Linking Intellectual Capital and Financial Performance in Pharmaceutical Companies

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A R T I C L E   I N F O

A B S T R A C T

Purpose: The present research aims to examine the connection between the three types of "intellectual capital" ("human capital", "structural capital" and "Value-Added Capital") and the financial performance of pharmaceutical companies trading on the India Stock Exchange (BSE and NSE).

Design/Methodology/Approach: To gauge the connection between intellectual capital & financial performance of companies, 10 companies on the basis of their market capitalization belonging to the pharmaceutical sector were selected and the information pertaining to these companies is collected for the period 2000-2022. The stationarity of the data was checked by applying a unit root test & regression analysis.

Findings: The size of a country's financial performance might differ significantly from one country to the next. Whereas, Pharmaceutical businesses perform more effectively and charge less when there is competition in the market. Furthermore, "structural capital", "Value Added capital", and "human capital," have a substantial impact on ROA.

Research Limitation: This study was limited to a small sample size consisting of 10 companies belonging to the pharmaceutical sector, generalizing across the entire sector challenging. Future researchers could employ a larger sample size and include diverse sectors in their analysis for a more comprehensive look.

Managerial Implications: Pragmatically, the study's findings imply that pharmaceutical companies would benefit from creating an internal division or program dedicated to measuring, managing, and expanding intellectual capital as a key resource in order to better position themselves to benefit financially from the knowledge economy, also investments in Intellectual capitalwould have a substantial impact on ROA.

Originality/Value: This research paper presents an original work of authors in the field of intellectual capital and its linkage with financial performance.

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Introduction

The eight steps that make up the pharmaceutical system and industry are as follows: R&D, clinical trials, registration, production and packaging, procurement and importing, supply chain, dispensing, sales, and usage. The pharmaceutical business is among the most capital-intensive sectors because of the high costs associated with the research, development, and production of new drugs (Mehralian et al., 2012). There is no doubt that the pharmaceutical business is not only capital-demanding but also has characteristics of a knowledge base sector due to the need for trained laborers, one-of-a-kind procedures, and scientific research involved in producing and marketing pharmaceutical goods. The pharmaceutical sector in modern-day India is one of India's most successful scientifically based businesses. It has a wide range of skills that may be put to use in the complex pharmaceutical industry. In comparison to other developing nations, it ranks rather well for the sophistication, quality, and range of its pharmaceutical offerings.

One element of the financial performance of some of India's most successful pharmaceutical businesses will be discussed here. Intellectual capital is expected to play a larger role in the development of wealth in the future. Additionally, it was found that intellectual capital may have a positive effect on a company's bottom line, and many tools have been created to track its value. In addition, it became clear that intellectual capital had a beneficial effect on companies' bottom lines. The success of a business relies heavily on its ability to amass intellectual capital. Competing successfully in today's business environment requires a corporation to invest in and use its intellectual capital. An organization's intellectual capital consists of "the collection of knowledge assets that are assigned to the organization and most substantially contribute to an enhanced competitive position of the organization by contributing value to designated key stakeholders" (Marr et al., 2004). Simply said, an organization's intellectual capital consists of all of the resources it has accrued in terms of knowledge.

From "human capital" (which includes "knowledge capital," "skills capital," "motivation capital," and "task capital") to "business process capital" (which includes "information flow," "products flow," "cash flow," "cooperation forms," and "strategic processes") to "business renewal and development capital" (which includes "specialization," "production processes," "new concepts," "sales and marketing," and "organizational renewal"), the term "intellectual capital" encompasses (resources spent cultivating relationships with customers, suppliers, retail partners, and investors). To put it simply, "human capital" is an organization's human resources. This includes its employees' education, training, experience, expertise, and other forms of acquired knowledge. "human capital" may be defined as an organization's accumulated body of information, including its employees' education, training, experience, expertise, and other forms of information. The education and experience of a worker might also be considered. Connection Wealth (also Relationship Capital, Customer Capital, External Capital). The whole total of an organization's interactions with outside parties like clients, vendors, and others. A company's brand names, trademarks, and reputation are all examples of external capital.

