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Does the Intellectual Capital Acts as a Catalyst for the Sustainability of Indian Emerging Corporates?

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Abstract

The key objective of this paper is to determine whether intellectual capital serves as a catalyst for the sustainability and helps minimise the likelihood of financial distress among Indian emerging corporations. The study has employed Fixed-Effects Model for the analysis of BSE-listed companies, with data spanning from 2009 to 2025. The VAIC model for measuring Intellectual capital and Altman EM_Z_Score for measuring the sustainability and longevity of firms were used for analysis. The findings have exposed the power of intellectual capital in corporate life. A positive and significant relationship has been found, indicating the true efficiency of intellectual capital in firms typically helps them serve and act as a catalyst for the sustainability of Indian emerging corporates. It also supports the Resource-Based View theory. The findings of the study are pertinent and can assist in business strategy by highlighting the efficiency of intellectual capital in developing economies such as India and making a pioneering contribution to the business landscape.

Keywords : Financial distress, Corporate bankruptcy, Altman Z Score, Intellectual Capital, Sustainability, India.

Jel Classifications : G32, G33, L25

1. Introduction

“Financial freedom is attainable for those who educate themselves about it and work towards it.” These wise words by Robert Kiyosaki open up individuals' mindsets and the economy as well. The greater the degree of an economy’s financial freedom, the more benefits it has in regard to its financial advantage and overall efficiency (Chortareas et al., 2013). The financial decisions made within firms play a great role in achieving financial freedom (Hilgert & Hogarth, 2003). Financial freedom in a firm is the state in which it is able to cover its obligations, meet its expenses, and achieve its financial goals without financial limitations, using its own sufficient savings, profits, or income. This is closely tied to risk, too; i.e., the higher the risk, the higher the returns. However, excessive, unmanaged risk-taking can negatively affect a firm's long-run stability and sustainability. The global economic downturn of 2008 and COVID-19 outbreak made a major impact on economies and financial markets worldwide, which affected all aspects of global life. This had a negative impact on both financial and non-financial sectors in India. They experienced significant financial difficulties, resulting in financial distress (FD). However, this significantly increased the number of bankruptcy cases in India. Between 2017 and 2025, the number of admitted cases under the Corporate Insolvency Resolution Process in the Insolvency and Bankruptcy Code has increased significantly. It should be specific, emphasising precise forecasting of corporate bankruptcy, and FD is crucial for withstanding the normal economic climate and unexpected shocks.

Financial distress is a state in which an individual, organization, or entity is experiencing significant financial difficulties or unable to meet its financial obligations (Frydman et al., 1985; Habib et al., 2013; Aparna & Kavida, 2025). This may arise when a firm is in a stage where its cash flow is inadequate to pay creditors or liabilities exceeding its assets (He et al., 2023). This doesn’t come like a sudden one; it signals some warning signs. Their continued

avoidance of warning signals may lead to bankruptcy. Previous literatures stated that when a firm having two consecutive years of negative growth in its market value (Oz & Simga-Mugan, 2018) and its EBITDA falls below its financial expenses (Hernandez Tinoco & Wilson, 2013), or when book value is more than the net asset per share (Sun et al., 2020), and when financial expresses are more than the operating cashflow (Gupta & Chaudhry, 2019), can cause in trouble of FD. Though it substantiates the relationship between FD and corporate bankruptcy. Platt & Platt (2006) distinguished between FD and bankruptcy, as FD arises from inefficient operations or external pressures. On the other hand, bankruptcy is a strategic decision that helps safeguard assets from creditors. The study by Jensen and Meckling (1976) suggests boundless debt financing can lead to FD, high agency costs, and information asymmetry, particularly due to the inherent risk associated with intangible assets.

Currently, we live in an information-centred economy, where intangible assets are engaged among the dominant economic resources and as a critical factor in enhancing financial and organisational performance. The Knowledge-Based View Theory has expanded the value of knowledge and shown that it is a valuable resource for firms. Nowadays, the value of knowledge and intangible assets owned by enterprises has gradually exceeded that of general tangible assets. Intellectual capital (IC) is a leading factor in sustainability and helps achieve a comprehensive advantage over competitors (Gogan & Anca Draghici, 2013). It is considered as a rare factor in the relationship between an enterprise's market value and book value (Higson, 2001). The definition of IC given by Bontis et al. (1999), as a bundle of intangibles and flow of resources, is similar to that of Marr et al. (2004), where the study stated it as a collection of knowledgeable assets attributed to the organisation, and it is primarily significant in contributing to better competitiveness by maximising value to the designated stakeholders.

