Impact of Intellectual Capital Efficiency on Firm performance, CAPM expected return and Value at Risk of IT MNCs in India

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ABSTRACT

This study analyzes the effect of Intellectual Capital Efficiency on firm performance,CAPM expected return and Value at Risk of IT MNCs in India. The best performing Ten IT companies was chosen for the study, the ICE was gauged using Value Added (VA) and Modified Value Added Intellectual Coefficient (M-VAIC^{TM}). The study uses secondary data for 10 years from 2007 to 2016 and empirically analyses the relationship of VA and the components of M-VAIC^{TM} with Firm performance indicators (ROA, ROE, EPS and NPM), CAPM Expected return and Value at Risk of the selected IT MNCs in India.The study employed panel regression for disproving hypotheses. The result of the study reports that there is a statistically significant and positive impact Intellectual capital on firm performance parameters.Intellectual capital negatively impacts the CAPM expected return. The study showed that the Value at Risk will be reduced if IC coefficient is high. High level of HCE and CEE reduces Value At Risk. The study is limited in analyzing only IT industry and the number of companies taken for the analysis is limited.

KEY WORDS: Value Added (VA), Indian MNCs, Net Profit Margin, components of Intellectual capital, Value Added Intellectual Coefficient (VAIC^{TM}), CAPM expected Return, Value at Risk

INTRODUCTION

The term "Knowledge economy" (Fritz Mechuip) Propagated by Philip Kotler has got tremendous attention from last two decades as the knowledge asset became the supreme asset in the organization and industries. The knowledge assets or Intellectual assets are forming part of Intangible assets which is presented in the balance sheet with an optimum level of disclosures. Intangible Assets include knowledge, experiences , Skills and traits etc…which are difficult to measure, whereas both Physical and financial assets of a firm include tangible assets like building, machinery, plants etc and working capital, owner's equity, retained earnings etc has been reported without force. We are witnessing the notable difference between the Market Value and book value of assets. This difference is due to the performance of Intangible assets or Intellectual Capital of the firm.

Intellectual Capital (IC) contributes largely to the competitive edge. IT, ITeS ,BPO, KPO companies are having appreciable amount of intellectual assets in the form of Human Assets with good grade of intelligence and academic credentials and Intellectual Properties like patents, trademarks, licensing, copyrights etc.. The Directors and BOD members including CEOs of major IT companies are either expelled or retained in the business to withstand the keen competition in the technology field. They are paid highest remuneration and other compensation to carve the fruitful outputs of intelligence from them. Even the technicians and designers like personnel have been paid high in this sector all that costs are treated as Human cost with respect to conventional accounting standards and written off against profit in the Income statements. Ante Pulic (1998) identifies these costs as Human Assets and he developed an intellectual capital Assessment Formula called VAIC™.

This study is an attempt to analyze how the Intellectual capital impacts on the financial performance of IT MNCs in India by taking the Top 10 IT MNC companies into account. The data of the 10 respective companies in the top List index has been collected from secondary sources (Ycharts and CMIE Prowess) and measured the value of IC Using Ante Pulic's VAIC™ model. The firm performance Indicators are summarized towards the selection of Return on Equity (ROE), Net Profit Margin and Earning Per Share (EPS) Return on Assets (ROA). Many country specific and industry specific analysis have been made by previous researchers to analyze the very relationship of IC with these performance Indicators. Significant relationship between IC on ROA has been concluded (Maheran & Muhammad, 2004) (Firer, Williams, & Firer, 2006) Researchers also Concluded that there is significant relationship between IC (VAIC™) and ROE (Fethi Calisir, Cigdem Altin Gumussoy, 2010) (Amitava & Mondal, 2012). The strong significant relationship of IC on performance Indicators ROA and ROE has been established (Chang & Hsieh, 2011) (Chen, 2005). The impact of IC (VAIC™) on Net Profit Margin and Gross Profit Margin has been proved by (Chang & Hsieh, 2011) and (Amitava Mondal, 2012).

The Intellectual Capital of an organization is a source of competitive advantage and there are studies which proved that the success of the business can be partly influenced by its Intellectual Capital. The value of the employees' knowledge of organizations, business training and any exclusive information that may give an upper hand to the organization. Intellectual Capital is considered as an asset that gathers every available information resources of an organization and that can be used to skyrocket the profits, increase new clients, make new products, or enhance the business. Intellectual Capital is a real business asset, although measuring it is a very difficult and subjective task. Organizations spend millions every year preparing their employees in business-particular topics and otherwise paying for enhanced ability in their staff. This capital employed gives return to the organization and that can contribute towards many years of business value. As product innovation and process innovation enhancements are turning out to be a differentiating factor within present day organizations, Intellectual Capital is probably is likely to become an even stubborn force in the marketplace.

As indicated by Stewart (2002), the new economy stands on three pillars; First pillar as knowledge being what we are doing, selling and buying. Knowledge asset is so much pervasive. Second, knowledge assets has become increasingly important for the organizational success and functioning. Third, prospering new management techniques, advancement in technologies and methods are expected to clarify the knowledge based assets.

