

THE MEDIATING IMPACT OF INTELLECTUAL CAPITAL ON THE RELATIONSHIP BETWEEN CORPORATE GOVERNANCE & FINANCIAL PERFORMANCE: A STUDY OF INDIAN CONSTRUCTION AND ENERGY SECTOR COMPANIES

PANKAJ ANAND¹*, JITENDRA KUMAR², HARISHANKAR VIDYARTHI³ and SUBHADEEP MUKHERJEE⁴

 ^{1,2}Department of Management Studies, Sikkim Manipal Institute of Technology, Majhitar, Sikkim Manipal University, Gangtok, Sikkim, India.
 ³Department of Management Studies, Institute of Public Enterprise, Hyderabad.
 ⁴Faculty of Management & Commerce, Ramaiah University of Applied Sciences, Bangalore.
 *Corresponding Author Email: Pankajjhaanand@gmail.com

Abstract

Purpose: The present study investigates the moderating impact of Intellectual capital over the association between corporate governance and Firm performance among the listed Indian construction and energy firms. **Design/methodology/approach**: The current study employs data of 45 Indian construction and energy sector companies from 2014 to 2021. Panel Corrected Standard Error regression analysis is employed to analyse the relationship. **Findings:** The current research indicates that corporate governance does not significantly impact firm performance, while Intellectual capital is proven to have a substantial impact over firm performance. However moderating impact of Intellectual capital on corporate governance – firm performance is insignificant. **Originality/Value:** The present study extensively examines how Intellectual capital (IC) mediates the association among corporate governance and firm performance in listed Indian construction and energy firms.

Keywords: Intellectual Capital, Corporate Governance, Firm Performance, Construction, Energy.

INTRODUCTION

An effective corporate governance is important for achieving firm's long-term goals, and is vital for the continued trust among stakeholders, including investors, customers, employees, and the public (*Arora & Bodhanwala, 2018; Hamdan et. al., 2017*). It is a set of principles and practices that guide how a company is directed, managed, and controlled to ensure accountability, transparency, and ethical conduct (*Wondem & Batra, 2019*).

Corporate governance principles in India have evolved significantly in recent years. In 1999, SEBI established the Birla Committee on corporate governance, chaired by Kumar Mangalam Birla, with the objective of enhancing corporate governance practices among Indian companies.

The committee proposed a set of recommendations, addressing key aspects such as the board composition, the role of audit committees, and standards for corporate disclosures. Based on the Birla committee report, Indian Companies Act, 2013, and the Securities and Exchange Board of India (SEBI) have introduced various regulations to improve corporate governance practices in Indian companies (*Arora & Sharma, 2015*). The corporate governance principles include transparency, accountability, board of directors, ethics and values, and risk management (*Bijalwan, 2012*).

Corporate governance gives us multiple ways in which stakeholders of a company controls the management decisions in such a way that their interests are met *(John & Senbet, 1998)*. *Sheikh & Wang (2012)* found out that the countries with a good corporate governance



mechanism in place have experienced growth in their corporate sector and therefore have always attracted capital and investment. *Bonn et al (2004)* emphasized that the vital element in maintaining the shareholder's confidence in CG is the role of board structure, which can ultimately lead to the attainment of optimal financial performance and sustained market growth.

Furthermore, various previous researchers (*Darko et al., 2016; Ciftci et al., 2019*) have confirmed an incremental impact of various CG practices on the firm performance in developing / emerging economies. Past researchers have used Board Size, Audit Committee, Boards Gender Diversity, Board Meeting and Board Independence as factors of corporate governance (*Drobetz et al., 2003; Gemmill & Thomas, 2004; Almaqtari, et al., 2020*).

An organisation is distinguished by their unique resource capacity, and Intellectual capital these days plays a vital role in increasing the unique resources (*Marr et al, 2003*). Physical capital consists of tangible assets such as land, labour, and capital, while intellectual capital encompasses knowledge-based assets that an organization owns or controls, contributing to value creation for key stakeholders (*Alipour, 2012*).

Intellectual capital includes human capital (HC), brand name, corporate reputation, Intellectual Property, customer relations, organizational processes, patents and innovation. Intellectual capital is regarded as a critical factor in the highly competitive modern landscape. *Makki and Lodhi, 2014,* recognizes intellectual capital as essential for a company's competitiveness across all industries and suggests that it may serve as the most critical factor in determining corporate performance.

According to Marr et al. (2003), organizations must identify, develop, and effectively utilize their intellectual capital to achieve a competitive edge. In the increasingly competitive knowledge-based environment, the significance of intellectual capital grows substantially, as it helps in building and maintaining a competitive advantage over competitors, thus increasing the firm performance (*Vishnu & Gupta, 2014*).

Different companies have different factors contributing to its operational efficiency, thus assessing their performance remains a challenging task. The study takes ROA (Return on Assets) and ROE (Return on Equity) as the measures of firm performance (FP). Previous studies on intellectual capital and firm performance were relatively equivocal, with few researchers discovering that the intellectual capital has a favourable influence on firm performance (*Clarke et. al., 2011; Hamdan et al. 2017; Singla, 2019 add recent papers*) while a few others concluded that intellectual capital had no or very little influence on firm performance (*Firer & Williams 2003; Shiu 2006; and Chan 2009*).

The present study aims to examine various aspects related to intellectual capital, corporate governance and firm performance in the construction and energy sectors. Specifically, it seeks to analyse the moderating impact of intellectual capital on the association among corporate governance and firm performance. To address these research objectives, the study utilizes data spanning eight years, from 2014 to 2021, focusing on companies listed within the BSE 500 that operate in India's construction and energy industries.

This study offers four key contributions to the existing literatures. First, it examines how intellectual capital serves as an intermediary in the association among corporate governance and firm performance. Second, it explores how different components of intellectual capital impact corporate governance and firm performance, specifically in the construction and energy sectors, addressing gaps in prior research *(Schaeffer, 2015; Islam & Khan, 2017; Berardi, 2017).*





Third, it stands out as one of the first to examine this relationship in the Indian context for these industries. Lastly, the study adopts the Modified VAIC (MVAIC) model, which includes relational capital as an additional measure (*Vidyarthi, 2019; Xu & Li, 2020; Ge & Xu, 2020; Tiwari et al., 2023*). The findings offer practical insights to business leaders in these sectors aiming to enhance firm performance by effective utilization of their intellectual capital.

The construction and energy sectors are integral to the economic growth and development of India, each playing a pivotal role in GDP contribution, employment generation, and industrial support. The construction sector, accounting for approximately 8-9% of the GDP and employing over 70 million individuals, drives key infrastructure development that strengthens foundational industries such as cement and steel. This sector also attracts substantial domestic and foreign investment, aided by government initiatives that aim to modernize and expand infrastructure.

