

The Moderating Role of Managerial and Institutional Ownership on Relation of Intellectual Capital and Firm Performance; An Empirical Analysis of Manufacturing Companies Listed on PSX

Mr. Ajmal¹

Lecturer, Faculty of Economics, Bakhtar University Kabul, Afghanistan.
Corresponding Author Email Id: ajmal.shahzad2000@gmail.com

Abstract

This study examines the interaction effect of managerial and institutional ownership on the association between intellectual capital and firm value enhancement. The dependent variable in this study is Tobin's Q which is measured as (Mkt value per share / Book value per share). Intellectual capital is measured by VAIC using Pulic's formula. VAIC is constructed through three constituents (Human capital efficiency, Structured capital efficiency, and Capital employed efficiency). Executives and institutional possession are the moderating variables followed by control variables.

The results of the study indicated that VAIC positively enhances firm value. Institutional ownership does not affect firm performance and managerial ownership has a negative impact on firm value enhancement. Later the study examines three components impact individually. The HCE and SCE indicated no significant impact on firm performance while CEE indicated positive impact on firm value enhancement. Finally, the study examines the main theme. The analysis of moderating role of managerial and institutional ownership indicated some meaningful results. Managerial ownership negatively moderates the link between firm performance and intellectual capital. Meanwhile, institutional possession illustrated no significant role in influencing the association of VAIC and firm performance.

A sample of 200 listed manufacturing companies on Stock Exchange of Pakistan (PSX) was considered for analysis for time period of eight years from 2016-2023.

Key words: intellectual capital, managerial ownership, institutional ownership, firm value, VAIC, Tobin's Q.

Introduction

Theory of resource suggests the efficient use of profitable, unique, incomparable, and non-substitutable resources of a firm will lead to strategic advantage and surplus profit or economic rent (Lin & Wu, 2014). Additionally, it will lead to better performance, which is relatable to the capabilities of particular firm. there are two types of resources for companies' tangible and intangible. The efficient use of these resources will lead the company to better performance and a decent strategic position in the market (Odat & Bsoul, 2022). Intellectual capital (IC) has been the considered the main theme for organizations since its introduction by Galbraith (1969). Intellectual capital is highlighted as the critical factor for firm life cycle, growth, and performance (Bellucci, Orlando, & Ciampi, 2020). Moreover, it is considered that the study of intellectual capital is very multipurpose and also very demanding which has attracted the attention of many scholars. Bellucci et al. (2020) defines IC as the intangible

¹Corresponding Author: Mr. Ajmal, Lecturer, Faculty of Economics, Bakhtar University Kabul, Afghanistan, Email Id: ajmal.shahzad2000@gmail.com.

²Cite as: Ajmal (2025). The Moderating Role of Managerial and Institutional Ownership on Relation of Intellectual Capital and Firm Performance; An Empirical Analysis of Manufacturing Companies Listed on PSX, *Bakhtar International Journal of Economics and Management Review*, 1(4),01-15.

set of a firm assets. OECD countries firms have witnessed that corporations are diverting the investments from traditional physical asset investments to its intangible assets (Pedro, Leitao, & Alves, 2016). Additionally, World Bank data indicates that more of OECD countries wealth is constructed around intellectual capital or intangible assets. In 2022, Odat and Bsoul emphasized on the importance of intellectual capital investment. As it states that through efficient use of intellectual capital firms can achieve competitive advantage and enhanced firm value.

Financial statements play a significant role in the efficiency of intellectual capital, firms present sound reporting of their intellectual capital assets will improve user effectiveness and also the performance of relevant firms (Goh, 2005). IC providing value to the firm and competitive advantage is not reported in the statements because it does not meet the criterion defined for an asset. Intellectual capital could be measured through different means. Pulic (2000) states that the current accounting system is not sufficient or capable of recording the value created through intellectual assets. Moreover, the company must be aware of how effectively they produce value. So, the efficiency of value is necessary for intellectual capital efficiency. Therefore, VAIC method is used for quantifying the intellectual wealth efficiency.

VAIC could be used with different constituents of intellectual capital. In this study the VAIC includes three subsets, capital employed efficiency, structural capital efficiency, and human capital efficiency. Structural capital explains the organization infrastructure, production processes, patents, trademarks, and databases at the service of company. Structural capital is aimed for assortment and transmission of information in the firm which enhances interaction (Odat & Bsoul, 2022). Human capital is all about the knowledge, skills, and expertise an employee brings to the firm. HC and firm performance showed positive impact on firm performance and leads to resource beneficiation (Scafarto, Ricci, & Francesca, 2016). And finally, capital employed addresses the amount of capital invested in the physical. It is about how well the physical resources are used efficiently for value creation.

Essentially, the association of intellectual capital and firm performance under the interaction effect of institutional ownership and managerial ownership is decisive and it is pivotal to study the significance. Because the decisions of managers and institutional owners influence the firm performance. Institutional possession is defined as scale of stocks held by institutions to total shares outstanding (Chung & Zhung, 2011). Managerial ownership is stated as shares held by directors to total shares outstanding (Noradiva, Parastou, and Azlina, 2016). Li and Zhao (2018) states the relation of IC and firm performance is affected by managerial ownership which needs to be studied. To upturn the performance of firm the management needs to incorporate institutional ownership in ownership structure of corporate and it is considered as an appropriate technique for better governance (Zahid, 2021). Furthermore, Zahid (2021) adds two hypotheses of financial management literature related to behavior of managerial ownership, entrenchment hypotheses and interest-alignment hypothesis. The agency association between major stockholders and managers when managerial ownership is increased and is referred as entrenchment hypothesis meanwhile the opposite is called interest-alignment hypothesis. Abukosim & Mukhtaruddin (2014) states that institutional ownership is essential for better corporate governance and firm value. Moreover, Mallorquí (2011) states the significance of ownership with consideration of intellectual capital and its relation with firm performance. Noradiva et. al (2016) examines the moderating role of managerial ownership on the relation of IC and firm performance and marks its significance for effectiveness of managerial ownership on firm intangible investments and value enhancement.

The main theme of this paper is to examine the relationship of intellectual capital and firm performance along with the interaction effect of managerial ownership and institutional ownership. This paper also considers the relationship of different components of IC with firm performance. Understanding the relevance of IC in firm performance through quantitative measures will contribute to decision makers to mark some money-making movements in the market strategy of corporation and gain competitive advantage. So this study is designed to evaluate the moderating effect of institutional and managerial ownership on the relationship of intellectual capital and firm performance.

Gap and Research Significance

The study is aimed to add more to literature in relation to intellectual capital, the moderating role of managerial and institutional ownership in Pakistan's manufacturing industry. There is little evidence in Pakistan to empirically investigate the importance of intellectual capital and its significance. The competitive world of growing businesses and strategies along with scarce resources firms need to invest in those resources which are less costly but make a major difference and impact on firm performance and profitability and intellectual capital is considered one of those. Moreover, the interaction effect of management stake holding and institutional possession in the association among IC and firm value for Pakistan's manufacturing sector, as past researches have proven a significant connection between ownership structure and its influence on major strategic decisions of corporations. Therefore, this study finds it a point of interest to examine the impact.

