



## Intellectual Capital, Financial Performance, and the Mediating Role of Financial Vulnerability

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### ABSTRACT

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This study investigates the contribution of intellectual capital in enhancing firms' financial vulnerability and performance in Pakistan's emerging economy. This research considered ten years of data from 2011 to 2020 of non-financial firms listed on the stock exchange of Pakistan (PSX) and falls in the KSE-100 index. This research successfully applied a previously defined regression methodology to test the hypothesis investigating the significance of intellectual capital. Empirical investigation successfully reveals IC's significance in improving firms' financial vulnerability and performance using an aggregate measure of IC called value-added intellectual coefficient (VAIC) and its components human capital, structural capital, and capital employed efficiency. Financial Vulnerability mediates between intellectual capital and financial performance. The results of this study prove VAIC significance in developing countries like Pakistan. The study also shows that Pakistani investors and firms give IC weight in their investment decisions and must focus on IC for success in a competitive world. Accounting bodies should also focus on developing standards that incorporate IC as an asset. This study considered firms of multiple sectors to examine the significance of IC in Pakistani firms successfully. Along with enhancing IC literature, the VAIC model is significant in measuring IC in developing economies. This study also tried to extend IC literature in the context of the financial Vulnerability of firms and its indirect impact on financial performance.

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## 1.0 Introduction

The transformation of the economic world from industrial to knowledge-based raised the importance of knowledge-intensive resources (Dzenopoljac *et al.*, 2016). An innovative global economy upsurges the importance of knowledge-intensive resources that are key to sustaining firms' competitive advantage, most importantly intellectual capital (Maurizio *et al.*, 2018). Firms shifted their focus to developing knowledge and intangible assets to achieve a competitive edge and pursue value creation. These assets are considered crucial success factors (Li *et al.*, 2008) as the growth of a business can be measured by competence and novelty sustained by the valuable management of intellectual capital, an invisible asset, and the natural assets of a firm (Xinyu, 2014)—the strategic role of Intellectual capital (IC hereafter) in business performance. IC is a combination of foundational apparatus that is vital for any business. Therefore, today's market dynamics consider IC a possible alternative to building competitive leverage (Allee, 1997; Donlon & Haapaneimi, 1997). Human capital theory gives birth to IC by exclusively relating knowledge with capital (Stewart, 1997). Some workers acquire more knowledge, skills, and abilities and are more productive than their fellows (Hornbeck & Salman, 1991; Muller, 1982). IC picked the knowledge factor from this theory and considered the knowledge of individuals as wealth for the organization.

Therefore, IC theory in this study says that the asset of knowledge is housed in organizations and individuals; the systematic connection of one system with another results in better performance of organizations (Harris, 2000). Lev (2001) argues that regular earnings can be generated by the financial and physical assets of the firm, while the growth of intangible assets or intellectual property attains abnormal earnings. On the other side, if financial statements of knowledge-intensive corporations do not account for intellectual property, the cost of capital in those companies will be overcharged (Abhayawansa & Guthrie, 2016; Andrikopoulos, 2005; Chaminade and Roberts, 2003; Fincham and Roslender, 2003; Sardo and Serrasqueiro, 2016; Tseng and Goo, 2005; Lev and Zarowin, 1999; Lev, 2001; Lev and Radhakrishnan, 2003; Neha, 2018; Zerenler and Gozlu, 2008). As a result, it undervalues the company's market value, delays investment, and hinders the growth progression of firms. Limitations in accurately explaining the firm's value via financial statements highlighted that IC creates an economic and market value for the firm; only producing material supplies cannot create such value (Chen *et al.*, 2005).

Therefore, resource-based theory gives more importance to internal resources than external ones to attain competitive advantage and exceptional performance. The focus of this theory is the efficient utilization of strategic resources so that a firm can achieve outstanding performance and a competitive edge (Zeghal and Maaloul, 2010). In the intellectual capital context, various studies examine the role played by IC in improving firm performance (Roos *et al.*, 1998; Sardo and Serrasqueiro, 2016; Gianluca, 2018). So, IC is indicated as a key imperative driver of firm-level performance (Teece, 1998; Youndt *et al.*, 2004). Previous studies also highlighted the positive and significant association between business capital and the company's performance (Bontis, 1998; Bontis *et al.*, 2000). It also paves the way for IC-related disclosure as it contributes to a firm's value, so disclosures also have positive significance (Sarishma and Dharni, 2017). The literature

is further enhanced in the context of financial distress and tries to examine IC's role in improving firm performance that reduces financial distress likelihood (Pour *et al.*, 2014; Nadeem *et al.*, 2016; Nawaz, 2017; Cenciarelli *et al.*, 2018; Shahwan and Habib, 2020). The studies provided empirical evidence that IC has a role in improving firm value, competitiveness, and asset management, reducing the chances of financial distress.

Despite this research, the IC role debate between management and accounting researchers has not been concluded (Khalique *et al.*, 2020). A few reasons are mixed results reported by various researchers (Chang, 2007; Chu *et al.*, 2011; Maditinos *et al.*, 2011; Stahle *et al.*, 2011) and constraints of emerging and developing economies in exploring their knowledge potential as they rely mostly on their tangible assets (Malhotra, 2003). The rapidly changing world and global uprising challenges like COVID-19 have stressed the need to study IC literature in the current situation. Financial Vulnerability (FV) is one of these situations because FV is the ability of the country or corporation to recuperate sudden financial shocks. Financial shock is a situation in which the nature of a company is under threat (Mwenja and Lewis, 2009; Trussel, 2002; Tuckman and Chang, 1991). These shocks can be in the form of unexpected or sudden income loss, uncontrollable increases in expenditures, etc. Top management and regulatory bodies should consider such assessment techniques crucial for the operation because a financially vulnerable organization is more sensitive to financial shocks. An interesting academic question arises concerning assessing financial Vulnerability and factors that reduce this vulnerable exposure. The interest of management and investors is substantial because they consider these factors to avoid risk and investment decision-making.

Research addressing intellectual capital and financial vulnerability is of significant importance in emerging economies like Pakistan, which face two types of challenges: First is the high uncertainty level, and so is the level of financial and business risk. Second is the true utilization potential of their human capital due to poor health and education facilities (HCI, 2020). Pakistan ranked at 0.4 on the 0-1 World Bank Human Capital Index 2020 scale. Many improvements need to be made to meet the global challenges. The research exploring the IC role in the context of financial Vulnerability and firm performance provides an opportunity for the government and organizations to formulate policies and generate resources for the utilization of IC potential.

Further, this enhances the literature on the VAIC model's efficiency and shows the Pakistani firms' and investors' preference for knowledge-based intangible assets. Pakistan is a low-income emerging country with a massive population and a potential for improvement of human capital compared to developed countries (Bano *et al.*, 2018). Aside from that, though it is known that intellectual capital pursues a firm's performance, the specific means of intellectual capital that can indirectly influence organizational performance are still under research.

