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Research Article

Intellectual capital and firm value: The role of firm performance

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ABSTRACT

Businesses worldwide are getting new opportunities and facing challenges due to increased market competition and the transformation of globalization dynamics. To become successful and to get a competitive edge, it has become imperative for companies to adopt modern business strategies. This study empirically examines the nexus between intellectual capital and firm value with the mediating role of firm performance. VAIC (value-added intellectual capital) has been taken as an independent variable along with its three components, i.e., VACA, VAHU, and STVA. ROA and ROE have been taken as a measure of firm performance. Firm value was measured through Tobin's Q. The panel data was collected from non-financial firms listed on the Pakistan stock exchange for six years resulting in 474 observations. Fixed-effect regression test was conducted with the help of Eviews 9.0. The findings revealed that intellectual capital positively impacts the firm value. Moreover, firm performance mediates the nexus between intellectual capital and firm value. This study has contributed not only to literature related to intellectual capital, firm performance, and firm value but is also helpful for practitioners and managers as it provides insight into the specific components of intellectual capital, which generates firm value if invested and maintained efficiently and effectively.

Keywords: *Firm Performance; Firm Value; Intellectual Capita; Pakistan Stock Exchange*

1. INTRODUCTION

Companies worldwide are facing new opportunities and challenges due to increased market competition and the transformation of globalization dynamics. It has become imperative for companies to adopt modern technologies and dynamic business strategies; otherwise, companies will be swallowed by competitors. Companies are also getting considerable pressure in the market due to the transformation of the industrial economy into a knowledge economy which forces firms to use their soft resources, like knowledge and human capital, to get a competitive edge. According to Nuryaman (2015), companies in the past notably relied on tangible assets, which included land, equipment, and infrastructure, while Vodák (2011), stated that intangible assets create around 80% of company values in the current global economy with the help of knowledge management

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and human capital management. Companies' ability to efficiently utilize tangible assets enables them to create intangible value for the company (Noradiva et al., 2016). According to Usoff et al. (2002), the economic transition from industrial to knowledge has amplified the necessity of intellectual capital (IC) for firm value creation. Xu and Wang (2018), also emphasized the importance of IC for a firm's financial stability and competitiveness.

Borgo et al. (2013), stated that companies observed almost 40% labor productivity growth during the 1990s. Nowadays, companies are not only focusing on human capital development but also focused on knowledge management. Companies are motivated to make long-term affiliations with their business partners to enhance company value and reputation. Branding is labeled as a reputation asset (a type of intangible asset) that generates firm value (FV) (Urwin et al., 2008), which shows that IC investment has become imperative because of the long-term return on investment. Therefore, financial management dynamics can notably be highlighted by exploring the research domain of the nexus between IC and FV. Acknowledging the importance of IC, even big organizations like IBM have been investing in IC to reap the benefits associated with IC (Wang et al., 2021).

IC can be an intangible FV created with the help of three capitals, i.e., human, structural, and value-added capital. According to Kalkan et al. (2014), Tom Stewart was the first person who initially opined on the concept of IC in 1991. Afterward, this concept was notably welcomed by researchers and professionals in financial management. Scholars have used different procedures to measure the nexus between IC and FV (Ozkan et al., 2017). The VAIC (value-added intellectual capital) model is widely used and considered the most effective for calculating IC and its different components. Pulic (1998) is regarded as the pioneer in developing this model, which was further upgraded in 2004. According to Firer and Williams (2003), this model is helpful for the comparison of the financial performance of different firms. As IC creates value, companies are motivated to engage in IC investment because it has also increased investor interest. FV can be generated through IC investment because it is observed through ROA, ROE, profitability, and share price (Feimianti & Anantadjaya, 2014). As the business environment in Pakistan is highly uncertain, this provides an excellent justification to unlock the potential of IC and measure its impact on FV.