Problem Statement

To investigate the impact of VIAC on firm performance, along with the moderating role of managerial and institutional ownership in relationship of VAIC and firm performance.

Research Query

Does investment in intellectual capital make a difference for firm in terms of its performance according to market? And does the managerial or institutional stake holders influences the impact of VAIC on firm performance?

Implication of the Study

The study will help Pakistan manufacturing industry firms listed on PSX to understand the underline impact of investment on intellectual capital and also the moderating role of managerial and institutional ownership. It will assist decision makers adjust the ownership structure accordingly. Intellectually capital has been considered as an important factor in enhancing firm performance hence this study will suggest accountants and financiers to disclose the value created by intellectual capital so investors can make more precise decisions when investing their valuable funds.

Objectives of the study

- Relationship of intellectual capital efficiency and firm performance
- Quantitative measurement of IC value creation for better decision making
- To examine the interaction effect of institutional and managerial ownership on the relationship of IC and firm performance
- To assess each component of IC and its impact on firm performance

This paper will examine 200 non-financial firms listed on Pakistan Stock Exchange (PSX) for period of 5 years, ranging from 2019-2023.

Study Hypothesis

To address the research objectives of this study, below hypotheses have been developed:

H1: *VIAC, Institutional ownership, and Managerial ownership has positive influence on firm market value*

H1(a): HCE has positive influence on value enhancement of firm

H1(b): SCE has positive influence on value enhancement of firm

H1(c): CEE has positive influence on value enhancement of firm

H2: *Managerial ownership moderates the relationship between firm value and IC (VAIC)*

H3: *Institutional ownership moderates the relationship between firm value and IC (VAIC)*

Methodology

Prelude

The critical review segment explained the hypothesis and its related literature. The dependent variable is Tobin's Q a proxy used for market performance. it is calculated as market capitalization divided by book value of total assets (Ahmed et.al, 2019). This study examines impact of intellectual capital on firm performance and it also analyze the moderating role of managerial and institutional ownership on the association of VAIC-performance.

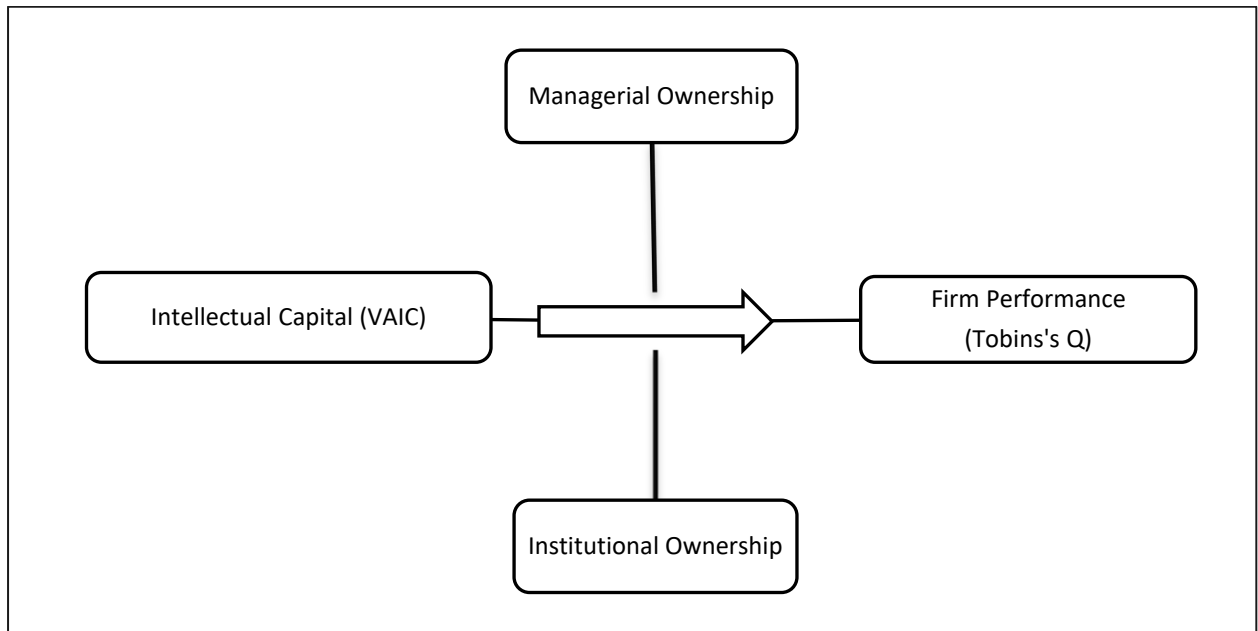
Problem declaration

To investigate the moderating role of managerial and institutional ownership on the link of VAIC-performance.

Objective of Study

The study is aimed to examine regulating effect of executive and institutional possession of stakes on link of VAIC and firm performance. moreover, the constituents of IC are also analyzed separately.

Theoretical formation



Variable formation

Dependent Variables

This study examines IC impact on firm performance using Tobin's Q a proxy for firm performance which is called market to book ratio or MBV (Ahmed et.al, 2019). Tobin's Q is calculated as follow:

Tobin's Q (MBV) = Market value per share / Book value per share

Independent Variables

Independent variables include VAIC and its three components as proposed by Pulic's (1998) model. The model has been widely used.

This model is used to calculate the value creation efficiency. It converts the value created by intangible assets of a firm to numeric results and indicates how efficient the firm is using its intellectual capital.

VAIC calculations:

Step 1: Value Added (VA) = outputs – inputs

Value added represents the value created to stakeholders. Outputs represents the operating revenue; input indicates the operating expenses excluding the salaries and wages of employees because it is considered as value creation factors not expenditure.

VAIC could also be calculated as the total of EBIT, wages and salaries, and non-cash expenses.

$$VA = EBIT + D + A + W$$

Step 2: calculate capital efficiency ratios

Human capital efficiency:

Human capital includes skills, experiences, and knowledge of employees. According to VAIC, HC is the total salaries and wages of employees.

$$HCE = VA / HC$$

HCE indicates the value created by each unit spending on employees. The higher the ratio the more the firm is utilizing its human capital. HC = total expenses of employees

Structural capital efficiency:

It includes information system, databases, and other organizational infrastructure.

$$SC = VA - HC$$

$$SCE = SC / VA$$

Capital employed efficiency:

$$CE = \text{total assets} - \text{intangible assets}$$

$$CEE = VA / CE$$

CEE indicates the total value added to the company by investing in its physical assets. High ratio means the company is efficiently using its capital employed.

The VAIC is then calculated as total of SCE, HCE, CEE

$$VAIC = HCE + SCE + CEE$$

Moderating variables

Institutional ownership = total shares held by institutions scale to total shares outstanding (Paputungan et.al, 2019).

