

IMPACT OF INTELLECTUAL CAPITAL ON BUSINESS PERFORMANCE: EVIDENCE FROM INDIAN PHARMACEUTICAL SECTOR

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Abstract: Based on the data of 121 listed pharmaceutical and drug companies in Bombay stock exchange of India Pharmaceutical sector for the period 2005 -2016, this study tries to analyze the relationship between intellectual capital (i.e. Human Capital, Relational Capital, Structural Capital) with traditional measures of business performance (i.e. Productivity, profitability and market valuation). The empirical data have been collected from the audited financial statement of these 121 pharmaceutical companies. Among several methods of intellectual capital accounting, Pulic's Value Added Intellectual Coefficient (VAIC) is being used for the value creation efficiency measurement. Regression and correlation have been conducted for the set of variables representing the performance of the companies and Intellectual Capital. The analysis indicates that the relationship between the performance of a company's Intellectual Capital (IC) and conventional performance indicators are varied. The findings suggest that the performance of a company's IC can explain profitability, but not productivity and market valuation in India. In addition, the empirical analysis found that structural capital and relational capital were important factors which have a major impact on the profitability of the firms over the period of study. Thus reflecting the fact that the industry is more concerned about the technological knowledge and innovation. The outcome draws some significant implications for policymakers that will help in enhancing the performance of the pharmaceutical sector.

Key words: intellectual capital, pharmaceutical and drug industry, business performance, India

DOI: 10.17512/pjms.2017.15.1.22

Article history:

Received January 12, 2017; *Revised* March 1, 2017; *Accepted* April 11, 2017

Introduction

The value of firm is always greater than the book value. This is as a result of global revolution which resulted in reallocation of priorities in an economy from manufacturing to a knowledge based economy over the last decade. Knowledge is the push factor in business performance and thus support competitive business advantage (Ghosh and Wu, 2007; Qianyu et al., 2016). Intangible assets contribute to the company's future worth and are more effective than tangible assets.

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Intellectual capital is the new buzzword in the economic world and is essential for sustainability (Chen et al., 2005; Bismut and Tojo, 2008).

The traditional method of accounting is not sufficient to measure the performance of the knowledge based firm (Sveiby, 1997; Edvinsson and Malone, 1997; Bontis, 2001). Keeping this in focus, this paper is an initiative to measure the relationship between intellectual capital accounting and the company's business performance indicator and how intangible assets build organizational capability and enhance competitive advantage for companies. The present paper is categorized into three segments; the first segment includes a short outline of the pharmaceutical sector in India. The second part consists of a literature review, hypothesis development and methodology used. The third section analyses the collected data, discuss the result and concludes the study. This paper attempts to investigate the intellectual capital across one of the most knowledge related sector, i.e, Pharmaceutical sector in India. The Indian pharmaceutical market increased at a CAGR (Compound Annual Growth Rate) of 17.46 per cent during 2005 to 2016 with the revenues, increasing from US\$ 6 billion in 2005 to US\$ 36.7 billion in December 2016 and is expected to expand at a CAGR of 15.92 per cent to US\$ 55 billion by 2020. It gives a competitive edge to India over other pharmaceutical companies located in developing economies.

The Indian pharmaceuticals market is the third largest in terms of volume and thirteenth largest in terms of value, as per a report by an equity research firm, Equity Master in 2016. The Pharmaceutical industry is one of the most innovative and fastest growing sectors in the Indian economy, thus contributing a major portion in country's foreign exchange earnings. As per IPIA (2016), the trends influencing the growth of the Indian pharmaceuticals market are as follows:

- doubling of disposable incomes and the number of middle-class households,
- expansion of medical infrastructure, rising prevalence of chronic diseases,
- adoption of product patents.

Therefore, data from the pharmaceutical industry was taken to study the relationship between the business performance and intellectual capital.

Literature Review

The intellectual capital reporting intends to present a portrait of the corporate effort to expand and rationalize its resources and competencies in relation to its employees, customers, technology and processes. Stewart defines intellectual capital as intellectual material that has been streamlined to create wealth by producing high value asset. Generally, the literature has identified three sub phenomena that constitute the concept of intellectual capital which are Human Capital, Structural Capital, Organizational Capital (Ordonez de Pablos, 2002; O'Donnell, 2004).