DEFINITIONS OF INTELLECTUAL CAPITAL

"The knowledge embedded in individuals and organizations has been termed as Intellectual Capital" (Sullivan, 1999).

"Intellectual capital is the group of knowledge assets that are attributed to an organization and most significantly contribute to an improved competitive position of this organization by adding value to defined key stakeholders"- Marr and Schiuma (2001)

COMPONENTS OF INTELLECTUAL CAPITAL

Human Capital (HC)

Human capital, a term promoted by Gary Becker - an economist from the University of Chicago, describes that as the bundle of knowledge, academic excellence, social and personality values,

General Intelligence, Capacity and creativity to perform a given task or solve a problem and creating economic value out of it.

HC (Human Capital) = Personnel cost (Salaries and Wages) considered as an investment.
HCE (Human Capital Efficiency) = VA/HC

Structural capital (SC)

Structural capital is a cardinal of intellectual capital, and consists of the Databases of the organization that allows human capital to function and supportive infrastructures. It is owned by an organization and stays with it even when people leave the organization. It incorporates: capacities, schedules, techniques, methodology and systems implanted in organization.

SC (Structural Capital) = VA - HC
SCE (Structural Capital Efficiency) = SC/VA

Relational Capital (RC)

Relational Capital is the Collaboration of relationship established among firms, institutions, Customers and people.

RC (Relational Capital) = Marketing Cost
RCE (Relational Capital Efficiency) = VA/RC

Modified Value Added Intellectual Coefficient (MVAIC)

MVAIC = HCE+CEE+SCE+RCE

VAIC™ Ante Pulic Model: VAIC™ an Austrian approach is one of the important and consistent approaches for measuring the IC's performance of insurance sector. This approach is alternative to traditional approaches in which IC performance is based on assets, net profit and shareholder equity. Many researchers, practitioners and academicians have used this approach in their research work. For details see, Ahangar (2011), Maditinos *et al.* (2011), Joshi, Cahill and Sidhu (2010), Diez *et al.* (2010), Abeysekera (2008), Makki, Lodhi and Rahman (2008), Tan *et al.* (2007), Kamath (2007) , Bontis *et al.* (2000) [11], Ji-jian *et al.* (2006), Goh (2005), Mavridis m (2005), Goo and Tseng (2005), Mavridis (2004) .The Pulic Model lacks the representation of

relational capital. So a modified version of the same model has been introduced in this study by accommodating relational capital efficiency and named it as Modified Value Added Intellectual Coefficient (MVAIC).

CAPM Expected Return

The capital asset pricing model (CAPM) gauges Expected return based on beta market coefficient and market risk premium.The following formula can be used to arrive at the Expected return.

$ER_i = R_f + \beta_i (ER_m - R_f)$

ER_i = Expected return on investment

R_f = Risk free rate

β_i = Beta of the investment

$(ER_m - R_f)$ = Market Risk Premium

Risk (Value at Risk)

Value at Risk is a statistical technique employed to quantify the level of financial risk within a firm or investment portfolio over a specific time period.

LITERATURE REVIEW

Researchers define the concept of Intellectual Capital in different ways. Therefore, it has been interpreted as intangible assets which are not listed explicitly on a firm's balance sheets but there exist a positive impact on the performance and success of it (Brooking, 1996; Kayancan & Alkan, 2005; Mondal & Ghosh, 2012).The VAIC model is widely applied to measure the intellectual capital overall performance of firms in various countries and within different sectors. Consequently, there's a wide range of studies investigating the impact of intellectual capital at the overall performance of firms by the VAIC model. At the same time some of the studies (Chen et al., 2005; Chu, Chan, & Wu, 2011; Gan & Saleh, 2008; Kamath, 2008; friend & Soriya, 2012; Tan et al., 2007) suggest that intellectual capital has positive impacts on overall performance of firms, others (Chan, 2009 Ghosh & Mondal, 2009) fail to provide good enough