Meanwhile, the energy sector is indispensable for sustainable economic progress, as it ensures a stable and efficient energy supply essential for industrial and economic stability. Given its capital-intensive nature, the energy sector requires targeted investment and informed policy support to maintain energy security and optimize resource allocation. Collectively, these sectors form a robust economic framework, guiding policy and investment strategies that are vital for India's long-term economic sustainability and industrial resilience.

The study has been arranged as follows: In Section 2, the researchers have highlighted key findings of prior studies to shape up the present study. Section 3 outlines the methodology adopted for the study. Section 4 provides results obtained from the various analysis employed for the study. Section 5 is the conclusion for the present study, including the managerial implications, along with limitations and future scope of the study.

LITERATURE REVIEW

The Knowledge-Based View (KBV) emphasizes knowledge as a key driver of a firm's competitive advantage, focusing on how organizations create, share, and apply knowledge to remain adaptive and innovative. Intellectual capital, particularly employee skills and expertise, plays a central role in this process (*Tiwari et al., 2023; Smriti & Das, 2021; Ge & Xu, 2020; Vidyarthi, 2019; Nadeem et al., 2017)*. Complementing this, Stakeholder Theory argues that sustainable success requires addressing the interests of all stakeholders not just shareholders, by fostering strong relationships with employees, customers, suppliers, and communities (*Freeman, 1984; Carroll & Shabana, 2010*).

2.1 Association between corporate governance and firm performance:

Previous literature reviews suggest that the academicians are yet to reach any unanimity over the association among CG and firm performance. Few research found that, CG has a major impact on firm performance, (Drobetz et al., 2003; Gemmill & Thomas, 2004; Almaqtari, et al., 2020) while others demonstrate almost no relationship among corporate governance and firm performance (Tiwari & Arora, 2024; Sueyoshi et al., 2010; Bauer et al., 2010). Even studies without clear conclusions demonstrate that CG has a tangential impact on business performance (Maassen, 1999). These contradictory findings underscore the need for further research into the CG and firm performance dynamics.

Wu et. al., (2012) suggested that communication challenges among board members may arise due to an increase in the size of the board, potentially leading to inefficiencies that negatively affect firm performance.





Tusiime et al., (2011) concluded that a larger number of executive directors tends to have a negative impact over the firm performance. *Isola et. al., (2020)* focused on female's boardroom participation, IC efficiency and firm performance in developing countries, using the data of 14 banks listed on NSE during the year 2008 to 2017. The researchers found that board participation of females have insignificant impact on bank's performance. As the previous results are inconclusive, the following hypothesis is proposed:

H1: Corporate governance has a significant and positive impact on firm performance.

2.2 Mediating impact of intellectual capital on the relationship between corporate governance and firm performance.

Literature suggest that previous studies have focussed on either intellectual capital and firm performance (*Pedro et al. 2018*; *Abeysekera & Guthrie, 2005; Weimer & Pape, 1999*) or corporate governance and firm performance (*Almaqtari, et al., 2020; Alves & Mendes, 2004; Gemmill & Thomas, 2004; Drobetz et al., 2003*) or intellectual capital and corporate governance (*Kamath, 2019; Nadeem et. Al., 2019; Appuhami & Bhuyan, 2015; Mubaraq & Haji, 2014*) across various sectors and nations. However, studies analysing the dynamics between the intellectual capital, corporate governance and firm performance have been very rare. Limited research has collectively addressed all three topics within a single study.

Chen et al. (2021) examined the correlation between human resource development (HRD) practises (developmental, constructive, and collaborative HRD practises), IC attributes (human capital, organisational capital, and social capital), and an increase in organisational performance using an intellectual capital-based perception. Their findings suggests that the human capital and social capital serve as a linkage among the HRD practises components. There has been a growing interest in the impact of intellectual capital over CG and firm performance. Intellectual capital is found to have a direct influence on both corporate governance and firm performance (*Subramanian & Vrande, 2019*). Companies that invest in developing their intellectual capital are expected have a positive impact on corporate governance and financial performance (*Aslam & Haron, 2020*).

Furthermore, intellectual capital mediates the influence of CG on firm performance. The influence of intellectual capital on corporate governance and financial performance is mediated by several factors, including the company's culture, leadership, and human resource management practices (*Aslam & Haron, 2020; Titisari, 2018*).

Intellectual capital helps to enhance corporate governance by making available companies with the knowledge and expertise they require for decision making, manage risks effectively, and improve their products and services. It also helps to improve financial performance by increasing productivity, reducing costs, and enhancing innovation *(Subramaniam & Vrande, 2019)*.

The mediating impact of corporate governance over the relationship among intellectual capital effectiveness and financial, operational, and market performance was explored by *Hamdan et. al.*, in 2017. The study made use of a combined dataset of 171 companies listed during 2012 and 2014 on Saudi Stock Exchange. Only human capital efficiency showed a positive effect on firm performance, while both capital employed efficiency and structural capital efficiency have a positive impact on operational performance, as per the researchers.

H2: Intellectual capital has a positive and significant impact over the relationship between corporate governance and firm performance.





3. DATA AND METHODOLOGY

We have employed the BSE listed construction and energy firms data over the year 2014-2021. The following variables are used:

3.1 Measures of corporate governance:

3.1.1. Board Size: *Tusimme et. al., (2011)* found out that most of the firms have a moderate board size of 9-12, this aligns with the findings of *Gunawan & Widodo, 2022* and *Mak & Kusnadi, (2005)*. Also, communication between the board of directors could be one issue as due to an increased number of directors, they might not be able to communicate with each other very effectively, which might affect the Firm performance (*Wu et al., 2012*).

3.1.2. Board Independence: A firm's board comprises of both internal and external directors. *Wu et al. (2012),* concludes that the presence of both internal and external directors is very important for a good CG in any organisation. *Tusiime et al., (2011)* found that a large proportion of executive directors is negatively associated with the firm performance.

3.1.3. Board Gender Diversity: Prior researchers have found mixed findings on the impact of female representation on corporate boards. Few researchers found that the inclusion of female directors have a positive impact over IC efficiency of the firm (*Smriti & Das, 2021; Nadeem et. al., 2019*) whereas *Isola et. al., (2020)* found that female board participation has an insignificant effect on bank performance, whereas intellectual capital efficiencies exhibit a positive contribution to overall performance.

Table 2: Variables Used Description:

Firm performance (Dependent variables): As the dependent variable, the following two accounting measures are employed –

1) ROA (Return on Assets)- It demonstrates a firm's competency to utilise its total assets to gain profits (*Tiwari & Arora, 2024; Gunawan & Widodo, 2022; Suzan and Sabila 2022*).