Although previous articles have explored the association between IC and Financial performance (FP) and its impacts on FD in firms (Cenciarelli et al., 2018; Khurana & Sharma, 2024; Jaunanda et al., 2024; Festa et al., 2020), this paper takes a different perspective on these topics with the following research question.

RQ1. Whether IC acts as a catalyst for the sustainability of Indian emerging corporates?

This paper contributes to the existing literature on IC and firms' sustainability through panel data regression, investigating whether these concepts are truly related and whether they serve as catalysts for the sustainability of emerging Indian corporates. A data span from 2009 to 2025 has been selected, covering a significant timeframe that yields meaningful results by applying Fixed Effect Model in the analysis. The study exposed the effectiveness of IC in serving as a catalyst for the financial health of corporations and assisting in their sustainability. The findings of the study are pertinent and can assist in business strategy by highlighting the efficiency of intellectual capital in developing economies such as India and making a pioneering contribution to the business landscape.

The remaining sections of this paper consist of theoretical framework with the development of hypotheses, a methodological part, data analysis and interpretation, followed by the study's findings and conclusions.

2. Theoretical framework and hypothesis development

2.1 Intellectual capital

Within this knowledge-driven economy, IC is widely recognised as one of the most valuable intangibles. The academic literature views IC as a non-monetary resource and as intangible assets, defined as knowledge assets that are able to be translated into future profits (Sullivan, 2000). It is the total of knowledge possessed by everyone in the organization that gives a competitive advantage (Stewart & Ruckdeschel, 1998) and their relation to external parties (Edvinsson & Malone, 1997). According to the Resource-Based View theory, IC portrayed as a vital asset compared to physical and financial assets, which comprises human capital (HC), structural capital (SC) and relational capital (RC) (Edvinsson & Malone, 1997; Stewart & Ruckdeschel, 1998; Stewart & Ruckdeschel, 1998), which results in the source of competitive advantages of organization and value added (Sundac & Fatur Krmpotić, 2009). The knowledge found in people, which consists of skills, abilities, and efficiency (Kramer & Kroon, 2020), that are developed through continuous training and development programmes, is referred to as HC. It also includes organisational value, culture, and principles (Bontis, 2001). SC is the outcome of a company's knowledge acquired through routine operations and the information exchanged across stakeholders, such as customers and the market (Barbery & Torres, 2019), as well as everything that supports employees' productivity. Usually, this can be owned and traded (Bontis, 2001). The relationships that are established with an environment, which includes key market participants like suppliers, buyers, competitors, stakeholders, society (Bontis, 1996; Stewart, 1997), intermediaries, collaborative partners, regulators, institutional figures, pressure groups, communities, creditors, and investors, are said to be the RC (Marr et al., 2004). The synergy of HC, SC and RC becomes an organisational source that leads to competitive advantage and value added (Sundac & Fatur Krmpotić, 2009). According to Rastogi (2003), IC is the central interaction of HC, social capital, and knowledge management.

2.2 The state of financial distress and bankruptcy

Financial health takes a major part in the success of a firm's life. Poor financial health poses a significant threat to the survival of firms, leading to increased risk and business failures. It is well understood that risk is an inherent factor in financial decisions. Prior literature has studied the relationship across risk management and financial crisis. Failure in risk management, both general and operational, leads to this situation (Andersen et al., 2012). During the period of financial instability, the relationship between strength and risk appears stronger than the relationship between concern and risk. Risk refers to a firm's ability to settle maturing liabilities (Singh & Singla, 2021). He et al. (2023) claim that it is due to insufficient cash flow to pay debts or liabilities. FitzPatrick (1932) describes five stages that lead to final failure, including five forms of insolvency: "incubation, fiscal embarrassment, economic insolvency, complete insolvency, and confirmed insolvency". During the incubation stage, financial difficulties begin to emerge gradually. Fiscal embarrassment arises when the executives recognize the firm's troubled financial state. Economic insolvency arises when a company is unable to secure the funds that are vital to carry out their contractual accountabilities. Complete insolvency arises when liabilities exceeds the physical assets. Eventually, confirmed insolvency when formal steps are taken as a precaution to secure creditors or when divestiture takes place (Poston et al., 2011). 'Bankruptcy is a legal process by which creditors seek to recover their claims from individuals or firms that are unable to fulfil their financial obligations.' It reflects the firm's failure and problems due to its liquidity issues (Gordon, 1971). Domestic and foreign micro- and macro-economic factors are also considered causes of bankruptcy (Altman & Narayanan, 1997).