Managerial ownership = Total shares held by directors fractioned by total shares outstanding (Noradiva et.al, 2016).

Control variables

Control variables are used in research studies to avoid biased results. It helps to uplift the validity of a study and limits the impact of extraneous factors. They are used for establishing causal relationship between the main variables used in the study. The eight control variables used in this study are as follow:

Firm size

Firm size is used as to replicate the results should not be influenced by the wealth, economies of scale, bargaining power of larger firms (Odat & Bsoul, 2022).

Debt to Equity

It is proven that high levered firms affect firm's profitability and market performance (Chowdhury et al. 2019). Researchers discuss that larger-scale companies are more persuaded to tackle risks and to reduce the volatility of stock which may help to stabilize firm values; therefore, this study applies another six control variables to the analysis which are *current ratio*, *debt to total assets*, *asset turnover ratio*, *net profit ratio*, *independent directors*, and *Board size* (Ni & Cheng, 2020).

Statistical Test

Weighted least square or GMM model is used in this study to carry the analysis for the panel.

Statistical Models

For testing Hypothesis 1 or H1 of this study following model is used:

H1: VAIC, Managerial ownership, and Institutional Ownership has positive impact on firm performance.

Tobin's Q =

$$\alpha + \beta1*INSTOWN + \beta2*MANGOWN + \beta3*VAIC + \beta4*SIZE + \beta5*DTE + \beta5*DTA + \beta6*CR + \beta7*ATR + \beta8*PROFITMAR + \beta9*BSIZE + \beta10*INDDUM + \varepsilon$$

Testing **H1a**, **H1b**, and **H1c** following model is used:

Tobin's Q =

$$\alpha + \beta_1 * HCE + \beta_2 * SCE + \beta_3 * CEE + \beta_4 * SIZE + \beta_5 * DTE + \beta_5 * DTA + \beta_6 * CR + \beta_7 * ATR + \beta_8 * PROFITMAR + \beta_9 * BSIZE + \beta_{10} * INDDUM + \epsilon$$

For testing Hypothesis 2 or H2 of this study following model is used:

H2: managerial ownership moderates the relationship between firm value and intellectual capital (IC).

Tobin's Q =

$$\alpha + \beta_1 * VAIC + \beta_2 * MANGOWN + \beta_3 * (VAIC * MO) + \beta_4 * SIZE + \beta_5 * DTE + \beta_5 * DTA + \beta_6 * CR + \beta_7 * ATR + \beta_8 * PROFITMAR + \beta_9 * BSIZE + \beta_{10} * INDDUM + \epsilon$$

For testing hypothesis 3 or H3 of this study following model is used:

H3: Institutional ownership moderates the relationship between firm value and intellectual capital (IC).

Tobin's Q =

$$\alpha + \beta_1 * VAIC + \beta_2 * INSTOWN + \beta_3 * (INST * VAIC) + \beta_4 * SIZE + \beta_5 * DTE + \beta_5 * DTA + \beta_6 * CR + \beta_7 * ATR + \beta_8 * PROFITMAR + \beta_9 * BSIZE + \beta_{10} * INDDUM + \epsilon$$

Data gathering

The panel data for this study was collected from targeted manufacturing companies' annual reports available on Pakistan stock exchange official website. Some data were collected from websites of respected firms. To compile the necessary data for this panel companies' balance sheet, income statement, cashflow statement, pattern of shareholders, and firm's closing stock price at year end were used.

Study population

The study population for this paper is the non-financial and non-service firms operating in Pakistan that are listed on Pakistan Stock exchange market (PSX). A group of 200 listed manufacturing corporations operating in Pakistan is used for analysis. The data was collected for period of 8 years from 2016-2023. The sampling technique used in this study is convenience sampling technique. This technique is approached because of the availability of data and annual reports of respected firms.

Statistical Assessment

Hypothesis 1

For testing hypothesis one we have two models. Model 1 tests if intellectual capital, institutional ownership and managerial ownership has an impact on firm performance. While, model 2 explains the impact of intellectual capital components on firm performance individually.

Table 4.3: Hypothesis 1; Model 1

Variables	Panel Regression		Fixed-Effect		Random-Effect		WLS	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Const	0.657379	0.2142	13.8883	<0.0001***	7.72950	<0.0001**	0.679630	<0.0001***
INSTOWN	-0.647444	0.0176**	-0.0672894	0.8264	-0.0213789	0.9418	-0.115092	0.1080
MANGOWN	-0.661476	<0.0001***	-0.0523773	0.8376	-0.525329	0.0149**	-0.496680	<0.0001***
VAIC	0.0093640	0.0007***	-0.000344557	0.8364	0.000878063	0.6078	0.00376298	0.0033***
Size	-0.039432	0.0971*	-0.577101	<0.0001***	-0.326891	<0.0001**	-0.0433886	<0.0001***
DTE	0.0030852	0.4907	-0.000223426	0.9270	-0.000210375	0.9335	0.00272265	0.0410**
CR	-0.000267	0.4182	2.04490e-06	0.9945	9.80566e-05	0.7363	-4.71731e-05	0.6096
DTA	0.0102407	0.9478	-0.0804178	0.4879	-0.0589503	0.6130	-0.139687	0.0030***

ATR	0.467140	<0.000 1***	-0.039005 0	0.4108	0.0335832	0.470 1	0.267465	<0.000 1***
PROFIT MAR	-0.00086	0.2034	-0.000166 97	0.6385	-0.000224	0.541 7	-0.0008206 4	0.3053 58
BSIZE	0.149828	<0.000 1***	0.0182167	0.6183	0.0819070	0.015 0**	0.104137	<0.000 1***
INDDUM M	-0.35729 2	0.0518 *	0.0817294	0.7202	0.0686381	0.747 9	0.0128956	0.8201
Durbin Watson	0.347982		0.33112		0.347982		N/A	
	4.94161e-40							
R- Squared	0.103060		0.797337		N/A		0.321155	
F-statistic (p-value)	2.72e-31		0.00		N/A		4.3e-125	
p-value for Chow test (differing intercept groups (F-test(p-value)								P(F(199, 1388) > 23.8943) = 0
Wald Test for Heteroskedasticity								p-value (0.00)
Chi-Square test (p-value) Breusch Pagan								2526.32(0.00)
Chi-Square test (p-value) Hausman test								133.25(3.81783e-23)
1 % significance level ***, 5% significance level **, 10% significance level *								

Diagnostic tests

The data in the table illustrates regression outcomes for four regression tests for panel diagnosis for the respected hypothesis model. It also includes diagnostic tests to select the best regression test.