The researchers are mainly concerned with quantifying IC because of its invisible nature. Quite a few methods have been utilized for the measurement and reporting of intellectual capital in easier and less costly way. One method was based on the

economic approach of the production function (Lim and Dallimore, 2004; Mehralian et al., 2012) whereas others have used financial and non-financial reports such as the balanced scorecard (Kaplan and Norton, 1992). Guthrie and Abeysekera (2006) came up with a content analysis approach as a research method that could economically measure IC. However, another approach having practical use in the analyses of data from the financial statement of a firm is the VAIC (Value Added Intellectual Capital) model developed by Pulic (2000). This model is exclusive as it uses online available data from the conventional financial report (Andriessen, 2004). There is no study at present involving analysis of Intellectual capital in Indian Pharmaceutical industry.

Based on the literature review the research objective of the study is to:

- evaluate the VAIC for top firms in drug and pharmaceutical industry of India during the period 2005 to 2016,
- evaluate the relation between corporate performance and IC in the top firms of pharmaceutical industry in India for the period 2005 to 2016,
- analyze the relative importance of various components of the IC on the company's performance.

The versatile nature of intellectual capital contributes itself to both a richness of prospect as well as a hardship for valuation (Bontis et al., 1999). Facing burning globalized competition, intellectual capital is a recognized as a sharp force that drives economic growth (Huang and Liu, 2005). Hence, the following research hypotheses are proposed:

H1. Companies with greater Intellectual Capital have better financial performance.

The firm's relations with stakeholders, including customers and external stakeholders, strategic partners, and Customers-Suppliers Relations (CSR) represents Capital employed efficiency (Roos et al., 1997; Bontis, 1998). As a result, this capital works as a multiplying resource that creates value by connecting all IC components with other stakeholders (Kong and Prior, 2008). Hence, the following research hypothesis is proposed:

H1a. Companies with greater capital employed efficiency have better financial performance.

Human Capital employed efficiency covers human resources, includes cumulative tacit knowledge representation by competencies, learning and education and innovativeness and creativity (Bontis, 1998). Findings of Sharabati et al. (2010), Bontis (1998), Hsu and Fang (2009), Bontis (2001) revealed that the human capital had significant effects in most industries. Based on this, the following research hypothesis is proposed:

H1b. Companies with greater human capital employed efficiency have better financial performance.

Structural Capital (SC) refers to the supporting infrastructure for Intellectual capital, which is embedded in the company's structure, business processes, information systems and databases, research and development, and style of management and the company's culture (Bontis, 1998; Edvinson and Malone, 1997). Based on the literature, the following research hypothesis is proposed:

H1c. Companies with greater structural capital employed efficiency have better financial performance.

According to Stewart (1997) human capital is “the place where all the ladders start: the wellspring of innovation, the home page of insight”. It is presumed that human capital is necessary in order to establish structural and relational capital (Bollen et al., 2005). Hence, the following hypotheses are proposed:

H2. Human capital is more important than relational and structural capital in Indian pharmaceutical industry.

Research Methodology

To calculate the Intellectual capital, VAIC approach is used in the present study. The dependent variables are given below in table 1.

Table 1. Description of the variables

Dependent Variable	Description
ROA	Net Income/Book Value of the total assets of the firm. This reflects the profitability of firm.
MB	Market Capitalization/Book Value of the total assets of the firm. It which reflects the market valuation.
ATO	This is the ratio of total revenue to the book value of the assets of the firm. This reflects the productivity of the firm.
Independent Variable	
The Value added intellectual capital (VAIC)	This reflects the intangible assets of the firm. The VAIC is measured by using three important components, i.e., Value added capital coefficient (VACA), Human capital coefficient (VAHU), and Structural capital value added (SCVA)
Value Added Human capital coefficient (VAHU)	Indicator of value added efficiency of human capital is the ratio of VA of the firm to the expenditure made by the firm on its human capital. This consists of all business capabilities rooted in employees and not owned by the organization.
Value added capital coefficient (VACA)	Indicator of value added capital employed efficiency coefficient for company. This represents embedded knowledge in customer preferences including suppliers and relationships with partners. This is also known as physical capital.
Value added efficiency of structural capital	This comprises of explicit knowledge, including organizational routines, structural design, procedures and networking system. Thus, it is also known as organizational

(SCVA)	culture.
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Control Variable	
Market capitalization (Mcap)	This the ratio of market capitalization to book value of the total assets of the firm for the given year.
Leverage(Lev)	Financial leverage as measured by total debt divided by book value of total assets is used to control for the impact of debt servicing on corporate performance and wealth creation.
Return On Equity (ROE)	This is the amount of net income returned as a percentage of shareholders equity. Return on equity measures a corporation's profitability by revealing how much profit a company generates with the money shareholders have invested.

