EUROPEAN
ACADEMIC
RESEARCH

Investigating the Relationship between Intellectual Capital and Company Performance in Non-financial Sector of Pakistan

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Abstract:

   The aim of this research work is to understand and examine the impact of the intellectual capital and performance of non-financial companies in Karachi Stock Exchange. Intellectual capital is measured by a value added intellectual coefficient (VAIC) method and performance of the companies is measured by return on equity (ROE). Firm size, firm growth and total debt are used as control variables. Panel data is collected from the audited annual reports of the 55 non-financial companies of Karachi stock exchange from 2005 to 2012. The regression finding reveals that there is a positive and significant relationship between VAIC and return on equity (ROE). Moreover, it has been also examined the human capital play a vital role in overall performance of the companies because human capital efficiency has a

significant relation with return on equity (ROE). The first limitation of this study is that the results cannot be applied to the financial sector of the KSE and also not to the companies of the other stock exchanges in Pakistan.

Key words: Intellectual Capital (IC), Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE), Capital Employed Efficiency (CEE), ROE, and KSE.

Introduction

Literature reveals that the economy is moving toward the more knowledge based economy, intangibles assets are becoming more important assets of the companies. Intellectual capital is a main success driver of gaining competitive edge in a more global world. Intellectual capital is a quite new concept which is becoming a critical source for achieving a better organizational performance (Afzali, et al. 2013).

As the world is entering in new era of information and knowledge, physical/financial capitals and production facilities are not enough to sustain competitive position among the wealthy organizations (Cegarra-Navarro and Sanchez-polo 2010). According to Johnson and Kaplan (1987), intellectual capital has a significant role in overall performance of the companies. Similarly, there is a positive relationship between intellectual capital and economic performance of the companies (Bornemann 1999).

Previously, companies used such performance measurement methods that are inclined towards the physical and financial performance and ignored all the aspects related to intellectual capital efficiency. As a result mostly companies are contented with their performance. But with the emergence of knowledge based economy, companies have to consider the intellectual capital aspect for measuring performance. That's

why; new models and techniques are required for measuring firm's performance that includes the intellectual capital performance.

As Pakistan is a developing country and has been facing with a lot of issues to compete in a competitive world. The author suggests that Pakistani companies can achieve higher competitive position in the global market by considering and investing in a new product development, technology and in the intellectual capital (Amjad 2006). Now it's time for a Pakistan to take steps for developing its economy more competitive and knowledge intensive otherwise country loses its share in the global world. Therefore this study emphasizes that intangible assets/intellectual capital have a critical role in the better firm performance in today's knowledge based economy.

The key objective of this study is to examine the effect of IC has on Pakistani firm performance and also to evaluate whether IC interacts with the tangible assets to affect its firm performance or not. The description of this study results will provide more empirical evidence to better understand the IC efficiency of firms and its role in overall performance of the companies.

Research Gap

Although substantive research has been done on this subject in the past but most of them was in the developed economies and limited empirical evidence is available from the developing countries, especially Pakistan. It's the basic motivation behind choosing this topic.

By going through past research studies on the intellectual capital, I identified that mostly previous research are focused on the developed economy rather than developing countries like Pakistan. If research is done in developing country on IC performance than they just take on limited number of firms and takes few years data to generalize the

result. It is a research gap that we are going to fulfill through the study of intellectual capital and firm's performance in Pakistan that observes the top 100 companies of Karachi stock exchange based on market capitalization.

Literature Review

Concept of Intellectual Capital

There are a number of meanings of intellectual capital and different researchers define it in certain way. Broadly, intellectual Capital (IC) can be termed as some creation of human mind and skills, which derives more value and wealth to the companies (Aulbur and Kannan 2004). Recently intellectual capital is considered as a combination of knowledge assets that are organized and managed by the organization and they also act as critical drivers for creating value in the companies. All the investment related to intellectual capital and their efficiency is generally not incorporated in the firm's annual reports. To boost and support organizational performance improvement, intellectual capital is taken as an essential knowledge factor by the managers. Author Jacob Ben-Simchon(2005), used the term 'intellectual capital' for enfolding all of the non-physical or non- tangible resources & assets of an business, along with its patents, practices and the inherent knowledge of its employees and all their stakeholders. Intellectual is composes of the intelligence, flexibility, wisdom, skills that are essential to move in a more competitive business world & become a successful company (Hung, et al. 2007).

Relationship of Intellectual Capital with Company Performance

The authors (Asgharnezhad and Madhoushi 2009) discussed that there is a significant relationship between firm's intellectual capital and return on investments (ROI), future return on investment (ROI) and growth rate of future return on

investment in the organizations and given economy. Zeghal and Maaloul (2010) directed a similar research on 300 firms in the United Kingdom during 2005 to observe the effect of intellectual capital on financial performance and stock market. The results show valid arguments in support of relationship of IC and firm performance.