2) ROE (Return on Equity)- ROE is the ratio of total income to shareholders' equity (*Tiwari & Arora, 2024; Gunawan & Widodo, 2022; Ge & Xu, 2020; Isola et. al., 2019*)

Moderating Variables (Interaction terms):

We have used three measures of corporate governance namely – Board Size (BSIZE), Board Independence (BIND) and Board Gender Diversity (BGEND). As an interaction term between intellectual capital and corporate governance, the below given proxy measures have been used:

Interaction terms: CG*IC

Where, CG measures include - BSIZE, BIND and BGEND, IC measures includes- VAIC and MVAIC.

Control variables: We have used Leverage, Size and Asset tangibility as control variables for the current study:

- Leverage (LEV): The proportion of total liabilities to total asset gives the total value of Leverage. (*Appuhami & Bhuyan, 2015; Shahwan & Fathalla, 2020*).
- **SIZE:** SIZE is determined using the natural logarithm of total assets. (*Alipour, 2012; Fathalla, 2020; Aslam, 2020; Shahwan & Xu & Li, 2020.*)
- Asset Tangibility: It is the ratio between Fixed assets and Total assets (*Chambers & Cifter*, 2022; *Smriti & Das*, 2018)





Independent Variables:

VAIC (Value Added intellectual capital) Framework: A firm's intellectual capital can be assessed using the VAIC framework. The VAIC framework was first established by *Pulic (2000, 2004)*. The VAIC approach calculates a company's asset value and overall intellectual capital efficiency using financial report data. The management may use this approach to make better, and more informed decisions. Various literatures (*Smriti & Das, 2018, 2021; Vidyarthi, 2019, Alipour, 2012; Xu & Li, 2020)* have employed VAIC as a measure of intellectual capital. It can also be utilised by stakeholders to know more about the company's intangible assets.

The VAIC method emphasizes assessing the relative contribution of intellectual, physical, and financial capital to value creation. VAIC is calculated as follows:

Where, SCE is the Structural Capital Efficiency; HCE is the Human Capital Efficiency; CEE is the Capital Employed.

Drawbacks of VAIC model: Despite its benefits, VAIC has received criticism from a few academicians (*Vidyarthi, 2019; Ge & Xu, 2020; Xu & Li, 2020*). Previous study discovered that the VAIC framework ignores the firm's relational assets. In accordance with other researchers (*Ge & Xu, 2020; Xu & Li, 2020; Tiwari et al, 2023*), the current researchers attempted to overcome the aforementioned shortcomings by using the RCE (Relational Capital Efficiency) along with the VAIC to calculate the Modified Intellectual capital, because retaining positive relationships with existing clients along with acquiring new customers is a critical aspect of enhancing firm performance. RCE is calculated as:

RCE=RC/VA,

Where, RC=Marketing, Selling or Advertising expenses. Thus, the Intellectual capital using the MVAIC model is calculated as:

$$MVAIC = VAIC + RCE,$$

$$MVAIC = HCE + SCE + CEE + RCE$$

To get precise and robust outcomes, researchers employed the MVAIC model with the VAIC framework.

Table 3: Models for Panel Estimation:

Firm performance $_{i,t} = CG_{i,t} + LEV_{i,t} + SIZE_{i,t} + Asset Tangibility_{i,t} + \varepsilon_{it}$ (H1)	
Firm performance $_{i,t} = CG_{i,t} + IC_{i,t} + Interaction term_{i,t} + LEV_{i,t} + SIZE_{i,t} + Asset Tangibility_{i,t} + \varepsilon_{i,t}$	(H2)

Source: Author's Compilation

5. EMPIRICAL RESULTS

Table 5.1 shows the descriptive statistics, i.e. Mean, Std. deviation, minimum and Maximum values of each variables employed for the current study. Here, we found that the mean value for BSIZE, BIND and BGEND are 9.6, 0.44 and 0.117 respectively. Also, we find that the mean values of VAIC and MVAIC are 8.142 and 8.192 respectively, which suggests that the sampled companies are able to generate \gtrless 8.142 and \gtrless 8.192 for every \gtrless 1 invested. HCE (mean value – 6.952) is found to be the highest contributor to the IC, whereas RCE (mean value – 0.05) being the lowest contributor.



Variable	Obs	Mean	Std. Dev.
ROA	352	0.046	0.063
ROE	352	-0.082	3.491
BSIZE	352	9.06	4.096
BIND	352	0.44	0.309
BGEND	352	0.117	0.096
VAIC	352	8.142	6.739
MVAIC	352	8.192	6.731
HCE	352	6.952	6.493
SCE	352	0.79	0.621
CEE	352	0.4	0.985
RCE	352	0.05	0.272
LEV	352	0.143	0.143
SIZE	352	9.19	1.55
AssetTangibility	352	0.29	0.386

Table 5.1: Panel A: Descriptive Statistics:

Source: Author's compilation

A State

Table 5.1: Panel B: Correlation matrix

Variables	Min	Max	ROA	ROE	BSIZE	BIND	BGEND	VAIC	MVAIC	HCE	SCE	CEE	RCE	LEV	SIZE	Asset Tangibility
ROA	-0.472	0.266	1													
ROE	-65.32	0.902	0.38	1												
BSIZE	0	22	-0.04	-0.02	1											
BIND	0	5	-0.04	0.003	0.233	1										
BGEND	0	1	-0.04	-0.05	0.06	0.599	1									
VAIC	-5.459	40.47	0.295	0.055	0.057	0.038	0.046	1								
MVAIC	-5.002	40.47	0.293	0.049	0.06	0.019	0.035	0.999	1							
HCE	-6.073	39.16	0.282	0.048	0.071	0.028	0.035	0.985	0.987	1						
SCE	-5.609	6.016	0.011	0.039	-0.027	0.172	0.081	0.203	0.176	0.12	1					
CEE	-8.478	12.01	0.153	0.035	-0.065	-0.04	0.03	0.218	0.219	0.08	-0.01	1				
RCE	-3.055	1.119	-0.06	-0.15	0.079	-0.45	-0.278	-0.05	-0.009	0.01	-0.65	0.008	1			
LEV	0	0.654	-0.36	-0.13	0.092	0.087	0.06	0.113	0.111	0.13	0.037	-0.09	-0.06	1		
SIZE	-2.996	13.79	-0.24	-0.02	0.453	0.082	-0.035	0.061	0.061	0.07	0.027	-0.03	0.003	0.39	1	
Asset Tangibily	-4.673	2.24	0.149	0.039	0.064	-0.26	-0.134	0.091	0.108	0.14	-0.48	0.009	0.405	0.03	0.1	1

Source: Author's compilation





Correlation matrix was used for multicollinearity testing in the data set. Panel B does not exhibit high correlation among the variables.