IC's relation with financial vulnerability was previously investigated by Aslam and Amin (2015) based on Tuckman and Chang's (1991) use of VAIC as a measure of IC. Still, this study was confined to the Pakistani pharmaceutical sector only. Further, this literature needs to be extended to other sectors of the economy to prove the IC's significance in another strategic

dimension. Therefore, in the current study, we aim to develop the IC literature in Pakistan by exploring the mediating role of financial vulnerability between intellectual capital and firm performance. For financial Vulnerability, we used the methodology of Tuckman and Chang (1991), which is designed to measure the potential to survive a financial shock. It is different as it uses book-based figures to evaluate the firm's flexibility to stay if the business activity halts due to financial shock. Therefore, a firm might not be financially distressed but financially vulnerable because of the non-flexibility to face financial shock. Aside from that, this study also covers an under-research area of identifying indirect factors between intellectual capital and organizational performance.

In the context of organizations in Pakistan, this study will confirm the impact of IC on financial performance and financial vulnerability and the mediating role of financial vulnerability in influencing firm performance. All the non-financial listed firms of the PSX 100 index were used to explore and enhance the literature on financial Vulnerability, performance, and IC/VAIC. This study shows that the VAIC and its components positively impact firms' financial Vulnerability and performance. Further financial Vulnerability positively mediates between intellectual capital and firm performance. This study has five sections: The first section is an introduction, and the second addresses the research background and hypothesis development. Data and methodology are the third section. The fourth is the result and discussion, and the fifth section concludes.

## **2.0 Literature Review and Hypothesis Development**

Klein and Prusak (1994) created a universal definition of IC. According to their meaning, IC is intellectual material that can be captured, controlled, and developed to produce an asset of higher value. Similarly, Edvinsson and Malone (1996) described IC as the knowledge that can be converted into value. Correspondingly, Sullivan (2000) considers IC to be knowledge that can be reflected in profits. IC is also characterized as 'hidden assets'; thus, they are not easily quantifiable in financial statements and are challenging to identify in the entity contribution (Fincham and Roslender, 2003). Several researchers and writers have consensus on three main IC components: relational (customer), human, and structural capital (Dzenopoljac *et al.*, 2017; Bontis, 1998; Edvinsson, 1997). These indicators are valuable and useful for IC. As per Dumay (2016), until the monetary aspect of IC is not realized, it won't be easy to consider its impact. For the first time, William *et al.* (2017) uses the Market Capitalization approach to measure the IC in the Italian firm's context.

### **2.1 VAIC as a measure of Intellectual Capital**

The Public (2000, 2004) presented a widely accepted approach named the VAIC (Value Added Intellectual Coefficient) model. The model was reported as unique because it uses data from conventional company financial reports. Andriessen (2004) discussed the VAIC model as an enhanced tool for analyzing IC due to the availability of online data. According to Tan *et al.* (2008), VAIC measures the IC level in the companies and helps determine value-added efficiency due to tangible and intangible assets. This method of measuring IC was based on the information derived from the employed capital of an entity, which is a tangible asset, and the entity's intangible assets comprise structural and human capital. This VAIC approach is different from other approaches

because it is an indirect way to determine the value-based IC impact via capital employed efficiency (VACE), the efficiency of structural capital (STVA), and the efficiency of human capital (VAHU). In the United Kingdom, the Department for Business, Innovation, and Skills (BIS) uses VAIC as a maker to identify IC by firms. The practical viability of the VAIC model (Zeghal and Maaloul, 2010). VAIC model is simple to use; the required data for this model is easily accessible through financial reports, and IC value is easily calculated and compared through this model. All these points support the VAIC methodology for IC measurement (Al-Musali and Ku Ismail, 2016; Janosevic *et al.*, 2013; Nimtrakoon, 2015; Young *et al.*, 2009).

## 2.2 Intellectual Capital and Financial vulnerably

Resource-based theory requires strategic internal resources to achieve outstanding performance (Zeghal and Maaloul, 2010). According to human capital and IC theory, knowledge assets are embedded in individuals and organizations (Harris, 2000), so this internal asset of knowledge can be converted into profit (Sullivan, 2000). The efficient utilization of these recourses helps firms avoid the financial distress of bankruptcy and increases their ability to bear financial shocks. It provides an opportunity to test the relationship of financial Vulnerability with strategic resources like IC. Tuckman and Chang (1991) also concluded that less elastic firms are more exposed to financial shocks. Therefore, we can estimate that IC has a role in increasing financial elasticity and decreasing the financial Vulnerability of the organization.

**Hypothesis 1:** *Entities with superior IC have a better level of financial Vulnerability ( $H_{1a}$ ), VACE have a better level of financial Vulnerability ( $H_{1b}$ ), VAHU has a better level of financial Vulnerability ( $H_{1c}$ ), STVA has a better level of financial Vulnerability ( $H_{1d}$ ).*

## 2.3 Intellectual Capital and Financial Performance

IC and its component's relation with financial performance has previously been investigated across various countries and industries. Most of them found a significant positive impact of IC on performance (Ahangar, 2011; Bontis, 1998; Denicolai *et al.*, 2015; Dzenopoljac *et al.*, 2016; Nimtrakoon, 2015; Tseng *et al.*, 2013; ul Rehman *et al.*, 2011). IC is significantly linked with the firm's performance, and this association differs by the industry. Aside from that, the available empirical evidence is insufficient to draw a consensus regarding that because this evidence is pretty much questionable. Financial performance is positively associated with intellectual Capital (Riahi-Belkaoui, 2003). Bontis *et al.* (2000) derived that regardless of any industry, the development of structural capital enhances the performance of the business. Firer and Williams (2003) fail to determine any relationship between IC and financial performance.

Therefore, the current study aims to further explore the literature of IC by hypothesizing:

**Hypothesis 2:** *Entities with superior IC provide higher financial performance ( $H_{1a}$ ), VACE provides higher financial performance ( $H_{1b}$ ), VAHU provides higher financial performance ( $H_{1c}$ ), and STVA provides higher financial performance ( $H_{1d}$ ).*

## 2.4 Financial Vulnerability and Financial performance of firms

The financial vulnerability level measures the firm's ability to face financial shocks (Aslam and Amin, 2015). Previous research concluded that IC has a role in improving firm value, competitiveness, and asset management, reducing the chances of financial distress (Cenciarelli *et*

*al.*, 2018; Shahwan and Habib, 2020). Financial Vulnerability is different to an extent as it evaluates the firm's flexibility or elasticity to survive if the business activity halts due to financial shock. Therefore, a firm might not be financially distressed but financially vulnerable because of the non-flexibility of a financial shock. This improved vulnerability level increases the firm's market reputation, as do its price and financial performance. It contributes towards the sustainable ability of firms'

Therefore, we hypothesized the relationship between vulnerability and financial performance in the current study.

**Hypothesis3:** *Entities with superior IC provide higher firm performance*

## **2.5 The mediating effect of Financial Vulnerability on the Intellectual Capital–financial performance nexus**

Aslam and Amin (2015) concluded that knowledge-based resources like IC have a key role in reducing financial risk and increasing financial strength. The efficient utilization of these resources helps firms avoid the financial distress of bankruptcy and increases their ability to bear financial shocks. Improved vulnerability levels result in increased financial performance. This contributes to the sustainable ability of firms' literature to explore the direct relation between IC and financial performance and financial Vulnerability; in this research, we will explore the indirect path. The study helps to bridge the literature gap and proves the IC's significance in another strategic dimension.

Therefore, we hypothesized the relationship between vulnerability and financial performance in the current study.