The panel diagnosis is constructed by comparing the regression tests with each other. Firstly, panel regression which is also called Ordinary Least Square model is compared with Fixed-effect regression model. To select a test between these two p-value for differing groups (Chow-test) is considered. The probability value is less than 5% (table 4.3). this leads to refusal of baseline hypothesis or (H0) "Panel regression is fit" which automatically accepts Fixed-Effect model as suitable test for this panel. D-Watson p-value for identifying autocorrelation problem indicates that there is existence of autocorrelation in the panel (Table 4.3). based on this the outcome of Panel regression is overturned. The panel was then analyzed for issue Heteroskedasticity. To identify the issue Wald-test was applied and the probability value shows problem of Hetero do exist in the panel. Therefore, the results of Fixed-Effect are invalidated. Thus, additional tests are necessary to discover appropriate regression test model.

Afterwards, Panel regression is compared with Random Effect model. The two compared based on the p-value of Breusch Pagan test. probability value of respective test model is less than 5% (Table 4.3) so the baseline hypothesis (H0) "Panel regression is best fit" and approve substitute hypothesis "R.E (Random-Effect) is best fit". Although R-Effect model suffers from problem of autocorrelation and does not tackle the issue. Hence, we overturn results of R-effect regression test.

Lastly, Random effect model is compared with fixed effect model based on Hausman test. To decide, p-value of Hausman test was examined. The test shows probability value is less than 5%. This leads to rejection of baseline hypothesis (H0) "R-effect is fit" and heads to acceptance of substitute hypothesis (H1) "F-effect is better". But the previous analysis overturned results of Fixed-Effect or F-effect.

Consequently, the only remaining better model was Weighted least Square (WLS) that represents significant and consistent results based on its ability to resolve the issues of auto-correlation and heteroskedasticity. The test also acknowledges companies based on their size and other factors and portrays results that are reliable and valid.

Results and Discussion

Table 4.3 presents summary results of regression for model 1 developed in the study. The model is established based on first hypothesis that assumes intellectual capital, institutional ownership, and managerial ownership has a positive impact on firm performance. It is important to note that the results of weighted least square of WLS test will be considered as stated in panel diagnosis.

The results regarding relationship of institutional ownership and firm performance indicate a negative but insignificant relationship. This clearly indicates that institutional ownership has no significant impact on firm performance. Meanwhile managerial ownership has negative relationship and is highly significant at 1% level. This specifies that if managerial ownership is present at high level it will impact the firm performance negatively. Entrenchment effect is a factor which is considered as reason for reduced firm performance. Since, high managerial ownership leads the way to personal interest for managers which reduces the firm profitability. Moreover, reduced monitoring, and resource misallocation are also sound reasons for reduction in firm performance. This result contradicts with (Zahid, 2021), (Noradiva,2016) that state a non-significant relationship with firm performance. Li et.al (2007) results shows positive and significant relationship between managerial ownership and firm performance of Chinese firm which also contradicts the results of this paper. Ahmad et.al (2019) indicates negative and significant relationship between managerial ownership and firm performance which aligns with our result. The results regarding managerial and institutional ownership both contradicts this study's hypothesis.

Next, VIAC a proxy for intellectual capital indicates a significant relation with firm performance which supports our first hypothesis. VIAC indicates a positive low coefficient value which explains that it improves firm performance at very low level but is highly significant. The reason for this low value is that VAIC is not only predictor for firm performance. The result is in line with (Ahmad et.al, 2019), (Zahid, 2021), (Noradiva, 2016), (Alturiqi & Halioui, 2020), and (Maji & Goswami, 2016) stated positive impact of intellectual capital on firm performance measured by ROA. Furthermore, a study from Chinese manufacturing sector assess the relationship between IC and firm performance. It concluded that IC influences performance metrics positively (Xu & Li, 2022). The positive influence of VAIC on Tobin's Q indicates that firms can enhance their financial and market performance by using both type of tangible and intangible resources. This is also consistent resource-based view of firm Wernerfelt (1994); Reed and Defillippi (1990). Next, for control variables size is highly significant indicating negative relationship with firm performance. There could be several reasons one of them is market saturation which larger corporations compete in slow growth firms. Debt to Equity (DTE) holds a weak positive coefficient and mediocre significant impact at 5% significance level on firm performance. Current ratio has insignificant impact on firm performance. Debt to Asset (DTA) has highly significant impact with negative coefficient on firm performance. Meaning the increase in DTA will negatively impact the performance of firm. Asset turnover ratio (ATR) has significant positive relationship with firm performance. Profit margin has insignificant impact on firm performance. The existence of independent director has no significant impact on the firm performance indicators (see table 4.3).

Additionally, the model's R-square is 0.321 or 32.1%. this typically means that 32.1% of changes in dependent variable are defined by the independent variables considered in this study. F-stats value demonstrates the model is fit according to its probability value which is fewer than 5% (see table 4.3).

It is important to note independent variables indicated the same results when were tested in separate models.

Table 4.4 covers the second model of first hypothesis. In this model the impact of components of intellectual capital is analyzed on the firm performance. The dependent variable remains the same (Tobin's Q), while intellectual capital components (HCE, SCE, CEE) are add as independent variables.

Table 4.4: Hypothesis 1; model 2

Variables	Panel Regression		Fixed-Effect		Random-Effect		(WLS)	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
const	-0.60446 7	0.2089	14.4664	<0.00 01***	6.47697	<0.0 001* **	-0.171953	0.1580
HCE	0.007930 56	0.0051 ***	-0.000196 246	0.9091	0.0002228 86	0.899 9	0.00023234 4	0.8676
SCE	0.004931 46	0.7557	0.0024714 4	0.7650	0.0038571 3	0.653 9	-0.0004496 21	0.9016
CEE	0.388141	<0.000 1***	-0.050276 6	0.2009	0.0834440	0.031 4**	0.414997	<0.000 1***
Size	0.004208 99	0.8503	-0.603000	<0.00 01***	-0.278274	<0.0 001* **	-0.0130471	0.0127 **

DTE	0.002556 32	0.5662	-0.000185 855	0.9392	-0.000309 536	0.902 6	0.00076653 8	0.5810
CR	-0.00017 3602	0.5964	-6.81918e -06	0.9815	0.0001320 19	0.650 8	1.37363e- 05	0.8642
DTA	0.028779 5	0.8535	-0.079069 6	0.4929	-0.035970 5	0.757 7	-0.0912005	0.0489 **
ATR	0.460866	<0.000 1***	-0.039451 1	0.4045	0.0409662	0.378 5	0.265558	<0.000 1***
PROFIT	-0.00098 3514	0.1468	-0.000163 547	0.6448	-0.000237 024	0.520 8	-0.0007696 71	0.3542
BFSIZE	0.147917	<0.000 1***	0.0177616	0.6263	0.0812238	0.015 7**	0.112930	<0.000 1***
INDDUM	-0.37729 2	0.0393 **	0.0870571	0.7027	0.0592477	0.781 5	-0.134277	0.0174 **
Durbin	0.373370		0.383211		0.373370		N/A	
Watson	2.28027e-38							
R-Squared	0.109973		0.797579		N/A		0.330133	
F-statistic	7.82e-34		0.0		N/A		1.2e-129	
(p-value)								
p-value for Chow test								
(differing intercept groups (F-test(p-value))								P(F(199, 1388) > 23.693) = 0
Wald Test for Heteroskedasticity								336.82 (0)
Chi-Square test (p-value) Breusch Pagan								2485.5 (0)
Chi-Square test (p-value) Hausman test								149.9 (1.52026e-26)
1 % significance level ***, 5% significance level **, 10% significance level *								