2.3 Intellectual capital and financial distress

Predicting FD or bankruptcy has been of interest for several decades due to its relevance for investors, creditors, stakeholders, listed firms, financial institutions, the government, and researchers alike (Geng et al., 2015; Jayasekera, 2018). Numerous studies have examined the role of IC in strengthening FP and minimising the likelihood of FD (Cenciarelli et al., 2018; Nawaz, 2017; Khurana & Sharma, 2024; Jaunanda et al., 2024; Festa et al., 2020). A substantial impact of IC on firm competitiveness, values, and asset management efficiency, which contributes to reducing FD, was among the key findings. Chava & Jarrow (2004) discovered that default risk varies across industries, and the industry dummies improve the accuracy of the model and predictive ability. The study by D'Amato (2021) found organisations with greater intellectual resources exhibit less financial gearing, resulting in higher profits. Additionally, lower leverage minimises the risk of bankruptcy in enterprises. In similar terms, Nawaz & Ohlrogge (2022) and Sardo et al. (2018) have stated great IC lowers the risk of FD. Beyond Phan & Nhat (2025) unearthed the essential role of IC in an organisation's performance, irrespective of the presence of a crisis. Tseng et al. (2013) demonstrated a substantial effect of IC on business strategy and FP. On an international context, Agustia et al. (2020) also confirmed the role of IC in minimising risk arising from bankruptcy in firms. IC, as a vital intangible asset, has been found by Cenciarelli et al. (2018) and Lev (2001) to enhance overall financial health of firms and predict default. Even though some studies have also found that IC is insignificant and doesn't have any relationship with the likelihood of FD in firms. Dalwai & Salehi (2021) have studied the impact of corporate strategy and IC, along with their components, on performance and insolvency risk of non-financial enterprises in Oman. Their study revealed that higher strategy index leads in greater firm performance, and there is a favourable relationship with the efficiency of IC and ROA, ROE, but not with bankruptcy likelihood.

The relationship between IC and the likelihood of FD serves as a pathway to the sustainability of firms. Drawing from the previous literatures, the following hypothesis was brought forward:

H1: IC is significantly associated with the sustainability of corporates.

3. Research Methodology

3.1 Data collection for the study

The study has incorporated BSE 500 listed companies, as they represent a broad set of large and mid-cap companies across various sectors in India, thereby ensuring the generalizability of the results to a broader corporate context. The data for the study were obtained from a secondary database, CMIE ProwessIQ, and the analysis was done using StataMP 13. The companies with incomplete or missing data for key variables during the study period have been omitted from the study to ensure robustness and consistency of panel dataset, resulting in final sample of 4,777 firms' year observations, with data ranging from 2009 to 2025.

3.2 Measurement of variables for the study

3.2.1 Altman Z-Score for Emerging Markets

The core objective of this study is to determine whether IC acts as a catalyst for the sustainability of emerging Indian corporates. The study employed Altman EM_Z_Score as the dependent variable to measure the sustainability of Indian corporates. The Altman Z Score model was proposed by Edward Altman in 1968 and later modified for use in emerging markets

(Altman, 2013). This model utilizes a discriminant analysis technique, which was intended to forecast financial stability as well as the probability of FD within companies.

$$Altman\ EM\ Z_Score = 3.25 + 6.56\ k1 + 3.26k2 + 6.72k3 + 1.05k4$$

Where, "k1 is working capital by total asset, k2 is retained earnings by total asset, k3 is earnings before interest and tax by total asset, and k4 is book value of equity by total liabilities". If Altman EM_Z_Score is greater than 2.60, the company is in safe zone and has high sustainability. If the Altman EM_Z_Score values fall between 2.60 and 1.10, the company is in the grey zone, where sustainability is moderate. If the company performs well, its sustainability will be good; if it performs poorly, there is a chance of FD in future, and company's sustainability will be affected. If the Altman EM_Z_Score is less than 1.10, the company is in danger zone, where its survival is at risk, the likelihood of bankruptcy is high, and its sustainability is low.