**Hypothesis4:** *Financial Vulnerability mediates the association between Intellectual Capital and financial performance*

## **3.0 Data and Methodology**

### **3.1 Sample and Measures**

This empirical research used a quantitative research design to study Pakistan's listed corporations. Ten years of panel data from 2011 to 2020, comprising non-financial listed firms included in the KSE-100 index of the Pakistan stock exchange, was considered for this research. This benchmark index represents Pakistan's stock market performance overall (Rizwan *et al.*, 2020). The initial sample consisted of 71 non-financial firms. Still, the study's final sample of 53 listed non-financial firms was shortlisted based on data availability (Shahwan and Habib, 2020) and audited annual reports of the companies used to collect data. Annual reports are obtained from the company's official website and the Pakistan Stock Exchange—data for all variables are extracted manually from these reports.

The impact of intellectual capital is studied in terms of its contribution to financial performance and financial vulnerability using the VAIC methodology. Effectiveness of its components: Human, structural, and capital employed are also considered separately for objectivity. This study is a widely used technique among researchers for the performance assessment of intellectual capital. The first time was introduced by Public (2000, 2004), and Chan (2009a, b) promoted this as a standardized methodology because of its reliability and data

availability. Multiple regression techniques were applied to the data set using Stata to study the hypothesized relationships of variables, like VAIC, its components, Tobin Q, Equity Ratio (ER), Operating margin ratio (OM) and Admin cost ratio (ACR), derived using the previous methodology of (Sullivan, 2000; Firer and Williams, 2003; Bontis, 1999; Chen et al. 2005; Roos *et al.*, 1997; Maditinos *et al.*, 2011; Sardo and Serrasqueiro, 2016; Shahwan and Habib, 2020). The variables, firm size, and leverage control these regressions. These are consistent with the methodology of (Alipour, 2012; Chan, 2009a; Firer and Williams, 2003; Mondal and Ghosh, 2012; Mehralian *et al.* 2012; Maditinos *et al.*, 2011; Sumedrea, S. 2013; Chowdhury *et al.*, 2019).

### 3.2 Research Variables and Econometric Models

Table 1 of Annexure 1 elaborates the variables and their measurement used in this study to test the hypothesis. The study used four types of variables. The Value-added Intellectual Coefficient is the primary explanatory variable along with its three components measuring the efficiency of human, employed, and structural capital. These are calculated by using the methodology of Public (2000, 2004) as adopted by Chowdhury *et al.* (2019) and Shahwan and Habib (2020). Second, Tobin's Q is used as a response variable because it measures the impact of invisible capital like that of IC; therefore, it better represents performance than that of book-based measures (Bontis, 1998) and is also less prone to managerial manipulation as it comprises of both book and market value (Hassan & Romilly, 2018). The third main variable is financial vulnerability, which is based on the methodology of Tuckman and Chang (1991). It comprises three proxies: Equity ratio, Operating margin, and administrative cost ratio. It measures the flexibility and adaptability of the firm to face financial shock. Financial Vulnerability is used as a mediating variable and a response variable. Finally, the study used firm-level controls like Firm Size and leverage as per the methodology adopted by the previous studies (Maditinos *et al.*, 2011; Firer and Williams, 2003; Sharma and Dharni, 2017).

**Table 1. Variable and Measures**

Variables	Symbols	Expected Sign	Description
Dependent Variable			
Financial Performance	TQ	+/-	The market value of total shares outstanding + total liabilities divided by total assets
Independent Variable			
Intellectual Capital			
Value-added Intellectual Co-efficient	VAIC	+	VAHU+STVA+VACE
Value-added Human Capital	VAHU	+	Value-Added/Total Wages and Salaries(HC)
Value-added Structural Capital	STVA	+	Value Added-HC
Value-added Capital Employed	VACE	+	Value Added/Total Assets-Current Liabilities
Mediating Variable			
Financial Vulnerability			
Equity Ratio	EQ	+/-	Total Equity/Total Revenue
Operating Margin Ratio	OM	+	Operating Profit/Total Revenue
Administrative Cost Ratio	ACR	+/-	Administrative Cost/Total Revenue

Control Variables			
Firm Size	SIZE	+/-	The natural log of total assets of the firm Total debt divided by total assets
Leverage	LEV	+/-	

To examine the impact of intellectual capital on financial Vulnerability, we estimate the fixed effect regression model below:

$$FV = \alpha_0 + \beta_1 VAIC + \beta_2 LEV + \beta_3 FSIZE + \varepsilon \tag{1}$$

$$FV = \alpha_0 + \beta_1 VAIC_{comp} + \beta_2 LEV + \beta_3 FSIZE + \varepsilon \tag{2}$$

Equation 1 represents the estimate to measure the impact of VAIC on financial vulnerability (FV) as hypothesized in H1. Here, FV represents the three proxies of financial vulnerability, and LEV and FSIZE represent firm-specific controls. Similarly, equation 2 represents the VAIC components: VACE, VAHU, and STVA as VAICcomp.

Test our second hypothesis (i.e., the impact of intellectual capital on financial performance); equations are estimated as follows:

$$\text{Tobin's Q} = \alpha_0 + \beta_1 VAIC + \beta_2 LEV + \beta_3 FSIZE + \varepsilon \tag{3}$$

$$\text{Tobin's Q} = \alpha_0 + \beta_1 VAIC_{comp} + \beta_2 LEV + \beta_3 FSIZE + \varepsilon \tag{4}$$

Here, Tobin's Q represents the financial performance, and VAIC is a proxy of intellectual capital. Similar to equations 1 and 2, Firm-specific controls are represented by LEV and FSIZE. Equation 3 estimates VAIC components' impact on financial performance.

Further, equation 4 is estimated to measure the impact of financial vulnerability on firm performance.

$$\text{Tobin's Q} = \alpha_0 + \beta_1 FV + \beta_2 LEV + \beta_3 FSIZE + \varepsilon \tag{5}$$

FV represents the three proxies to measure financial vulnerability, and Tobin's Q is the firm's performance. Firm-specific controls are the same as those of previous equations.

Equation 5 estimates the mediation effect of financial Vulnerability between VAIC and firm performance, as hypothesized in H4.

$$\text{Tobin's Q} = \alpha_0 + \beta_1 FV + \beta_2 VAIC + \beta_3 LEV + \beta_4 FSIZE + \varepsilon \tag{6}$$

Similar to equations 1 and 3, Tobin's Q represents financial performance, FV is denoted as three proxies of financial Vulnerability, and the rest are firm-specific controls used in this study.

## 4.0 Data Analysis

### 4.1 Descriptive statistics

Table 2 of Annexure 1 shows the descriptive statistics of all the variables used in this study. "N" shows the total number of observations of any study; in the current study, this number is 451. The descriptive statistic indicates that the most influential component of VAIC is VAHU, as its mean is the highest (5.262) among all components. Tobin's Q (TQ) ratio has a mean (1.9), indicating that the market value of assets and liabilities is higher than that of book value. This study supports our arguments that a more significant percentage of the market value of a corporation is not reflected in its financial reports. This study is consistent with the previous empirical literature of



Maditinos et al. (2011), which states a gap exists between the book value and market value of entities. Various other studies highlighted the failure of accounting to bridge the gap between book value and market value (Lev and Radhakrishnan, 2003; Lev and Zarowin, 1999).

