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Impact of Intellectual Capital on Firm Value

A Panel Data Analysis of Indian IT Firms

AUTHORS

V. Murale
Assistant Professor
School of Management,
Karunya University,
Coimbatore.

Dr. Clement Sudhahar
Associate Professor
School of Management,
Karunya University,
Coimbatore

Dr. Ashrafali
Director,
Shri Venkateswara
Institute of
Management,
Coimbatore

ABSTRACT

This paper throws insight into prior studies carried out in the area related to impact of Human Capital on organisational performance and outcomes as it is the central theme of study being carried out. Human capital of a firm may be viewed as consisting of highly skilled, creative, motivated, collaborative and knowledgeable people who understand the dynamic business environmental context, and the competitive logic of their enterprise; and the critical requirements thereof. They understand and realize their own broad role and responsibility for the vision, values, and competitive viability of their organization. For this purpose, they continually learn, develop, share, integrate and use their knowledge both individually and collaboratively to cultivate enterprise competencies/capabilities, innovation, expertise, and speedy business processes in a proactive manner. They are focused on the success of their enterprise in facing the challenges of both today and tomorrow.For this study we include human capital is included as a component of intellectual capital on the basis of definition given by Brooking(1996) and Roos et al(1997)

1. THEORETICAL UNDERPINNINGS

According to Brooking (1996), intellectual Capital is the term given to the combined intangible assets of market, intellectual property,Human-centered assets and infrastructure—which enable the company to function. The definition a, adopted from Roos, et al.(1997), "intellectual capital is the combination of human, organizational and relational resources of an organization."

The concept and perspective of human capital akin to that hard work, skills, motivation, and cooperation, of employees though important; play only a limited role in the survival and success of enterprises today. Best efforts and best intentions by themselves will not produce new and innovative products and services. They cannot create new business or markets. They cannot trigger customer demand. A company may be producing flawless products through its dedicated employees, but would close down if there is no demand for its products. Technology, by itself, is also no solution to the problem of competitiveness. General Motors in the 1980s invested $40 billion in new machinery and automation. The results of this massive investment were high cost, poor quality, excess capacity, frequent breakdowns, and disrupted schedules. With such a massive investment, GM could have acquired its Japanese competitors. The concept and perspective of human capital stem from the fact is that there is no substitute for knowledge and learning, creativity and innovation, competencies and capabilities; and that they need to be relentlessly pursued and focused on the firms' environmental context and competitive logic; for the survival of firms in a milieu of hyper-competition.

The foregoing discussion of human capital toward understanding its nature and significance has been at a rather broad and macro level. In order to understand its nature at a deeper level, as well as, the requirements for its building and development, one needs to examine its structure and composition at a micro-level. The challenge for Human resource specialists

is to take notice of the research, adapt and present its data in ways that persuade their management colleagues that people really are 'our most important asset' and use its conclusions to better inform their own decisions and practice. This was instigated by the fact that new economy is often called the knowledge economy. Emerging from an industrial age, this new economy distinguishes itself by a large amount of the value of the company residing in the head of the employee instead of in the tangible assets of the company.

By their essence, software companies represent the structure of the new economy because they create new entities called software codes, which are totally digital. Software is however very powerful to optimize the physical world and provides tremendous value. (an example is supply chain optimization software).

2. REVIEW OF LITERATURE

Organisations are increasingly looking at human resources as a unique asset that can provide sustained competitive advantage. The changes in the business environment with increasing globalisation, changing demographics of the workforce, increased focus on profitability through growth, technological changes, intellectual capital and the never-ending changes that organisations are undergoing have led to increased importance of managing human resources(Devanna, Fombrum, & Tichy, 1981; Wright, 1998)

A specific example of the value of human capital highlights the fundamental primacy of human capital in mergers, takeovers and alliances in high technology firms (Ranft and Lord, 2000). The researchers show that strategically significant intellectual property, in some cases, rests within individuals, rather than with the firm itself. Also, other researchers have also demonstrated that knowledge management can have an impact on the efficiency and the performance of the firm (Gupta, Iyer, and Aronson, 2000). Analysts need to be assessing these factors more systematically as we move into a knowledge-based society.