Human capital is more significant strategic resource of the enhanced organization performance. This argument is supported by (Moditinos, et al. 2011) study on 96 Greek firms in the Athens Stock exchange during 2006 to 2008. The outcomes indicated that a positive relationship exist between efficiency of human capital and company performance.

Researchers find out the relationship between intellectual capital and organizational performance in Australia from 2004 to 2008. They measures intellectual capital by Pulic method VAIC. The result exhibited that a direct association exists between IC and firm performance (Clarke, Seng and Whiting 2011). Finally, the researcher revealed that organizational performance has a direct impact on intellectual capital (Molodchik & Bykova, 2011).

Likewise, Saeedi et al. (2012) found that human capital has the most significant effect among all other dimension of the intellectual capital on the corporate performance of the companies. Intellectual capital is a competitive source of better performance in the organizations. Good intellectual management systems will lead to the low financial turnover of the companies (Ahmadi 2012).

Researcher identified the role of IC in the Iran insurance companies and its relation with financial performance (Return on assets). He selected the 39 insurance companies for the period of 2005 to 2007. Researcher used the value added intellectual method and analyzed through partial least square regression method. The results of the study explain that there

is a significant positive relationship among IC and its components and firm's productivity (Alipour 2012).

Rahman (2012) and Djilali et al. (2012) argued that the more IC efficiency leads to the improved company financial performance. Furthermore, Gilaninia and Matak (2012) showed that there is a positive relationship among the dimensions of intellectual capital (HC, RC, and SC) and business performance. There is also a positive relationship exists between intellectual capital dimensions, economic factors and firm's performance (AbdelBaki, Bouabdellah and Zehri 2012).

Asghar, Hafeez-ul-Rehman, Wasim-ul-Reham, & Usman (2012) evaluate the impact of IC performance on the financial performance of the Banks in Pakistan for the period of 2010. Intellectual Capital performance is measured VAIC and financial returns of banks by ROA, ROE & EPS. The results supports that there is a positive relationship between components of IC and performance.

Commonly, organizations used two certain sources for value creation and making profits, which are physical/material resources & intangible/intellectual resource in Knowledge base economy. Researcher suggest that higher the overall performance of all components of IC, higher will be the company corporate performance and growth & learning in the organization (Afzali, et al. 2013).

Similarly, the author explained the significant role of intellectual capital in the increased business performance (Fathi, Farahmand and Khorasani 2013). Bayatiani and Khodmipours (2013) revealed that there is weak relationship exists between financial performance measures (EPS, GPR and OPR) and intellectual capital of the listed companies of the Tehran stock exchange during 2001-2010.

Intellectual capital is not only proved compatible for banking sector but also for other sectors in the economy. The author conducted a research on intellectual capital and

business performance in Iraqi industry and concludes that firm performance is strongly being influence by more efficiency of all components of intellectual capital (Mushref 2014).

The author determined the role of IC on the internal and external performance of Oil & gas sector in Pakistan. IC efficiency is measured by VAIC and performance measures by ROA, ROE, EPS, MB and sales growth. The results show that there is a positive and significant relationship among VAIC & ROA, ROE while insignificant with MB & EPS (Kharal, et al. 2014).

Deep and Narwal (2014) observed the impact of the IC on the profitability of the Indian textile sector and data was analyzed from 2002-2012 by using correlation and OLS regression. There is a direct and significant relationship of Intellectual capital and firm's profitability. Amin, Aslam and Makki (2014) conducted a study to examine the role of IC on the financial performance (ROE, EPS & ROA) of the pharmaceutical sector in Pakistan. The data is collected from 2009 to 2013. VAIC model is used to measure Intellectual capital efficiency, the results shows that there is a significant relationship between intellectual capital and firm performance (ROE & ROA), but insignificant relation among IC and earnings per share (EPS).

According to Al-Musali and Ismail (2014), the relationship between IC components and Saudi banks performance vary during 2008-2010 by using value added intellectual capital (VAIC). Minouei, Maleki and Sefidgar (2014) studied the effect of intellectual capital on the financial ratios of the banking industry during the 2007-2012. Their findings suggested that there is no relationship between relative efficiency of banks and IC performance while positive relationship exists among intellectual capital performance and banks profitability.