3.2.2 Intellectual Capital

Numerous measurement approaches have been proposed in earlier literature for measuring IC in direct and indirect ways. Market capitalisation method, Return on Asset method, Score card method, and direct IC are among them. The study incorporates the direct IC method, Value Added Intellectual Coefficient Model (VAIC model), which was developed by Pulic (2000), and widely regarded for prominent measuring of IC in accounting-based studies (Rani & Sharma, 2023). IC reports are not available for every company; however, the VAIC model is measured using data from publicly available financial statements, which are compiled in line with commonly accepted accounting standards and subject to external audit, therefore, it is reliable for the study. Human capital efficiency (HCE), structural capital efficiency (SCE) and capital employed efficiency (CEE) together constitute the Value-Added Intellectual Coefficient Model.

$$VAIC = HCE + SCE + CEE$$

The study has also incorporated other variables to assess the financial ratios of the firms. Debt service coverage ratio (DSCR) to measure solvency, current ratio (CR) to measure liquidity, return on capital employed (ROCE) to measure profitability, and total asset turnover ratio (TATR) to measure the firm's turnover. Firm age (FAGE) , measured as the logarithm of the year of incorporation, and firm size (FSIZE), measured as the logarithm of total assets, are also considered control variables in the study. Further description on the calculation of variables is provided in Table 1.

3.3 Model specification

This empirical study has utilized a Fixed Effect Model to examine whether IC acts as a catalyst in the sustainability of Indian emerging corporates. The dependent variable Altman EM_Z_Score, and the primary independent variable, IC, along with other variables, for profitability, liquidity, solvency and turnover, and the control variables of FAGE and FSIZE together make the model specific as follows:

$$Altman\ EM\ Z_SCORE_{it} = \beta_0 + \beta_1\ (VAIC_{it}) + \beta_2\ (ROCE_{it}) + \beta_3\ (CR_{it}) + \beta_4\ (DSCR_{it}) + \beta_5\ (TATR_{it}) + \beta_6\ (FAGE_{it}) + \beta_7\ (FSIZE_{it}) + \epsilon_{it}$$

Where 'i' is the firm and 't' is the year, 'ϵ_{it}' is the error term.

The study's conceptual framework is presented in Figure 1.

4. Data Analysis and Interpretation

4.1 Descriptive Statistics

The empirical analysis for this study has begun by addressing the presence of outliers in the dataset. For this, the study underwent a process called winsorizing to remove extreme outliers and normalise the dataset for further analysis. Once the process was completed, descriptive statistics were made. Table 2 depicts the descriptive statistics for selected variable in the study, focusing on minimum and maximum values, as well as the mean and standard deviation of 4777 observations. The dependent variable of the study, Altman EM_Z_Score, had an average value of 4.924, ranging from 0.68 to 9.994, indicating the dispersion in the likelihood of FD among enterprises and their sustainability within the economy. Typically, a value of more than 3 usually indicates firms with a strong potential to be established in the economy, characterised by a high financial position. The minimum and maximum values shown here indicate that while some firms are threatened with existence, others are fully stable and have a very low chance of experiencing FD. The primary independent variable, which measures IC efficiency, shows an average value of 4.021, ranging from -0.326 to 10.01. It shows that while some are good at efficiently utilising their IC, others are underperforming and underutilising it within their organisation. A wide dispersion can be seen in the DSCR variables, which stands for solvency in the firms, with an average of 19.154 that ranges from 0.34 to 105.305. It reveals that even some firms are struggling to cover their debts, while others are overindebted. The TATR, which shows the turnover in the organisation, had a mean of 0.942, with lowest and highest values of 0.005 and 2.982. The metric used for profitability, ROCE, showed an average of 12.478, ranging from -1.508 to 35.876. CR showing an average of 1.606, with lowest and highest values of 0.675 and 3.176, respectively. FSIZE and FAGE show mean values of 3.68 and 1.583, respectively.