Diagnostic tests

The model is again diagnosed by four panel models. Initially, the panel regression test does not solve problem of autocorrelation. This statement is supported by the value of Durbin Watson in table 4.4. so, the results of Panel-Regression are not valid. Afterwards, Panel-Regression and Fixed-Effect or (F-Effect) regression tests are compared. The two are diagnosed through Chow-test. the probability value of test heads to rejection of baseline hypothesis (H0) "Panel-Regression is fit" and substitute hypothesis or (H1) that states "F-Effect is better" is accepted. Additionally, the panel is inspected for problem of heteroskedasticity by applying Wald-test. the relevant test indicated that the problem exists. So, the outcome of F-effect model is overturned. Panel-regression and Random-Effect or (R-Effect) regression tests are matched based on Breusch-Pagan test. the probability value of test shows a value of less than 5% (table 4.4). subsequently, baseline hypothesis or (H0) is not approved and (H1) "R-Effect is good" is accepted. But, R-Effect regression test still cannot tackle the issue of autocorrelation so the results are not reliable.

Lastly, for finding suitable regression test for hypothesis model R-effect and F-effect regression models are compared. the statistical test used for this analysis is Hausman-test. It indicated a significant value of less than 5% so it heads to rejection of baseline hypothesis (H0) "R-effect is good" and acceptance of "F-effect model is fit". But as already discussed Fixed effect model suffers from problem of heteroskedasticity and results overturned. In conclusion, the reliable and valid test is Weighted least square (WLS) test that depicts consistent and valid results based on its ability of tackling the troubles related to autocorrelation and heteroskedasticity.

Results and Discussion

Table 4.4 examines the impact of components of IC on firm performance. The regression result for humane capital efficiency (HCE) indicates a non-significant association with firm performance measured by Tobin's Q. this result specifies that investors do not pay attention to expenditures on employees by particular firm. Therefore, firms investing on employees will not impact the market-based performance. The outcome does not support hypothesis H1a. This result is consistent with Odat & Bsoul (2022); Bataineh et.al (2022). But it is inconsistent with Soewarno and Tjahjadi (2020) which states a positive relationship between HCE and firm performance. Regarding SCE or structural capital efficiency the coefficient is negative but has no association with firm performance as the probability is more than 0.05 (see table 4.4). This demonstrates that investment in structural capital such as information systems, databases, organizational processes etc.... do not interests investors thus it has no contribution in improving firm performance significantly. This result is consistent with Odat & Bsoul (2022); Maji & Goswani (2015). but is inconsistent with (Bataineh et.al, 2022) and also Iranian study of (Hejazi, Ghanbari,

Alipour, 2016). This does not support the hypothesis H1b of this study. Third component of VAIC in this model is capital employed efficiency (CEE) proxied by tangible assets. The regression result suggests a significant association with firm performance. The relationship of capital efficiency is positive which means that investment in tangible assets by a firm increases firm value and also attracts investors more than other two constituents of intellectual capital. It supports hypothesis H1c of this study. This also clarifies that tangible assets generate more intellectual value for firm and also is a major constituent of IC in manufacturing sector companies listed on Pakistan Stock Exchange (PSX). Moreover, it supports the theory of efficient use of firm's capital which improves firm profitability and stock values overall (Odat & Bsoul, 2022). The outcome is consistent with Firer & Williams (2003); Soewarno and Tjahjadi (2020); Bataineh et.al (2021); Smriti and Das (2018), and study of Hamdan (2017) for KSA firms.

In the context of control variables size indicated a negative coefficient and significant value at 5% significant level. Most firms are mature and are large in size which affects the firm in different factors. Debt to equity (DTE) demonstrates no significant impact on firm market value. While Debt to total asset (DTA) affects the firm negatively and significantly at 10% confidence. Current ratio (CR) has no noteworthy impact on firm value enhancement. Furthermore, asset turnover ratio (ATR) and board size (BSIZE) both have highly significant impacts on firm value improvement. Because the better the ratio of turning asset to cash the more the profitability. Board size matters in terms of firm control, strategic decisions, resource allocation and more. Independent director has a negative and significant impact on firm performance. the reason for this outcome may replicate that independent directors like immediate returns while investment in intellectual capital components by firm will not have such quick results and are more prolong projects. The R-square value of this model is 33.01% (see table 4.4). this demonstrates that 33.01% of change which occurs in dependent variable is caused by the independent variables. Model fitness is examined by probability value of F-stats. It shows a value less than 5% so it declares the model is suitable.

Hypothesis 2

Hypothesis two examines the moderating effect of managerial ownership on the relationship of firm performance and intellectual capital. In this hypothesis, the dependent variable is Tobin's Q which is a proxy for firm performance and independent variables are VAIC, managerial ownership, and moderating role of managerial ownership in relation with intellectual capital and firm performance along with control variables.

Table 4.5: Hypothesis 2

Variables	Panel-Regression		Fixed-Effect		Random-Effect		WLS	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
const	0.673602	0.2033	13.8674	<0.001***	7.73675	<0.001***	0.629847	<0.001***
VAIC	0.013382 4	0.0001 ***	-0.000314 456	0.8820	0.0011660 4	0.590 8	0.00647825	<0.001 1***
MANGO WN	-0.52607 7	0.0007 ***	-0.048149 8	0.8511	-0.517325	0.017 0**	-0.451331	<0.001 1***
VAIC*MO	-0.02248 86	0.0419 **	-0.000210 443	0.9744	-0.001485 55	0.825 4	-0.0117312	<0.001 1***
Size	-0.04602 07	0.0521 *	-0.576665	<0.001***	-0.327493	<0.001***	-0.0416113	<0.001 1***
DTE	0.003394 36	0.4484	-0.000201 194	0.9342	-0.000200 906	0.936 4	0.00278754	0.0500 **
CR	-0.00023 3350	0.4791	2.27992e- 06	0.9938	9.78517e- 05	0.736 8	-6.09357e- 05	0.4870
DTA	0.015934 7	0.9189	-0.080109 3	0.4896	-0.059471 4	0.609 9	-0.114461	0.0070 ***
ATR	0.468881	<0.001 1***	-0.038619 1	0.4153	0.0332181	0.474 7	0.288111	<0.001 1***
PROFIT MAR	-0.00092 1053	0.1762	-0.000171 912	0.6285	-0.000229 556	0.532 5	-0.0008637 30	0.2570
BSIZE	0.153780	<0.001 1***	0.0186688	0.6096	0.0822382	0.014 6**	0.101189	<0.001 1***