The mean statistic of the financial vulnerability proxies, equity, operating margin, and administrative cost ratio are 0.603, 0.180, and 0.032, respectively. The highest dispersion was reported in VAIC, with a standard deviation of 3.167. This study reflects that data comprises firms with very high and low levels of IC. ACR has the lowest standard deviation (0.052) level, and so is its dispersion. The dispersion of VAHU (2.998) and TQ (1.927) was also reported as high. The distribution of the rest of the variables is low; this could be concluded from the data of most of the variable ranges around the mean. Maximum and minimum values also reflect higher dispersion levels in VAIC and VAHU. This study shows that firms have high and low human and intellectual capital utilization efficiency.

**Table2. Descriptive Statistics**

VARIABLES	N	MEAN	STDV	MIN	MAX
VACE	530	0.230	0.155	0.018	1.175
VAHU	530	4.359	2.998	0.975	18.83
STVA	530	0.673	0.180	-0.025	0.947
VAIC	530	5.262	3.167	0.980	20.16
ER	530	0.603	0.537	0.017	2.985
OM	530	0.180	0.142	-0.067	0.681
ACR	530	0.032	0.052	0.002	0.460
TQ	530	1.927	1.658	0.392	9.859
FSIZE	530	7.454	0.582	5.840	8.824
LEV	530	0.514	0.199	0.111	0.983

#### 4.2 Correlation Matrix

Correlation statistics results of Table 3 of Annexure 1 show that VAIC and all its three components have a significant positive correlation with financial vulnerability proxies and TQ. These proxies also correlate significantly and positively with firm performance (TQ). These results are consistent with our hypothesis. The administrative cost ratio (ACR) has a negative but insignificant correlation with TQ, and its correlation level is shallow. ER, with a correlation level of (0.213), correlates more with firm performance (TQ) than other factors. Capital employed efficiency has a strong positive correlation (0.650) with TQ than that of VAHU (0.019) and STVA (0.121). The correlation results of VAIC and FV are high compared to others. VAIC (0.529), VAHU (0.509), and STVA (0.504) have a high and positive correlation with OM and 0.143 0.147 with ACR. This is consistent with our hypothesis and the intellectual capital theory that human and structural capital, though not coming on books of account, have an influential impact on raising financial Vulnerability. An essential contribution of this research is that intellectual capital increases the firm's flexibility and adaptability by reducing its vulnerability level to face financial shock. This raises investor confidence and the firm's performance measures as TQ.

### 4.3 Regression Results and Discussion

**Table 3. Correlation Matrix**

Variables	(TQ)	(VAIC)	(VACE)	(VAHU)	(STVA)	(ER)	(OM)	(ACR)	(FSIZE)	(LEV)
TQ	1.000									
VAIC	0.057*	1.000								
VACE	0.650***	0.183***	1.000							
VAHU	0.019*	0.698***	0.130***	1.000						
STVA	0.121***	0.516***	0.181***	0.793***	1.000					
ER	0.213***	0.094**	0.159***	0.104**	0.055	1.000				
OM	0.130***	0.529***	0.382***	0.509***	0.504***	0.528***	1.000			
ACR	-0.052	0.143***	0.092**	0.147***	-0.133***	0.264***	0.239***	1.000		
FSIZE	-0.152***	0.137***	-0.375***	0.156***	0.126***	0.358***	0.254***	-0.010	1.000	
LEV	-0.153***	-0.042	-0.340***	-0.028	0.009	-0.491***	-0.291***	-0.023	0.191***	1.000

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Multiple regression models have been used in this study to test the hypotheses. This regression technique is in line with previous research (e.g., Firer and Williams, 2003; Chan, 2009a; Mondal and Ghosh, 2012; Alipour, 2012; Mehralian *et al.*, 2012; Maditinios *et al.*, 2011; Shahwan and Habib (2020). The Stata software is used to run these results on the panel data. Regression results of all hypotheses H1 are presented in three tables (4-6). The mediator financial vulnerability has three proxies; therefore, tables 4, 5, and 6 show results with this proxy ER, OM, and ACR, respectively.

H1 and its sub-hypothesis predict the impact of intellectual capital on financial Vulnerability. Table 4 of Annexure 1 shows that VAIC and its components significantly and positively impact financial vulnerability proxy ER. As per the results of Model 1 and 2 ( $\beta=0.019$ ,  $p < 0.01$ ;  $\beta=0.798$ ,  $p < 0.01$ ;  $\beta=0.019$ ,  $p < 0.01$ ;  $\beta=0.324$ ,  $p < 0.01$ ). The strength of the relations is also good, as the R-square is approximately 0.505, 0.494, 0.505, and 0.504. The firm-specific controls, i.e., firm size and leverage, also significantly impact the relation. Table 5 of Annexure 1 shows that VAIC and its components also significantly impact financial vulnerability in the second proxy operation margin (OM). Models 1 and 2 show that ( $\beta=0.021$ ,  $p < 0.01$ ;  $\beta=0.447$ ,  $p < 0.01$ ;  $\beta=0.022$ ,  $p < 0.01$ ;  $\beta=0.374$ ,  $p < 0.01$ ) R-square is 0.410, 0.371, 0.391 and 0.406 respectively. The relation between VAIC and its third proxy of financial vulnerability, the administrative cost ratio (ACR), is positive and significant, accepting the STVA. The same is denoted in Model 1 and 2 of Table 6

of annexure 1 ( $\beta=0.002$ ,  $p<0.1$ ;  $\beta=0.035$ ,  $p<0.01$ ;  $\beta=0.003$ ,  $p<0.01$ ;  $\beta=-0.038$ ,  $p<0.01$ ) R-square is approximately 0.023, 0.009, 0.023 and 0.018.

The H2 and its sub-hypothesis predicting the impact of intellectual capital on firm performance are presented in Table 4 of Annexure 1. The measures of intellectual capital (VAIC and its components) have a significant and positive relationship with the firm performance measure (Tobin's Q). Models 3 and 4 show that the VAIC has  $\beta=0.107$  and  $p<0.01$ ; similarly, its components VACE, VAHU, and STVA have  $\beta=7.614$ ,  $p<0.01$ ;  $\beta=0.02$ ,  $p<0.01$ ;  $\beta=1.298$ ,  $p<0.01$  respectively. The strength of the relations is also good as the R-square is approximately VAIC (0.390), VACE (0.437), VAHU (0.040), and STVA (0.058). These results are consistent with our hypothesis and the intellectual capital theory. The empirical investigation supports the assumption that a corporation with a higher IC level draws more interest from the investor. This also shows that investors value the IC while making an investment decision. More value is given to the capital employed efficiency of the firm than that of human capital and structural capital efficiency.

The results indicate that VAIC and its components have different values associated with them. This shows that investors treat each component differently while calculating real value before making an investment decision. This result supports the findings of Firer and Williams (2003) and Stahle *et al.*'s (2011) criticism of the VAIC model. Therefore, the study's investment decision results will help constitute IC's value-added ability. These results conform with the results of past studies (Chen *et al.*, 2005; Nimtrakoon, 2015; Dzenopoljac *et al.*, 2016). These results require that Pakistani firms have to divert the focus of their investment in developing their human and structural capital. These knowledge resources help the companies attain profitability and a competitive advantage. This study also paves the way for the country's human resource development, so the actual potential of these intellectual capitals is efficiently utilized for the betterment of the organization and the nation.