4.2 Correlation

Table 3 presents the correlation matrix of selected variables in the study. The dependent variable Altman EM_Z_Score shows moderate correlations with other variables, including the primary independent variable, VAIC. CR and ROCE are the variables that have the highest relations of 0.655 and 0.560 with the dependent variable, respectively, when compared with others. The relationship between CR and EM_Z-score indicates that companies with greater liquidity can lead to the sustainability of firms and a healthy financial condition. A positive correlation with ROCE also indicates that firms with better profitability can lead to a better financial condition and stability, as evidenced by a higher EM_Z_Score. DSCR with 0.350 also exhibits moderating relationship with EM_Z_Score, suggesting, firms with higher values of Altman EM_Z_Score will be better able to cover their financial obligations. FSIZE alone shows negative relationship with EM_Z_Score, with a value of -0.299. VAIC have a positive correlation with DSCR and ROCE, with values 0.059 and 0.109, respectively, while others have a negative correlation. FSIZE shows negative correlation with almost all the variables, whereas FAGE has a positive correlation with all the variables except VAIC. The correlation matrix indicates no multicollinearity among the key variables, suggesting that the dataset is suitable for further regression analysis.

4.3 Regression

The study employed panel data regression for the analysis. The details shown in Table 4 represent the result of Fixed Effect Model. Across the model, VIF values for all independent variables were below 3, with a mean VIF of 1.31, indicating that there is no multicollinearity across selected variables. The selected predictors are not highly correlated with each other, and there is no concern about using them in regression analysis.

As the study relied on panel data, the primary analysis focused on determining whether to use Pooled OLS, Fixed Effects Model (FEM), or Random Effects Model (REM) for this study. For this, Bruesch pagan test was done, and it resulted a p-value less than 0.05, indicating to use FEM or REM instead of Pooled OLS for the study. Afterwards, the Hausman test was conducted to determine whether to use FEM or REM, and a p-value of less than 0.05 indicated rejection of the alternative hypothesis and suggested using FEM for the study.

Table 4 overviews the results of FEM, which provides valuable insight into the determinants of the dependent variable, Altman EM_Z_Score. The dependent variable accounts for approximately 43% of variance in the model, which attributes the independent variable, and the overall p-value below 0.05, confirms model is statistically supported. The analysis explored the relationship between Altman EM_Z_Score and VAIC, which is significantly positive (see the Figure 2.). This evidenced to discard null hypothesis and accept H1. The β value of 0.23 indicates, a one-unit increase of VAIC leads to 0.023 unit increase of Altman EM_Z_Score. This typically suggests an increase in the change in risk associated with the sustainability of firms and likelihood of FD. A significant negative relation among leverage and dependent variable is found from the analysis. DSCR, with -0.002 β value and p-value below 0.05, conveys an increase in leverage gradually associates to a decrease of EM_Z-Score. If debt coverage by firms decreases, there is a chance of risk rise for FD which ultimately affects sustainability of firms. Similarly, a significant negative relationship is observed for FSIZE, having -0.295 of β and a p-value below threshold. This indicates an increase in FSIZE associates less EM_Z_score value, suggesting higher risk of FD. This could be due to the fact that larger firm tends to have increased complexity, which could potentially cause the company to struggle in maintaining its performance and sustainability. TATR is positively significant with Altman EM_Z_Score having β value of 0.315 and p-value below threshold. This suggests that a one-unit increase of turnover causes a 0.315-unit increase of EM_Z_score. This indicates that turnover is also one of the key indicator in determining sustainability of firms. Efficient utilisation of assets is needed for healthy and stable firms. A positive and considerable relationship of ROCE ($\beta = 0.053$, $p < 0.01$) with dependent variable is notable. This typically indicates that an increase in capital efficiency within the company helps achieve better financial health and lower the chance of FD, thereby enabling the company to stabilise and sustain itself in the economy. Similarly, a notable positive significance of CR with β value of 1.019 and p-value below 0.01 is evident. This indicates, the companies with higher liquidity typically help in minimizing financial risk and improving financial stability within the organization. Though it also have a major role in financial stability of the firms. FAGE also shows a positive and considerable relationship with EM_Z_Score ($\beta = 0.814$, $p < 0.01$). This suggests that as the age of the firm increases, it becomes more likely to survive in the economy, and older firms are generally more stable than younger ones. It may be due to the fact that they are more mature and have the experienced to withstand previous complex circumstances.

