Journal of Social Economics Research
2023 Vol. 10, No. 3, pp. 108-123
ISSN(e): 2312-6264
ISSN(p): 2312-6329
DOI: 10.18488/35.v10i3.3465

Intellectual capital and firm performance in India after the companies act, 2013: A study of selected BSE-listed firms

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Article History
Received: 17 January 2023
Revised: 10 July 2023
Accepted: 21 August 2023
Published: 5 September 2023

Keywords
Firm performance
Human capital
Intellectual capital
Physical capital
Structural capital
Value added.

JEL Classification:
O34; L25.

ABSTRACT

This study explores the effect of Intellectual Capital (IC) on the performance of Fast-Moving Consumer Goods (FMCG) and Information Technology (IT) sector firms in India after the Companies Act, 2013. This study used Return on Assets (ROA) as a performance variable. The IC efficiency and its constituents are used as predictor variables and measured by Value Added Intellectual Coefficient (VAIC™) model, which was applied to the longitudinal dataset during Financial Year (FY) 2015-16 to FY 2019-20. The study finds that IC had a momentous affirmative impact on accounting performance during the study period. This study also finds that the components of IC, human capital, and structural capital positively impact firm performance. Nevertheless, this study fails to extract any significant stimulus from the efficiency of physical capital on firm performance. Further, firm experience and size positively influence the performance measured by ROA. This paper highlights new determinants of firm performance, i.e., IC and its components, which market regulators, policymakers, researchers, and investors can take into consideration for different market-related decisions.

Contribution/Originality: This study is an original, comprehensive work in the emerging Indian economy to assess the impact of IC on performance in FMCG and IT sector firms. This study will enrich the prevailing literature in corporate financial reporting, measurement, and the impact of IC and human resource management.

1. INTRODUCTION

In the early days of business, Physical Capital (PC) was the primary determinant of corporate performance because there was little competition and little access to the outside world. But with the opening up of a liberal economy driven by advanced technology, the importance of physical assets has eroded, and Intellectual Capital (IC) is getting more attention in the business environment and has become a significant economic resource (Wang & Chang, 2005). More specifically, with the evolution of the Knowledge-Based Economy (KBE), the efficiency, productivity, and profitability of a firm have shifted from investment in PC assets such as buildings, plants, and machinery to IC assets (employees' perfection and proficiency, experience, and qualification) (Vishnu & Gupta, 2014). The IC may be defined as knowledge with the potential to transform into value (Edvinsson & Sullivan,

1996). Several authors have described the IC in different dimensions and aspects. According to Stewart & Ruckdeschel, (1998), IC is an intangible asset that an organization could use to create value. The IC comprises employees' knowledge, experience, expertise, research and development (R&D), organizational values and practices, databanks, relations with the various customers and investors, etc. (Weqar, Khan, Raushan, & Haque, 2021). Most of the studies across the globe agreed that IC is composed of three dimensions: human capital (HC), structural capital (SC), and customer capital (CC) (Secundo, Lombardi, & Dumay, 2018; Sumedrea, 2013). Joshi, Cahill, and Sidhu (2010) said knowledge is vital for continued growth and development in diverse fields and envisage the need for research to assess the role of knowledge in shaping corporate performance.

Studies have observed that, despite having a significant and indispensable contribution to overall performance, the IC is yet to get its place in the financial reporting platform (Kalkan, Cetinkaya, & Arman, 2014), as it is qualitative and tough to measure in terms of monetary figures. Previous research has observed that the market capitalization of any firm is greater than the replacement cost of physical capital employed (Dumay, 2009) and tried to find out the factors responsible for such an overvaluation by the markets. The plausible reason for such an overvaluation is the presence of IC (Bontis, Dragonetti, Jacobsen, & Roos, 1999; Brennan & Connell, 2000), which is not revealed in the financial reporting for general purposes (Lev, 2001).