"Structural capital", sometimes called organizational capital or internal capital, is "what's left after employees go home for the night." Things like protocols, databases, regulations, intellectual property, cultural norms, and so on are all part of this. Consequently, the data is kept inside an organization's internal mechanisms and practices.

Literature Review

The relationship between intellectual capital and economic performance has been analyzed by (Chen et al., 2005). Intellectual capital has been demonstrated to increase both a company's market value and its financial performance, and it has been suggested that this factor may be a leading predictor of the company's future financial success. Furthermore, it was shown that the three components of value-generating efficiency – physical capital, "human capital", and "structural capital" – may be valued differently by different investors. These components make up the efficacy of value generation. Intellectual capital and a range of economic variables were examined in a study by Singh & Narwal, (2015a). While there was a positive correlation between intellectual capital and corporate profit, no correlation could be established between intellectual capital and either productivity or market value. Intellectual property and

important financial performance parameters of Indian software and pharmaceutical industries are analyzed (Ghosh & Mondal, 2009). However, only a company's profitability was shown to positively correlate with IP. The sole evidence for this conclusion is the positive relationship between intellectual capital and financial profits. Kamath, (2008) studied the connection between the innovation cycle (IC) and conventional indicators of success in India's pharmaceutical sector. He found that home-grown businesses gave the impression of doing well and making good use of their IC, with "human capital" (HC) having a significant bearing on both their profitability and productivity.

Gan & Saleh, (2008) looked at whether or not Bursa-listed technology-heavy firms' internal controls were connected with their ability to create value (Malaysia). Their research aimed to answer the question, "Is there a connection between intellectual capital and company performance?" While Value added intellectual capital (VAIC) was shown to be useful in explaining such metrics as profitability and productivity, it was found to be inadequate when it came to explaining market value. This led to the realization that market value, profitability, and productivity may all characterize efficiency as evaluated by VAIC. Companies with high levels of intellectual capital and financial success were studied (Tan et al., 2007) and looked at the relationship between the two. In doing so, they relied on equity, profits per share, and annual return on equity as indicators of financial health. Moreover, to quantify intangible assets, they used the VAIC method. Their research indicated that an organization's intellectual capital correlates positively with its expected future performance. The researchers also concluded that a prosperous business is correlated with rapid increases in intellectual capital.

Maditinos et al., (2011) examination of Greek enterprises revealed that "human capital" significantly affects and positively correlates with consumer capital. Although evidence will be found in both service and non-service firms, it is anticipated that "structural capital" will be shown to have a stronger impact in non-service industries. Researchers in Turkey discovered a relationship between the value-added intellectual coefficient and the market value-book value ratio in the banking

sector (VAIC). It was established that each of the three components of the VAIC significantly correlated with the examined dependent variable (the ratio of market value to book value). In a study titled "Intellectual capital and traditional measures of corporate performance" Firer & Williams, (2003), the authors used VAIC M to investigate the relationship between intellectual capital and the financial success of African businesses. They discovered no statistically significant correlations between the three components of intellectual capital (human, structural, and relational capital) and the three dependent variables. The Value of Intellectual Capital (VAIC) Model, according to Firer & Mitchell Williams, was developed to examine the relationship between the intellectual capital of African enterprises and their bottom lines (profitability, productivity, and market value).

Young & Franklin, (2009) assessed Asian commercial banks' global competitiveness between 1996 and 2001. They discovered that "human capital" and physical capital are the primary forces behind value creation, which helps to explain why banks in various nations have variable degrees of success in generating value for their customers. Investigations on the significance of intellectual capital's human, institutional, and consumer components were conducted (Bontis et al., 2000). The importance of "structural capital" to company performance as well as the importance of human and customer capital in organizational management are some of the study's most important conclusions. The VAICTM was used to look at the connection between intellectual capital and financial outcomes. He did this to determine how much intangibles contributed to the revenue of Iranian enterprises. While the association between structural and physical capital did not affect financial performance, the relationship between HCE and financial returns was proven to be positive and statistically significant. (Riahi Belkaoui, 2003) looked at the financial performance of many MNCs with U.S. bases and the relationship between intellectual capital.