H3 predicts the relation of financial Vulnerability with financial performance. Model 5 of Tables 4, 5, and 6 shows a positive increase in equity ratio and operating margin and significantly impacts firm performance. ( $\beta=1.295$ ,  $p<0.01$ ;  $\beta=1.786$ ,  $p<0.01$ ). This shows that VAIC influences profitability, which could result in an improvement in financial vulnerability. Further, this reflects that the increase in firm strength, flexibility, and adaptable capacity positively impacts its market price and Tobin's Q. This boosts the investors' confidence, so their interest increases in these firms.

The study's fourth hypothesis predicts that the firm's financial vulnerability mediates the relationship between intellectual capital and financial performance, and this association is stronger in firms with a good vulnerability level. Mediation is tested using a technique developed by Baron and Kenny (1986). The condition for mediation is that (1) There is a significant association between intellectual capital, the independent variable, and firm performance, the dependent variable (ii) Intellectual capital, the independent variable, also significantly influences the mediating variable, financial Vulnerability and (iii) financial Vulnerability the mediating variable also has a significant relation with the dependent variable firm performance; after the fulfilment of these three conditions of mediation the combined effect is tested of independent variable intellectual capital and financial Vulnerability the mediating variable on firm performance.

**Table 4. Regression Results**

Variables	(1)	(5)	(3)	(6)	(2)	(4)	(2)	(4)	(2)	(4)
	ER	TQ	TQ	TQ	ER	TQ	ER	TQ	ER	TQ
VAIC	0.019*** (0.005)	-	0.107*** (0.019)	0.096*** (0.019)	-	-	-	-	-	-
VACE	-	-	-	-	0.798*** (0.154)	7.614*** (0.608)	-	-	-	-
VAHU	-	-	-	-	-	-	0.019*** (0.005)	0.020 (0.017)	-	-
STVA	-	-	-	-	-	-	-	-	0.324*** (0.095)	1.298*** (0.285)
ER	-	1.295*** (0.158)	-	0.595*** (0.149)	-	-	-	-	-	-
FSIZE	0.385*** (0.035)	0.199 (0.121)	-0.021 (0.080)	0.207** (0.092)	0.364*** (0.036)	0.290*** (0.090)	0.385*** (0.034)	- 0.379*** (0.113)	0.388*** (0.033)	- 0.413*** (0.111)
LEV	- 1.845*** (0.130)	- 3.105*** (0.581)	1.170** (0.461)	0.0712 (0.653)	- 1.743*** (0.122)	0.582 (0.405)	- 1.843*** (0.130)	-1.053** (0.474)	- 1.862*** (0.131)	-1.053** (0.470)
Constant	- 1.231*** (0.232)	2.822*** (0.840)	0.544 (0.752)	-0.189 (0.707)	- 1.034*** (0.264)	- 2.285*** (0.848)	- 1.217*** (0.233)	5.206*** (0.892)	- 1.361*** (0.232)	4.677*** (0.837)
Observations	530	530	530	530	530	530	530	530	530	530
R-squared	0.505	0.135	0.390	0.409	0.494	0.437	0.505	0.04	0.504	0.058

**Table 5. Regression Results**

Variables	(1) OM	(5) TQ	(3) TQ	(6) TQ	(2) OM	(2) OM	(2) OM
VAIC	0.021*** (0.002)	-	0.107*** (0.019)	0.075*** (0.021)	-	-	-
VACE	-	-	-	-	0.447*** (0.0360)	-	-
VAHU	-	-	-	-	-	0.022*** (0.002)	-
STVA	-	-	-	-	-	-	0.374*** (0.027)
OM	-	1.786*** (0.619)	-	2.077*** (0.555)	-	-	-
FSIZE	0.060*** (0.010)	-0.502*** (0.132)	-0.021 (0.080)	0.138* (0.083)	0.117*** (0.011)	0.059*** (0.011)	0.063*** (0.010)
LEV	-0.130*** (0.026)	-0.622 (0.547)	1.170** (0.461)	0.901* (0.473)	-0.155*** (0.0297)	-0.232*** (0.0276)	-0.246*** (0.0272)
Constant	-0.227*** (0.072)	5.663*** (0.933)	0.544 (0.752)	-0.442 (0.729)	-0.712*** (0.083)	-0.239*** (0.073)	-0.418*** (0.076)
Observations	530	530	530	530	530	530	530
R-squared	0.410	0.058	0.390	0.406	0.371	0.391	0.406

**Table 6. Regression Results**

Variables	(1) ACR	(5) TQ	(3) TQ	(6) TQ	(2) ACR	(2) ACR	(2) ACR
VAIC	0.002* (0.001)	-	0.107*** (0.019)	-0.113*** (0.019)	-	-	-
VACE	-	-	-	-	0.035*** (0.009)	-	-
VAHU	-	-	-	-	-	0.003*** (0.001)	-
STVA	-	-	-	-	-	-	-0.038*** (0.009)
ACR	-	-1.807** (0.727)	-	-2.349*** (0.839)	-	-	-
FSIZE	0.002 (0.003)	-0.363*** (0.109)	-0.021 (0.080)	-0.016 (0.080)	0.003 (0.003)	0.002 (0.003)	0.002 (0.003)
LEV	-0.003 (0.009)	-1.082** (0.473)	1.170** (0.461)	1.161** (0.459)	0.002 (0.009)	-0.008 (0.009)	-0.006 (0.009)
Constant	0.027 (0.023)	5.244*** (0.888)	0.544 (0.752)	0.609 (0.744)	0.004 (0.024)	0.035 (0.022)	0.053** (0.022)
Observations	530	530	530	530	530	530	530
R-squared	0.023	0.042	0.390	0.396	0.009	0.023	0.018

Tables 4, 5, and 6 reflect that all the direct relationship conditions of mediation are fulfilled. However, Models 6 of Tables 4, 5, and 6 present the results of combined regression considering the independent and mediating variable (i.e., intellectual capital and financial Vulnerability) on the study's dependent variable (i.e., financial performance). The influence of intellectual capital on financial performance remains statistically significant (positive, negative), as expected ( $\beta = 0.096$ ,  $p < 0.01$ ;  $\beta = 0.075$ ,  $p < 0.01$ ;  $\beta = -0.113$ ,  $p < 0.01$ ), whereas the mediator impact of financial vulnerability on financial performance also remains significant statistically (positive, negative) as per measurement of financial vulnerability proxy ( $\beta = 0.595$ ,  $p < 0.01$ ;  $\beta = 2.077$ ,  $p < 0.01$ ;  $\beta = -2.234$ ,  $p < 0.01$ ) in Models 6. These results show that intellectual capital increases the sustainability level of the firm by improving its vulnerability level, further improving firm performance. These results are consistent with previous research supporting IC's economic and sustainable advantages (Peng et al., 2007; Ferreira and Fernandes, 2017; Shahwan and Habib, 2020). Based on resource-based theory, intellectual capital increases the utilization of organizational resources that increase the firm's flexibility and adaptability power, improving the firm's vulnerability level and strength to face financial shocks. A better vulnerability level increases the firm's performance by raising investor confidence in the firm's sustainability level. These results confirmed the mediating role of financial Vulnerability and H4.