Research shows that with the advancement of the integrated world economy, the industrial economy has started to shift to a KBE over the past few decades (Dzenopoljac, Janoševic, & Bontis, 2016; Guthrie & Petty, 2000). In the present globalized competitive KBE, the firms are trying to achieve efficiency and competitive advantage by paying attention to developing the IC assets over the PC assets (Li, Pike, & Haniffa, 2008; Yi & Davey, 2010). Consequently, IC is considered a crucial source of value creation (Siboni, Nardo, & Sangiorgi, 2013) and a driver for market value and performance (Sonnier, Carson, & Carson, 2009). The IC and knowledge management play a crucial role in the success of corporate establishments (Wiig, 1997). The concept of IC became popular in accounting literature with the discovery of its close connection with firm performance (Bontis, 1998; Pulic, 1998, 2000). Some studies claim that the financial performance of an organization is nearly impossible without considering the role of IC (Bontis, 2001; Sveiby, 2001). Pulic (1998) introduced the Value Added Intellectual Coefficient (VAICTM) model as a means to assess intangible assets, taking into account the deficiencies and constraints of the conventional financial reporting system. According to Pulic (1998), IC is the aggregate of HC, SC, and PC. Since then, the VAICTM model has been widely used in financial literature to examine the effect of IC on corporate performance (Alipour, 2012; Chang & Hsieh, 2011; Joshi, Cahill, Sidhu, & Kansal, 2013; Maditinos, Chatzoudes, Tsairidis, & Theriou, 2011; Mehralian, Rajabzadeh, & Rasekh, 2012).

Essentially, IC is an indispensable asset to a successful business in any sector, be it production or service. The only difference is the extent of use; some are highly knowledge-intensive (Like IT Sector), and some are less (Like FMCG). Therefore, the focus has shifted from less knowledge-intensive to highly knowledge-intensive firms (Bagozzi & Phillips, 1982). Several studies have been conducted across different industries and geographical segments to investigate the impact of IC on business performance. Typical sectors include banking and finance (Abdulsalam, Al-Qaheri, & Al-Khayyat, 2011; Al-Musali & Ismail, 2014; Gigante & Previati, 2011; Hu & Lee, 2022; Joshi et al., 2010; Joshi et al., 2013; Kamath, 2007, 2010; Weqar, Sofi, & Haque, 2021); pharmaceuticals (Amin & Aslam, 2017; Festa, Rossi, Kolte, & Marinelli, 2021; Gupta, Goel, & Bhatia, 2020; Kamath, 2008; Mehralian et al., 2012; Pal & Soriya, 2012; Vishnu & Gupta, 2014), chemicals (Maji & Goswami, 2017); healthcare (Tiwari, 2022); textile (Liang, Yu, Jin, & Xu, 2021; Pal & Soriya, 2012).

Although comprehensive studies are conducted investigating the impact of IC and its impact in developed economic setups, little attention has been paid to emerging economies like India, where socio-economic, political, and business environments are quite different. The studies of IC and business performance in the IT sector are from different economic regions like Malaysia (Gan & Saleh, 2008; Saleh, Rahman, & Hassan, 2009); Taiwan (Chang & Hsieh, 2011; Wang, 2011); and Jordan (Zeghal & Maaloul, 2010), but little is known about Indian economy, and no

studies have been conducted on the FMCG sector in any economic region so far. The study of FMCG firms in the manufacturing sector has vital importance for Indian economic growth. The Government of India has projected to expand the manufacturing sector's share of GDP from 16 to 25 percent and create 100 million new jobs by 2022 (IBEF, 2017). Even though the study of IC is relatively new in India, previous studies in the Indian context considered a few significant sectors like the steel and engineering sector (Maji & Goswami, 2016), pharmaceutical (Gupta et al., 2020; Vishnu & Gupta, 2014), chemical (Maji & Goswami, 2017), banking and finance (Weqar et al., 2021), textile, and healthcare, among others (Neha & Das, 2018) to study the impact of IC on performance. But there have been no studies conducted on the FMCG and IT sector companies so far in the Indian context after the Companies Act, 2013, came into effect. Therefore, this study aims to fill the gap by assessing the connection between IC and firm performance in FMCG and IT sector firms listed in the BSE (Bombay Stock Exchange) after the Applications of the Companies Act, 2013 from FY 2015-16 to FY 2019-2020. FMCG is a labor-intensive industry with a large consumer base in the domestic market and changes in consumer choice and preferences. The FMCG sector attracts huge foreign investment. As a result, the government has allowed 100 percent Foreign Direct Investment (FDI) in food processing and single-brand retail and 51 percent in multi-brand retail. On the other hand, the IT sector is a knowledge-based industry with high demand from the overseas market and a high degree of technological innovation characterized by rapid changes and competition. Thus, this study is a new contribution to the emerging economy, like the Indian corporate sector, to evaluate and compare the impact of IC on firm performance in the FMCG and IT sectors. These two sectors contribute a significant share of the country's Gross Domestic Product (GDP) and emerge as a significant foreign exchange earning sector. They also employ a large number of educated youth (Arora & Athreye, 2001).