Pharmaceutical enterprises reported much more IC data and a wider range of IC data as compared to other industries in Bangladesh (Abhayawansa & Azim, 2014). Although medication producers are not required to do this, it has been demonstrated that this is the case. This shows that the

pharmaceutical business is committed to spreading IC as a part of the processes of generating corporate value and values doing so. The results of the study show that Jordanian pharmaceutical companies successfully safeguard and profit from their intellectual property (Sharabati et al., 2010). The research indicates that improved financial outcomes could follow from better management of intellectual capital. The study found that efficiency was increased by incorporating IC components. Singh & Narwal, (2015b), also delved into the following topics. The researchers concluded that HC had no appreciable influence on increasing corporate output outside of the IT industry after looking at a wide range of Indian enterprises. The findings also indicate a link between increased HC efficiency and better financial performance, albeit this link does not appear to hold in terms of stock market success. Companies with lower stock prices are those who place more emphasis on the professional development of their staff than on facility improvements. Komnenic & Pokrajianalyze how IC affects the productivity of MNCs doing business in Serbia. It has been demonstrated that "human capital" positively correlates with all three performance indicators for an organization. The statistical significance of the association between "structural capital" and return on equity was demonstrated. We may develop the following hypothesis in light of the literature:

$H0_1$: Value-added capital (VAC) has a negative impact on the performance of businesses.

$H0_2$: Performance of a business is adversely impacted by "human capital" (HC).

$H0_3$: Negative effects of "structural capital" (SC) on business performance.

Rationale

This particular study endeavor will examine the relationship between intellectual capital and financial success. Since it is still a relatively new concept, most firms, especially those in India's pharmaceutical sector, do not routinely sell their intellectual capital. This study aims to understand how intellectual capital affects the operational effectiveness of Indian pharmaceutical companies. It is quite challenging to comprehend a company's financial performance without first having a firm understanding of its measurable intellectual capital. The study might assist pharmaceutical companies and regulators in improving their intellectual capital investments, which would ultimately result in greater financial performance.

Objective of the Study

- To examine the effect of Value-added capital (VAC) on the performance of business.

- To examine the effect of "human capital" (HC) on the performance of a business.

- To examine the effect of "structural capital" (SC) on business performance.

Research Methodology

Data and Sampling

The population consists of all pharmaceutical businesses trading on the Indian Stock Exchange, and the sample is made up of the ten largest companies by market capitalization.

S. No.	Company Name	Market Cap (Rs. Cr.)
1.	Sun Pharma	238,745.83
2.	Divis Labs	90,264.63
3.	Cipla	87,413.17
4.	Dr. Reddys Labs	70,785.04
5.	Torrent Pharma	53,135.93
6.	Abbott India	45,895.30
7.	Zydus Life	42,279.77
8.	Alkem Lab	35,891.02
9.	Lupin	33,283.93
10.	Gland	25,691.67

The focus of the inquiry was on the potential causes. The goals of this investigation were to examine how intellectual capital affects financial performance. The study's overarching goal was to learn more about the relationship in a culturally specific Indian context. This data was collected throughout the preceding nine years. The effects of intellectual capital types including value-added capital, "structural capital", and "human capital" on Return on Assets (ROA) were analyzed on an individual basis. Value-added capital (VAC), "structural capital" (SC), "human capital" (HC), and return on assets (ROA) data were gathered and analyzed over time in an Indian setting. The website moneycontrol.com was the primary data source. The research covered the period of 22 years from 2000-2022. A company's performance is the result of all of its efforts. Accounting-based measurements and market-based measures are two common classifications of performance indicators. ROA and ROE are two of the most popular accounting-based performance metrics utilized today (Baliga et al., 1996; Hejazi et al., 2016; Hitt et al., 2017). Previous research has shown that return on assets is a useful criterion (Acuña-Opazo & Contreras Gonz Alez, n.d.; Carter et al., 2003; Nimtrakoon, 2015). For the reasons stated, the Return on Assets (ROA) was chosen as the indicator of performance in this analysis.