evidence displaying that impact. In the global literature research the usage of the VAIC model mainly focus on the banking and finance sectors. The first study shifting through the effects of intellectual capital on the banking sector by using the VAIC model belongs to Ante Pulic and Manfred Bornemann. In their study, the authors offer valuable facts on the performance of the intellectual capital held via 24 foremost banks operating in Austria between 1993 and 1995. The authors claim that growing the performance of intellectual capital is most inexpensive and safest manner to ensure sustainable functioning of banks. Pulic (2004) emphasizes that there may be a strong hyperlink among the intellectual capital and success of an organization. Additionally, the author argues that banks making an investment closely inside the intellectual capital and its components improve their overall performance (Joshi et al., 2013; Mondal & Ghosh, 2012; Ting & Lean, 2009).Firer and William (2003) examined the effect of Intellectual Capital on the firms' performance measures such as ROA, ATO, M/B of 75 listed organizations in South Africa and concluded a combined affiliation between IC and performance. Similarly Chen (Min Chin Chen,2005) tested the IC effect on the performance and market value of Taiwanese listed companies the usage of VAIC model and concluded IC had a greater effect on the overall performance and market to book ratio(M/B ratio). Anvari Rostami et.al. (2005) examined the effect of IC on firm value of the financial organizations in Ireland and found that IC had an influence on firm performance. The effect of IC on overall performance of Indian Banking during 2000 to 2004 was studied by Bharathi (Bharathi Kamath, 2007) and he concluded that there is a sizable difference in the IC and value creation of Indian banking sector. A study conducted by Yalama (Yalama and Goskun,2007) on the impact of IC on all of the banks that were indexed in Istanbul stock exchange, Turkey by using VAIC model and concluded that IC has a greater impact on profits than that of the physical capital. 25 pharmaceutical companies in India were analyzed to check the role of IC on firms' overall performance and that was a failure on proving IC has an impact on firm's performance(Kamath, 2008) . His study on impact of VAIC on ROA, ATO and M/B of 25 companies indexed in BSE, India concluded that the Human Capital performance significantly affects the companies' overall performance and earnings. Nik (Nik Maheran & Nik Mohammed, 2009) has conducted a study on Malaysian financial sector using panel data with Ante Pulic's VAIC model and they concluded that there is a significant relation with firms' performance indicators and ROA. In the same year another study was conducted in Malaysia by Ting (Ting & Lean, 2009) examined the impact of IC on

financial companies during the period 1999 to 2007 by using ante Pulic's VAIC model and found that there is a positive relationship. Similiarly Gosh (Gosh & Mondal , 2009) discovered a massive effect of IC on return On assets , Asset flip Over ratio and market to book ratio of the 50 software and 30 pharmaceutical groups in India. Another study that analyzed the effect of IC on firm performance (ROI) of 25 companies listed in Lahore stock exchange and concluded a positive relationship among IC and ROI (Makki and Lodhi, 2009). The effect of VAIC on operating profit, revenue, ROA, M/B ratio of 18 financial firms in Malaysian study found out a positive relationship among VAIC with the listed overall performance measures(Muhamed Ismail, 2009).Similiarly Fethi (Fethi Calisir , 2010) studied the impact of IC by using VAIC to evaluate the quoted facts technology and communication agencies indexed in Istanbul stock exchange, Turkey during the period 2005 to 2007. After analyzing through a multiple regression they arrived at a conclusion that Capital Employed Efficiency (CEE) found to be the huge predictor of productivity and ROE. Maditinos (Madintinos , 2011) determined a strategically important asset to enhance up the firm performance by studying the impact of IC on financial overall performance of 96 Greek companies indexed in Athens stock exchange. He concluded there is significant relationship among HCE and financial performance. In another study Wang (Wang, 2011) has conducted a panel data analysis on the impact of IC on company overall performance of Taiwanese listed firms using VAIC^{TM} model and its components and concluded there is positive relationship with IC with the firm performance components such as ROA and M/B ratio.The correlation among IC components and company performance are found to be positively related among all of the VAIC components such as HCE, SCE, and CEE with performance measures. Relational Capital efficiency confirmed the best Correlation (Abdulla and Sofian, 2012). Similiarly the impact of IC on ATO, ROA, ROE and M/B ratio of high intangible extensive companies and concluded that IC has a significant relationship with performance measures taken for study (Muhamed Gorban Mehri, 2013).Muhamed (Muhamed Ziqul Haq, 2014) tested the performance of IC of the industrial Banks in Pakistan with VAIC model and ROA, ROE and ATO as performance indicators and arrived at a conclusion that there is significant relationship among IC with ROA and ROE. The observations concluded a high-quality effect of IC on ROA and ROE however no longer on ATO. Dominique(Dominique and Zaenab, 2015) analyzed the effect of IC on overall performance in instances of financial disturbances in Pakistan during the period 2004 to 2011 the use of VAIC and concluded HCE

and CEE were definitely associated with company performance mainly after the crisis. A majority of the research referred to above followed traditional OLS regression estimates for facts evaluation. The research performed the use of a current econometric strategies are very uncommon and furthermore the performance of IT industry, that is rich in intellectual asset, become now not given much interest formerly for an enterprise specific or sectoral index precise look at that's in deed extensive because of the nature of IT sector in which intellectual capital is commonly higher.