Literature related to IC suggests that it impacts the different market and organizational factors. However, it has mainly been studied in financial aspects, which shows that IC notably impacts innovation, profitability, firm performance (FP), FV, and many other management-related fields. For instance, Li and Zhao (2018), concluded in their study that positive nexus existed between IC and FV. Similarly, Kalkan et al. (2014) have also concluded a positive nexus between IC and FP. It can be stated that FV and profitability can be better explained with the help of IC; however, researchers have given very little attention to the possible mediating effect of FP between the nexus of IC and FV. In this regard, researchers in the current study have tried to measure the mediating role of FP between IC and FV. Moreover, the nexus between IC and FV is inconclusive as we can find both significant and insignificant results in the literature, e.g. (Appuhami, 2007; Seyed et al., 2012; Wang, 2008). This fact has also motivated the researchers to measure this relationship in the context of Pakistan.

This study has the following contributions. To cover the gap in the literature, this study investigates the mediating role of firm performance between the relationship of intellectual capital and firm value. Moreover, this study is among the pioneer studies and can also motivate future researchers to explore further the different dynamics of IC, FP, and FV. The current research findings have provided notable insights which are also helpful for managers and policymakers to devise their future strategies. Non-financial firms have a notable contribution to the economy and are engaged in investment activities, producing goods and services, and employ a significant share of the country's labor force. So this study helps to understand the parameters of IC as this research gives insight into the importance of human capital investment. Thus, this study's findings will help managers to enhance and preserve their IC through effective HRM activities and allocate resources to different components of VAIC as per their impact on firm performance and value.

2. LITERATURE REVIEW

2.1. INTELLECTUAL CAPITAL (IC)

Rapid technological change and globalization are continuously pressurizing organizations to become more competitive. To get a competitive edge, firms employ different tools, such as resource utilization and strategic investment decision. Thus, investment in IC is vital for competitive advantage. According to Kalkan et al. (2014), Tom Stewart introduced the term "Intellectual Capital" in an article "*Fortune Magazine*" titled "*Brainpower: How intellectual capital is becoming America's most valuable asset*" in 1991. Intangible assets like intellectual property, employee experience, knowledge, information, and material used to generate wealth are known as IC (Stewart, 2010). It covers more than trademarks, patents, copyrights, etc. IC is the leading factor in a knowledge-based economy. Therefore, the firms must be able to explore the rooted knowledge of their suppliers, customers, and employees to survive in the competition (Noradiva et al., 2016). "*Human capital, structural capital, and customer/external capital*" are the three basic components of IC (Kalkan et al., 2014; Noradiva et al., 2016; Nuryaman, 2015).

2.1.1. Human Capital (HC)

Schultz (1993), defined human capital as a critical factor that enhances employee performance, increases productivity, and enables the firm to compete in a competitive business environment and remain sustainable. According to Nuryaman (2015), unique intellectual ability, creativity, and innovation possessed by a firm's employees are human capital. Marimuthu, Arokiasamy, and Ismail (2009) said that activities executed in an organization to enhance employees' satisfaction and performance come under the human capital domain. These activities include knowledge and employee empowerment, social & cultural values, and training & development (Marimuthu et al., 2009).

2.1.2. Structural Capital (SC)

It is non-human capital that supports human capital (Kalkan et al., 2014). It gives infrastructural support and enhances employee performance (Sveiby, 1998). Kalkan et al. (2014) stated that anything helpful in executing day-to-day operations is known as

structural capital. Structural capital includes equipment, strategies, process manuals, hardware, software, and databases.

2.1.3. Customer Capital (CC)

External or relational capital is called customer capital (Jacobsen et al., 2005). Firms' relationship with their stakeholders helps to maintain a smooth relationship with internal and external stakeholders such as suppliers, creditors, employees, government, customers, consumers, and other parties (Nuryaman, 2015). Moreover, Kalkan et al. (2014) said customer capital brings loyalty and satisfaction to the firm and its stakeholders.

2.2. Intellectual Capital (IC) and Firm Value (FV)

IC is a vital resource for becoming sustainable in a competitive environment, and investors pay more attention to efficient IC (Chen et al., 2005). Li and Zhao (2018) stated that the massive gap in book and market value of companies such as Microsoft, Amazon, Apple, and Google is due to IC. Because it changed how FV is measured from the traditional way, it is now being estimated while considering IC and its components. In this regard, Mehralian et al. (2012), studied the impact of IC on FV in the pharmaceutical sector of Iran from 2004 to 2009. After statistical analysis, the researchers found no signification relationship between the studied variables. Shaban and Kavida (2013) investigated the linkage between FP and FV in the IT firms of India and found no association between IC and M/B ratio. However, VAIC and FP had a significant relationship.