These results are empirical evidence for those Pakistani firms paying less attention to intellectual capital that they should have to divert their investment focus to develop their human and structural capital. These knowledge recourses help companies reduce financial vulnerability, attain a competitive advantage, and improve firm performance. The study also paves the way for the country's human resources development. A better organizational structure is needed so that the actual potential of this intellectual capital can be efficiently utilized for the betterment of the organization and the country.

## 5.0 Discussion and Conclusion

Previous Literature on VAIC raises criticism of its reliability and effectiveness. Generally, mixed results have always been reported by various empirical studies; for instance, Firer and Williams (2003) conducted their study in South African firms and failed to identify any relationship between VAIC and market value, profitability, or productivity, while a positive relation among IC, market value and financial performance were reported by Chen et al. (2005) in the economy of Taiwan. Thus, the questions arise of whether the VAIC approach adequately explains business reality or whether it needs further adjustments or improvements to perform coherently. Previous studies also revealed that corporations in developing or emerging economies primarily depend on tangible assets and neglect intangible assets (Madinios *et al.*, 2011). Madinios *et al.* (2011) concluded that most mixed results were reported while replicating the VAIC model in developing countries. The inefficiencies of developing countries in properly utilizing their intangible asset might be the reason for mixed results, so there is a need to investigate the VAIC model in developing countries further to authenticate this model. Hence, it seems logical for IC studies to establish a proper and complete link between Intellectual Capital and the corporation's value.

The scope of the current study is to explore the IC literature further using Pakistan's corporation to confirm the IC's role in enhancing financial performance under the mediating role of financial vulnerabilities of Pakistan firms. This study helps answer some of the abovementioned questions about the VAIC approach's potential in measuring intellectual capital. The study also validates the potential of this approach in indirectly measuring the role of intellectual capital in increasing firm performance by improving the sustainability and adaptability power of the firms. This study contributes to the running debate among management and accounting researchers about the role of intellectual capital. It directly impacts firms' performance by increasing profitability and indirectly influencing firm vulnerability level, which is crucial to accessing sustainability.

This study has theoretical and practical implications for future research. Relating IC with performance using an indirect path of financial Vulnerability provides an opportunity for intellectual capital research to associate it with the current COVID-19 situation when organizations face sudden disruption of business operations and resultant financial shocks. The organization has to struggle for its survival. The ability of a firm to meet financial shock is a crucial factor for an organization's survival, and IC is a key contributor to increasing this ability. Therefore, we could say that the increase of VAIC and its components like capital employed efficiency, human capital efficiency, and structural capital efficiency has a significant positive impact on profits and equity building. However, they have to bear the increase of admin for a broader perspective, which will result in a decrease in a firm's vulnerability level. This improved vulnerability level increases the firm's market reputation, as do its price and financial performance.

This study shows that Pakistani investors and corporations emphasize IC and its human and structural capital components. In this study, a country like Pakistan, with a huge population, requires a shifting focus on developing its human capital, which is a core part of IC; this could help the corporation obtain a competitive advantage and attain sustainable growth. The organization has to invest in staff training and improving structural capital so that employees can contribute effectively to its success. This is another study that supports the IC theory; therefore, there is a need for accounting bodies to focus on developing accounting standards that incorporate IC as part of financial statements. This paves the way for further investigation of IC significance and the development of more mature IC measurement techniques to capitalize on IC on the balance sheet. The study helps in bridging the book value and market value gap. The disclosure of IC allows investors to easily differentiate firms with higher IC, so investment decisions become easy for them.

Like every study, the current study also has limitations that should be addressed in future research. This study used Tobin's Q as a measure of performance; other performance measures like Return on investment (ROI), Economic Value Added (EVA), and Market Value Added (MVA) should be considered for future research. The scope of the current study is limited to ten years of 53 corporations in Pakistan's non-financial sector. In future research, knowledge-based and other sectors (financial and non-financial) could be compared with intangible assets. Instead of financial vulnerability, measures like financial resilience are required to explore the role of IC in enhancing the strength of organizations to withstand financial shocks.

**Muhammad Zain ul Abidin:** Problem Identification and Theoretical Framework

**Muhammad Umar:** Data Analysis, Supervision and Drafting

**Waseem Subhani:** Literature Search, Methodology, and Drafting

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### References

Abhayawansa, S. and Guthrie, J. (2016), "Does IC disclosure in analysts' reports vary by firm characteristics?" *Advances in Accounting*, Vol. 35, pp. 26-38.

Allee, V. (1997) *The knowledge evolution: Expanding organizational intelligence*, San Francisco: Butterworth-Heinemann.

Alipour, M. (2012), "The effect of intellectual capital on firm performance: an investigation of Iran insurance companies," *Measuring Business Excellence*, Vol. 16 No. 1, pp. 53-66.

Al-Musali, M. A. and Ku Ismail, K. N. I. (2016), "Cross-country comparison of intellectual capital performance and its impact on the financial performance of commercial banks in GCC countries," *International Journal of Islamic and Middle Eastern Finance and Management* Vol. 9 No.4, pp. 512-531.

Andriessen, D. (2004), "Making Sense of IC: Designing a Method for the Valuation of Intangibles", Elsevier Butterworth-Heinemann, Burlington, MA, 1-456. ISBN: 978-0-7506-7774-5.

Andrikopoulos, A. (2005), "The Real-Options Approach to IC Analysis: A Critique," *Knowledge and Process Management*, Vol. 12 No.3, pp. 217-224.

Appuhami, B. A. R. (2007), "The Impact of IC on Investors' Capital Gains on Shares: An Empirical Investigation of Thai Banking, Finance, and Insurance Sectors," *International Management Review*, Vol. 3 No. 2, pp. 14-25.

Ariff, A. H. M, Islam, A. and Van Zijl, T. (2016), "IC and Market Performance: The Case of Multinational R&D Firms in the US," *The Journal of Developing Areas*, Vol. 50 No, 5, pp. 487-495.

Aslam, S. and Amin, S. (2015), "Impact of IC on Financial Vulnerability of Pharmaceuticals Sector in Pakistan," *Pakistan Journal of Commerce and Social Sciences*, Vol. 9 No.1, pp. 171-184.

Bano, S, Zhao, Y, Ahmad, A, Wang, S. and Liu, Y. (2011), "Identifying the impacts of human capital on carbon emissions in Pakistan," *Journal of Cleaner Production*, Vol. 183, pp.1082-1092.

Bontis, N. (1998), "IC: An Exploratory Study That Develops Measures and Models," *Management Decision* Vol. 36 No. 2, pp. 63-76.

Bontis, N, Keow, W. C. C. and Richardson, S. (2000), "IC and Business Performance in Malaysian Industries," *Journal of Intellectual Capital* Vol. 1 No. 1, pp. 85-100.

Cenciarelli, V.G., Greco, G. and Allegrini, M. (2018), "Does intellectual capital help predict bankruptcy?" *Journal of Intellectual Capital*, Vol. 19 No. 2, pp. 321-337



Chaminade, C. and Roberts, H. (2003), "What It Means is What It Does: A Comparative Analysis of Implementing IC In Norway and Spain," *European Accounting Review*, Vol. 12 No. 4, pp. 733-51.