Exploring the previous literatures related to intellectual capital impact on Value at risk or risk in general have been showed an infancy stage. Very limited number of studies had been conducted in this arena. The Influence of Intellectual Capital on Shareholders Expected Return was done by Ehsan Kermani1, Mohammad Kia Mehr, and Esmaeel Farzaneh Kargar (2014).This research intends to examine the impact of Intellectual Capital in the investors expected return in the organizations recorded on Tehran stock trade. The investors expected return was figured utilizing CAPM show. The examination time frame was 2007 to 2011 and the chose sample contains 104 organizations. This study found that there is a significant relationship between Intellectual Capital and investors' expected return. However the relationship of the size of the firm and financial leverage and the expected return of the investors were not confirmed. Anvari (Anvari Rostamy & AA and Seraji, 2007) conducted a study on valuing Intellectual Capital and study the relation between companies' IC values with their share market prices; empirical evidence from Tehran Stock Exchange (TSE). Similarly Appuhami (Appuhami & BA Ranjith , 2007) studied the impact of Intellectual Capital on the investor's capital gain on shares; empirical investigation in Thai banking sector, finances sector and insurance sector. The Zimbabwe evidence of Intellectual capital impact on Shareholders value showed that an Increase in IC Multiplier had an extensive effect on shareholder's value (Bongani Ngwenya, 2013). A statistically significant association between intellectual capital and shareholders earnings has been also reported based on the study on selected companies from Lahore Stock Exchange (Muhammad Abdul Majid & Suleman Aziz, 2009). While coming to the studies related to intellectual capital effect on Firm risk A statistically negative effect of intellectual capital on Risk has been proved upon selected Tehran Companies Using Ante Pulic's VAIC^{TM} Model (Behzad Ardalan & Haleh Askarian, 2014). Similiarly (Firer &Williams, 2003) Investigated the relationship between Intellectual capital and firm performance and came up with the proof of Intellectual capital being the most

significant determinant that could enhance firm performance and control Risk. In another study Intellectual capital efficiency and human capital efficiency showed a negative relationship with credit Risk (Santanu kumar Ghosh & Santi Gopal Maji, 2014)

OBJECTIVES OF THE STUDY

- To examine the impact of Intellectual Capital on firm performance.
- To analyze the impact of Intellectual Capital components on firm performance.
- To examine the impact of Intellectual Capital on CAPM Expected Return.
- To analyze the impact of Intellectual Capital components on CAPM Expected Return.
- To examine the impact of Intellectual Capital on value at Risk.
- To analyze the impact of Intellectual Capital components on value at Risk.

RESEARCH HYPOTHESIS

H1: There is a significant effect between MVAIC and ROA

H1a: There is a significant effect between human capital efficiency (HCE) and ROA

H1b: there is a significant effect between structural capital efficiency (SCE) and ROA

H1c: There is a significant effect between capital employed efficiency (CEE) and ROA

H1d: There is a significant effect between relational capital efficiency (RCE) and ROA

H2: There is a significant effect between MVAIC and ROE

H2a: There is a significant between human capital efficiency (HCE) ROE

H2b: there is a significant effect between structural capital efficiency (SCE) and ROE

H2c: There is a significant effect between capital employed efficiency (CEE) and ROE

H2d: There is a significant effect between relational capital efficiency (RCE) and ROE

H3: There is a significant effect between MVAIC and EPS

H3a: There is a significant between human capital efficiency (HCE) EPS

H3b: there is a significant effect between structural capital efficiency (SCE) and EPS

H3c: There is a significant effect between capital employed efficiency (CEE) and EPS

H3d: There is a significant effect between relational capital efficiency (RCE) and EP

H4: There is a significant effect between MVAIC and CAPM Expected Return

H4a: There is a significant between human capital efficiency (HCE) and CAPM Expected Return

H4b: there is a significant effect between structural capital efficiency (SCE) and CAPM Expected Return

H4c: There is a significant effect between capital employed efficiency (CEE) and CAPM Expected Return

H4d: There is a significant effect between relational capital efficiency (RCE) and CAPM Expected Return

H5: There is a significant effect between MVAIC and VAR (Value at Risk)

H5a: There is a significant between human capital efficiency (HCE) and VAR (Value at Risk)

H5b: there is a significant effect between structural capital efficiency (SCE) and VAR (Value at Risk)

H5c: There is a significant effect between capital employed efficiency (CEE) and VAR (Value at Risk)

H5d: There is a significant effect between relational capital efficiency (RCE) and VAR (Value at Risk)

Formulas of Variables Used in the Analysis:

VA (Value Added) = Operating Profit + Personnel Cost + Depreciation + Amortization

HC (Human Capital) = Personnel cost (Salaries and Wages) considered as an investment.

HCE = VA/HC (Human Capital Efficiency referred to per unit of value of human capital).

CE = Total Assets – Intangible Assets (Capital Employed)
CEE = VA/CE (Capital Employed Efficiency refers to per unit value of physical and financial assets).

SC (Structural Capital) = VA - HC

SCE = SC/VA (Value Added Structural Capital Efficiency referred to per unit value of structural capital).