Tools Used for Data Analysis
The following methods were used to perform the research:

- The ADF test was used to verify that the data was steady.

- The assumptions of the regression model were tested using residual analysis, as shown below.

  o Testing for serial correlation using the LM technique.

  o A test for heteroscedasticity.

- The least squares regression model was used to verify a causal connection.

Results and Discussion

Unit Root Test
According to Glynn & Asmussen, (2007), unit root tests are statistical tests used to determine if a time series is stationary or not. Because it indicates whether the time series' statistical characteristics are stable, stationarity is a key notion in time-series analysis (Jalil & Rao, 2019). It is essential to confirm that the variables are stationary since time series data were utilized, to prevent unanticipated regression. The Augmented Dickey-Fuller test was utilized to investigate the unit root. Both a test statistic and a p-value are generated by the ADF test. All variables were stationary at the first level of integration, as shown in Table 1's results from the Unit root. If the p-value falls below a predetermined level of significance (0.05), the null hypothesis is rejected.

Regression Analysis
Regression analysis is a statistical method for simulating the relationship between a dependent variable and one or more independent variables. How a regression analysis test should be understood depends on the specific hypothesis being tested and the results of the statistical test. The goodness of fit of a regression analysis test is often viewed as a measure of how well the model fits the data. When there is only one independent variable, the R-square statistic is frequently used to quantify how much of the variance in the dependent variable is explained by the independent variables, and

Table 1: Unit Root Test Results

Variable	ADF- Statistic	Critical Value	Probability Value	Level of Significance	Order of Integration
HC	-3.70495	-2.566923	0.0000	1% level	Level
SC	-4.21199	2.566889	0.0000	1% level	Level
VAC	-2.65960	-2.566930	0.0000	1% level	Level
ROA	-3.20813	-2.566889	0.0000	1% level	Level

the Adjusted R Square Statistic is when there are many independent variables. When the R-square number is 1, the model completely explains the variability of the dependent variable; conversely, this is true when the value is 0. We have included the Adjusted R Squared Variable (Table 3), which, with a 0.124762 coefficient of determination, explains 12.47 percent of the variation in ROA. This is because our study includes several independent factors. The 30.03190 F-value is much less than 5%, indicating that the model adequately fits the data. There is no auto-correlation between the variables since the Durbin-Watson statistic's value (1.910770), which is between the range of 1 and 2, is not positive. Additionally, Table 2's regression model findings show that "structural capital" (0.0001), "human capital" (0.0000), and "value-added capital employed" (0.0000) all significantly affect the return on assets, as shown by the fact that the Prob. value of the t-statistic is less than 0.05.

$$y = 5\neg\Re\Rightarrow_{it} + 5\neg\wp\Rightarrow1(VAC_{it}) + 5\neg\wp\Rightarrow2(HC_{it}) + 5\neg\wp\Rightarrow3(SC_{it}) + 5\neg\varnothing\Rightarrow_{it}$$

Regression's Assumption Tests

A statistical test for autocorrelation (serial correlation) in a regression model is the Breusch-Godfrey Serial Correlation LM Test. As part of the test, a set of lagged residual values is subjected to an auxiliary regression of the residuals from the first regression model. The null hypothesis is that there is no autocorrelation among the residuals, whereas the alternative hypothesis is that there is some sort of autocorrelation present. The study's tables 4 and 5, which reveal that the p-value is greater than the significance threshold (0.05), respectively, imply that there is insufficient evidence to infer that the residuals in the regression model are autocorrelated and heteroskedastic. As a consequence, the regression model may be considered to be well-specified and the predicted coefficients and standard errors can be regarded as being correct.