INDDUM	-0.35386	0.0542	0.0811640	0.7221	0.0686815	0.747	0.00340086	0.9548
M	3	*				7		
Durbin Watson	0.347		1.376818		0.347		N/A	
	5.76383e-40							
R-Squared	0.102214		0.797330		N/A		0.348077	
F-statistic (p-value)	5.53e-31		0.0		N/A		7.0e-139	
p-value for Chow test (differing intercept groups (F-test(p-value)))					23.922 (0)			
Wald Test for Heteroskedasticity					P(Chi-square(75) > 244.869037) = 0.0			
Chi-Square test (p-value) Breusch Pagan					2527.84 (0)			
Chi-Square test (p-value) Hausman test					132.39 (5.70186e-23)			
1 % significance level ***, 5% significance level **, 10% significance level *								

Diagnostic tests

The table 4.5 includes 4 types of regression models. Model selection is based on the goodness of fit. The first model to consider is panel regression test. Primarily, the panel is diagnosed for autocorrelation problem through the value of Durbin-Watson test. the (p-value) of the test indicates issue of autocorrelation exist in the data so the outcome for Panel-Regression test is overturned. In next step, Panel-regression is compared with Fixed-effect or F-effect regression results. The two are compared based on Chow-test for differing groups. The probability value of Chow-test shows a value less than 5% (table 4.5). So, baseline hypothesis (H0) that states “Panel-Regression is suitable” is rejected and automatically the substitute hypothesis is accepted “F-Effect is fair”. Furthermore, the data is examined for heteroskedasticity. Wald-test for heteroskedasticity indicates there is problem so the results of this regression are also invalid.

Following, Panel-Regression and Random-effect or R-effect regressions are compared based on Breusch pagan test. the probability of that test shows a value less than 5% (table 4.5). Hence, we conclude to accept substitute hypothesis (H1) “R-Effect is suitable” and reject (H0). Although, R-effect regression does no solve issue of autocorrelation this statement is supported by value of autocorrelation presented in the table 4.5. Hence, the outcomes of this model are also unreliable.

Lastly, R-Effect and F-effect models are compared. the Hausman test probability value indicates a less than 5% value. So, the baseline hypothesis (H0) “Random is suitable” is rejected and leads to acceptance of alternate hypothesis (H1) “F-effect is better” but the results of Fixed-effect model are already disqualified due to problem of heteroskedasticity. For the reason the results are not accepted.

In conclusion, WLS regression results are reliable. As already discussed, WLS solves the issues of autocorrelation and heteroskedastic. It also analyzed companies based on their scale and many other factors and assign weight accordingly which makes the test more reliable and a good fit.

Result and discussion

The regression results for this hypothesis demonstrate the moderating role of managerial ownership in organization in influencing the relationship of VIAC and Tobin’s Q.

The outcome for VIAC and its association with firm value indicates the same result as tested in the first hypothesis individually. It indicates a significant and positive association with firm performance. Moreover, managerial ownership also signals the same outcome as tested in the first hypothesis regardless of moderating effect and illustrated a significant and negative impact on firm value. The interaction term (VIAC*MO) is indicating a negative coefficient and has a significant negative impact on the relationship of VAIC and firm value measured by Tobin’s Q. this negative moderating role means that if the level of managerial ownership increases the positive effect of intellectual capital measured by VIAC on firm value will become weaker. the average managerial stake of managerial ownership is 24% (see table 4.1) according to this study which is a notable share. In this case the possibility of entrenchment effect of managers can cause the negative moderating role and may result in reduction of VAIC positive impact on firm value. Because, managers with substantial ownership may feel secure and not work efficiently to boost firm’s IC which eventually leads to weaker VIAC-performance relation. This result accepts the second hypothesis of this study which concludes that managerial ownership does moderate the relationship between VAIC and firm value. The outcome is aligned with study of (Ahmad et. Al, 2019). Moreover, the outcome is inconsistent with (Noradiva et.al, 2016). Her study suggests the concept of managerial myopia

which states that managers opt for short term outcomes which leads them to more investment in tangible assets rather than other intellectual components. In context of control variables, size has negative and significant relation with firm value. The debt to equity (DTE) indicates a significant relation with firm value with positive impact. Current ratio (CR), profit margin (PROFITMAR), and independent director (INDDUM) all indicate non-significant impacts on firm value enhancement. Debt to asset (DTA) and asset turnover ratio (ATR) both have significant positive impacts on firm value improvement. The level of DTA should be analyzed according to industry and it is noteworthy that continuous increase in DTA will eventually impact firms negatively.

To examine the dependency level R-Square value is considered. It indicates a value of 34.8% (see table 4.5) which means that 34.8% changes in Tobin's Q are resulted from the independent variables. For model fitness the F-statistics p-value is considered. The value is fewer than 5% (table 4.5) so it concludes the model explains the hypothesis fairly.

Hypothesis 3

Hypothesis 3 is about the moderating effect of institutional ownership on association of intellectual capital and firm performance. The dependent variable in this hypothesis is firm performance measured by Tobin's Q. and the independent variables are VAIC, institutional ownership, and moderating variable.

Table 4.6: Hypothesis 3

Variables	Panel Regression		Fixed Effect		Random Effect		Weighted Least Square	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
const	-0.331267	0.4933	13.8814	<0.0001***	7.25216	<0.0001**	0.154061	0.2199
VAIC	0.0126357	0.0011***	-0.00238636	0.3221	-0.000671400	0.7858	0.00220090	0.2925
INSTOWN	-0.327223	0.3131	-0.206423	0.5313	-0.0628689	0.8428	-0.0523803	0.5449
INST*VAIC	-0.0273688	0.3581	0.0224343	0.2435	0.0165284	0.4012	0.0116940	0.2746
Size	-0.00490543	0.8283	-0.576876	<0.0001***	-0.311983	<0.0001**	-0.0231688	<0.0001***
DTE	0.00269553	0.5495	-0.000358542	0.8832	-0.000351876	0.8892	0.00144372	0.3709
CR	-0.000182960	0.5807	4.03452e-06	0.9890	0.000123620	0.6714	1.90743e-05	0.8180
DTA	-0.00518063	0.9738	-0.0724125	0.5304	-0.0351410	0.7630	-0.138223	0.0112**
ATR	0.458796	<0.0001***	-0.0357271	0.4512	0.0388659	0.4045	0.266207	<0.0001***
PROFITMAR	-0.000910691	0.1836	-0.00020013	0.5747	-0.000253269	0.4931	-0.000728288	0.4116
BSIZE	0.151581	<0.0001***	0.0174795	0.6323	0.0812284	0.0161**	0.113256	<0.0001***
INDDUM	-0.353864	0.0555*	0.0828401	0.7165	0.0762279	0.7216	-0.137801	0.0119**
Durbin Watson	0.346021	9.87897e-40	1.377776		1.377776		N/A	
R-Squared	0.092399		0.797530		N/A		0.204561	
F-statistic (p-value)	1.98e-27		0.0		N/A		2.38e-71	
Chow Test for differing group intercepts (F-test statistic (p-value))					24.29 (0)			
Wald Test for Heteroskedasticity					253.18 (0)			