Secondary data were collected from a Centre for Monitoring Indian Economy Pvt Ltd. (CMIE) database. Out of available 137 companies 121 companies listed on the BSE were selected based on the data available for the given period. Rest companies were dropped out as continuous data was not available. The period for the study is 2005-2016. These 121 companies comprise around 70% of the total assets and 80% of the market share (in terms of sales) for Indian pharmaceutical and drug industry in the year 2016.

The descriptive statistics used are mean and standard deviation of the variables. This is followed by the simple correlation analysis and the multiple linear regression analysis to evaluate the variables on different constraints. Hypotheses testing were predefined to understand the relationship between the intellectual capital dimension and business performance. Value Added Intellectual Capital Coefficient (VAIC) methodology was developed by Ante Pulic (2004) forms the underlying measurement basis for the independent variables in this research work. Three components of Intellectual Capital will be used, which are value added capital coefficient (VACA), structural capital value added (SCVA) and human capital coefficient (VAHC). The first step in measuring IC is to measure the efficiency of the capital coefficient. VACA is the ratio of the Value Added (VA) to the total book value of the net assets (CA_n) by the firm; the total capital is taken as the book value of the firms' net assets during the period is given below:

$$VACA_n = VA_n / CA_n \quad (1)$$

The Value added (VA_n) for the firm n computed as the sum of the I_n Interest expense; D_n , dividends; DP_n , depreciation expenses; T_n , corporate taxes; R_n , profits retained ; M_n , equity of minority shareholders in net income of subsidiaries for the year.

$$VA_n = I_n + D_n + DP_n + R_n + T_n + M_n \quad (2)$$

The next step is to calculate the efficiency of the human capital coefficient (VAHC) on the value creation of the firm. This is obtained by estimating the ratio VA of the firm to the expenditure made by the firm to its employees. These expenses are reflected in the salaries and wage cost of the firm in their annual reports and the formula is given below:

$$VAHC_n = VA_n / HC_n \quad (3)$$

where VAHC_n is the value added human capital coefficient for the firm *n*; VA_n, value added for the firm *n*; HC_n, total salary and wage costs for the firm *n*. The next step includes the measurement of the efficiency of the structural capital value added (SCVA) on the VA by the firm. SCVA is calculated as given below:

$$SCVA_n = SC_n / VA_n \quad (4)$$

where SCVA_n is the structural capital value added for the firm *n*, SC is the structural capital for the firm *n* and VA is the value added for the firm *n*. SC is estimated by subtracting Human capital (HC) from Value added (VA) for the firm *n* as given below:

$$SC_n = VA_n - HC_n \quad (5)$$

Finally, Value added Intellectual Coefficient (VAIC) for firm *n* is computed as the sum of Value added capital coefficient, Value added human capital coefficient and Structural Capital value added. The empirical study followed by Ante (2004), Bontis (1999), Stewart (1997), Edvinsson and Malone (1997), Kamath (2008) showed that VAIC is a standardized indicator. The formula is given below formalizes the VAIC relationship algebraically:

$$VAIC_n = VACA_n + VAHC_n + SCVA_n \quad (6)$$

where VAIC is the value added intellectual coefficient for the firm *n*; VACA_n, the value added capital coefficient for firm *n*; VAHC_n, value added human capital for the firm *n*; SCVA_n, structural capital value added for the firm *n*.

Results

Descriptive statistics of the sample companies wereshows that the value added human capital increases over the financial year 2006-2007 to 2010-2011 and then shows a flatted trend from the year 2011-12 to 2015-16. A major portion of VAIC comes from Human capital. This result matches with the empirical study conducted by Kamath (2008), Ho and Williams (2003), Bontis et al. (2000). Mcap, Leverage, market to book ratio remains constant throughout this period. Value added capital coefficient, value added human capital, value added intellectual coefficient, structural capital value added increases over the same time period. The constant variable return on equity, leverage, Mcap shows a slight increase over the financial

year 2004-05 to 2015-16, which is in tune with the findings of Kamath (2008). The productivity and profitability decreases over the same period. This observation is in contrast with the finding of Kamath (2008). The market value increases from 2004-2005 to 2009-2010 and then shows a decline from 2010-2011 to 2015-2016. A correlation coefficient is a statistical measure which predicts the effect of change in the value of one variable over other. This is shown in the table 2. VAIC shows negative correlation with market value and productivity, which is in tune with the study of Wang and Chang (2005). However, it is significantly positively correlated with dependent variable ROA. Therefore hypotheses H1 is partially supported.