The remainder of this article is organized as follows: Section 2 examines current literature relevant to evaluating the influence of IC on firm performance and develops hypotheses and study objectives. The research methodology is presented in Section 3. The fourth section addresses the data analysis and findings. Section 5 concludes with a summary and conclusion, as well as limits and possible implications.

2. LITERATURE REVIEW

Traditional definitions of a firm's assets include its land, labor force, and financial capital, but IC is a fourth element that serves as an intangible generator of value. Intellectual capital (IC) refers to the intangible assets and resources that contribute to the value and competitiveness of a company. It encompasses the knowledge, expertise, skills, innovations, patents, trademarks, and other intangible assets that are unique to an organization. According to Dzenopoljac et al. (2016) and Sonnier et al. (2009), the IC is a term for non-physical assets that include knowledge, brands, patents, trademarks, customer connections, human capital, and research and development. Stewart and Ruckdeschel (1998) stated that IC is the intangible asset that an organization could use to create value". According to the majority of research conducted throughout the world (Secundo et al., 2018; Sumedrea, 2013), IC is made up of three dimensions: (1) Human Capital (HC), inherent in the people, i.e., knowledge, skills, and competencies possessed by employees and organization cannot be retained when they leave (Choo Huang, Luther, & Tayles, 2007; Smriti & Das, 2018). (2) Structural Capital (SC) is a part of non-physical infrastructure like organizational database, patents, copyrights, and internally generated utility software that is left with the organization when employees go home or leave the organization (Bontis, 1998; Edvinsson & Sullivan, 1996), and (3) The value of relationships maintained by the organization with its stakeholders represents relational capital, or customer capital (Festa et al., 2021; Pedro, Leitão, & Alves, 2018). Relational capital helps the firm establish and uphold relationships between customers and other stakeholders (Meles, Porzio, Sampagnaro, & Verdoliva, 2016). According to Mehralian, Nazari, and Ghasemzadeh (2018), these three dimensions of IC are perceived to contribute significantly to improving the firm's value creation activities. However, conventional balance sheets do not integrate IC's value for general-

purpose reporting about the company's affairs, despite the fact that IC plays a vital role in the business's success along with the physical and financial capital.

The IC plays a vital role in driving profitability by providing a competitive advantage, fostering innovation, enabling effective knowledge management, enhancing brand value, improving employee retention and engagement, and mitigating risks. Companies that recognize and leverage their intellectual capital effectively are better positioned to achieve sustainable profitability and long-term success. Organizational innovation is a crucial basis for producing IC assets. The term "knowledge economy" originated from the need to manage knowledge at micro and macro levels. Joshi et al. (2010), and therefore, the growing knowledge economy has amplified the significance of IC in the organization (Pinto, 2013). The ability of the organization to transform its properties and competencies into a competitive advantage is the key to success in the contemporary business environment (Dharni & Jameel, 2021). Research showed that value-added is a function of knowledge creation, acquisition, and exploitation (Kianto, 2007). In modern KBE, IC is most important for any corporate organization to achieve success in any field of business and gain a competitive advantage over other players in the market (Bismuth & Tojo, 2008; Chen, Cheng, & Hwang, 2005; Chu, Lin, Hsiung, & Liu, 2006; Nahapiet & Ghoshal, 1998; Stewart & Ruckdeschel, 1998). The technology-driven industry in the free enterprise economy has led to significant importance being attached to the IC in the corporate sector across the globe. Remarkably, the wealth creation focus has moved from physical assets to IC assets (Goldfinger, 1997); therefore, IC assets enjoy significant priority over PC in the KBE (Forte, Tucker, Matonti, & Nicolò, 2017). As a result, scholars across the globe have suggested that investment in IC assets is rapidly growing compared with physical capital investments (Borgo, Goodridge, Haskel, & Pesole, 2012; Corrado, Hulten, & Sichel, 2009). Therefore, studies from developed economies have indicated the need for exploring the association between IC assets and firm performance, which has attracted significant attention from policymakers, regulators, investors, and analysts in the last couple of years (Inkinen, 2015; Verbano & Crema, 2016). In the existing literature, the studies on IC assets are related to developed market setups, and comparatively fewer studies have focused on developing countries' contexts (Anifowose, Rashid, Annuar, & Ibrahim, 2018; Dey & Faruq, 2019). Apart from the limited studies on IC focusing on IC and firm performance, research revealed significant differences in IC reporting across developed and developing countries due to differences in prevailing business, socio-economic, social, and political factors (Abeysekera, 2007; Ståhle & Bounfour, 2008). Therefore, it is vital to emphasize developing countries to assess the impact of IC on firm performance (Xu, Shang, Yu, & Liu, 2019).