All the values are below 0.70, confirming no multicollinearity in the selected dataset (*Tiwari & Arora, 2024*).

VAIC and MVAIC are found to have strong positive correlation with each other. The corporate governance proxies – BSIZE and BGEND showed negative correlation with both ROA and ROE.

5.2: Relationship between Corporate governance and Firm performance (H1):

A Panel Corrected Standard Error (PCSE) regression analysis is conducted to examine the association among CG and firm performance. CG was measured using board size (BSIZE), board independence (BIND), and board gender diversity (BGEND), while firm performance was assessed through return on assets (ROA) and return on equity (ROE).

Additionally, leverage (LEV), firm size (SIZE), and asset tangibility are included as control variables. The results show that ROA does not exhibit a significant association with any of the corporate governance measures.

However, for ROE, BSIZE and BGEND demonstrate a significant negative effect at the 1% confidence level, whereas BIND has a significant positive impact at the 5% confidence level. Furthermore, leverage showed a significant negative influence on both ROA and ROE at the 1% confidence level.

		ROA			ROE	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
BSIZE	0.0003			-0.049***		
BIND		0.006			0.37**	
BGEND			-0.018			-2.152***
LEV	-0.135***	-0.135***	-0.136***	-10.769***	-10.641***	-10.971***
SIZE	-0.002	-0.002*	-0.002	0.126*	0.091	0.11
Asset Tangibility	0.013	0.014	0.012	0.41**	0.513**	0.236**
Constant	0.075***	0.074***	0.079***	-0.122	-0.396	-0.122
R-Squared	0.169	0.178	0.177	0.07	0.068	0.074

Table 5.2: Regression results:

Source: Author's compilation

5.3: Moderating impact of intellectual capital over the relationship between corporate governance and firm performance (H2):

In this analysis, BSIZEVAIC and BSIZEMVAIC are introduced as interaction terms alongside the corporate governance measure BSIZE.

Additionally, for the subcomponents of VAIC and MVAIC, the interaction terms BSIZEHCE, BSIZESCE, BSIZECEE, and BSIZERCE are utilized. BSIZE was not found to have a significant effect on ROA.

However, both VAIC and MVAIC exhibit a positive and significant influence on ROA. Among the subcomponents, HCE demonstrates a positive and significant relationship with ROA when analysed independently, without interaction terms.

Conversely, RCE shows a significant but negative association with ROA. The relatively lower R-squared value aligns with the findings of Tiwari and Arora (2024).





	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
BSIZE	0	-0.001	0	-0.001	0	-0.001	0	0.007*
VAIC	0.003***	0.002*						
BSIZEVAIC		0						
MVAIC			0.002***	0.002				
BSIZEMVAIC				0				
HCE					0.003***	0.002	0.003***	0.001
SCE					0.007***	0.005	-0.001	0.062*
CEE					0.001	0.004	0.001	0.004
RCE							-0.035**	0.044
BSIZEHCE						0		0*
BSIZESCE						0		-0.011*
BSIZECEE						0		0
BSIZERCE								-0.014**
LEV	-0.151***	-0.149***	-0.151***	-0.149***	-0.148***	-0.148***	-0.141***	-0.134***
SIZE	-0.004**	-0.004**	-0.004**	-0.004**	-0.004***	-0.005***	-0.005***	-0.004**
Asset Tangibility	0.014	0.014	0.013	0.013	0.018**	0.019*	0.023*	0.013
Constant	0.078***	0.082***	0.079***	0.082***	0.076***	0.08***	0.081***	0.037*
R-Squared	0.19	0.191	0.186	0.187	0.197	0.189	0.223	0.239

Table 5.3: Panel A: ROA = f (BSIZE + VAIC / MVAIC + Interaction term + LEV + SIZE + Asset Tangibility)

Source: Author's compilation

The findings indicate that intellectual capital has a significant and positive influence on firm performance. However, the interaction terms incorporating the corporate governance measure (BSIZE) do not show a significant impact on firm performance. Table 5.3, Panel B presents the results for return on equity (ROE) as a component of firm performance, with board size representing corporate governance. The findings reveal that board size has a significant but negative effect on ROE. In contrast, intellectual capital measures, VAIC and MVAIC, exhibit a positive and significant impact on ROE. Among the interaction terms, BSIZEVAIC shows a small but significant impact on ROE. Regarding the subcomponents of VAIC and MVAIC, human capital efficiency (HCE) is found to have a significant effect on ROE. Among the control variables, leverage has a significant negative impact on ROE, whereas asset tangibility demonstrates a significant positive effect.

Table 5.3: Panel B: ROE = f	(BSIZE + VAIC / MVAIC + Interaction term + LEV +
	SIZE + Asset Tangibility)

ROE * BSIZE												
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8				
BSIZE	-0.07***	-0.09***	-0.069***	-0.086***	-0.067***	-0.244***	-0.024	0.367**				
VAIC	0.104***	0.069***										
BSIZEVAIC		0.004*										
MVAIC			0.093***	0.062***								
BSIZEMVAIC				0.004								
HCE					0.09***	0.101***	0.112***	0.022				
SCE					0.446**	-1.043**	-0.346	2.455*				
CEE					0.004	-0.501*	-0.026	-0.078				
RCE							-3.911***	1.951				
BSIZEHCE						-0.001		0.012**				
BSIZESCE						0.229***		-0.542**				
BSIZECEE						0.055		0.002				
BSIZERCE								-1.17***				
LEV	-10.997***	-10.851***	-10.962***	-10.796***	-10.932***	-10.637***	-10.937***	-8.563***				
SIZE	0.097	0.07	0.103	0.073	0.079	0.046	0.037	0.133				
Asset Tangibility	0.327**	0.329*	0.306**	0.308**	0.66**	0.572**	1.268**	0.458				
Constant	-0.304	0.059	-0.29	0.074	-0.432	1.039	0.325	-2.13				
R-Squared	0.08	0.08	0.078	0.078	0.083	0.087	0.138	0.188				

Source: Author's compilation





The results suggests that CG has a significant but negative impact over firm performance and IC has a significant and positive impact over firm performance. The interaction terms are showing mixed results.