Value creation" is the process by which we accumulate value.The concept of value has went a radical redefinition in a knowledge economy, Skaikh (2004) views IC as knowledge that can be converted into value, or intellectual material (knowledge, information, intellectual property and experience) that can be used to create wealth. Value based on knowledge is not based on tangible "quantity," rather it is based on the perception that potential clients have. It is "value creation" and not the "production of prices" that serves principal actors in the new economy. "Quantity" is now substituted with "value." Whereas in the old economy, wealth was equal to an increase in the quantities produced of a product, with the measurement of quantities captured by models based on cost/I income ratios, in the knowledge economy, the attention has been switched from quantity to value and hence the topic need a study in detail.

3. RESEARCH FRAME WORK

The primary objective of this study was to ascertain the relationship between human capital of a firm and indices of organizational performance at the organizational level; The human capital indices considered for this study is addressed by the Value added Intelligent coefficient(VAIC) VAHC and the outcomes are measured by Market Value to Book Value (MB)

4. DATA AND METHODOLOGY

The data used for the study is of Thirteen firms representing BSE ,T he data is obtained from Prowess baseDataProwess

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provides detailed information on each company. This includes a normalized database of the financials covering 1,500 data items and ratios per company.

The data used for the study are for the period 2003 to 2009..The firms were selected from the Information Technology service sector which plays a crucial role in the economy of India , its innovation in products and services, and driving factor for competition is mainly accounted for by intellectual capital.

5. THE VAIC METHOD ™

This empirical study applies a new accounting tool of VAIC(TM) or the Value Added Intellectual Coefficient, developed by Ante Pulic (1998) as his trade mark- and his colleagues at the Austrian IC Research Centre (Pulic 2000; Borhemann 1999) which is designed to help managers leverage their company's potential. The key contribution of VAIC is to provide a standardized and consistent measure that can be used to conduct comparative analyses across various sectors locally and internationally.

VAIC™ numerically shows that total efficiency of physical, financial and intellectual capitals in value-adding process. Pulic's methodology focuses on value-adding, value-adders, and value-adding procedures. VAIC™ considers the entire company as a dynamic system. An economic system becomes more efficient if it can provide more goods and services to society without expending more resources. But in order to analyze efficiency at an enterprise level, we must also consider it an economic category that defines a system's capacity to turn tangible and intangible input into output.

The ultimate purpose of an enterprise is its yield of profit. But is making profit make an enterprise to have an sustainable competitive edge. Modern indicators for quantifying performance at a macro-economic level are built on the concept of value creation. It is through this concept that can best determine the level of efficiency within a given enterprise, and it often underlines a surplus value, which appears after the cost of the invested capital has been covered by the operation results. In economic terms, this surplus value is called"value added" or "value created".

VA=OUT-INP Where:
VA= Value Added
OUT= Output
INP= Input

The value added indicator is measured in monetary units (units of value): Money earned by an enterprise is what provides this enterprise with value. The indicator is simple, and intellectual Capital is one of its central contributing factors. Each and every employee takes part in the process of value creation, as well as company stockholders, suppliers and clients.

In a later research from Firer and William (2003), they define VAIC as a composite sum of three separate indicators

1 Capital employed efficiency (CEE): indicator of VA efficiency of capital employed.
2 Human capital efficiency (HCE): indicator of VA efficiency of human capital.
3 Structural capital efficiency (SCE): indicator of VA efficiency of structural capital.

Human Capital : As the Human Capital is not only one of the most important components of intellectual capital, it is also the ability source of intellectual capital. Stewart suggests that the workers in a company from bottom to top must be seen not as assets, but investment. Human capital can be defined as health, knowledge, motivation and skills, the attainment of which is regarded as an end in itself (irrespective of

their income potential) because they yield fulfillment and satisfaction to the possessor. It is also referred to the employee competence in creating both tangible and intangible assets by contributing in the continuous generation of knowledge and ideas.