Previous scholars have argued that investment in IC is crucial for corporate sector performance (Kafetzopoulos & Psomas, 2015; Yam, Lo, Tang, & Lau, 2011). Tandon, Purohit, and Tandon (2016) documented that the VAIC™ index significantly impacts firm performance and productivity across various sectors in their inter-sector comparative study. They noted that HC and PC were positively associated with performance but found that SC was not significantly associated with performance. Gupta and Raman (2021) noted the positive association between IC and its components (i.e., HC, PF, and SC) with firm productivity in India. However, Ghosh and Mondal (2009) and Pal and Soriya (2012) observed that IC influences firms' financial performance but not productivity or market valuation in India. Allam (2018) exposed similar results related to Saudi Arabia and Bahrain. Vishnu and Gupta (2014) noted that IC has a significant positive impact on the performance of pharmaceutical companies in India. However, they find that none of the variables in IC have any impact.

Similarly, Neha and Das (2018), Gupta et al. (2020), and Lu, Li, Luo, Anwar, and Zhang (2021) found a positive overtone between IC and firms' profitability. They also exposed that HC, relational capital, and PC have a significant role in increasing the firm's profitability. Based on the London Stock Exchange and Pharmaceutical companies (Amin & Aslam, 2017), it was also noted that IC and its components have a positive impact on the financial performance of the firm, and similar results were encountered by Alipour (2012) and Weqar et al. (2021) in Iranian and Indian contexts, respectively. Chatterjee, Chaudhuri, Thrassou, and Sakka (2021) advocated that IC helps firms get a competitive advantage, which results from a positive association between IC and firm performance.

Tiwari (2022) noted that the IC coefficient positively influences the healthcare sector's performance in the Indian context. Kamath (2017) found that market capitalization, ownership, and age of the firms are the major determinants of IC disclosure in India. Dharni and Jameel (2021) found a positive association between IC disclosure and the market valuation of firms in India. Maji and Goswami (2016) reported that IC efficiency and physical capital efficiency are positively and significantly associated with firm performance in India and observed that the impact of IC on performance is greater in the knowledge-based sector than that of the traditional sector. Singh, Sidhu, Joshi, and Kansal (2016) noted that private-sector banks performed relatively better regarding creating total IC than government-sector banks in India, which corroborates the similar findings of Tiwari and Vidyarthi (2018). Zhang, Qi, Wang, Pawar, and Zhao (2018) observed that IC improves product innovation performance in India and China.

However, Elisabeth and Fabienne (2019) shed different light on the IC research and documented that HC, PC, and SC do not influence financial performance.

Many other studies (Firer & Williams, 2003; Zeghal & Maaloul, 2010) have noted a negative or insignificant association between IC and corporate performance. Therefore, the existing literature is inconclusive with regard to the impact of IC on firm performance, producing mixed results. Some studies have found a positive relationship between IC and firm performance (e.g., (Clarke, Seng, & Whiting, 2011; Gan & Saleh, 2008; Mehralian et al., 2012; Wang, 2011)), while others found a weak or no relationship between IC and performance (Maditinos et al., 2011; Weqar et al., 2021). Considering the divergent scholarly outcomes, this study seeks to investigate the potential impact of IC on traditional performance in FMCG and IT sector firms under the new Companies Act, 2013 regime in emerging Indian economies. The primary goal of this study is to evaluate the impact of IC on performance in FMCG and IT companies in India, as well as investigate the impact of different components of VAIC™ on performance.

Four testable hypotheses have been formulated to realize the stated objectives of this study. The first hypothesis explicitly envisages understanding how IC impacts the performance of FMCG and IT sector firms in India:

H_1: The IC positively influences the performance of FMCG and IT sector firms in India.

Considering the inconclusive results concerning the individual effects of EHC, ESC, and EPC on firm performance, three additional hypotheses are structured as follows:

H_2: The EHC positively influences the performance of FMCG and IT sector firms in India.