Table 2. Correlation coefficient of dependent variable

		MB	ROA	ATO
VAIC	Perason Correlation	-0.054	0.189*	-0.135
	Sig. (2-tailed)	0.558	0.038	0.140
VAHC	Perason Correlation	-0.041	-0.031	-0.018
	Sig. (2-tailed)	0.653	0.737	0.841
VACA	Perason Correlation	0.255**	-0.113	-0.013
	Sig. (2-tailed)	0.005	0.216	0.884
SCVA	Perason Correlation	-0.268**	-0.080	0.718**
	Sig. (2-tailed)	0.003	0.381	0.000
Significant at *0.05 and **0.01 levels (two tailed)				

VACA shows a significant positive correlation with market valuation. An important result is seen in the case of structural capital, where, ROA is significantly positively correlated and the market value is significant, but negatively correlated.

Overall human capital seems to have a negative correlation with the indicators of firm performance, which is similar to the study conducted by Mehralian et al. (2012). Thus H1b and H2 hypothesis are not accepted. The correlation analysis implies that structural and physical capital is the most significant factor in the pharmaceutical industry, which is in tune with the findings of Firer and William (2003). Therefore, accepting H1a, H1c hypothesis. Conversely, the correlation result implies that structural and physical assets play a more important role than Human assets in productivity and market valuation of Indian pharmaceutical companies.

Regression analysis is a statistical process which includes techniques for analyzing several variables and also to identify the factor among Intellectual capital, which has a significant effect on the firm performance indicator. The model shows good adjusted R² in the case of productivity (51%) as compared to market value and profitability, whereas the research conducted by Mehralian et al. (2012) has adjusted R² value less than 10%, but Kamath (2008) found relatively high adjusted R² of 90% in productivity and profitability and 55% in market value. Structural

capital is statistically significant and positively affecting the productivity of the firms, which is in tune with the earlier study by Cabrita and Bontis (2008). A positive and significant relationship is shown between the constant variable Mcap and profitability. Further, profitability is negatively affected by Leverage and VACA, whereas Kamath (2008) found a negative effect on the control variable. Thus, the control variable of financial performance and leverage also helps in explaining the movement productivity. The control variable also contributes to the explanatory power of regression models as shown in Table 3.

Table 3. Multiple regressions for the survey period

	Dependent Variable		
	<i>Market Valuation (MB)</i>	<i>Profitability (ROA)</i>	<i>Productivity (ATO)</i>
Adjusted R square	0.392	0.325	0.506
F	13.872	10.624	21.511
Significance	0.000 ^b	0.000 ^b	0.000 ^b
	t- statistic	t- statistic	t- statistic
(Constant)	3.619**	7.580**	2.332*
VAHC	0.003	-1.279	-0.075
VACA	3.001**	-1.425	0.027
SCVA	-3.648**	-1.233	11.212**
ROE	7.330**	-3.177*	-0.303
Mcap	-2.220**	4.090**	-1.315
Lev	-0.870	-5.522**	1.333
Significant at *0.05 and **0.01 level			

Implication for Researchers and Practitioners

Intellectual capital is an emerging concept and is not usually revealed by the companies; especially in the pharmaceutical companies in India. This study tries to understand the influence of Intellectual capital on the performance of Indian pharmaceutical companies. The present study is an eye opener for the stakeholders and practitioner and researcher to understand the reason behind its relationship with the performance indicator. The result in this study leads to the following recommendations which can be implicated by Indian pharmaceutical companies:

- Pharmaceutical companies should disclose IC as a part of the annual financial report.
- Decision makers should be educated about the significance of the IC as they play an important role in the company's value.

- As no significant correlation was observed between Human capital and firm performance indicator, therefore, in Indian context more importance should be paid over employee's skill enhancement.