Structural Capital: Structural capital encompasses the enabling structures that allow the organization to exploit the intellectual capital. The structures ranges from tangible items offered by an organization such as patents, trademarks and databases, to complete intangible success such as culture, transparency and trust among employees (Seetharaman, Low, and Saravanan, 2004). This capital is resulted from the products or systems that firm has created over time and will stay remains with the enterprise when people leave (Nik Muhammad and Aida, 2007). Thus, organizations that possess strong structural capital will have a supportive culture that permits their employees to try new things, to learn and to practice them (Bontis et al., 2000).

Capital Employed: Capital employed refers to physical capital employed for attaining business goals. The VAIC approach can be explained further as : Firstly, to find out the competence of a company in 'creating' or value added (VA) the difference between output and input should first be calculated. Where OUT (output) includes the overall income from all products and services sold on market, IN (input) contains all expenses for operating the company, exclusive of labour expenses, which is not regarded as a cost. VA (value added) results from how current business and related resources, capital employed, human and structural, are used or employed

Then, it is necessary to determine how much new value has been created by one unit of investment capital employed, with the second step being the calculation of the relation of value added and capital employed (including human financial capital and structural) The next step is to assess each resource that helps to create or produce VA.

$$VAIC(TM) = VACA + VAHC + STVA \quad \text{——————————} \quad 2$$

where VAIC, the Value Added Intelligent Coefficient, indicates corporate value creation efficiency. Where VAHC denotes Value added human capital, VACA denotes capital employed efficiency and STVA structural Capital efficiency

Based on the resource-based view, firms gain competitive advantage and superior performance through acquiring, holding and subsequently using strategic assets (namely, both tangible and intangible assets) that are vital to developing competitive advantage and achieving strong financial performance(Werner felt, 1984), we would like to propose the following hypothesis:
H1:Firms with higher intellectual capital (VAIC™) yields a higher firm value(market/ Book value) in Indian Information technology sector

6. REGRESSION MODEL

The study uses the multiple linear regression model to identify the relationship between Market value /Book value and VAIC and its components such as VAHC, VACA and STVA. The equation can be set as (1) M/Bit= á0 + á1 CEEit + á2 HCEit + á3 SCEit+ åit.....Independent Variables

As mentioned beforehand, in this study s the VAIC method as modified by Firer and Williams (2003) was used and the measure of independent variables as follows:

VAICi = CEEi HCEi SCEi where VAICi = VA intellectual coefficient for firm i;
CEEi = VAi / CEi; VA capital employed coefficient for firm i;
HCEi = VAi / HCl; human capital coefficient for firm i; and SCEi = SCi /VAi; structural capital VA for firm i;

VAi = Ii (sum of interest expenses) DPi

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(depreciation expenses) Di (dividends) Ti (corporate taxes) Ri (profits retains for the year) CEi = book value of the net assets for firm i; HCi = total investment salary and wages for firm i; SCi = VAi - HCi; structural capital for firm I;

7. DEPENDENT VARIABLES

To conduct the analysis, t dependent variable of Market value to book value was used as measure for and market valuation , VAIC is applied as it indicates efficiency in creating corporate value or the extent of corporate intellectual ability.

8. THE ANALYSIS

This evaluation of the hypothesized model is carried out by linear multiple regression to analyze the data. Before proceeding with regression analysis the assumption of regression analysis have to be ful filled . None of the multivariate analysis may yield reliable results if the assumption are not satisfied, For testing the linearity of variables initial test was through correlation analysis that is being discussed in the forth coming section of the paper. The data was normalized by converting it to natural logarithm.

9. NON PARAMETRIC APPROACH

Data Envelope Analysis was used as a Non Parametric Measure to corrugate the research the findings are discussed below Starting from the equation of the VAIC (VAIC=CEEi+HCEi+SCEi), to find out what portion of intellectual capital is transformed into profitability, input-oriented analysis has been applied (DEA Model). DEA is a non-parametric method for the estimation of "production frontiers." It is used to empirically measure the efficiency of decision making units (DMUs). Built on the idea of Farrel (1957), the work "Measuring the Efficiency ofDecision Making Units" by Charnes, Cooper and Rhodes (1978) applies linear programming to estimate an empirical production technology frontier for the first time. DEA is used not only to compare efficiency across DMU's within an organization, but also to compare efficiency across firms—guiding managers in terms of defining the levels of their own company's inefficiency in relation to other benchmarks (Macro-Level) and guiding decision-making units in making necessary pre-constraints (Micro Levels.