Table 5.3, Panel C provides results for Board Independence as a measure of corporate governance and ROA as a measure of firm performance. The result suggests that Board Independence has no impact over ROA. Also, the result depicts that VAIC and MVAIC have a significant and positive impact over ROA at 1% confidence level. Among the subcomponents of IC, HCE and SCE has a significant and positive impact over ROA. The interaction terms does not show impact over ROA. Among the control variables, Leverage and SIZE are found to have a significant but negative impact over ROA, whereas Asset Tangibility has a positive impact over ROA.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
BIND	0.007	0.008	0.008	0.008	0.006	0.026	-0.008	0.088***
VAIC	0.003***	0.003***						
BINDVAIC		0						
MVAIC			0.003***	0.003***				
BINDMVAIC				0				
HCE					0.003***	0.003***	0.003***	0.002**
SCE					0.007***	0.011***	-0.002	0.042***
CEE					0.001	0	0.001	0
RCE							-0.04*	-0.027
BINDHCE						-0.001		0.001
BINDSCE						-0.008		-0.102***
BINDCEE						0.004		0.003
BINDRCE								-0.06**
LEV	-0.152***	-0.151***	-0.152***	-0.151***	-0.149***	-0.151***	-0.14***	-0.135***
SIZE	-0.004***	-0.004***	-0.004***	-0.004***	-0.005***	-0.005***	-0.004***	-0.005***
Asset Tangibility	0.016*	0.016*	0.015*	0.015*	0.02**	0.019**	0.022**	0.021*
Constant	0.076***	0.075***	0.076***	0.076***	0.074***	0.068***	0.087***	0.055***
R -Squared	0.195	0.195	0.191	0.191	0.202	0.199	0.228	0.234

Table 5.3: Panel C: ROA = f (BIND + VAIC / MVAIC + Interaction term + LEV + SIZE + Asset Tangibility)

Source: Author's compilation

The results suggest no impact of corporate governance over firm performance. And a significant impact of IC over firm performance.

Table 5.3 Panel D presents the results for board independence (BIND) as a measure of corporate governance and return on equity (ROE) as an indicator of firm performance. The findings suggest that board independence has a significant and positive effect on ROE. Similarly, intellectual capital measures, VAIC and MVAIC, also exhibit a significant positive impact on ROE at the 1% confidence level.

However, the interaction terms demonstrate a significant but negative influence on ROE. Among the subcomponents of IC, human capital efficiency (HCE) shows a significant positive effect on ROE at the 1% confidence level, while relational capital efficiency (RCE) has a significant negative impact.

Furthermore, within the interaction terms, BINDHCE is found to have a significant but negative association with ROE. Regarding the control variables, leverage has a significant negative impact on ROE, whereas asset tangibility exerts a positive influence.





	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
BIND	0.44	0.934***	0.459*	0.635***	0.343	2.078**	-1.604***	1.849
VAIC	0.104***	0.161***						
BINDVAIC		-0.125***						
MVAIC			0.093***	0.128***				
BINDMVAIC				-0.075**				
HCE					0.087***	0.183***	0.106***	0.171***
SCE					0.449**	0.747***	-0.645*	-1.305
CEE					0.016	-0.102	-0.035	-0.062
RCE							-5.209***	-8.168***
BINDHCE						-0.206***		-0.186**
BINDSCE						-0.65**		-0.141
BINDCEE						0.228**		0.057
BINDRCE								1.709
LEV	-10.945***	-11.186***	-10.896***	-11.029***	-10.739***	-11.242***	-10.147***	-8.867***
SIZE	0.033	0.04	0.039	0.04	0.011	0.025	0.075	0.044
Asset	0.426**	0.428**	0.414**	0.414**	0.756***	0 713***	1 0/1**	0.7
Tangibility	0.420	0.420	0.414	0.414	0.750***	0.715	1.041	0.7
Constant	-0.502	-0.765	-0.5	-0.583	-0.543	-1.368	0.749	0.496
R-Squared	0.079	0.08	0.076	0.077	0.08	0.083	0.15	0.164

Table 5.3: Panel D: ROE = f (BIND + VAIC / MVAIC + Interaction term + LEV + SIZE + Asset Tangibility)

Source: Author's compilation

The results suggest a significant and positive impact of corporate governance over firm performance and that of intellectual capital over firm performance. Table 5.3, Panel E, suggests that BGEND has a negative impact over ROA. VAIC and MVAIC is found to have a significant and positive impact over ROA. Among the subcomponents of IC, HCE is found to have a significant and positive impact over ROA. Among the interaction terms, BGENDHCE has a significant and positive impact over ROA. Among the control variables, Leverage and SIZE are found to have a significant but negative impact over ROA.

Table 5.3: Panel E: ROA = f (BGEND + VAIC / MVAIC + Interaction term + LEV + SIZE + Asset Tangibility)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
BGEND	-0.01	-0.06	-0.008	-0.037	-0.007	-0.16***	-0.038	-0.158**
VAIC	0.003***	0.002***						
BGENDVAIC		0.007*						
MVAIC			0.002***	0.002***				
BGENDMVAIC				0.005				
HCE					0.003***	0.002***	0.003***	0.002**
SCE					0.007***	-0.004	-0.002	-0.013
CEE					0.001	-0.002	0.001	-0.002
RCE							-0.039	-0.05*
BGENDHCE						0.01**		0.01***
BGENDSCE						0.072**		0.058
BGENDCEE						0.022		0.02
BGENDRCE								0.029
LEV	-0.151***	-0.141***	-0.151***	-0.143***	-0.148***	-0.139***	-0.142	-0.128***
SIZE	-0.004***	-0.004***	-0.004***	-0.004***	-0.005***	-0.004**	-0.005	-0.004**
Asset Tangibility	0.013	0.013*	0.012	0.012	0.018**	0.023***	0.022	0.023**
Constant	0.08***	0.082***	0.081***	0.081***	0.078***	0.089***	0.089	0.1***
R-Squared	0.193	0.205	0.188	0.196	0.201	0.226	0.235	0.249

Source: Author's compilation



The results suggests that corporate governance does not have a significant impact over firm performance, whereas IC is found to have a significant and positive impact over firm performance.

Table 5.3, Panel F suggests BGEND has a significant but negative impact over ROE. VAIC and MVAIC are found to have a significant and positive impact over ROE. The interaction terms BGENDVAIC and BGENDMVAIC are found to have a negative impact over ROE. Among the subcomponents, HCE is found to have a significant and positive impact over ROE, whereas RCE is found to have a significant but negative impact over ROE. Also, among the control variables, Leverage is found to have a significant but negative impact, whereas Asset Tangibility is found to have a significant and positive impact over ROE.