5. Findings and Conclusion

This study strives to analyse whether ICl acts as a catalyst for the sustainability of Indian emerging corporates that are listed on the BSE from 2009 to 2025, using the Fixed Effects Model. The study is grounded in the theoretical framework of the Resource-Based View theory. The findings revealed that IC has positive and significant relationship with Altman EM_Z_Score, This proves that ICly efficiency in firms typically helps in serving the and act as a catalyst for the sustainability of Indian emerging corporates. The findings of the study are aligned with those of Khurana & Sharma (2024) and Cenciarelli et al. (2018), who demonstrated the effectiveness of IC enhancing financial stability of firms, thereby reducing the likelihood of FD (Festa et al., 2020; Nawaz, 2017; Shahwan & Habib, 2020). The efficiency of intangibles, such as IC, is a dominant factor in financial stability and sustainability of firms. As we live in a knowledge-based economy, placing greater importance on these intangible assets and utilising them with utmost care and effectiveness can help firms perform well and remain healthy. The emergence of greater economic competitiveness is evident today. Firms are compelled to compete with others in this era, and adopting measures to efficiently utilize IC within firms can help them withstand this situation. The study also emphasises the significance of profitability, liquidity, and turnover as key determinants of firm's sustainability (Festa et al., 2020; Kliestik et al., 2020). Giving higher priority to financial indicators, along with IC, can help firms achieve sustainability.

Overall, the study highlights that IC serves not only as a buffer against FD but also as a strategic resource whose impact varies based on the firm's existing health. The study validated the importance of intangible assets and considers them to be strategic ones that yield improvements and betterment of the firm’s financial stability. Regulators and policymakers can encourage this, and investors and creditors can also adopt the utilisation of IC to improve risk minimisation and make more informed, efficient financial decisions. Although the study is relevant in this era, the model could be made more approachable by including additional variables in the study. Further research can explore non-financial variables that affect the sustainability of corporates, such as corporate governance and CSR. The external risk, such as a global crisis, that may affect the overall global market and have an impact on the existence of firms, can also be studied in future papers. The emergence of artificial intelligence can also be considered in future studies, which may contribute to the study of improved firm performance and corporate sustainability.