The Malmquist index, Another useful metric within the DEA framework is used for the study which is the product of two elements: (i) change in technical efficiency or how close a bank can get to the efficient frontier (namely, the catching up index) and (ii) technological change (namely, the changes in best-practice index) or how much the benchmark production frontier shifts at eachbank's observed input mix (innovations or shocks).

The Malmquist total factor productivity (TFP) index measures the TFP change between two data points by calculating the ratio of the distances of each data point relative to a common technology. Following Färe *et al.* (1985), the Malmquist TFP change index between period *s* (the base period) and the period *t* is given by:

mo(ys, xs, yt, xt) = [ds
o (yt, xt)* dt
o(yt, xt)/ ds
1(ys, xs)*dt
1(ys, xs)]1/2, (1)

where the notation *ds o (yt, xt)* represents the distance from the period *t* observation to the period *s* technology. A value of *mo* greater than one indicates a positive TFP growth from period *s* to period *t*, while a value less than one indicates a TFP decline.

In empirical applications, the measure are calculated for each firm in each pair of adjacent time periods using a mathematical

programming techniquedescribed by Coelli *et al.* (1998) and Coelli (1996) for the computer program DEAP Version 2.1.

Thus the above discussion provided a plausibility of hypothetical assertions about potential interrelationships among construct as well as the measures assessing them. Analytical procedures and tools for testing the model was also presented ,both independent and dependent variables have been were operationalised . With these we will extent the study by presenting the results of analysis.

10. DISCUSSION

The table one represent the model generated using regression analysis. Three models were generated with model 1 being the best one variable model , Model 2 being the best two variable model and model three is a single multiple regression with three variables.The R square ranges between 0.446 and 0.647. According to Table-2 44

Table 1 Model Summary
IMPACT OF VAIC COMPONENTS ON MARKET VALUE TO BOOK VALUE

Modal	R	R. Square	Adjusted R Square	Std. Error of the Estimate
1	.672[a]	.451	.445	.445
2	.787[b]	.620	.611	.611
3	.804[c]	.647	.634	.634

(a). Predictore: (Constant), CEE, (b). Predictore: (Constant), CEE, SCE, (c). Predictore: (Constant), CEE, SCE, HCE

Table - 3[2]
ANOVA

Modal		Sum of Squars	df	Mean Squre	F	Sig.
1	Regression	44.935	1	44.935	68.320	.000[a]
	Residual	54.590	83	.658		
	Total	99.525	84			
2	Regression	61.685	2	30.842	66.835	.000[b]
	Residual	37.841	82	.461		
	Total	99.525	84			
3	Regression	64.375	3	21.458	49.448	.000[c]
	Residual	35.151	81	.434		
	Total	99.525	84			

(a) Predictors: (Constant), CEE, (b) Predictors: (Constant), CEE, SCE, (c) Predictors: (Constant), CEE, SCE, HCE, (a) Dependent Variable : MVBV

Mamquist analysis of firms

Table 4 MALMQUIST INDEX SUMMARY OF ANNUAL MEANS

Year	Effch	techch	pech	sech	Tfpch
2004	1.166	1.122	1.005	1.160	1.308
2005	1.101	0.876	0.995	1.10	0.964
2006	0.836	0.926	1.012	0.826	0.775
2007	1.019	1.296	0.935	1.090	1.320
2008	0.853	1.002	0.995	0.857	0.855
2009	1.203	1.038	0.941	1.278	1.249
Mean*	1.019	.035	0.980	1.040	1.055

[*Note that all Malmquist index averages are geometric means]