Breusch-Pagan test (Chi-Square test statistic (p-value))	2529.7 (0)
Hausman test (Chi-Square test statistic (p-value))	138.72 (2.96149e-24)
***Significant-at-1%, **Significant-at-5%, *Significant-at-10%	

Diagnostic test

Table 4.6 displays results of four regression models. These models are compared based on specific criteria to uncover best fit model for the panel. Thus, panel diagnosis is conducted so that to end up with one better model. Initially, Panel-regression is compared with fixed-effect model. Chow analysis is used to compare between the two. The probability value of relevant analysis shows a value lesser than 5% (table 4.6). it heads to rejection of baseline hypothesis (H0) "Panel-Regression is fair" and approves the substitute hypothesis (H1) "F-Effect is suitable". Since, the data suffers from heteroskedasticity therefore the results of F-Effect are not valid. Panel regression cannot resolve the issue of autocorrelation in the panel as Durbin-Watson value in table 4.6 shows existence of autocorrelation. Thus, the outcome of Panel-Regression is also overturned.

Next, Panel-regression is compared with R-effect based on Breusch-pagan test. the analysis shows a value fewer than 5%. This heads to rejection of baseline hypothesis (H0) "Panel-regression is fair" and approves substitute hypothesis (H1) "R-effect is suitable". But, R-effect does not resolve issue of autocorrelation so the results of regression is not considered.

Finally, R-effect and F-effect are compared based on Hausman-test. the probability value is less than 5%. This rejects the baseline hypothesis (H0) "Random-Effect is suitable" and accepts (H1) "F-effect is fair". Thus, the results of F-effect are already overturned due problems of heteroskedasticity and autocorrelation problem. Which leads to the last regression model of the panel analysis called WLS or weighted Least Square. WLS is suitable model for this because it resolves the issue of autocorrelation effect and heteroskedasticity effect in the data.

Result and Discussion

The results for testing third hypothesis are presented in table 4.6. it examines the moderating role of institutional ownership in association between intellectual capital and firm value. Institutional ownership indicates a non-significant result which means it has no impact on firm performance. Surprisingly VAIC showed non-significant result in this model when the moderating variable and also institutional ownership is included. This mean institutional ownership disappears the strong relationship of VAIC and firm performance. The moderating variable (INSTOWN * VAIC) indicates a non-significant impact on the relation of VAIC and firm value. This outcome clarifies that and change in level of institutional ownership doesn't influence the impact of VAIC on firm value enhancement. It also doesn't support the stake holder salient theory which suggest that institutional owners do influence the decisions of corporations (Papatunga, Subroto, Abdul Ghafor, 2019). The average stake holding by institutional owners is 0.095 or 9.5% (see table 4.1) which is relatively low to influence the decisions of a firm. Furthermore, the negative correlation between firm value and institutional ownership also is a point to note for this outcome of regression (see table 4.2). this result does not meet the expectation of third hypothesis of this study. The result of this model is consistent with Papatunga et.al (2019); Mollah and Farooque (2012); and Rini, Sutrisno, & Nurkhilis (2017). Size of firm indicates negative relation and significant impact on firm performance. Additionally, Debt to Equity (DTE) has no significant on firm performance. Current ratio (CR) also do not impact firm value significantly. Debt to asset (DTA) has a significant impact on firm performance with a negative influence. Because the more a firm opts for debt the more the firm will have troubles in profitability and also market performance. Asset turn over (ATR) has positive relation with firm performance and is significant. both board size and independent director has significant impacts while board size positively influences firm value and independent director negatively influences the firm value.

The R-square of this model is 24.45% (see table 4.6). this mean 24.45% of changes in dependent variable are caused by independent variable. Furthermore, for model fitness the F-stats in the table 4.6 indicates the model is very suitable as the probability value is fewer than 5%.

Conclusion

This research examined the relationship between value-added intellectual capital along with its constituents and firm value which is measured by Tobin's Q. Moreover, the study also analyzed the moderating role of managerial ownership and institutional ownership on the association of VAIC and firm performance. this study found that VAIC has a positive impact on firm value. which means corporations investing in VAIC will improve the market value of their firm. The efficient use of resources typically helps the firm to gain competitive advantage and a major market share. Additionally, the study also examined the impact of managerial and institutional ownership

on firm performance. The outcome indicated that firms with high managerial ownership will struggle in terms of their value enhancement. Because the entrenchment effect will affect the firm's strategic decisions. As for institutional ownership the study did not find any significant impact on firm performance. The low level of institutional ownership does not impact the firm decisions. The result also aligns with salient theory. It states that institutional ownership does not influence the strategic decisions of a particular firm.

Furthermore, the study examined each component of VAIC and its impact on firm value. The outcome for human capital efficiency (HCE), and structural capital efficiency (SCE) indicated no significant impact on firm performance. This means manufacturing firms in Pakistan expect no impact of expenditure on human capital and structural capital on enhancing firm performance. On the other hand, capital employed efficiency indicates positive impact on firm value. This clarifies that manufacturing sector of Pakistan efficiently use the tangible resources for value creation. Hence, a particular firm investing in tangible assets and its efficient use to create value for firm will impact the market performance of the firm. Likewise, this also indicates that investors choose those firms which use their tangible resources efficiently and create value.

The principle aim of this study is to examine the interaction-effect of executive and institutional possession of stakes in the company on the relation of VAIC or IC on firm value enhancement. The outcome of the study indicated that management holdings have a negative influence on the relation of IC and firm performance. Firms with high levels of managerial ownership will reduce the positive impact of VAIC on firm performance. Because managers opt for personal interest and will not favor the investment in projects which the returns do not flourish soon. Institutional ownership has no significant moderating effect on the link of VAIC-performance. As discussed earlier, institutional ownership holding is low and it doesn't have a noteworthy impact on firm decisions.

Acknowledgment

I am really thankful to my university and the professors for always being there for me and giving me advice. This was very helpful during this study.

Conflict of Interest

The authors affirm that no conflicts of interest are linked with this publication. The research was conducted autonomously without financial or non-financial assistance from external entities.

Author Contribution Statement

The author meticulously crafted the study, devised the methodology, executed the investigation and data analysis, composed the original manuscript, and undertook the review and editing of the document. The author autonomously executed every aspect of the research and the development of the manuscript.