In addition to the above, Berzkalne and Zelgalve (2014) found a positive impact of IC on FV in the case of firms working in Latvia and Lithuania. However, no such results were found in the firm of Estonia. Iranmahd, Moeinaddin, Shahmoradi, and Heyrani (2014) confirmed that IC and its components have no impact on FV in the manufacturing firms of Tehran. In contrast, Nejati and Pirayesh (2015) found a positive association between IC and FV. Lotfi, Elkabbouri, and Ifleh (2016) concluded that IC (VAIC), HCE, CEE, and SCE positively affect the FP (ROE, ROI, and ROA). However, no association was found between IC and FV in the Morocco banking sector. Onyekwelu and Ubesie (2016) researched in Nigeria while taking the panel data covering ten years and found that HC and CEE positively impact the M/B ratio and EPS. Whereas SCE negatively influences the pharmaceutical sector's EPS and M/B ratio. Further, China Li and Zhao (2018) revealed that HC is only effective in capital-intensive firms, but organizational capital significantly impacts firm value in 1850 Chinese companies. Moreover, the researchers showed that investment in organizational capital reduces FV in the current year and increases in the subsequent year.

The resource-based theory (RBT) was developed by Barney (1991). According to RBT, firms utilize their resources to gain a competitive edge. With the support of strategic usage of resources, an organization can have abnormal returns and competitiveness. However, using firm resources depends on decision-making. In this regard, Bambang, Mukhtaruddin, Arista, and Rahmah (2015) proposed three components of simple criteria. First, the decision regarding resource allocation should create value. Second, the resources should be in-accessible, non-replicable, and distinctive so the competitive edge may sustain for longer. Third, allocated resources should generate opportunities for operational

and financial growth. Based on RBT, IC should create value for the firm, but previous studies show different views by giving mixed positive and negative results. For instance (Berzkalne & Zelgalve, 2014; Chen et al., 2005; Lotfi et al., 2016; Nejati & Pirayesh, 2015) found that IC significantly relates to FV. Whereas (Mehralian et al., 2012; Shaban & Kavida, 2013) found the same relationship insignificant. Based on these arguments and findings, this research proposed:

H_1: There is a significant relationship between Intellectual Capital and Firm Value.

2.3. Intellectual Capital (IC) and Firm Performance (FP)

IC is considered a valuable and leading element to enhance FP and get a competitive edge over competitors (Chen et al., 2005). Most investors prefer those firms having more invisible value because, generally, while following the accounting standards, IC does not show in the firms' financial statements. Several researchers found a significant linkage between IC and FP in this regard. For instance, Chen et al. (2005) found empirically that IC-efficient firms have more growth in profit and revenue working in Taiwan from 1992 to 2012. Sharabati, Jawad, and Bontis (2010) said there is a considerable difference in Microsoft's book value and market value, and this gap is because of IC and organizational learning.

Further, Sharabati et al. (2010) studied and found a positive linkage between IC and FP in Jordan's pharmaceutical sector. Afroze (2011) examined this relationship in private banks of Dhaka, Bangladesh, during 1998-2009 and confirmed the correlation between IC and FP. Maditinos, Chatzoudes, Tsairidis, and Theriou (2011) revealed that HC significantly impacts the FP. Moreover, Sumedrea (2013) studied the nexus of IC and FP (growth rate, ROA, and ROE) in Romanian companies during the 2010-2011 crises and revealed that HC, skills, knowledge, and experience are vital in business growth and performance due to learning and adaptability of human. Kalkan et al. (2014) researched the effect of IC, innovation, and organization strategy on the FP in Turkey and revealed that IC positively impacts FP. Furthermore, Hashim, Osman, and Alhabshi (2015) and Matinfard and Khavari (2015) also showed the positive influence of IC on FP. Pratama (2016) concluded that the IC of high-tech companies registered on the Indonesia stock exchange positively linked with firm financial (ROA) and market performance (MB). Ozkan et al. (2017) found that HC had more influence on the financial efficiency of Turkey's banking sector in 2015 than SC and CE. Gogan, Artene, Sarca, and Draghici (2016) found positive nexus between IC and FP. Based on the reviewed literature, the IC significantly impacts the FP, which is consistent with RBT. Based on RBT, better financial performance and a competitive edge can be obtained while utilizing the firm's strategic resources. Thus RBT and reviewed literature motivated the researcher to generate the following hypothesis:

H_2: There is a significant relationship between Intellectual Capital and Firm Performance.

2.4. Intellectual Capital (IC), Firm value (FV), and Firm Performance (FP)

Ghasempour, Ghasempour, Branch, and Bahonar (2013) studied the nexus between FP and FV during 2000-2008 among the firms listed on the Tehran stock exchange. The researchers measure the FP while taking the liquidity, profitability, continuity, and

efficiency ratios. In contrast, FV was measured with the help of abnormal stock returns. The researchers revealed that strong PF yields strong FV. Nuryaman (2015) also concluded that better FP is necessary to obtain good market value.

Further, Gamayuni (2015) confirmed the positive impact of firm profitability on FV. Similarly, Setiawanta, Pamungkas, and Jumanto (2021) also concluded the positive effect of FP on FV. Nawaiseh (2017) also found significant nexus between FP and FV. Thus, an increase in IC can boost the FV because IC enhances FP, ultimately increasing FV (Nuryaman, 2015). Suhendra (2015) also studied the FP as an intervening variable between IC and FV and confirmed the mediation. The above studies showed the mediating role of FP between IC and FV; however, every market has different uncontrollable factors that influence the results. Thus this study proposed the following hypothesis and theoretical framework in Fig. 1.

H_3: Firm Performance has a significant relationship with Firm Value.

H_4: Firm Performance mediates the nexus between Intellectual Capital and Firm Value.

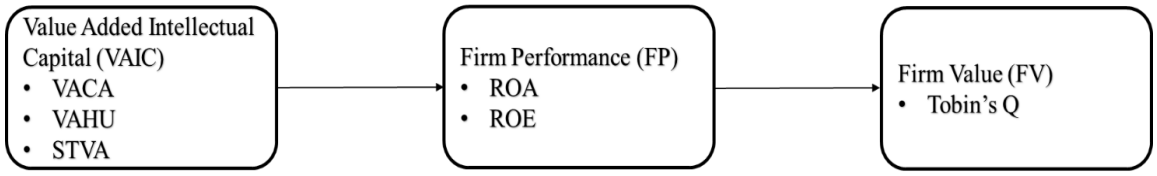

Fig. 1. Theoretical Framework

3. METHODOLOGY

Research methodology is considered a pillar for any research because it outlines that by following, the researchers try to find the answer to the research question and provide the solution to the investigated problem. The researchers' perception of knowledge development is known as research philosophy (Saunders, Lewis, & Thornhill, 2012). The appropriate philosophy is vital because it depends on the study's objective (Saunders et al., 2012). Based on the study's purpose, aims and nature, this study selected "positivism" as the research philosophy. Further, research tools, methods, and analyses have also been chosen according to research philosophy.

3.1. POPULATION AND SAMPLING

Kothari (2004) stated that anything being investigated is known as population. "The population refers to the entire group of people, events, or things of interest that the researcher wishes to investigate. It is the group of people, events, or things of interest for which the researcher wants to make inferences (based on sample statistics)" (Sekaran & Bougie, 2016). Thus, this study has taken all non-financial firms listed on the Pakistan stock exchange (PSX) as the study population. Non-financial firms are selected because of their notable contribution to the economy. According to Tebrake and O'Hagan (2017) large share of economic activities are contributed by non-financial firms around the globe. These firms engage in investment activities, producing goods and services, and non-financial firms employ a significant share of the country's labor force. By investigating the population, the

researcher can find the answer to the research question more quickly and accurately. However, due to many unavoidable circumstances along with financial and time constraints, it is not possible practically to study the entire population (Zikmund, Babin, Carr, & Griffin, 2013). Thus, based on research objectives, this study applied the Purposive sampling technique and selected only seventy-nine firms with complete data on the study period and variables. The panel data set was based on six years (2010-2015) with 474 observations which satisfied the minimum sample size recommended by (Hair, Black, Babin, & Anderson, 2017).