Findings

A study of Indian pharmaceutical companies focused on the implications of intellectual capital on the bottom line. This study mainly depends on

Table 2: Regression Analysis

Variable	Co-efficient	Std. Error	T Statistics	Prob.
C	-1.1043	0.31121	-3.5484	0.0005
HC	-0.314116	0.036454	-8.616821	0.0000
SC	0.124934	0.031496	3.966602	0.0001
VAC	-0.071815	0.015355	-4.676867	0.0000

Table 3: Model Summary

Adjusted R- squared	Durbin-Watson statistic	F-statistic	Prob.(F- statistic)
0.124762	1.910770	30.03190	0.000000

Table 4: Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.551128	**Probability** 0.4613
Obs*R-squared	0.641454	**Probability** 0.4232

Table 5: Heteroskedasticity Test: Arch

F-statistic	1.835649	**Probability** 0.1000
Obs*R-squared	11.88863	**Probability** 0.1043

data from the moneycontrol.com website, namely its time series on value-added, "structural capital", "human capital", value-added capital, and return on investment. For its examination, the research looked at the 22 years from 2000 to 2022. To ensure uniformity, all pharmaceutical company data was analyzed in an Indian context. To confirm that the regression model was stable, a variety of statistical studies were performed, including the Arch LM Test, the Heteroskedasticity Test, the Breusch-Godfrey Serial Correlation LM Test, and the Histogram Normality Test. The regression test was applied to analyze the "Impact of Intellectual Capital on Financial Performance: A Research on Pharmaceutical Companies in India". After putting the hypothesis to the test, it came to the following conclusion:

i.   Neither "value-added," "structural capital," nor "human capital" have a unit root.

ii.   The quantity of "structural capital" and value-added capital utilized in manufacturing has a big impact on return on assets.

iii. The Augmented Dickey-Fuller test was used for unit root testing, and the results showed that all variables were stationary at the level predicted by the order of integration.

iv.   There is no connection between an increase in ROI and an investment in people.

v.   There is no autocorrelation between the variables.

vi.   There is no proof that the residuals are serially correlated.

vii. There is no sign of an Arch effect in the residuals.

viii. In eigenvalue space, the residuals are not heteroskedastic.

Conclusion

The statistics show that predicting the effects of a change in the financial performance of pharmaceutical enterprises depends slightly more on a company's intellectual capital. "Human capital," "structural capital," and "value-added capital" are the three subcategories that fall under this broad category of capital. The study's conclusions are summarized as follows: Compared to "structural capital" and value-added capital employed, "human

capital" was shown to have minimal effect on ROA. However, the size of a country's financial performance might differ significantly from one country to the next. Pharmaceutical businesses perform more effectively and charge less when there is competition in the market. It has also been observed that the kind and effectiveness of financial performance may be closely related to the financial success of other sectors in nations all over the world. In the proposed research, "human capital", "structural capital," and Value-Added Capital were taken into consideration as the predictor of Return on Asset. The findings show that "structural capital" and Value Added, but not "human capital," have a substantial impact on ROA. To govern their financial performance, businesses must also manage their intellectual capital.

Implications and Suggestions

The results of this study may help pharmaceutical businesses better understand the role that "human capital," "structural capital," and "value-added capital" play in determining Return on Assets. This implies that firms could gain from performance management that accounts for the money they have invested. Anyone thinking about making investments in the pharmaceutical business may also find this research to be interesting. Investors and decision-makers would benefit from the financial data being more clearly presented by identifying and creating metrics of intellectual capital and their influence on the financial statements. Students who are interested in studying how "human capital," "structural capital," and "value-added capital" impact pharmaceutical businesses' return on assets or financial performance might find the study's results instructive. There is a possibility that this study will open the door for more investigation in the field.

The results of this study imply that pharmaceutical companies could benefit from setting up an internal division or program devoted to the measurement, management, and expansion of intellectual capital as a key resource in order to better position themselves to benefit financially from the knowledge economy. The results of the suggested study show that investments in both structural and value-added capital employed have a substantial impact on ROI. This suggests a causal relationship between the variables affecting intellectual capital and the metrics used to assess market perfor-

mance, suggesting that raising the intellectual capital variables should raise market performance. Value-added capital (VAC) is a tool that may be used to gain a competitive advantage. The authors of the research recommend that companies implement a system of awards and recognition for staff members with high IQs to increase the company's intellectual capital and, consequently, its bottom line.

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