Table 5.3: Panel F: ROE = f (BIND + VAIC / MVAIC + Interaction term + LEV + SIZI
+ Asset Tangibility)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
BGEND	-1.803***	-1.465	-1.776***	-0.974	-0.067***	-7.13***	-6.804***	-4.435
VAIC	0.104***	0.111***						
BGENDVAIC		-0.043						
MVAIC			0.09***	0.108***				
BGENDMVAIC				-0.141*				
HCE					0.09***	0.071**	0.095***	0.051*
SCE					0.446**	-0.032	-0.636*	-0.067
CEE					0.004	-0.189	-0.023	-0.548
RCE							-5.082***	-5.81***
BGENDHCE						0.12		0.414***
BGENDSCE						3.084***		-6.174
BGENDCEE						1.032		2.489*
BGENDRCE								-2.984
LEV	-11.121***	-11.092***	-11.074***	-11.245***	-10.932***	-10.236***	-10.312***	-9.081***
SIZE	0.083	0.074	0.085	0.082	0.079	0.048	0.139	0.124
Asset	0.191**	0.185**	0.164**	0.173**	0.66**	0.785***	1.186**	0.922*
Tangibility	0.191	0.100			0.00			0.722
Constant	-0.558	-0.533	-0.488	-0.546	-0.432	0.162	0.335	0.393
R-Squared	0.083	0.083	0.08	0.081	0.083	0.086	0.162	0.171

Source: Author's compilation

The results suggest that corporate governance has a negative impact over firm performance, whereas IC is found to have a significant and positive impact over firm performance.

5.4: Discussion:

Past researchers (*Tiwari & Arora, 2024; Xu & Li, 2020; Nadeem et. al., 2019*) have found IC to be able to create competitive advantage and thus to have a significant impact over the firm performance. This implies that firms with better IC tend to perform better. Similarly, corporate governance is expected to provide better firm performance by ensuring better monitoring, unbiased decision making and transparency. The average value for BSIZE is 9.060, wherein 54.82% of the observations were below the average value. The average value for BIND is 0.440 and 33.52% of observations have their BIND less than the average value. Similarly, the average number of women on board of the selected firms was found to be 0.117, and 53.40% of observations were found to have BGEND value less than the average value, which may be a reason for corporate governance showing insignificant impact over Firm performance. The companies Act, 2013 made it mandatory for all the public companies to have at least one women director on their Board of directors. As, our data is from 2014 only, the data shows that it may take some more time for these companies to fully adhere to these guidelines, wherein



we find that more than 46.60 percentage of firms are already adhering to these changes.

In our study we tried to find the moderating impact of IC over the relationship between CG and FP. The overall results suggest corporate governance and its measures to not have a significant impact over firm performance, whereas IC and its measures are found to have a significant and positive impact over the firm performance, no significant impact of the moderating variables was found, which is in line with results of *Tiwari & Arora, 2024, Alsarhani et. al., 2023 and Gunawan & Widodo, 2022.*

5.5: *Robustness Check:* ROA is employed as the firm performance indicator. The researchers also double-checked the firm performance results using ROE. All the outcomes are in line with the other. VAIC and its components are employed in the current study, and to double check with the robustness of the results, the researchers have additionally employed the MVAIC model using the additional RCE (Relational Capital efficiency). No high correlation among the independent variables was observed, which suggest multi-collinearity is not an issue in our sample.

5.6: Theoretical Framework:

The Knowledge-Based View (KBV) builds upon the Resource-Based View (RBV) by emphasizing knowledge as the most valuable strategic asset for a firm *(Tiwari et al., 2023; Smriti & Das, 2021; Ge & Xu, 2020; Vidyarthi, 2019; Nadeem et al., 2017).* This approach highlights the importance of organizational learning, knowledge management, and intellectual capital in fostering innovation and maintaining a competitive edge. The present study's focus on Human Capital Efficiency (HCE) aligns with KBV, reinforcing the idea that companies with a highly knowledgeable and skilled workforce tend to perform better, as supported by the findings of *Ge & Xu (2020)* and *Vidyarthi (2019)*.

Additionally, Stakeholder Theory advocates that businesses should create value for all stakeholders to achieve sustainable long-term success. Effective corporate governance structures that incorporate stakeholder interests - such as inclusive decision-making and corporate social responsibility - enhance firm performance by building trust, loyalty, and support from various stakeholder groups (*Carroll & Shabana, 2010*). Results of the current study shows moderate impact of corporate governance factors over firm performance, which may be due to the fact that many of the relevant changes took place after the Companies Act, 2013, such as presence of one female board member was made mandatory. At least 50% of the board members should be independent directors and others. Most of these companies have slowly but successfully adopted these changes, whereas there are still few companies, which are yet to oblige with these regulations.

6. CONCLUSION

The impact of corporate governance over Firm performance along with the moderating impact of intellectual capital over the relationship between corporate governance and firm performance among the listed companies working in construction and energy sector during the year 2014-2021 was studied. It was observed that corporate governance has very limited impact over firm performance which may be attributed to the corporate governance factors being implemented post the companies act, 2013, wherein many companies are yet to fully oblige with the regulations. The average board size among the selected companies was found to be 9.06, similarly the average value of board independence was found to be 0.440, and the average value of number of women on board was found to be 0.117, which suggests that the preferred number of directors on board is 9 and thus, it is found that the selected companies are yet to





fully comply with the regulations such as presence of 50% of independent directors on the board and presence of at least one women director on the board, as per the Companies Act, 2013. Also, it was observed that intellectual capital has a significant impact over firm performance, whereas the moderating variables were not found to have a very significant impact. Also, the results show firms should focus on building their intellectual capital, especially the employees or the Human Capital. Corporates should focus more on continuously enhancing skills and capabilities of their employees. Adhering to the corporate governance is another factor that these corporates should focus on adhering to the guidelines as given in the Companies Act, 2013.

Managerial implications: The results suggest that to enhance performance, the top-level managers need to focus more on Human Capital, by continuously enhancing their skillsets and continuous learning. To stay competitive in the energy sector, firms should foster a culture of innovation, continuously evaluate their intellectual capital, and ensure it aligns with their strategic goals. Proactively adapting to economic and market shifts, encouraging knowledge sharing, and integrating intellectual capital initiatives with long-term business objectives are key strategies for sustaining growth and maintaining a competitive edge. Also, firms need to focus more on better and transparent corporate governance by having greater number of independent directors and female directors.

Future scope and limitations:

The current study has three main limitations, which may provide scope of study for future researchers. First, the current study has considered data from the listed firms during the year 2014-2021, future researchers may increase the duration of study. The second limitation is the fact that only 2 sectors were considered for study. And, the third limitation is that only Indian firms were considered for the current study. Thus, future researchers may expand their study to more sectors and countries.