Chan, K. H. (2009) "Impact of IC on Organizational Performance, An Empirical Study of Companies in The Hang Seng Index (Part 1)", The *Learning Organization*, Vol. 16 No. 1, pp. 4-12.

Chen, M. C, Cheng, S. J. and Hwang, Y. (2005), "An Empirical Investigation of the Relationship Between IC and Firms' Market Value and Financial Performance," *Journal of Intellectual Capital*, Vol. 6 No. 2, pp. 159-76.

Chen, Y. S, Ming, J. L, and Ching, H. C. (2006), "The Influence of IC on New Product Development Performance - The Manufacturing Companies of Taiwan as an Example," *Total Quality Management*, Vol. 17 No.10, pp. 1323-1339.

Chowdhury, M. A. L, Rana, T. and Azim, I. A. (2019), "Intellectual capital efficiency and organizational performance? In the context of the pharmaceutical industry in Bangladesh", *Journal of Intellectual Capital*, Vol. 20 No. 6, pp. 784-806.

Chu, S. K. W, Chan, K. H. and Wu, W. W. Y. (2011), "Charting IC performance of the gateway to China," *Journal of Intellectual Capital*, Vol. 12 No. 2, pp. 433-450.

Denicolai, S, Ramusino, E. C. and Sotti, F. (2015), "The impact of intangibles on firm growth," *Technology Analysis & Strategic Management*, Vol. 27 No. 2, pp. 219-236.

Donlon, J. P. and Haapaneimi, P. (1997), "Knowledge capital", *Chief Executive*, Vol. 120, pp. 52-62.

Dumay, J. (2016), "A Critical Reflection on the Future of IC: From Reporting to Disclosure", *Journal of Intellectual Capital*, Vol. 17 No.1, pp. 168 – 184.

Dzenopoljac, V, Janosevic, S. and Bontis, N. (2016), "IC And Financial Performance in the Serbian ICT Industry", *Journal of Intellectual Capital*, Vol.17No.2, pp. 373 – 396.

Dzenopoljac, V, Yaacoub, C, Elkanj, N. and Bontis, N. (2017), "Impact of intellectual capital on corporate performance: Evidence from the Arab region," *Journal of Intellectual Capital*, Vol. 18 No.4, pp. 884-903.

Edvinsson, L. (1997), "Developing IC at Skandia," *Long Range Planning*, Vol. 30 No.3, pp. 366-73.

Edvinsson, L. and Malone, M. S. (1996), *IC: Realizing Your Company's True Value by Finding Its Hidden Brainpower*, New York, NY: Harper Business, 1-240.

Ferreira, J. and Fernandes, C. (2017), "Resources and capabilities' effects on firm performance: what are they?" *Journal of Knowledge Management*, Vol. 21 No. 5, pp. 1202-1217.

Fincham, R. and Roslender, R. (2003), "IC Accounting as Management Fashion: A Review and Critique", *European Accounting Review*, Vol. 12 No. 4, pp. 781-95.

Firer, S. and Williams, S. M. (2003), "IC and Traditional Measures of Corporate Performance", *Journal of Intellectual Capital*, Vol. 4 No.3, pp. 348-60.

Gan, K. and Saleh, Z. (2008), "IC and Corporate Performance of Technology-Intensive Companies: Malaysia Evidence," *Asian Journal of Business and Accounting*, Vol. 1 No.1, pp. 113-

30.

[Gianluca, G.](#), [Adele, C.](#) and [Annamaria, Z.](#) (2018), "Exploring the Impact of IC on Company Reputation and Performance," *Journal of Intellectual Capital*, Vol. 19 No.5, pp. 915-934.

Gilbert, L. R, Menon, K. and Schwartz, K. B. (1990), "Predicting Bankruptcy for Firms in Financial Distress," *Journal of Business Finance and Accounting*, Vol. 17 No.1, pp. 161-171.

Guthrie, J. and Abeysekera, I. (2006). "Content Analysis of Social, Environmental Reporting: What is New?" *Journal of Human Resource Costing and Accounting*, Vol.10 No.2, pp.114-126.

Guthrie, J, Petty, R., Yongvanich, K. and Ricceri, F. (2004), "Using Content Analysis as A Research Method to Inquire into IC Reporting," *Journal of Intellectual Capital*, Vol. 5 No. 2, pp. 282-93.

Harris, L. (2000), "A theory of intellectual capital", *Advances in Human Resource Development*, Vol. 2 No. 1, pp. 25-35.

Hassan, O. A., and Romilly, P. (2018), Relations between corporate economic performance, environmental disclosure, and greenhouse gas emissions: New insights. *Business Strategy and the Environment*, Vol. 27 No.7, pp893–909.

Henri H, Paavo R, Mika V. and Aino K. (2017), "IC, Knowledge Management Practices And Firm Performance," *Journal of Intellectual Capital*, Vol. 18 No. 4, pp. 904-922.

Hornbeck, D. W. and Salamon, L M. (1991), "*Human capital and America's future*. Baltimore Johns Hopkins University Press.

Janosevic, S., Dzenopoljac, V. and Bontis, N. (2013), "Intellectual capital and financial performance in Serbia," *Knowledge and Process Management* Vol. 20 No. 1, pp. 1-11.

Kaplan, R. and Norton, D. (1992), "The Balanced Scorecard – Measures That Drive Performance", *Harvard Business Review*, Vol. 70 No. 1, pp. 7-19.

Khalique, M, Hina, K, Ramayah, T. and Bin Shaari, J. A. N. (2020), "Intellectual capital in tourism SMEs in Azad Jammu and Kashmir, Pakistan", *Journal of Intellectual Capital*, Vol. 21 No. 3, pp. 333-355.

[Kaveh, A.](#), [Ruzita J.](#) and [Nick B.](#) (2018), "IC and Performance Measurement Systems In Iran," *Journal of Intellectual Capital*, Vol. 19 No. 2, pp. 294-20.

Klein, D. A. and Prusak, L. (1994), "Characterizing IC," Working Paper. Cambridge, MA: Center for Business Innovation, Ernst & Young LLP.

Lev, B. (2001), *Intangibles: Management, Measurement and Reporting*, Washington DC: Brookings Institution Press. 1-231.

Lev, B, and Radhakrishnan, S. (2003), "The Measurement of Firm-Septic Organization Capital," Working Paper, NBER.

Lev, B. and Zarowin, P. (1999), "The Boundaries of Financial Reporting and How to Extend Them," *Journal of Accounting Research*, Vol. 37, pp. 353-385.

Maditinos, D, Chatzoudes, D, Tsairidis, C. and Theriou, G. (2011), "The Impact of IC on Firms' Market Value and Financial Performance," *Journal of Intellectual Capital*, Vol. 12 No. 1,

pp. 132-151.

Makki, M. M. A. and Lodhi, S. A. (2008), "Impact of IC Efficiency on Profitability," *The Lahore Journal of Economics*, Vol. 13 No.2, pp. 81-98.

Malhotra, Y. (2003), "Measuring knowledge assets of a nation: knowledge systems for development," Ad Hoc Group of Experts Meeting – Knowledge Systems for Development, New York, available at: [www.kmnetwork.com/Knowledge](http://www.kmnetwork.com/Knowledge).