3.2. Data Collection and Analysis

The data has been taken from secondary sources while keeping in view the purpose of the study. The central data collection sources are official websites, annual reports of the selected firms, and regulators' websites like PSX, SECP, and SBP. The extracted data was organized in MS Excel, and further statistical analysis was performed with secondary data analysis software EViews 9.0.

3.3. Measurement of Variables

3.3.1. Intellectual Capital

VAIC model was followed for measuring IC, proposed by Pulic (1998). All components of IC have been added with value-added (VA) components. The following formula has been used to measure the VA. Where OUT means total sales of the company, IN means cost of sales without personnel expenses, and D stands for depreciation expense. VA = OUT – IN – D. As shown below, VA Capital Employed (VACA) is calculated by dividing the VA by capital employed (CE). CE is obtained by excluding intangible assets from the firm's total assets. VACA = VA / CE.

Further, VA Human Capital (VAHU) is calculated by dividing VA by human capital (HC), as shown in the below formula. Where HC is obtained by the addition of employees' benefits and salaries. VAHU=VA/H. Moreover, Structural Capital Value Added (STVA) is the division of SC with VA, where SC is a difference between HC and VA. STVA = SC / VA.

Finally, by adding three components, the value of VAIC was obtained. VAIC = VACA + VAHU + STVA.

3.3.2. Firm Value

For the measurement of FV, the researchers used Tobin's Q (TQ = Company's Market Value/ Company's Book Value) while following the measure used by (Nuryaman, 2015).

3.3.3. Firm Performance

For the measurement of FP, the researchers used the return on equity (ROE = Net Income/ Total Equity) and assets (ROA = Net Income / Total Assets) while following the measurement used by (Maditinos et al., 2011).

All study variables are summarized in below table 1.

Table 1. List of variables

Label	Variable Name	Source	Expected Impact on FP	Expected Impact on FV
VAIC	Value-Added Intellectual Capital	(Bhattu-Babajee & Seetanah, 2021; Marzo, 2022; Nuryaman, 2015)	Positive	Positive
VACA	Value-Added Capital Employed	Nuryaman (2015)	Positive	Positive
VAHU	Value-Added Human Capital		Positive	Positive
STVA	Structural Capital Value-Added		Positive	Positive
FP	Firm Performance Return on Assets (ROA) Return on Equity (ROE)	(Maditinos et al., 2011).	-	Positive
FV	Firm Value (Tobin's Q)	Nuryaman (2015)	-	-

4. RESULTS AND DISCUSSION

4.1. Descriptive Analysis

Table 2 shows that mean of VAIC is 2.9675, the SD is 2.9237, the minimum is -6.8819, and the maximum is 14.7807. Among the VAIC components, the mean of STVA is 0.4637, the SD is 0.8821, the minimum is -3.7974, and the maximum is 4.2053. The mean of VACA is 0.1845, the SD is 0.1720, and the minimum and maximum are -0.2827 and 0.8841, respectively. The mean of VAHU is 2.3193, the SD is 2.5809, and the minimum and maximum are -7.9138 and 13.7426, respectively. Overall, the SDs show that VAIC has more deviation due to VAHU than VACA and STVA.

Table 2 also shows that the mean value for ROA is 9.6325 while the mean value for ROE is 16.3748. The SD value for ROE (20.2276) is more than ROA (12.3525). On the other hand, the mean value for Tobin's Q is 1.4218 while having a lower SD (1.3777) compared to ROA and ROE.