RC = Marketing Cost

RCE = VA/RC

MVAIC™ = HCE+CEE+SCE+RCE

Econometric Methodology:

The following linear regression model has been estimated in this study:

$$Y_{it} = \beta_0 + \beta 1 x_{it1} + \ldots\ldots \beta_k x_{it} + u_{it}$$

The Data: This study uses micro panel data for testing the empirical relationship between the variables under study. Top 10 MNC companies have been selected as samples of MNC IT industry in India. The annual reports and Financial Reports of these companies are collected from audited and reliable sources like Company websites, Ycharts and CMIE ProwessIQ data base to collect the data for 10 years from 2007 to 2016. The Ten MNCs selected for the study are Adobe, Intel, Microsoft, Oracle, SAP SE, Symantec, VMware, IBM, HP and Dell.

The Equations for Linear Regression Model

$$ROA_{it} = \alpha_i + \beta(MVAIC_{it}) + \mu_{it} \quad M(1)$$

$$ROE_{it} = \alpha_i + \beta(MVAIC_{it}) + \mu_{it} \quad M(2)$$

$$EPS_{it} = \alpha_i + \beta(MVAIC_{it}) + \mu_{it} \quad M(3)$$

$$NPM = \alpha_i + \beta(MVAIC_{it}) + \mu_{it} \quad M(4)$$

$$ROA_{it} = \alpha_i + \beta_1(HCE_{it}) + \beta_2(SCE_{it}) + \beta_3(RCE_{it}) + \beta_4(CEE_{it}) + \mu_{it} \quad M(5)$$

$$ROE_{it} = \alpha_i + \beta_1(HCE_{it}) + \beta_2(SCE_{it}) + \beta_3(RCE_{it}) + \beta_4(CEE_{it}) + \mu_{it} \quad M(6)$$

$$EPS_{it} = \alpha_i + \beta_1(HCE_{it}) + \beta_2(SCE_{it}) + \beta_3(RCE_{it}) + \beta_4(CEE_{it}) + \mu_{it} \quad M(7)$$

$$NPM_{it} = \alpha_i + \beta_1(HCE_{it}) + \beta_2(SCE_{it}) + \beta_3(RCE_{it}) + \beta_4(CEE_{it}) + \mu_{it} \quad M(8)$$

$$\text{CAPM Expected Return}_{it} = \alpha_i + \beta(MVAIC_{it}) + \mu_{it} \quad M(9)$$

$$\text{CAPM Expected Return}_{it\ t} = \alpha_i + \beta_1(HCE_{it}) + \beta_2(SCE_{it}) + \beta_3(RCE_{it}) + \beta_4(CEE_{it}) + \mu_{it} \quad M(10)$$

$$VaR_{it} = \alpha_i + \beta(MVAIC_{it}) + \mu_{it} \quad M(11)$$

$$VaR_{it} = \alpha_i + \beta_1(HCE_{it}) + \beta_2(SCE_{it}) + \beta_3(RCE_{it}) + \beta_4(CEE_{it}) + \mu_{it} \quad M(12)$$

ANALYSIS AND RESULTS

This chapter deals with the Analysis part of the model and Hypothesis developed. Analysis part include Huasman test for Fixed or Random effect decision, Descriptive Statistics analysis were made to assess the characteristics of the variables, spearman's correlation analysis to check the relationship between variables and Panel Regression Analysis has been done to arrive at the final result for the hypothesis developed.

Unit Root Test

Unit Root test has been conducted to test the stationarity of the variables. The result of the analysis is shown in the table below. EPS, CEE and NPM were found not stationary in the result.

Table Showing Unit Root test results to check the Stationarity of the variables in the Models

Test	**ROE** Coefficient (probability)	**ROA** Coefficient (probability)	**MVAIC** Coefficient (probability)	**HCE** Coefficient (probability)	**SCE** Coefficient (probability)	**RCE** Coefficient (probability)	**EPS** Coefficient (probability)	**CEE** Coefficient (probability)	**NPM** Coefficient (probability)
Levin,Lin & Chut	-4.535 (0.00)***	-4.50 (0.00)***	-5.54 (0.00)***	-4.86 (0.00)***	-4.63 (0.00)***	-3.30 (0.00)***	-3.00 (0.00)***	-2.12 (0.01)**	-2.5 (0.00)***
Im, Pesaran and Shin W-stat	-2.003 (0.00)***	-1.87 (0.00)***	-2.26 (0.01)**	-2.5 (0.00)***	-1.84 (0.00)***	-1.90 (0.03)**	-0.906 (0.18)	-0.87 (0.19)	-1.029 (0.15)
ADF - Fisher Chi-square	30.11 (0.01)**	28.32 (0.02)**	30.81 (0.01)**	32.3 (0.00)***	27.7 (0.00)***	29.29 (0.00)***	21.29 (0.16)	20.83 (0.18)	22.39 (0.13)
PP – Fisher Chi-square	40.31 (0.00)***	25.8 (0.04)**	32.92 (0.00)***	34.40 (0.00)***	30.8 (0.00)***	48.29 (0.00)***	19.48 (0.24)	39.82 (0.00)***	21.33 (0.16)