H_3: The ESC positively influences the performance of FMCG and IT sector firms in India.

H_4: The EPC positively influences the performance of FMCG and IT sector firms in India.

3. METHODS

3.1. Data and Source

This study is an empirical analysis using the secondary data explored from the Capitoline corporate databank for five years after the Companies Act 2013, i.e., from FY 2015-16 to FY 2019-20.

We have considered two sectors that have significant contributions to the country's GDP and employment generation. In addition, the Indian IT sector has gained attention from global customers for its products, and the FMCG sector has attracted FDI, so both sectors have a favorable impact on the country's foreign exchange earnings. Out of the two sectors, the IT sector belongs to the knowledge-based industry, and the FMCG sector belongs to the labor-intensive industry.

This study has carefully selected two different sectors with significant contributions to the economy to compare the impact of IC on firm performance. Therefore, the total sample for this study consists of 87 companies. Out of them, 30 of the largest companies as per market capitalization are selected from the IT sector, and 57 are from the FMCG sector with the highest market capitalization.

3.2. Measurement of Variables

3.2.1. Performance Variable

Following contemporary research (Allam, 2018; Maditinos et al., 2011; Weqar et al., 2021) in the field of IC and accounting performance, this study used ROA as a response variable widely used across different economic setups. Further, Vishnu and Gupta (2014) argued that ROA is a better performance variable in the Indian context. ROA is calculated using the formula in Equation 1 as follows:

$$\text{ROA} = \text{EBIT}/\text{Total Assets} \quad (1)$$

EBIT stands for Earnings before Interest and Taxes. In the present study, the book values of all tangible assets are taken as total assets to calculate the ROA.

3.3. Explanatory Variables

Pulic (1998) and Pulic (2000) VAIC™ has been used to quantify the efficiency of IC in the present study as an explanatory variable. In spite of criticism, Pulic's model has gained attention across the corporate governance and financial literature in developed and developing economies because of its simplicity and easy accessibility of the required data to quantify the IC efficiency (Dzenopoljac, Yaacoub, Elkanj, & Bontis, 2017), which is audited and reliable (Bontis, 1998), and because it allows inter-firm comparison (Smriti & Das, 2018). The first step towards the calculation of VAIC™ is the calculation of Economic Value Added (EVA), which is the excess of Operating Revenue (OR) over Operating Cost (OC) incurred during the year except for salary and wages because (Clarke et al., 2011) suggested that salary and waste are value-creating factors. Mathematically, EVA is:

$$\text{EVA} = \text{OR} - \text{OC} \quad (2)$$

In accounting methodology, EVA is the sum of all constituents that belong to all stakeholders (Tiwari & Vidyarthi, 2018). Symbolically, EVA can be presented as

$$\text{EVA} = \text{EBIT} + \text{D} + \text{A} + \text{EC} \quad (3)$$

EBIT stands for Earnings before Interest and Taxes, representing operating profits, D is the amount of depreciation on tangible assets; A is amortization of intangible assets; and EC is employee's cost.

Intellectual capital is qualitative in nature, and its objective measurement remains a challenging domain in the financial literature (Pulic, 1998, 2000) VAIC™ model. The VAIC™ measures the efficiency of IC (EIC). Moreover, the measurement of VAIC™ depends on the calculation of Efficiency of Human Capital (EHC) and Efficiency of Structural Capital (ESC)

$$\text{EHC} = \text{EVA}/\text{HC} \quad (4)$$

HC represents the total employee cost of the firm. In this study, we considered salary and wages to symbolize the HC. Individual employees acquire implicit knowledge through experience, education, attitudes, and other personal individualities they bring into the organization (Curado, Guedes, & Bontis, 2014) and take away when they leave.

$$\text{ESC} = \text{SC}/\text{EVA} \quad (5)$$

SC indicates internal knowledge resulting from processes and procedures adopted by the organization. It includes organizational routines, organizational customs, processes, information systems, particular practices, working cultures, databases, etc. (Abhayawansa & Guthrie, 2014). According to Pulic (1998), SC and HC are inversely proportional to each other, i.e., the higher the HC, the lower the SC and vice-versa. As per VAIC™, SC is identical to EVA minus HC. Thus, mathematically, SC is measured as

$$SC = EVA - HC \quad (6)$$

The Efficiency of IC (EIC) is the summation of the Efficiency of Human Capital (EHC) and Efficiency of Structural Capital (ESC). Mathematically, the EIC is as follows:

$$EIC = EHC + ESC \quad (7)$$

In addition to ECI, we have calculated the Efficiency of Physical Capital (EPC) using the EVA as follows:

$$EPC = EVA/PC \quad (8)$$

Physical Capital (PC) is the tangible assets of the firm, and in the present study, the book value or replacement cost of total fixed assets is taken as a proxy for PC.