Table 2. Descriptive Analysis

Variable	Minimum	Maximum	Range	Mean	Median	Std. Dev.	N
VAIC	-6.8819	14.7807	21.6626	2.9675	2.6350	2.9237	474
STVA	-3.7974	4.2053	8.0027	0.4637	0.5515	0.8821	474
VACA	-0.2827	0.8841	1.1668	0.1845	0.1518	0.1720	474
VAHU	-7.9138	13.7426	21.6564	2.3193	1.8298	2.5809	474
ROA	-41.2800	67.5900	108.8700	9.6325	8.1200	12.3525	474
ROE	-64.6700	87.0800	151.7500	16.3748	15.3200	20.2276	474
TOBINS_Q	0.2737	9.7553	9.4816	1.4218	0.9357	1.3777	474

4.2. Correlation Analysis

After descriptive analysis, this study presented the correlation results in Table 3, which shows that Tobin's Q positively correlates with all study variables. The correlation values of ROA, ROE, VAIC, and VAHU are 0.3821, 0.2093, 0.2848, and 0.2617, respectively, which are not high. But the correlation between STVA and Tobin's Q is very low, as shown by its value, i.e., 0.0719. In contrast, the correlation between VACA and Tobin's Q is 0.5330, which is a

moderate correlation. Similarly, ROA and ROE have a positive correlation with other variables. For instance, the correlation value between ROA and ROE is 0.7134, and ROA and VAIC are 0.5291, showing a strong and moderate correlation, respectively, between mentioned variables.

Further, ROE has a moderate correlation with VAIC, VAC, and VAHU but a weak correlation with STVA, i.e., 0.0793. The correlation table further shows that VAIC has a moderate correlation with STVA and VACA but has a very strong correlation with VAHU; its correlation value is 0.9546. the moderate values do not cause multiclonality issues, but strong values cause multicollinearity. As STVA, VACA and VAHU are the components of the VAIC and these variables are not used together in regression analysis thus, their moderate and strong correlation values do not cause multicollinearity issues.

Table 3. Correlation Analysis

Variable	Tobin's Q	ROA	ROE	VAIC	STVA	VACA	VAHU
Tobin's Q	1						
ROA	0.3821	1					
ROE	0.2093	0.7134	1				
VAIC	0.2848	0.5291	0.4636	1			
STVA	0.0719	0.0348	0.0793	0.4181	1		
VACA	0.5330	0.7107	0.5797	0.5478	0.0340	1	
VAHU	0.2617	0.5401	0.4592	0.9546	0.1291	0.5419	1

4.3. Assumptions for Regression Analysis

4.3.1. Data Normality Test

It is a fundamental assumption of regression analysis. In this regard, the researchers applied the "Panel Unit Root Test" while using the data analysis statistical tool Eviews and presented the results of two tests, i.e., the PP – Fisher Chi-Square test and the Levein, Lin & Chu test in table 4, which shows data normality as the $P < 0.05$.

Table 4. Panel unit root test: Summary

Variables	PP - Fisher Chi-square	Prob.**	Levin, Lin & Chu t*	Prob.**
VAIC	385.450	0.0000	-37.6455	0.0000
STVA	337.680	0.0000	-66.9202	0.0000
VACA	273.243	0.0000	-65.3285	0.0000
VAHU	389.611	0.0000	-39.3405	0.0000
ROA	264.867	0.0000	-13.700	0.0000
ROE	249.877	0.0000	-13.4868	0.0000
TOBIN'S Q	249.402	0.0000	18.9846	0.0000

4.3.2. Multicollinearity

Data should be free from multicollinearity is the second assumption for regression analysis. Correlation analysis is the simplest method to check multicollinearity. The above correlation table shows that the correlation between VAHU and VAIC is high, i.e., 0.954, which shows multicollinearity. As VAHU is the VAIC component and both are not simultaneously used in any model thus, there is no issue of multicollinearity in our data set.

4.4. Regression Analysis

After completing the preliminary requirements, the researcher tested the hypotheses through regression analysis. Before running the regression models, it is compulsory to determine the appropriate effect model. The researchers first applied the Redundant variable (Likelihood Ratio) test for all models, showing a significant chi-square value. Which further confirmed the selection of a fixed model instead of a common effect. Additionally, the researcher applied the Hausman test to select random or fixed-effect models. The findings revealed that for all models, chi-square statistics are significant; thus, researchers used the fixed-effect model. In this regard, the following models were assessed, presented in Table 5, and discussed in detail.