*** Significance at 1% level, ** Significance at 5% level

Table No. 1

Stationarity Results			
Test	**D(EPS)**	**D(CEE)**	**D(NPM)**
Levin,Lin & Chut	-7.93 (0.00)***	-10.10 (0.00)***	-5.96 (0.00)***
Im, Pesaran and Shin W-stat	-3.55 (0.00)***	-4.20 (0.00)***	-2.98 (0.00)***
ADF - Fisher Chi-square	45.03 (0.00)***	50.83 (0.00)***	40.76 (0.00)***
PP – Fisher Chi-square	56.36 (0.00)***	84.78 (0.00)***	56.96 (0.00)***

*** Significance at 1% level, ** Significance at 5% level

Table No. 2

The non-stationary EPS, CEE and NPM put into first difference analysis and then found to be stationary. (Table No. 2)

FIXED EFFECT OR RANDOM EFFECT

In order to choose between fixed effect and random effect the HAUSMAN test has been carried out (Greene, 2000). If the null hypothesis is not valid Housman value has a chi-square distribution with a number of degree of freedom equal to the number of repressors. If the probability is lower than 5% we reject null hypothesis and conclude that the best model is the one using fixed effect otherwise random effect (Clark and Linzer, 2012).

Fixed Effect or Random Effect Result

Test / Models	Chi-Square	Degree of Freedom	Probability	Fixed effect or Random effect
Model 1	0.45683	1	0.493	Random
Model 2	0.408	1	0.522	Random
Model 3	3.825	1	0.045**	Fixed
Model 4	0.961	1	0.32	Random
Model 5	0.961	4	0.0005***	Fixed
Model 6	7.63	4	0.106	Random
Model 7	5.92	4	0.20	Random
Model 8	12.24	4	0.01	Fixed

*** Significance at 1% level, ** Significance at 5% level

Table No. 3

Descriptive Statistics

Descriptibve Statistics									
	ROA	ROE	EPS	NPM	MVAIC	HCE	SCE	RCE	CEE
Mean	0.11	0.26	2.92	5202.13	3.26	1.90	0.43	0.42	0.52
Median	0.11	0.21	2.01	2250.50	3.30	1.75	0.44	0.36	0.49
Maximum	0.26	1.01	14.94	22400.00	4.69	3.51	2.03	2.01	1.00
Minimum	-0.47	-0.90	-8.17	-6650.00	-2.56	-0.97	-3.00	-1.18	-0.63
Std. Dev.	0.08	0.24	3.72	6132.29	1.00	0.70	0.45	0.49	0.24
Skewness	-4.27	-0.25	1.65	1.11	-3.11	-0.19	-5.11	1.25	-1.07
Kurtosis	32.69	9.68	6.70	3.51	18.45	6.01	46.16	6.69	8.64
Jarque-Bera	3182.35	149.45	81.87	17.30	924.54	30.71	6558.50	66.15	121.23
Probability	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sum	8.44	20.54	233.84	416170.00	260.97	152.03	34.07	33.46	41.41
Sum Sq. Dev.	0.53	4.60	1094.91	2970000000.00	78.88	38.62	15.86	18.99	4.43
Observations	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00

Table No. 4

Table No. 4 indicates descriptive statistics of the variables under this study. It assesses the effect of MVAIC and its components (HCE, SCE, RCE and CEE) on ROA, ROE, EPS and NPM. As shown in the table, the mean (median) values of HCE, SCE, RCE and CEE are 1.90(1.75), 0.43(0.44), 0.42(0.36), and 0.52(0.49) respectively. The mean (median) values of MVAIC are 3.26,(3.30). In the case of ROA, ROE, EPS and NPM, the mean (median) values are 0.11(0.11), 0.26(0.21), 2.92(2.01) and 5202.13(2250.50).

HCE = Human Capital Efficiency; SCE = Structural Capital Efficiency; CEE = Capital Employed Efficiency; RCE = Relational Capital Efficiency; MVAIC = Modified Value Added Intellectual Coefficient.

Correlation Analysis

Pairwise Correlation Matrix									
Probability	ROA	ROE	EPS	MVAIC	NPM	HCE	CEE	RCE	SCE
ROA	1								
ROE	**0.6768**	1							
EPS	**0.3613**	**0.68461**	1						
MVAIC	**0.3612**	0.05815	-0.048	1					
NPM	**0.5242**	0.16708	-0.066	**0.42712**	1				
HCE	**0.5598**	**0.26718**	0.1325	**0.726806**	**0.65252**	1			
CEE	**0.4193**	**0.21498**	0.122	**0.447322**	-0.1236	0.02436	1		
RCE	0.0377	-0.12061	**-0.227**	**0.33152**	**-0.2001**	**-0.2255**	**0.497665**	1	
SCE	**-0.3308**	**-0.26887**	-0.131	**0.497075**	**0.21864**	**0.29443**	-0.11325	**-0.2658**	1

Table No.5

Table No. 5 shows the pair wise correlation matrix between the variables.