Pulic (2000) says that the VAIC™ is the sum of three measures of efficiency: the efficiency of human capital (EHC), the efficiency of structural capital (ESC), and the efficiency of physical capital (EPC). According to Pulic (2000), the higher the value of VAIC™, the better the IC performance, and vice versa. Therefore, mathematically VAIC™ **is-**

$$VAIC^{TM} = EHC + ESC + EPC \quad (9)$$

3.4. Moderating Variables

Apart from the explanatory variables, Firm Experience (EXP) is considered a significant variable that influences the firm's performance in any sector. Therefore, to capture the moderating effect of experience, this study has taken the natural log value of age as a measure of experience (Allam, 2018; Chatterjee et al., 2021). Similar to the experience, the firm's size contributes significantly to the firm's performance due to its longer involvement in the business, economies of scale, and specialization. Therefore, the natural log value of market capitalization (MCAP) is taken as a proxy of firm size (Weqar et al., 2021).

Table 1 presents the definition of the variables under consideration.

Table 1. Measurement of variables.

Variables	Definition
Performance variable	
(1) Return on capital employed (ROCE)	EBIT/ Total assets
Explanatory variables	
(1) Efficiency of intellectual capital (EIC)	VAIC™ (See (Pulic, 1998, 2000))
(2) Efficiency of human capital (EHC)	EVA/HC
(3) Efficiency of structural capital (ESC)	SC/EVA
(4) Efficiency of physical capital (EPC)	EVA/PC
Moderating variables	
(1) Firm experience (EXP)	Natural logarithm of age of the firm
(2) Firm size (FS)	Natural logarithm of market capitalization

3.4.1. Empirical Models

To assess the association between efficiency of IC and financial performance, several studies have administered the Ordinary Least Squares (OLS) regression model, ignoring the inherent problem of not capturing heterogeneity across time or groups. To overcome such a problem, this study considers a panel regression equation on longitudinal data comprising 435 firm-year observations (considering 87 companies for five years from FY 2015-16 to FY 2019-20). We also used the F-test (Baltagi, 1995) to compare the fitness between the pooled OLS and Fixed Effect (FE) models and the Lagrance Multiplier (LM) test (Breusch & Pagan, 1980) to choose between the pooled OLS and Random Effect (RE) models in order to assess the suitability of the regression model. Finally, we

employed the Hausman test (Hausman, 1978) to figure out if the Fixed Effect (FE) and Random Effect (RE) models appeared acceptable.

Therefore, the applied regression model is formulated as follows:

$$ROA_{it} = \beta_0 + \beta_1 VAIC^{TM}{}_{it} + \beta_2 EHC_{it} + \beta_3 EDC_{it} + \beta_4 EPC_{it} + \gamma_1 EXP_{it} + \gamma_2 FS_{it} + \varepsilon_{it} \quad (10)$$

'i' denotes an individual sample firm, 't' represents the period from FY 2015-16 to FY 2019-2020. The β and γ parameters capture the potential impacts of independent and moderating variables, respectively. 'ε' for error term.

4. ANALYSIS AND DISCUSSION

4.1. Descriptive Statistics

Table 2 presents the summary statistics of the variables in the present study. From Table 2, in the observed period (FY 2015-16 to FY 2019-20), we see that the firm performance measured by ROA has a mean score of 21.52 with a minimum value (-) of 16.62 and a maximum value of 67.9, indicating significant variations in the distribution of profitability in selected firms during the study period. Similarly, the average value of market capitalization representing firm size in the present study appeared to be 42543.47698 crores, with a minimum value of 8.11 crores and a maximum value of 750627.04 crores, indicative of variation in the size of firms under consideration. The experience (measured by age) statistics revealed that selected firms are from different age groups, where the average age of the firm is 41 years and the minimum and maximum age are 5 years and 232 years, respectively.

We have employed correlation analysis in the study to expose the nature and degree of relationship between the variables under consideration. Table 3 shows the correlation statistics of the variables. The highest correlation coefficient of 0.683 is found between the variables ROA and FE. However, the presence of multicollinearity in the model is not a concern, as these two variables are dependent and control variables, respectively.