References

- 1) Abeysekera, I., & Guthrie, J. (2005). An empirical investigation of annual reporting trends of intellectual capital in Sri Lanka. *Critical Perspectives on accounting*, *16*(3), 151-163.
- 2) Aboagye, A. Q., & Otieku, J. (2010). Are Ghanaian MFIs' performance associated with corporate governance? *Corporate governance: The international journal of business in society*, *10*(3), 307-320.
- 3) Adesina, K. S. (2019). Bank technical, allocative and cost efficiencies in Africa: The influence of intellectual capital. *The North American Journal of Economics and Finance*, *48*, 419-433.
- 4) Ahmed Sheikh, N., & Wang, Z. (2012). Effects of corporate governance on capital structure: empirical evidence from Pakistan. *Corporate governance: The international journal of business in society*, *12*(5), 629-641.
- 5) Alipour, M. (2012). The effect of intellectual capital on firm performance: an investigation of Iran insurance companies. *Measuring Business Excellence*, *16*(1), 53-66.
- 6) Almaqtari, F. A., Al-Hattami, H. M., Al-Nuzaili, K. M., & Al-Bukhrani, M. A. (2020). Corporate governance in India: A systematic review and synthesis for future research. *Cogent Business & Management*, 7(1), 1803579.
- Alsarhani, Y. A. S., Laili, N. H. B., & Marzuki, A. (2023) The Moderation Effect of Corporate governance between the Intellectual capital and the GCC Banking Industry's Performance. *International Journal of Business Society*, 7 (6), 775-788
- 8) Alves, C., & Mendes, V. (2004). Corporate governance policy and company performance: The Portuguese case. *Corporate governance: An International Review*, *12*(3), 290-301.





- Appuhami, R., & Bhuyan, M. (2015). Examining the influence of corporate governance on intellectual capital efficiency: Evidence from top service firms in Australia. *Managerial Auditing Journal*, 30(4/5), 347-372.
- 10) Arora, A., & Bodhanwala, S. (2018). Relationship between corporate governance index and firm performance: Indian evidence. *Global Business Review*, 19(3), 675-689.
- 11) Aslam, E., & Haron, R. (2020). Does corporate governance affect the performance of Islamic banks? New insight into Islamic countries. *Corporate governance: The International Journal of Business in Society*, 20(6), 1073-1090.
- 12) Bauer, R., Eichholtz, P., & Kok, N. (2010). Corporate governance and performance: The REIT effect. *Real* estate economics, 38(1), 1-29.
- 13) Berardi, U. (2017). A cross-country comparison of the building energy consumptions and their trends. *Resources, Conservation and Recycling, 123,* 230-241.
- 14) Bijalwan, J. G. (2012). Corporate governance system in India. International Journal of Management (IJM), 3(2), 260-269.
- 15) Bonn, I., Yoshikawa, T., & Phan, P. H. (2004). Effects of board structure on firm performance: A comparison between Japan and Australia. *Asian Business & Management*, *3*, 105-125.
- 16) Carroll, A. B., & Shabana, K. M. (2010). The business case for corporate social responsibility: A review of concepts, research and practice. *International journal of management reviews*, *12*(1), 85-105.
- 17) Chambers, N., & Cifter, A. (2022). Working capital management and firm performance in the hospitality and tourism industry. *International Journal of Hospitality Management*, *102*, 103144.
- Chen, M. Y. C., Lam, L. W., & Zhu, J. N. (2021). Should companies invest in human resource development practices? The role of intellectual capital and organizational performance improvements. *Personnel Review*, 50(2), 460-477.
- 19) Ciftci, I., Tatoglu, E., Wood, G., Demirbag, M., & Zaim, S. (2019). Corporate governance and firm performance in emerging markets: Evidence from Turkey. *International Business Review*, 28(1), 90-103.
- 20) Clarke, M., Seng, D., & Whiting, R. H. (2011). Intellectual capital and firm performance in Australia. *Journal of intellectual capital*, 12(4), 505-530.
- Core, J. E., Holthausen, R. W., & Larcker, D. F. (1999). Corporate governance, chief executive officer compensation, and firm performance. *Journal of financial economics*, 51(3), 371-406.
- 22) Darko, J., Aribi, Z. A., & Uzonwanne, G. C. (2016). Corporate governance: the impact of director and board structure, ownership structure and corporate control on the performance of listed companies on the Ghana stock exchange. *Corporate governance*, *16*(2), 259-277.
- 23) Das, A., & Paul, S. K. (2014). CO2 emissions from household consumption in India between 1993–94 and 2006–07: A decomposition analysis. *Energy Economics*, *41*, 90-105.
- 24) Dogan, E., & Smyth, R. (2002). Board remuneration, company performance, and ownership concentration: Evidence from publicly listed Malaysian companies. *ASEAN Economic Bulletin*, 319-347.
- 25) Drobetz, W., Schillhofer, A., & Zimmermann, H. (2003). Corporate governance and firm performance: Evidence from Germany. *Unpublished working paper, University of Basel, Basel, Switzerland.*
- 26) Firer, S., & Mitchell Williams, S. (2003). Intellectual capital and traditional measures of corporate performance. *Journal of intellectual capital*, 4(3), 348-360.
- 27) Ge, F., & Xu, J. (2020). Does intellectual capital investment enhance firm performance? Evidence from pharmaceutical sector in China. *Technology Analysis & Strategic Management*, *33*(9), 1006-1021.
- 28) Gemmill, G., & Thomas, D. C. (2004). Does governance affect the performance of closed-end funds? In *EFMA 2004 Basel Meetings Paper, Cass Business School Research Paper*.
- 29) Gunawan, R. M., & Widodo, W. (2022). Intellectual capital and corporate governance affect organizational performance through competitive advantage: Evidence from Indonesia. *Calitatea*, 23(189), 245-252.