Correlations in the bold are significant at $p < 0.01$

- ROA is positively and significantly related ROE, EPS MVAIC, NPM, HCE, and CEE and negatively related to SCE.
- ROE is positively and significantly related to EPS, HCE, and CEE and negatively related to SCE.
- EPS is negatively and significantly related to RCE.
- MVAIC is positively and significantly related to NPM, HCE, CEE, RCE and SCE.
- NPM is positively and significantly related ROA, MVAIC, HCE, SCE and negatively related to RCE
- HCE positively and significantly related SCE, ROA, ROE, MVAIC, and NPM and negatively related to RCE.
- CEE positively and significantly related RCE, ROA, ROE and MVAIC.
- RCE positively and significantly related with MVAIC, CEE but negatively and significantly related to EPS, NPM, HCE and SCE.

- SCE is positively and significantly related MVAIC, NPM, HCE and negatively related to ROA, ROE and RCE

Result of Regression Analysis

Variables	**Model 1 – ROA** Co-efficient (p- value)	**Model 2 – ROE** Co-efficient (p- value)	**Model 3 – EPS** Co-efficient (p- value)	**Model 4– NPM** Co-efficient (p- value)
Intercept	0.027	0.129	-1.96	-3.09
MVAIC	0.029 (0.0096)***	0.039 (0.045)**	0.67 (0.0034)***	10.20 (0.0019)***
Adj. R^2	0.28	0.60	0.02	0.044
R^2	0.35	0.64	0.13	0.15
F-value Stat.	4.90	15.9	1.2	1.4
F- value (prob.)	(0.00076)***	(0.0000)***	(0.29)	(0.20)
Durbin Watson	1.88	1.80	2.3	2.4

*** Significance at 1% level, ** Significance at 5% level

Table No. 6

Model 1 (Table No. 6) empirically examines the relationship between Intellectual Capital (MVAIC) and ROA. The test result shows a positive and statistically significant relationship between IC and ROA at a value of ($P<0.05$).

Model 2 examines the relationship between IC (MVAIC) and ROE. The test result showed a statistically significant and positive relationship ($P>0.05$).

Model 3 established a positive and statistically significant relationship between IC (MVAIC) and EPS ($P>0.05$).

Model 4 showed a positive and statistically significant relationship between IC (MVAIC) and NPM.

Variables	**Model 5– ROA** Co-efficient (p- value)	**Model 6– ROE** Co-efficient (p- value)	**Model 7– EPS** Co-efficient (p- value)	**Model 8– NPM** Co-efficient (p- value)
Intercept	0.078	0.050	-1.08	-6.9
HCE	0.113 (0.00)***	0.19 (0.00)***	1.12 (0.00)***	4.6 (0.00)***
SCE	-0.09 (0.00)***	-6.21 (0.00)***	-0.89 (0.00)***	2.3 (0.67)
RCE	0.014 (0.53)	0.046 (0.37)	-0.86 (0.12)	5.6 (0.00)***
CEE	0.02 (0.29)	0.03 (0.54)	5.25 (0.00)***	5.6 (0.00)***
Adj. R^2	0.83	0.91	0.78	0.334
R^2	0.86	0.92	0.81	0.437
F-value Stat.	33.94	68.34	24.002	4.24
F- value (prob.)	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Durbin Watson	1	1.5	2.2	2.1

*** Significance at 1% level, ** Significance at 5% level

Table No. 7

Model 5 to 8 (Table No.7) were empirically testing the components of Intellectual Capital (HCE, SCE, RCE and CEE) with the performance indicators (ROA, ROE, EPS and NPM). In model 5 HCE is significantly and positively related to ROA but SCE showed a negative and statistically significant relationship with ROA. RCE and CEE failed to establish any statistically significant relationship with ROA. In model 6 HCE shows a positively and statistically significant relationship with ROE where as SCE showed negatively and statistically significant relationship with ROE. RCE and CEE does not give a significant relationship with ROE. In model 7 HCE and CEE gives a positively and statistically significant relationship with EPS but SCE shows negatively and statistically significant relationship with EPS. RCE does not have any relationship with EPS. In model 8 HCE, RCE and CEE were shown a positively and statistically significant relationship with NPM but SCE failed establish any statistically significant relationship with NPM.

Intellectual Capital affects the performance parameters and profitability of the of the MNC IT companies in India. 64% of variation was explained by Intellectual Capital and ROE on the highest point.

Variables	**Model 9 CAPM Expected Return** Co-efficient (p- value)
Intercept	-1.483
MVAIC	-0.758 (0.0000)
Adj. R^2	0.203
R^2	0.213
F-value Stat.	20.678
F- value (prob.)	(0.00002)
Durbin Watson	0.695

Table No. 8

Model 9 (Table No.8) examines the relationship between Intellectual Capital (MVAIC) and CAPM Expected Return. The results show that Intellectual Capital (MVAIC) has a negative and statistically significant relationship with CAPM Expected Return.