Table 2. Summary statistics.

Variables	Observations	Average	Minimum	Maximum
Dependent variables				
ROA	435	21.52	-16.62	67.9
Independent variables				
VAIC™	435	13.91	-4.80	97.04
EHC	435	3.67	-5.69	73.62
ESC	435	0.49	0.08	1.73
EPC	435	9.75	-0.29	93.07
Control variables				
EXP (Years)	435	41	5	232
FS (Rs. in crore)	435	42543.47	8.11	750627.04

According to Gujarati and Porter (2010), if any two variables are highly correlated to the extent of 0.80 or more, then there is a problem of autocorrelation. Here, in Table 3, VAIC™ shows a significant positive correlation with the performance measured by ROA. Similarly, the performance variable is positively associated with the ESC, EPC, and FE. However, a negative connection was reflected between ROA, EPC, and FS. Apart from the correlation analysis, we employed variance inflation factor (VIF) analysis to deal with multicollinearity in the dataset. Table 3 discloses the VIF values of all variables other than ROA. Table 3 revealed that values corresponding to all variables are less than the threshold level (10), which confirmed the absence of multicollinearity among the variables (Gujarati & Porter, 2010).

Table 4 presents the result of the Breusch-Pagan test, where it is visible that the chi-square values are 37.51 and 23.86, respectively, for the FMCG sector and IT sector, with a corresponding P-value less than 0.05 for both sectors, which signifies the existence of heteroskedasticity and autocorrelation between the residuals.

Table 5 presents the results of optimal model specification tests, including the F-test, LM test, and Hausman test. A significant LM test also suggests that the random effect is superior to the pooled OLS, while a significant F-test indicates that the fixed effect is superior to the pooled OLS. Lastly, a notable Hausman test demonstrates that the fixed effect is superior to the random effect. Therefore, the present study carried out the regression analysis through a fixed-effect (FE) regression model as per the model suitability test results presented in Table 5. Indicate

Table 3. Correlation matrix.

Variables	ROA	VAIC™	EHC	ESC	EPC	EXP	FS	VIF
ROA	1	-	-	-	-	-	-	-
VAIC™	0.104***	1	-	-	-	-	-	4.325
EHC	-0.121*	0.375***	1	-	-	-	-	2.890
ESC	0.173***	0.075***	0.060**	1	-	-	-	2.951
EPC	0.098*	-0.192**	-0.099	0.178**	1	-	-	2.423
EXP	0.683*	-0.260*	0.078***	0.163***	0.335*	1	-	3.632
FS	-0.234*	-0.188***	-0.003	-0.179*	0.126***	0.213***	1	3.012

Note: ***, ** and * indicate significant at 1%, 5% and 10% level respectively.

Table 4. Breusch-Pagan test for heteroskedasticity.

Variables: VAICTM, EHC, ESC, EPC, EXP, FS				
H_0: Constant variance				
FMCG sector	Chi-square value	37.51	P-value	0.000
IT sector	Chi-square value	23.86	P-value	0.000

4.2. Regression Analysis

In this section, we report the regression analysis between performance, explanatory variables, and control variables. We have performed a fixed-effect (FE) panel data regression analysis to investigate the overall impact of VAIC™ and its constituents on the performance of selected firms measured through ROA in both the sectors (FMCG and IT) under consideration after nullifying the effect of firm size and experience. The observed values of adjusted R^2 (0.12167 for the FMCG sector and 0.28302 for the IT sector) and statistically significant F-statistics indicate the goodness of fit of the regression model under consideration. Thus, the results have rational statistical significance.

Table 5. Optimal model test results.

Sectors	F-test	LM test	Hausman test
FMCG sector	13.685*	51.535***	25.631***
IT sector	11.924***	25.631***	13.333**

Note: ***, ** and * indicate significant at 1%, 5% and 10% level respectively.

Table 6 shows that the calculated coefficient of VAIC™ is positive and significant at a 5 percent level for both sectors. A positive impact of VAIC™ on ROA shows that financial performance increases with efficient utilization of the organization's tangible and intangible resources. This result advocates in favor of the resource-based proposition of Wernerfelt (1984). Further, a higher coefficient value of VAIC™ is observed in the IT sector compared to the FMC sector, which signifies that the impact of overall intellectual and physical capital utilization efficiency on performance is greater in the knowledge-based sector than the conventional sector, which is consistent with the findings of Maji and Goswami (2016).