[Maurizio, M.](#), [John, D.](#), [Andrea, G.](#) and [Francesca, D. M.](#) (2018), "Practitioners' Views on IC and Sustainability: From a Performance-based to a Worth-based Perspective," *Journal of Intellectual Capital*, Vol. 19 No. 2, pp. 367-386.

Mehralian, G., Rajabzadeh, A., Sadeh, M. R. and Rasekh, H. R. (2012), 'Intellectual capital and corporate performance in Iranian pharmaceutical industry', *Journal of Intellectual Capital* Vol. 13 No. 1, pp. 138-158.

Mueller, M. W. (1982), "Applying human capital theory to women's changing work patterns," *Journal of Social Issues*, Vol. 31 No.8, pp.89-95.

Mondal, A. and Ghosh, S., K. (2012), "Intellectual capital and financial performance of Indian banks, *Journal of Intellectual Capital*", Vol.13 No.4, pp. 515-530

Mwenja, D. and Lewis, A. (2009), "Exploring the Impact of the Board of Directors on the Performance of Not-for-Profit Organizations," *Business Strategy Series*, Vol. 10 No.6, pp. 359-365.

Nadeem, M., De Silva, T. A. and Kayani, UN (2016), "Predicting corporate financial distress for New Zealand listed firms using intellectual capital indicators," *New Zealand Journal of Applied Business Research*, Vol. 14 No. 2, pp. 1-15.

Nawaz, T. (2017), "Intellectual capital, financial crisis and performance of Islamic banks: does Shariah governance matter?" *International Journal of Business and Society*, Vol. 18 No. 1, pp. 211-226.

[Neha S.](#) and [Niladri D.](#) (2018), "The Impact of IC on Firm Performance: A Study of Indian Firms Listed in COSPI," *Journal of Intellectual Capital*, Vol. 19 No. 5, pp. 935-964.

Nimtrakoon, S. (2015), "The relationship between intellectual capital, firms' market value and financial performance Empirical evidence from the ASEAN," *Journal of Intellectual Capital*, Vol.16 No. (3), pp. 587-618.

Peng, T.A., Pike, S. and Roos, G. (2007), "Intellectual capital and performance indicators: Taiwanese healthcare sector," *Journal of Intellectual Capital*, Vol. 8 No. 3, pp. 538-556.

Pour, Z.A., Ghanbari, P.M. and Shidinavi, B. (2014), "Application of intellectual capital on the financial distress model using neural network," *Bulletin of Environment, Pharmacology and Life Sciences*, Vol. 3 No. 8, pp. 55-63.

Pulic, A. (1998), "Measuring The Performance of Intellectual Potential In Knowledge Economy," Paper presented at the 2nd McMaster Word Congress on Measuring and Managing IC, Hamilton, Canada.

Pulic, A. (2000a), "VAIC – An Accounting Tool for IC Management," *International*

*Journal of Technology Management*, Vol. 20 No. (5-8), pp. 702-714.

Pulic, A. (2000b), "MVA and VAIC Analysis of Randomly Selected Companies from FTSE 250", Austrian IC Research Center, Graz – London. Available online at: <http://www.measuring-ip.at/Papers/ham99txt>.

Pulic, A. (2004), "IC – does it create or destroy value?" *Measuring Business Excellence*. Vol. 8 No. 1, pp. 62-68.

Roos, J, Robert, L, Edvinsson. and Dragonetti, N. (1998), *IC: Navigating in the New Business Landscape*, New York University Press. ISBN: 978-1-349-14494-5.

Sarishma, S. and Khushdeep, D. (2017), "IC disclosures in an emerging economy: status and trends," *Journal of Intellectual Capital* Vol. 18 No. 4, pp: 868-883.

Sardo, F. and Serrasqueiro, Z. (2016), "European empirical study of the relationship between firms' intellectual capital, financial performance, and market value," *Journal of Intellectual Capital*, Vol. 18 No. 4, pp. 771-778.

Shahwan, T. M. and Habib, A. M. (2020), "Does the efficiency of corporate governance and intellectual capital affect a firm's financial distress? Evidence from Egypt", *Journal of Intellectual Capital*, Vol. 21 No. 3, pp. 403-430.

Stahle, P, Stahle, S. and Aho, S. (2011), "Value Added Intellectual Coefficient (VAIC): a critical analysis," *Journal of Intellectual Capital* Vol. 12 No. 14, pp: 531-555.

Stewart, T. A. (1997), *Intellectual capital*, The new wealth of nations. New York Doubleday/Currency.

Sullivan, P. H. (2000), *Value-driven IC: How to Convert Intangible Corporate Assets into Market Value*, Toronto: John Wiley and Sons, 1-304. ISBN: 978-0-471-35104-7.

[Sayyed, M. A.](#) (2018), "Antecedents and Consequences of IC: The Role of Social Capital, Knowledge Sharing and Innovation," *Journal of Intellectual Capital*, Vol. 19 No. 5, pp. 858-874.

Tan, H.P, Plowman, D. and Hancock, P. (2007), "IC and Financial Returns of Companies." *Journal of Intellectual Capital*, Vol. 8 No. 1, pp. 73-94..

Trussel, J. M. (2002), "Revisiting the Prediction of Financial Vulnerability," *Non-profit Management and Leadership*, Vol. 13 No. 1, pp. 17-31.

Tseng, C, and Goo, Y. J. (2005), "IC and Corporate Value in an Emerging Economy: Empirical Studies of Taiwanese Manufacturers," *R & D Management* Vol. 35 No. 2, pp. 187-201.

Tuckman, H. P. and Chang, C. F. (1991), "A Methodology for Measuring the Financial Vulnerability of Charitable Non-profit Organizations," *Non-profit and Voluntary Sector Quarterly* Vol. 20 No.4, pp. 445-460.

Ul Rehman, W., Ilyas, M. and ur Rehman, H. (2011), Intellectual capital performance and its impact on financial returns of companies: An empirical study from insurance sector of Pakistan, *African Journal of Business Management*, Vol 5 No. 20, pp. 8041-8049.

William, F. J, Gaetano, M. and Giuseppe. N. (2017), "Measuring the IC of Italian listed companies," *Journal of Intellectual Capital*, Vol. 18 No. 4, pp. 710-732.

World Bank. (2020), Human Capital Index update 2020.

Young, C. S., Su, H. Y., Fang, S. C. and Fang, S. R. (2009), "Cross-country comparison of

intellectual capital performance of commercial banks in Asian economics," *The Service Industries Journal*, Vol. 29 No. 11, pp. 1565-1579.

Xinyu, Z. (2014), "The Impacts of IC of China's Public Pharmaceutical Company on Company's Performance," *Journal of Chemical and Pharmaceutical Research*, Vol. 6 No.4, pp. 999-1004.

Zerenler, M, and Gozlu, S. (2008), "Impact of IC on Exportation Performance: Research on the Turkish Automotive Supplier," *Journal of Transnational Management*, Vol. 13 No.4, pp. 318-41.

Zeghal, D., and Maaloul, A. (2010), "Analyzing Value Added as an Indicator of Intellectual Capital and its Consequences on Company Performance," *Journal of Intellectual Capital*, Vol. 11 No. 1, pp. 39-60.