The results show that VAIC has a positive coefficient, i.e., 0.147610, and has a positive relationship with Tobin's Q. In model 1, the R^2 and Adj-R^2 are low. This small value is because VAIC is not only the single determinant of FV; many other predictors, such as corporate governance, dividend policy, capital structure, etc., exist in the literature. Further, the researchers applied the F-test to check the model significance and found the F-statistic significant. Thus our first hypothesis is supported. In model 2, STVA and VACA have a positive relationship with Tobin'Q, which are significant at 5% and 1% significance levels, respectively. At the same time, the relationship between VAHU and Tobin's Q is negative. In the case of VAIC components, R^2 and Adj-R^2 are higher in contrast to equation 1, i.e., 33.15% and 31.99%, respectively. Further, the value of the F test is also significant at a 1% significance level in this model. In conclusion, two components of VAIC positively affect the FV.

In models 3 and 4, VAIC has a positive coefficient with ROA and ROE. Both relationships are significant. In the case of ROA, R^2 and Adj-R^2 are 65.45% and 58.52%, respectively. Similarly, regarding ROE, R^2 and Adj-R^2 are 55.92% and 47.08%, respectively. These higher values revealed that VAIC is the significant predictor of FP (ROA and ROE). Further, the significant value of the F-test also confirmed the model's significance. The results demonstrated that our second hypothesis was also supported.

Further, in models 5 and 6, the researchers tested the impact of components of VAIC on both proxies of FP (ROA and ROE). The findings confirmed that VACA and VAHU positively impact the ROA and ROE; both are significant at a 1% significance level. In contracts, STVA has no impact on both proxies of FP. The F-test was also used to check the model significance, which revealed that F-statistic is significant for this model. The component-wise testing showed that VACA and VAHU positively impact ROE and ROA.

In models 7 and 8, the table shows that the ROA and ROE have a positive coefficient, i.e., 0.046735 and 0.017034, respectively. The R^2 and Adj-R^2 for both models are not relatively high, but model 7 has more significant values than model 8. These low values show that many other predictors except ROA and ROE affect FV. Moreover, F-statistic is also significant in these models. In models 9 and 10, the researcher tested the mediating effect of FP between IC and FV. The results show that the coefficient values of VAIC (0.063044) and ROA (0.038985), as well as VAIC (0.119757) and ROE (0.009242), are positive and significant at a 1% confidence level. Further, the value change of R^2 and Adj-R^2 was also

observed in models 9 and 10 compared to the previous models. For instance, in equation 9, the value of R^2 (20.95%) and Adj-R^2 (19.76%) has increased from R^2 (12.34%) and Adj-R^2 (11.21%). Similarly, in model 10, R^2 (13.73%) & Adj-R^2 (12.43%) have increased from R^2 (12.34%) & Adj-R^2 (11.21%), which shows the mediating role of ROA and ROE in the relationship between VAIC and FV.

Table 5. Fixed Effect Model

Model	Dependent Variable	Independent Variable	Coefficient	t-Statistic	R^2	Adj-R^2	F Statistic
1	Tobin's Q	VAIC	0.147610	7.129989***	0.12337	0.11211	10.95389***
2	Tobin's Q	STVA	0.143679	2.370056**	0.33149	0.31999	28.82156***
		VACA	4.490265	12.41585***			
		VAHU	-0.017034	-0.699407**			
3	ROA	VAIC	1.440988	7.052637***	0.65448	0.5852	9.446823***
4	ROE	VAIC	2.428574	6.426175***	0.55916	0.47077	6.325982***
5	ROA	STVA	-0.404908	-1.12891	0.48479	0.4815	147.4156***
		VACA	53.65264	16.39386***			
		VAHU	0.602211	3.315219***			
6	ROE	STVA	0.255641	0.302439	0.39714	0.38676	38.28959***
		VACA	54.47012	10.80202***			
		VAHU	1.451282	4.273776***			
7	Tobin's Q	ROA	0.046735	9.906718***	0.19675	0.18643	19.06493***
8	Tobin's Q	ROE	0.017034	5.486524***	0.08681	0.07507	7.398742***
9	Tobin's Q	VAIC	0.063044	2.743275***	0.20952	0.19764	17.64479***
		ROA	0.038985	7.126281***			
10	Tobin's Q	VAIC	0.119757	5.222612***	0.1373	0.12434	10.59512***
		ROE	0.009242	2.743052***			