Likewise, the coefficients of EHC and ESC are positive and significant for both sectors under consideration. This significant positive association with ROA indicates that efficient use of HC and SC enhances the profitability of the firm irrespective of sectors, which is consistent with the findings of Vishnu and Gupta (2014) in the Indian context and Maditinos et al. (2011) in the Greek context. Similarly, Table 6 discloses that the EPC is positively associated with the ROA but not statistically significant in both sectors. The statistically insignificant connection

between EPC and ROA implies that the efficiency of PC utilization is less important compared to intellectual capital to increase financial performance. Table 6 shows that the coefficients of firm experience (EXP) and firm size (FS) are positively associated with performance (ROA). Therefore, a significant positive connection implies that, comparatively, older and larger firms enjoy some benefits over the smaller and newer firms in the industry, leading to better profitability for older and larger firms.

Table 6. Regression analysis through FE model.

Variable	FMCG sector		IT sector	
	Coefficient	T-stat	Coefficient	T-stat
Constant	6.577	0.294	13.877	1.519
VAIC™	0.224	2.842**	3.558	2.973**
EHC	15.049	2.387*	3.919	3.571**
ESC	3.367	3.709***	0.287	2.868**
EPC	0.111	1.433	-0.243	-1.092
EXP	0.404	2.206*	2.737	2.625**
FS	4.980	2.784**	3.902	8.067***
No. of observations	285		150	
Adjusted R^2	0.12167***		0.28302***	
F-statistic	14.297***		12.7634***	

Note: ***, ** and * indicate significant at 1%, 5% and 10% level respectively.

Broadly, the present study results strongly support the theoretical assumption of IC that there is a progressive connotation between VAIC and its components and firm performance for both the FMCG sector and IT sector, and thus advocate H1, H2, H3, and H4. The present study results acknowledge the findings of Maji and Goswami (2017) and F. Weqar et al. (2021) in the case of Indian listed firms.

5. CONCLUSIONS

This study intends to measure the IC efficiency and its impact on the financial performance of FMCG and IT sector firms in India after the application of the Companies Act, 2013, i.e., during FY 2015-16 to FY 2019-20. For measurement of IC efficiency, this study used (Pulic, 1998, 2000) VAIC™ model. The FE model of regression analysis on the panel dataset selected for this study shows an affirmative association between IC (measured by VAIC™) and firm performance (measured by ROA) in both the sectors under consideration. The findings also advocate that EHC and ESC have a significant positive impact on the financial performance of the firms under consideration. However, the study did not find any significant impact of EPC on firm performance for both the FMCG and IT sectors under study. Therefore, the finding of this study is similar to the result reported by many previous studies (Chatterjee et al., 2021; Pal & Soriya, 2012) in the Indian context, Wang (2011) in Taiwan, Maditinos et al. (2011) in Greece, etc.

The present study contributes to the literature in many ways. Firstly, regulators and policymakers should note that IC and physical capital play a substantial role in enhancing performance and achieving competitive advantage in knowledge-based and traditional sectors. Secondly, human capital and structural capital, even though there is no physical substance, play a substantial role in shaping corporate firms' financial performance in emerging markets like India. Finally, Physical capital plays a magnificent role in increasing performance because of the non-recognition of IC in the traditional reporting system. Therefore, policymakers may start recognizing the importance of valuation and reporting the IC and physical capital employed in the business.

This study carries some limitations related to the inefficiency of the model (VAIC™) itself. Since VAIC™ does not incorporate relational capital, it leads to the overvaluation of capital-intensive companies. This study considers 87 companies from two sectors only, out of which 57 are from the FMCG sector and 30 are from the IT sector.

Therefore, this finding can be further extended by considering that a larger sample from multi-sectorial firms with a longer time period accompanied by a modified VAIC™ model may offer different results. The multicounty

sample will also facilitate the comparison of the impact of IC on a firm's financial performance in different economic regions. Further, this study suggests to considering other market-based measures of firm performance like Tobin's Q ratio, market-to-book value ratio, and operating performance like turnover ratio to enrich the extant literature.

Funding: This study received no specific financial support.
Institutional Review Board Statement: Not applicable.
Transparency: The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.
Data Availability Statement: The corresponding author may provide study data upon reasonable request.
Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

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