Variables	**Model 10 – CAPM Expected Return** Co-efficient (p- value)
Intercept	0.498
HCE	-1.856 (0.0000)
SCE	0.844 (0.0000)
RCE	0.301 (0.0000)
CEE	-0.035 (0.6308)
Adj. R^2	0.514
R^2	0.543
F-value Stat.	18.746
F- value (prob.)	(0.0000)
Durbin Watson	0.687

Table No. 9

Model 10 (Table No.9) examines the components of Intellectual Capital (HCE SCE RCE and CEE) with CAPM Expected Return. The result showed that the HCE is having a negative and statistically significant relationship with CAPM where as SCE and RCE showed a positive and statistically significant relationship with CAPM Expected Return.

CEE didn't show any significant relationship with CAPM. 51% of variations in CAPM expected return is explained by Intellectual Capital Components.

Variables	**Model 11 – Risk** Co-efficient (p- value)
Intercept	-0.407
MVAIC	-1.408 (0.0055)
Adj. R^2	0.086
R^2	0.098
F-value Stat.	8.16
F- value (prob.)	(0.0055)***
Durbin Watson	0.29
Variables	**Model 12 – Risk** Co-efficient (p- value)
Intercept	4.298
HCE	-3.794 (0.0000)
SCE	2.484 (0.0000)
RCE	0.874 (0.0000)
CEE	-0.794 (0.0003)
Adj. R^2	0.510
R^2	0.539
F-value Stat.	18.174
F- value (prob.)	(0.0000)
Durbin Watson	0.564

Table No.10

Model 11 (Table No.10) tests the relationship between Intellectual Capital (MVAIC) and Risk. The results show that Intellectual Capital (MVAIC) has negatively and statistically significant relationship with Risk.

Model 12 examined the components of Intellectual Capital (HCE, SCE, RCE and CEE) with Risk.

This model showed that the HCE and CEE has a negative and statistically significant relationship with Risk where as SCE and RCE showed a positive and statistically significant relationship with Risk.

DISCUSSIONS AND CONCLUSIONS

The Panel regression models examining the impact of Intellectual Capital on firm performance showed a statistically significant and positive impact Of intellectual Capital on Return On Asset , Return on Equity , Earning per Share and Net Profit Margin) The results are consistent with the previous studies (Gosh & Mondal, 2009; Nik Maheran &Nik Mohamed, 2009; Kamath ,2009; Gorban mehri, 2013;Ting &Lean , 2009; Makki &Lodhi , 2009; Fethi Calisir ,2010; Niyas & Kavida, 2017). Most of the components of Intellectual Capital have a positive relationship with the performance indicators. The IC components such as HCE has positive relationship (Madintinos. 2011) and SCE has negative relationship with ROA. RCE and CEE didn't find any relationship with ROA. HCE has a positive relationship and SCE has negative relationship with ROE where as RCE and CEE couldn't find any relationship with ROE. It is found that the HCE and CEE has a positive relationship and SCE has a negative relationship with Earning Per Share where as RCE didn't have any relationship with Earnings Per Share. HCE, RCE and CEE were positively influenced the Net Profit Margin and SCE didn't have any influence on Net Profit Margin.

The Intellectual Capital has a negative impact on the CAPM Expected Return contrary to the findings of Ehsan (Ehsan kermani& Mohammed Kia Mehr,2014). CAPM expected Return is positively influenced by the components of Intellectual Capital such as SCE and RCE while HCE influenced negatively. There is no impact of CEE was found on the CAPM Expected Return. Regarding the Value at Risk, it is found that the Intellectual Capital (MVAIC) has a negative impact on Value at Risk(Behsad Ardalan & Haleh Askarian, 2014). The components of Intellectual Capital such as SCE and RCE have a positive impact on the Value at Risk where as HCE and CEE affected Value at Risk negatively.

The study titled "Impact of Intellectual Capital Efficiency on firm performance, shareholders CAPM expected return and value at risk of selected it MNCs in India" is a benign attempt to examine the relationship between Intellectual Capital (MVAIC) and firm performance measures (ROA, ROE, EPS and NPM). The study also explores to test the relationship between IC and CAPM Expected Return, IC and Risk (VAR). The components of Intellectual Capital (HCE, SCE, RCE and CEE) are also subjected to analyze its relationship with performance measures, CAPM Expected Return and Risk.

India's top 10 IT MNCs has been taken for the study with 10 years of requisite data from 2007-2016. The collected data have been subjected to panel regression with respect to Fixed Effect or Random Effect using Hausman test. The test result showed that the Intellectual Capital and firm performance is positively related, more clearly, if the Intellectual Capital coefficient tends to increase the performance will also increase. Nevertheless relational capital and capital employed efficiencies didn't show any effect. The study also reveals Intellectual Capital is negatively related to CAPM Expected Return. Structural capital and relational capital efficiencies positively related to CAPM. The study showed that the Risk will be reduced if IC coefficient is high. High level of HCE and CEE reduces Value At Risk.

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