Conclusion

Intellectual Capital is valued as an important strategic resource for sustainable competitive advantage, the empirical results of this study supports partially H1, H1b and H1c. However, it fails to support H2 hypotheses. The regression analysis reveals that a non-significant relation exists between Human Capital and the firm's financial parameters. Indian pharmaceutical firm's productivity is not affected by Human Capital. The lack of market valuation and productivity, in Indian market can be associated with the lack of employees' training, since Katsanis (2006) pointed out that continuous training program is a vital tool for employees and managers' performance.

In order to empower Human Capital, in developing country like India, proper training and improved incentives must be provided to the employees. Structural capital as revealed by regression analysis, affects market value and productivity. It can thus be concluded that the pharmaceutical companies in India are realizing the value of technological knowledge (know-how) and how they can maintain it (Subbanarasimha and Ahmad, 2003). The present study is consistent with those reported by Mehralian et al. (2012), Kamath (2008), Hang Chan (2009), Firer and Willaims (2003), who observed the same effect.

The present paper is not free from limitations. The main limitation of this study is the use of the IC efficiency measurement model. The exact contribution of each resource on final value creation is very difficult (Bontis et al., 2000). Further studies can be conducted by applying different IC efficiency measurement models, like, Economic Value added model, Balance Scorecard, Human resource costing and accounting, and the Skandia navigator. Other limitations can be the time sequences of the present study. A cross-sectional study can also be done to find the significance of the findings of this study across various sectors.

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WPLYW KAPITAŁU INTELEKTUALNEGO NA WYDAJNOŚĆ BIZNESOWĄ: PRZYKŁAD INDYJSKIEGO SEKTORA FARMACEUTYCZNEGO

Streszczenie: Na podstawie danych z 121 firm sektora farmaceutycznego zarejestrowanych na Bombajskiej giełdzie papierów wartościowych w Indiach w latach 2005-2016, autorzy próbują dokonać analizy związku między kapitałem intelektualnym (kapitał ludzki, kapitał powiązany, kapitał strukturalny) a tradycyjnymi miarami wydajności biznesowej (wydajność, rentowność i wycena rynkowa). Dane empiryczne zostały uzyskane ze skontrolowanego sprawozdania finansowego 121 firm farmaceutycznych. Wśród metod związanych z rachunkowością kapitału intelektualnego do pomiaru efektywności tworzenia wartości wykorzystywano współczynnik wartości dodanej Pulica (VAIC). Dla zbioru zmiennych reprezentujących wydajność firm i kapitał intelektualny przeprowadzono regresję i korelację. Analiza wskazuje, że relacje pomiędzy wydajnością kapitału intelektualnego firmy (IC) a konwencjonalnymi wskaźnikami wydajności są zróżnicowane. Wyniki wskazują, że wydajność kapitału intelektualnego firmy może wyjaśnić rentowność, ale nie wycenę rynkową firmy w Indiach. Ponadto analiza empiryczna wykazała, że kapitał strukturalny oraz kapitał powiązany były ważnymi czynnikami, które mają istotny wpływ na rentowność firm w badanym okresie, tym samym odzwierciedlając fakt, że przemysł jest bardziej zainteresowany wiedzą technologiczną i innowacjami. Wynik wskazuje na pewne

znaczące konsekwencje dla decydentów, co przyczyni się do poprawy wydajności sektora farmaceutycznego.

Słowa kluczowe: kapitał intelektualny, przemysł farmaceutyczny, wydajność biznesowa, Indie

知識資本對企業績效的影響：印度製藥行業的證據

摘要：根據印度醫藥行業2005-2016年度孟買證券交易所121家上市製藥公司的數據，本研究試圖分析智力資本（即人力資本，關係資本，結構性資本）與傳統業務績效（即生產率，盈利能力和市場估值）。實證數據來自121家製藥公司經審計的財務報表。在智力資本會計的幾種方法中，Pulic的增值智力係數（VAIC）正被用於價值創造效率測量。對於表示公司和智力資本績效的變量集合進行了回歸和相關。分析表明，公司知識產權（IC）與傳統業績指標的表現之間的關係各不相同。研究結果表明，公司IC的表現可以解釋印度的盈利能力，而不是生產率和市場估值。另外，經驗分析發現，結構性資本和關係資本是對企業盈利能力產生重大影響的重要因素在學習期間。這反映出業界更關心技術知識和創新的事實。結果對決策者產生重大影響，有助於提高製藥行業的表現。

關鍵詞：知識資本，製藥業，印度企業業績。