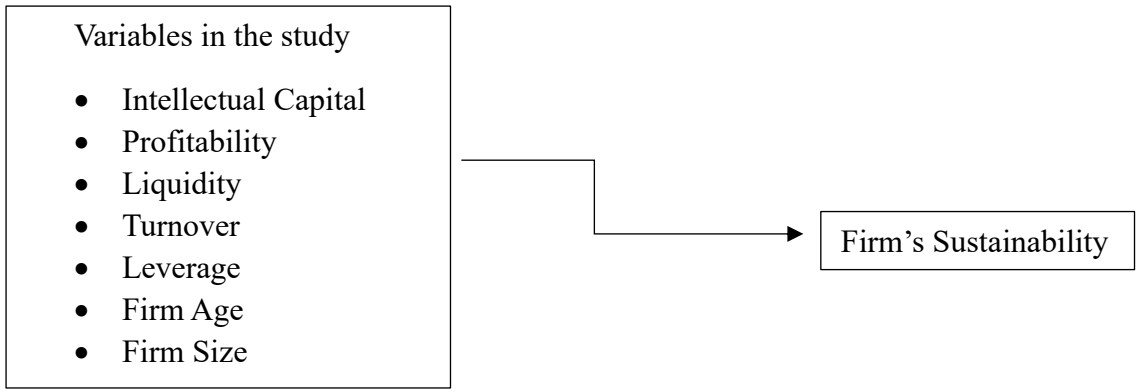


Figure 1: Conceptual framework of the study

Source(s): Authors' creation

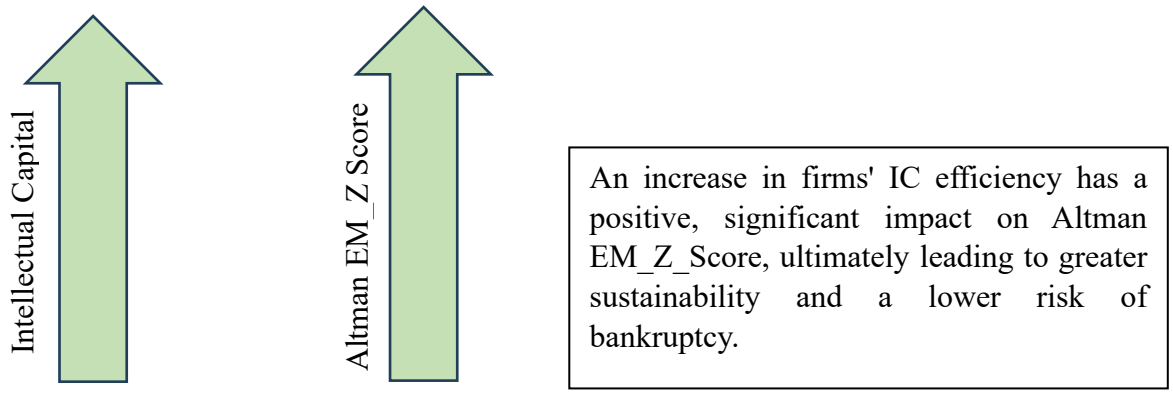


Figure 2. Picturization of the influence of IC on firm’s sustainability

Source(s): Authors’ creation

Table 1. Variables measurements

Dimension	Formulas
Dependent Variable:	
Sustainability of the firms	
Altman EM_Z_Score=3.25+6.56 k1+3.26k2+6.72k3+1.05k4	
k1	Working capital to total assets
k2	Retained earnings to total assets
k3	Earnings before interest and tax to total assets
k4	Book value of the equity to total liability
Independent Variables:	
Intellectual Capital (IC)	
VAIC = HCE+SCE+CEE	
Human Capital Efficiency (HCE)	Value Added/ Human Capital
Structural Capital Efficiency (SCE)	Structural Capital/ Value Added
Capital Employed Efficiency *(CEE)*	Value Added/ Capital Employed
Value Added	Operating Profit + Employee cost + depreciation + amortization
Human capital	Employee cost
Structural Capital	Value Added-Human capital
Capital employed	Book value of net asset
Profitability (ROCE)	Return on capital employed
Liquidity (CR)	Current ratio
Leverage (DSCR)	Debt service coverage ratio
Turnover (TATR)	Total asset turnover ratio
Control variables:	
Firm age (FAGE)	Natural log of years after incorporation
Firm size (FSIZE)	Natural log of total asset

Source(s): Authors' creation

Variables	Mean	Std. Dev.	Min	Max
DSCR	19.154	33.717	0.34	105.305
TATR	0.942	0.626	0.002	2.982
ROCE	12.478	9.724	-1.508	35.876
CR	1.606	0.784	0.675	3.176
VAIC	4.021	3.068	-0.326	10.01
EM_Z_Score	4.924	1.687	0.68	9.994
FSIZE	3.68	0.609	2.674	4.908
FAGE	1.583	0.217	1.176	1.949
Observations	4777			

a. Dependent Variable: EM Z Score

Table 2. Descriptive statistics (Author's calculations)

Variables	EM_Z_SCORE	VAIC	DSCR	TATR	ROCE	CR	FSIZE	FAGE
EM_Z_SCORE	1.000							
VAIC	0.034	1.000						
DSCR	0.350	0.059	1.000					
TATR	0.257	-0.028	0.078	1.000				
ROCE	0.560	0.109	0.475	0.413	1.000			
CR	0.655	-0.028	0.426	-0.056	0.302	1.000		
FSIZE	-0.299	-0.012	-0.095	-0.260	-0.167	-0.132	1.000	
FAGE	0.058	-0.226	0.063	0.067	0.045	0.085	0.164	1.000

Table 3. Correlation matrix of variables (Author's calculation)

EM_Z_Score	Coef.	St.Err.	t-value	p-value	Sig
VAIC	.023	.005	4.41	0	***
DSCR	-.002	.001	-2.98	.003	***
TATR	.315	.051	6.21	0	***
ROCE	.053	.002	23.79	0	***
CR	1.019	.024	41.97	0	***
FSIZE	-.295	.079	-3.73	0	***
FAGE	.814	.304	2.68	.007	***
Constant	2.067	.365	5.66	0	***
Mean dependent var (EM_Z_Score)	4.924		SD dependent var (EM Z_Score)		1.687
R-squared	0.429		Number of obs		4777
F-test	481.301		Prob > F		0.000

*** p<.01, ** p<.05, * p<.1

Table 4. Fixed Effect Model result (Author's calculation)

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