In a today's advanced economy, intellectual capital becomes a crucial source for future survival of organizations. The author collected data from 137 firms and regression and Pearson correlation was use to find out the relation between IC performance and growth rate. They identified that there is a signification relation among stock return and intellectual capital but IC has no significant association with growth rate of company sales (Ghanei and Kheibari 2015). Likewise, Dadashinasab et al (2015) examined the intellectual capital and financial performance of Iranian banks from 2007 to 2012. The finding shows that association among VAIC, SCE and HCE and banks performance are significantly positive while this relation is negative with Capital employed efficiency.

Another research was done on the IT sector in the national stock exchange (NSE) to find out either intellectual capital added some value in the company or not. This study adopted the VAIC methodology and return on assets, assets turnover ratio & net profit margin are taken as to measure company profitability. Sample of five IT companies was selected during the 2009-2014 for analyzing the relationship. The results suggest that positive and significant relation is present among intellectual capital components and firm performance indexes (Gupta and Tarikasingh 2015).

Arslan and Zaman (2015) explored the association of intellectual capital and company performance of the oil and gas sector of Pakistan during 2007-2012. They measured the IC by valued added intellectual coefficient method and ROE, ROI and EPS are taken as performance indicators. Results identifies that there is a significant relationship of IC components and firm performance measures. The researcher only takes one sector of the Pakistan which does not clear us how this study results can be generalized to other sectors. But in my research I try to analyze the many sectors of the Pakistan listed in KSE.

The above discussion regarding previous studies shows mixed results about the relationship of the intellectual capital and company performance. The association among components of IC and corporate productivity is varied among different industries and as well as of different nature among different countries.

Theoretical Framework

To show the relationship of the intellectual capital and firm performance measure, theoretical framework is shown below in figure 1. The proposed theoretical framework would play a better role in the intellectual capital literature to support the impact of intellectual capital on the company performance. Here, combination of the HCE, SCE and CEE provides the VAIC which clearly identifies that intellectual capital performance. While, dependent variable firm performance is measured by ROE. Three control variables are also used.
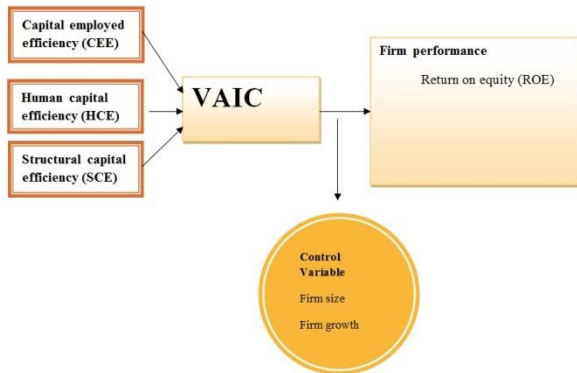
Figure 1: Theoretical framework of the Intellectual capital and firm performance
Source: (Hancock, Plowman and Tan 2007) and (Abdul-Rehman, et al. 2011)

Hypotheses Testing

The following hypotheses are proposed to examine the relationship between capital employed efficiency and firm's

financial performance by critically examining the previous research studies.

H1: Positive and significant relation exists b/w VAIC and firm performance (ROE).

H2: Positive and significant relation exists b/w HCE and firm performance (ROE).

H3: Negative and significant relation exists b/w SCE and firm performance (ROE).

H4: Positive and significant relation exist b/w CEE and firm performance (ROE).

Research Methodology

Population and Sample Description
Population of this research work is all the non financial companies of Karachi Stock Exchange (KSE) Pakistan. Data is taken from nine non-financial sectors listed on Karachi Stock Exchange. The original sample which I selected is top 100 listed companies of KSE based on market capitalization from the 2005 to the 2012. But due to some missing data on variables, the final sample size is 55 non-financial listed companies of KSE.

Data Collection Method
Panel data approach will be used to measure the relation between intellectual capital of the firm and firm performance. Data to analyze this relationship is collected from secondary sources like KSE websites and annual reports of companies and quantitative techniques will employ.

Description of the variables
This study used the human capital efficiency (HCE), structural capital efficiency (SCE) and capital employed efficiency (CEE) as independent variables. The dependent variable corporate

performance used the accounting and market based proxies. Return on equity is accounting way to measure the corporate performance. Formulas of variables are given in appendix.