5. CONCLUSION

In this study, the researchers empirically studied the relationship between IC and FV and the intervening role of FP. Independent variable IC was measured with VAIC (having components: VACA, VAHU, and STVA). The dependent variable, FV, was measured with Tobin's Q. In contrast, mediating variable, FP, was measured with the help of ROA and ROE. The study population was non-financial firms listed on PSX, and by applying purposive sampling, 79 firms were selected as the final sample. Companies' websites, annual reports, and regulators' websites were the sources of data collection.

By applying the statistical tests, it is revealed that VAIC and FV have a positive relationship. The findings are consistent with RBT and studies of (Berzkalne & Zelgalve, 2014; Chen et al., 2005; Nejati & Pirayesh, 2015; Noradiva et al., 2016; Nuryaman, 2015). Moreover, the researchers also studied the impact of components of IC and found that VAHU has a negative relationship with FV. In contracts, STVA and VACA have a positive relationship with FV. Further, the researchers analyzed the nexus between IC and FP and found that IC positively impacts ROA and ROE, which is also consistent with RBT and previous studies such as (Afroze, 2011; Gogan et al., 2016; Hashim et al., 2015; Kalkan et al., 2014; Maditinos et

al., 2011; Nuryaman, 2015; Ozkan et al., 2017). Moreover, in the case of components of IC, STVA has no relationship with FP, but VAHU and VACA positively impact FP (ROA & ROE).

Furthermore, to fulfill the third objective of the study, the researchers studied the effect of FP (ROA & ROE) on FP (Tobin's Q) and found that both proxies of FP positively impact the FV. These findings are also consistent with previous studies (Ghasempour et al., 2013; Kalkan et al., 2014; Nuryaman, 2015). After fulfilling the procedure suggested by Baron and Kenny (1986), researchers concluded that FP has a mediating role between IC and FV. The R^2 and Adj-R^2 showed the level of mediation, i.e., Partial. These findings are consistent with (Nuryaman, 2015; Sumedrea, 2013).

This study has several implications for practitioners and managers. As it is evident from the study concluded that all three factors of IC have a significant relationship with FP as well as FV. Therefore, managers should try to enhance and preserve their IC through effective HRM activities such as training and development of employees and investment in employee selection and recruitment. Moreover, this study's results help managers to allocate resources to different components of VAIC as per their impact on firm performance and value.

5.1. Limitations and Future Directions

There are some limitations of this study. Such as, the researchers applied quantitative methods for data analysis and ignored the subjective solution of the research problem. Thus, future researchers should use this approach to get more insights. Further, this research was done on non-financial firms; however, in the future, financial firms can be studied singly or jointly with non-financial firms for comparative analysis. Moreover, future researchers should conduct sector-wise research to find which kind of industry needs more concentration and effective allocation of resources.

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Conceptualization, Aftab Ahmed, Muhammad Usman Yousaf and Dr. Muhammad Kashif Khurshid; methodology, Zeeshan Riaz; software, Dr. Muhammad Zulifiqar; validation, Aftab Ahmed, Muhammad Usman Yousaf and Dr. Muhammad Kashif Khurshid; formal analysis, Dr. Muhammad Kashif Khurshid; investigation, Aftab Ahmed and Muhammad Usman Yousaf; data curation, Aftab Ahmed, Muhammad Usman Yousaf and Zeeshan Riaz; writing—original draft preparation, Aftab Ahned; writing—review and editing, Dr. Muhammad Kashif Khurshid; supervision, Dr Muhammad Kashif Khurshid. All authors have read and agreed to the published version of the manuscript."

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