital* , 13 (1), 138-158.
- Mohiuddin, M., Najibullah, S., & Shahid, A. I. (2006). An exploratory study on intellectual capital performance of the commercial banks in Bangladesh. *The Cost and Management* , 32 (6), 40-54.
- Mondal, A., & Ghosh, S. K. (2012). Intellectual capital and financial performance of Indian Banks. *Journal of Intellectual Capital* , 13 (4), 515-530.
- Pal, K., & Soriya, S. (2012). IC performance of Indian pharmaceutical and textile industry. *Journal of Intellectual Capital* , 13 (1), 120-137.
- Pulic, A. (2000). VAIC™ – an accounting tool for IC management. *Int. J. Technology Management* , 20 (5/6/7/8), 702-714.
- Shiu, H. J. (2006). The application of the value added intellectual coefficient to measure corporate performance: evidence from technological firms. *International Journal of Management* , 23 (2), 356-365.
- Stevo, V. D., & Bontis, N. (2016). Intellectual capital and financial performance in the Serbian ICT industry. *Journal of Intellectual Capital* , 17 (2).
- Ting, I. W., & Lean, H. H. (2009). Intellectual capital performance of financial institutions in Malaysia. *Journal of Intellectual Capital* , 10 (4), 588-599.
- Youndt, M. A. (1998). Human resource management system, intellectual capital and organizational performance. Unpublished PhD dissertation .
- Zeghal, D., & Maaloul, A. (2010). Analysing value added as an indicator of intellectual capital and its consequences on company performance. *Journal of Intellectual Capital* , 11 (1), 39-60.
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