References

- [1]. Abukosim, A., & Mukhtaruddin, M. (2014). Ownership structure and firm values: empirical study on Indonesia manufacturing listed companies. *Journal of Art Science & Commerce* (4), 1-14.
- [2]. Ahmed, A., Khurshid, M. K., & Yousaf, M. U. (2019). Impact of intellectual capital on firm value: the moderating role of managerial ownership.
- [3]. Ahmed, A., Khurshid, M. K., & Yousaf, M. U. (2019). Impact of intellectual capital on firm value: the moderating role of managerial ownership.
- [4]. Ahmed, A., Khurshid, M. K., Riaz, Z., Zulfiqar, M., & Yousaf, M. U. (2022). Intellectual capital and firm value: The role of firm performance. *Journal of Management Info*, 9(3), 402-417.
- [5]. Alturiqi, A., & Halioui, K. (2020). The impact of intellectual capital on firms' performance: Evidence from Saudi Arabia. *Accounting and Finance Research*, 9(4), 1-26. Available at: <https://doi.org/10.5430/afr.v9n4p44>.
- [6]. Bataineh, H., Abbadi, S. S., Alabood, E., & Alkurdi, A. (2022). The effect of intellectual capital on firm performance: The mediating role of family management. *Journal of Islamic Accounting and Business Research* 13 (5), 845-863. Available at: <https://ezproxy.yu.edu.jo:2087/10.1108/JIABR-02-2022-0032>.
- [7]. Bayraktaroglu, A. E., Calisir, F., & Baskak, M. (2019). Intellectual capital and firm performance: an extended VAIC model. *Journal of intellectual capital*, 20(3), 406-425.
- [8]. Bellucci, M., Marzi, G., Orlando, B., & Ciampi, F. (2021). Journal of Intellectual Capital: a review of emerging themes and future trends. *Journal of Intellectual Capital*, 22(4), 744-767.
- [9]. Chowdhury, L. A. M., Rana, T., & Azim, M. I. (2019). Intellectual capital efficiency and organisational performance: In the context of the pharmaceutical industry in Bangladesh. *Journal of Intellectual Capital*, 20(6), 784-806.
- [10]. Chung, K. H., & Zhang, H. (2011). Corporate governance and institutional ownership. *Journal of financial and quantitative analysis*, 46(1), 247-273.
- [11]. competitive advantage", *Academy of Management Review*, Vol. 15 No. 1, pp. 88-102.
- [12]. Goh, P. C. (2005). Intellectual capital performance of commercial banks in Malaysia. *Journal of Intellectual Capital*, 6(3), 385-396. Available at: <https://doi.org/10.1108/14691930510611120>.
- [13]. Hamdan, A. (2018). Intellectual capital and firm performance: Differentiating between accounting-based and market-based performance. *International Journal of Islamic and Middle Eastern Finance and Management*, 11(1), 139-151.

- [14]. Hejazi, R., Ghanbari, M., & Alipour, M. (2016). Intellectual, human and structural capital effects on firm performance as measured by Tobin's Q. *Knowledge and process management*, 23(4), 259-273.
- [15]. Li, Y., & Zhao, Z. J. A. E. L. (2018). The dynamic impact of intellectual capital on firm value: evidence from China. 25(1), 19-23
- [16]. Lin, Y., & Wu, L. Y. (2014). Exploring the role of dynamic capabilities in firm performance under the resource-based view framework. *Journal of business research*, 67(3), 407-413.
- [17]. Maji, S. G., & Goswami, M. (2016). Intellectual capital and firm performance in emerging economies: The case of India. *Review of International Business and Strategy*, 26(3), 410–430. Available at: <https://doi.org/10.1108/ribs-03-2015-0019>.
- [18]. Mollah, S., & Farooque, O. Al. (2012). Ownership structure, corporate governance and firm performance Evidence from an African Emerging Market. *Studies in Economics and Finance*, 29(4), 301–319.
- [19]. Ni, Y., Cheng, Y. R., & Huang, P. (2021). Do intellectual capitals matter to firm value enhancement? Evidences from Taiwan. *Journal of Intellectual Capital*, 22(4), 725-743.
- [20]. Ni, Y., Cheng, Y. R., & Huang, P. (2021). Do intellectual capitals matter to firm value enhancement? Evidences from Taiwan. *Journal of Intellectual Capital*, 22(4), 725-743. No. 2, pp. 171-174.
- [21]. Noradiva, H., Parastou, A., & Azlina, A. (2016). The effects of managerial ownership on the relationship between intellectual capital performance and firm value. *International Journal of Social Science and Humanity*, 6(7), 514.
- [22]. Odat, M., & Bsoul, R. (2022). The Role of Intellectual Capital in Firms Performance And Market Value: Evidence From Jordan. *International Journal of Management and Sustainability*, 11(4), 258-272.
- [23]. Papatungan, R. D., Subroto, B., & Ghofar, A. (2020). Does institutional ownership moderate the effect of intellectual capital and company value? *International Journal of Research in Business and Social Science (2147-4478)*, 9(1), 127-136.
- [24]. Papatungan, R. D., Subroto, B., & Ghofar, A. (2020). Does institutional ownership moderate the effect of intellectual capital and company value? *International Journal of Research in Business and Social Science (2147-4478)*, 9(1), 127-136.
- [25]. Pedro, E., Leitão, J., & Alves, H. (2018). Intellectual capital and performance: Taxonomy of components and multi-dimensional analysis axes. *Journal of Intellectual Capital*, 19(2), 407-452.
- [26]. Pulic, A. (2000). VAIC™—an accounting tool for IC management. *International Journal of Technology Management*, 20(5-8), 702- 714.
- [27]. Purwanto, A. (2011). Pengaruh Struktur Kepemilikan Perusahaan terhadap Intellectual Capital Performance. *Jurnal Prestasi*, 8(2), 11-33
- [28]. Reed, R. and Defillippi, R.J. (1990), “Causal ambiguity, barriers to imitation and sustained
- [29]. Rini, I. S., Sutrisno, T., & Nurkholis. (2017). The Effect of Ownership Structure on Firm Value with Investment Decision as Intervening Variable (Empirical Study of the Listed Companies in Indonesia Stock Exchange Period 2008-2014).
- [30]. Scafarto, V., Ricci, F., & Scafarto, F. (2016). Intellectual capital and firm performance in the global agribusiness industry: the moderating role of human capital. *Journal of Intellectual Capital*, 17(3), 530-552.
- [31]. 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.
- [32]. Soewarno, N., & Tjahjadi, B. (2020). Measures that matter: An empirical investigation of intellectual capital and financial performance of banking firms in Indonesia. *Journal of Intellectual Capital*, 21(6), 1085-1106.
- [33]. Wernerfelt, B. (1984), “A resource-based view of the firm”, *Strategic Management Journal*, Vol. 5
- [34]. Xu, J., & Liu, F. (2020). The impact of intellectual capital on firm performance: A modified and extended VAIC model. *Journal of Competitiveness*, (1).
- [35]. Zahid, A. (2021). The Impact of Intellectual Capital on Firm Value and Moderating Role Of Managerial Ownership And Institutional Ownership. *International Journal of Business Reflections*, 2(1).