- 30) Hamdan, A. M., Buallay, A. M., & Alareeni, B. A. (2017). The moderating role of corporate governance on the relationship between intellectual capital efficiency and firm's performance: evidence from Saudi Arabia. *International Journal of Learning and Intellectual capital*, *14*(4), 295-318.
- 31) Hang Chan, K. (2009). Impact of intellectual capital on organisational performance: An empirical study of companies in the Hang Seng Index (Part 1). *The learning organization*, *16*(1), 4-21.
- 32) Islam, S., & Khan, M. Z. R. (2017). A review of energy sector of Bangladesh. *Energy Procedia*, 110, 611-618.
- 33) Isola, W. A., Adeleye, B. N., & Olohunlana, A. O. (2019). Boardroom female participation, intellectual capital efficiency and firm performance in developing countries: Evidence from Nigeria. *Journal of Economics, Finance and Administrative Science*, 25(50), 413-424.
- 34) Joh, S. W. (2003). Corporate governance and firm profitability: evidence from Korea before the economic crisis. *Journal of financial Economics*, 68(2), 287-322.
- 35) John, K., & Senbet, L. W. (1998). Corporate governance and board effectiveness. *Journal of banking & Finance*, 22(4), 371-403.
- 36) Kamath, B. (2019). Impact of corporate governance characteristics on intellectual capital performance of firms in India. *International Journal of Disclosure and Governance*, *16*, 20-36.
- 37) Mak, Y. T., & Kusnadi, Y. (2005). Size really matters: Further evidence on the negative relationship between board size and firm value. *Pacific-Basin finance journal*, *13*(3), 301-318.
- 38) Makki, M. A. M., & Lodhi, S. A. (2014). Impact of corporate governance on intellectual capital efficiency and financial performance. *Pakistan Journal of Commerce and Social Sciences (PJCSS)*, 8(2), 305-330.
- 39) Mardnly, Z., Mouselli, S., & Abdulraouf, R. (2018). Corporate governance and firm performance: an empirical-evidence from Syria. *International Journal of Islamic and Middle Eastern Finance and Management*, *11*(4), 591-607.
- 40) Marr, B., Gupta, O., Pike, S., & Roos, G. (2003). Intellectual capital and knowledge management effectiveness. *Management decision*, 41(8), 771-781.
- 41) Maassen, G. F. (1999). An international comparison of corporate governance models: a study on the formal independence and convergence of one-tier and two-tier corporate boards of directors in the Unites States of America, the United Kingdom and the Netherlands (No. 31).
- 42) Mubaraq, S., & Ahmed Haji, A. (2014). The impact of corporate governance attributes on intellectual capital disclosure: A longitudinal investigation of Nigerian banking sector. *Journal of Banking Regulation*, *15*(2), 144-163.
- 43) Nadeem, M., Farooq, M. B., & Ahmed, A. (2019). Does female representation on corporate boards improve intellectual capital efficiency?. *Journal of Intellectual capital*, 20(5), 680-700.
- 44) Paniagua, J., Rivelles, R., & Sapena, J. (2018). Corporate governance and financial performance: The role of ownership and board structure. *Journal of Business Research*, 89, 229-234.
- 45) Pedro, E., Leitão, J., & Alves, H. (2018). Back to the future of intellectual capital research: a systematic literature review. *Management Decision*, *56*(11), 2502-2583.
- 46) Pillai, R., & Al-Malkawi, H. A. N. (2018). On the relationship between corporate governance and firm performance: Evidence from GCC countries. *Research in International Business and Finance*, 44, 394-410.
- 47) Pulic, A. (2000). VAIC[™]–an accounting tool for IC management. *International journal of technology management*, 20(5-8), 702-714.
- 48) Pulic, A. (2004). Intellectual capital-does it create or destroy value?. *Measuring business excellence*, 8(1), 62-68.
- 49) Schaeffer, G. J. (2015). Energy sector in transformation, trends and prospects. *Procedia Computer Science*, 52, 866-875
- 50) Shiu, H. J. (2006). The application of the value-added intellectual coefficient to measure corporate performance: evidence from technological firms. *International Journal of management*, 23(2), 356.





- 51) Singla, H. K. (2019). Does VAIC affect the profitability and value of real estate and infrastructure firms in India? A panel data investigation. *Journal of Intellectual capital*, 21(3), 309-331.
- 52) Smriti, N., & Das, N. (2018). The impact of intellectual capital on firm performance: a study of Indian firms listed in COSPI. *Journal of Intellectual capital*, *19*(5), 935-964.
- 53) Smriti, N., & Das, N. (2021). Do female directors drive intellectual capital performance? Evidence from Indian listed firms. *Journal of Intellectual capital*, 23(5), 1052-1080.
- 54) Subramanian, A. M., & van de Vrande, V. (2019). The role of intellectual capital in new product development: Can it become a liability? *Journal of Operations Management*, 65(6), 517-535.
- 55) Sueyoshi, T., Goto, M., & Omi, Y. (2010). Corporate governance and firm performance: Evidence from Japanese manufacturing industries after the lost decade. *European Journal of Operational Research*, 203(3), 724-736.
- 56) Suzan, L., & Sabila, W. H. (2022). The Influence of Intellectual capital and Good Corporate governance on Profitability at Conventional Commercial Banks in Indonesia. *Industrial Engineering and Operations Management (IEOM)*. 2493 – 2501.
- 57) Titisari, K. H. (2018). Mediation Effect of Value-Added Intellectual capital (VAIC) in Corporate governance (CG) and Financial Performance Relations. *Manajemen dan Bisnis*, *17*(2).
- 58) Tiwari, R., Vidyarthi, H., & Kumar, A. (2023). Nexus between intellectual capital and bank productivity in India. *Journal of Risk and Financial Management*, 16(1), 54.
- 59) Tran, N. P., Van, L. T. H., & Vo, D. H. (2020). The nexus between corporate governance and intellectual capital in Vietnam. *Journal of Asia Business Studies*, *14*(5), 637-650.
- 60) Tusiime, I., Nkundabanyanga, S. K., & Nkote, I. N. (2011). Corporate governance: Ownership structure, board structure and performance of public sector entities.
- 61) Vidyarthi, H. (2019). Dynamics of intellectual capitals and bank efficiency in India. *The Service Industries Journal*, *39*(1), 1-24.
- 62) Vishnu, S., & Kumar Gupta, V. (2014). Intellectual capital and performance of pharmaceutical firms in India. *Journal of intellectual capital*, 15(1), 83-99.
- 63) Weimer, J., & Pape, J. (1999). A taxonomy of systems of corporate governance. *Corporate governance: An international review*, 7(2), 152-166.
- 64) Wondem, B. A., & Batra, G. S. (2019). The impact of corporate governance practices on corporate financial performance in Ethiopia. *International Journal of Accounting Research*, 7(01), 1-10.
- 65) Worrell, E., Van Berkel, R., Fengqi, Z., Menke, C., Schaeffer, R., & O. Williams, R. (2001). Technology transfer of energy efficient technologies in industry: A review of trends and policy issues. *Energy Policy*, 29(1), 29-43.
- 66) Wu, H. Y., Chen, J. K., & Chen, I. S. (2012). Ways to promote valuable innovation: intellectual capital assessment for higher education system. *Quality & Quantity*, 46, 1377-1391.
- 67) Xu, J., & Li, J. (2020). The interrelationship between intellectual capital and firm performance: Evidence from China's manufacturing sector. *Journal of Intellectual capital*, 23(2), 313-341.