Table - 3
Coefficients

Modal	Unstandardized Coefficient		Standrdiedx Coefficient		
	B	Std. Error	Beta	t	Sig.
1. (Constant)	3.632	.127		28.490	.000
CEE	.887	.107	.672	8.266	.000
2. (Constant)	4.548	.186		24.477	.000
CEE	1.031	.093	.781	11.083	.000
SCE	.823	.137	.424	6.025	.000
3. (Constant)	3.905	.315		12.402	.000
CEE	1.069	.091	.809	11.682	.000
SCE	.479	.191	.247	2.502	.000
HHE	.520	.209	.249	2.490	.000

a. Dependent Variable: MMBV

%,62 % and 64.6% of the variation in Market value to book value on shares can be explained (explanatory power) by the variation in the Value Added Intellectual Capital Coefficient and its components such as physical capital, in first model , Physical and structural capital efficiency in second and all the three physical ,Structural and human capital efficiency respectively in third.

Table-2 shows the significant result (P value < 0.05) of the Global test, which suggests that at least one independent variable such as human capital, structural capital and physical capital has a positive correlation with market value to book value

Table 3 shows the coefficients of the linear regression in the respect of independent variables. All the three components of VAIC shows a significant positive relationship with market value to book value.

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Non-Parametric Model (DEA Analysis) We use data of the 13 Information Technology firms that constitute Techex of BSE banks from the Prowess and the panel data for the period 2003-2009 Was used for the study.

Generally speaking, the product of inputs and outputs in a DEA application should optimally be less than the sample size in order to distinguish the banks effectively. Therefore, we will use four inputs (Human capital, structural capital, physical capital and VAIC, and three outputs measures considered are Earning per share (EPS), Return on capital employed (ROCE),Return on net worth(RONW)

Note: effch = technical efficiency change; techch = technical or technology change; pech = pure technicalefficiency change; sech = scale efficiency change; and tfpch = total factor productivity change

11. RESULTS INTERPRETATION

The Malmquist index summary of annual means is presented in the Table 5. All indices are relative to the previous year. The year 2003 is the base year, so the output begins with the year 2004. Table 6 presents the changes in productivity for each firm in the sample.

A Malmquist index that is greater than 1 implies that total factor productivity progress occurred, while an index less than 1 means that total factor productivity declined. From the table we can be interpret average total factor productivity change index is 1.055 which indicates that the t otal sector efficiency has improved by 5 percentage during the study period, The total factor improvement is high mainly due to change in technical efficiency change and technology change(techch).In the years 2004, 2007 and 2009,the technical efficiency change(effch) and technological efficiency change(techch) levels are above 1.(refer table 4).In all these three years it is noticeable that total factor productivity change (tfch) improved(1.30,1.32,1.24) by 30 percentage and 24 percentage respectively, and in other years it is vice versa.It shows that the human capital denoted by technical efficiency and structural capital denoted by technological change efficiency influence firm value.

12. IMPLICATIONS OF THE STUDY

This investigation has shown potency of corporate intellectual capital in order to generate capital gain on shares average and as a result attract investors in the market. Thus a firm can formulate their business strategies to increase the efficiency of its resources and achieve competitive advantages over its rivals. Similarly investors should also carry out analysis on firms Intellectual capital along with other parameters to have a sustainable return.

13. CONCLUSION

Intellectual capital is recognized as a major corporate asset capable of generating sustainable competitive advantages and superior financial performance (Barney, 1991). An empirical evidence of this research suggests that there is a significant positive relationship between Market value to book value and corporate intellectual capital. In addition, this study indirectly proves the positive relationship between market value to book value and corporate financial performance since existing research has shown a positive relationship between VAIC and corporate financial performance (eg. Barney, 1991; Pulic, 2000b). The VAIC method measures and monitors value creation efficiency in the company using accounting-based figures. The better acompany's resources (capital employed and intellectual capital) are employed, the higher this company's value creation efficiency will be(human capital is the decisive value creation factor for modern businesses). Our research has shown, on the one hand, that this results in an increase of value added, and

on the other hand, it determines market value. Intellectual capital management is not and cannot bea means to an end in itself, but rather it must be a function of value creation, which is the primary goal of any business. Therefore, it is inevitable that, upon discussing intellectual capital, we must also cover the concept of value creation.

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