Research Model

In order to response to our proposed research hypothesis, multiple regression equations are applied to test the relationship of independent and dependent variables. The base model equation had also been used by previous researchers including Chen, Cheng & Hwang (2005); Ahangar (2011); Alipour (2012); Deep & Narwal (2014); Morariu (2014) and Arsalan & Zaman (2015). Basic regression equation can be explained as follows;

$$Y_{it} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \ldots\ldots + \mu_{it}$$

Y = Dependent Variable (ROE and EPS)
X1, X2 & X3= independent variables (VAIC, HCE, SCE, CEE)
Firm size = FS, Firm's growth= FG, Total debt = TD, β_0 = constant, μ_{it} = Standards errors; with, i: individual t: year

To empirically test developed hypothesis, following two multiple regression model are:

$$ROE_{it} = \beta_0 + \beta_1 VAIC_{tm} + FS + FG + TD + \mu_{it} \quad \text{(Model 1)}$$
$$ROE_{it} = \beta_0 + \beta_1 \, HCE + \beta_2 \, SCE_{it} + \beta_3 \, CEE_{it} + FS + FG + TD + \mu_{it}$$
$$\text{(Model 2)}$$

Value Added Intellectual Coefficient (VAIC$_{tm}$)

Since the late 80's different models of measuring IC were developed by the research scholars. Firstly, research start on the measuring and managing intangible assets/resources in the organizations. After that, these models were more developed and began to consider the intellectual capital aspect in the companies. Among all models, VAIC is the more valid and reliable method to measure IC performance.

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The Value Added Intellectual Coefficient (VAIC) used in this
paper as a basic methodology to calculate and analyze the IC
performance of KSE companies was introduced by Pulic (1998).
It gives a new insight to measure value creation efficiency in
companies using data available in financial statements. VAIC
method is adopted by many researchers to measure the
efficiency of intellectual capital such as, Chen, Cheng & Hwang
(2005); Wang (2008): Ismail & Maheran (2009); Zeghal &
Maaloul (2010); Clarke, Seng & Whiting (2011); Ahangar
(2011); Salman, Mansour & Babatunde (2012); AbdelBaki,
Bouabdellah & Zehri (2012); Alipour (2012); Bayatiani &
Khodamipour (2013); Al-Musali & Ismail (2014); Moditinos,
Chatzoudes, Tsairides & Theriou (2014); Amin, Aslam & Makki
(2014); Mushref (2014); Deep and Narwal (2014); Gupta &
Tarikasingh (2015) & Arsalan & Zaman (2015).

VAIC$_{TM}$ consists of the five different stages as:

**First stage: Determining the value added coefficient of
intellectual capital**
VAIC compiles the three efficiency measures:
VAIC   =ICE+CEE=   CEE   +   HCE   +   SCE
(Eq. 1)

Second stage: determining the added value
Pulic (1998) evaluates that the more the value addition by the
firm's resources, the larger the value of VAIC coefficient. Value
added is measures by following eq.:
Value added = operating profit+ Employee costs + Depreciation
+ Amortization (Eq. 2)

Third stage: calculating the efficiency of human capital

Human capital (HC) encompasses the skills, experiences, productivity, knowledge and fit of employees within the work place. Eq. 3 shows the formula for HCE below:

Human Capital efficiency (HCE) = HC/VA (Eq. 3)

Human capital (HC) = wages and salaries of employees

Fourth stage: determining the efficiency of structural capital

In order to calculate SCE, it is first necessary to determine the value of a firm's structural capital which is measured by the formula given below in eq. 4:

Structural capital efficiency (SCE) = Structural capital (SC)/VA (Eq. 4)

Structural Capital = VA – HC

Fifth stage: determining the capital employed efficiency

CEE encompasses the efficiency that SCE and HCE fail to capture. Eq. 5 presents the formula for this type of capital which is CEE as:

Capital employed efficiency (CEE) =VA/CE (Eq. 5)

Capital employed (CE) =total assets – intangible assets of the company

Data Analysis and Interpretation

The statistical correlation and regression analyses were part of the inferential statistics to analyze the relationship between the intellectual capital and the financial performance of the Pakistani non-financial companies. The data is analyzed through Stata version 14.

Below the table, the descriptive statistics is given for the intellectual capital variables and firm performance variables (ROE). The mean and standard deviation value of human

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capital efficiency (HCE) is 10.05 and 18.04 respectively which is
greater than SCE and CEE. VAIC has mean value of 11.8,
showing that non-financial companies of KSE created 11.6
Rupees for each one rupee employed. While, mean value of ROE
is 9.68. Similarly, control variables firm size (fs) has a mean
value of 6.9 with std. dev. of 1. 15. Firm's growth (FG) has a
mean value 0.09 and std. dev. of 0.46.

**Table 1: Descriptive statistics of the dependent and independent
variables**

Variable	Obs.	Mean	Std. Deviation	Min	Max
VAIC	440	11.79	19.12	-64.26	220.55
HCE	440	10.05	18.04	-64.95	218.83
SCE	440	0.80	0.82	-10.14	11.14
CEE	440	0.95	6.43	-37.78	89.09
ROE	440	9.69	166.55	-3264.57	218.44
FS	440	6.94	1.15	0	8.54
FG	440	0.09	0.47	-7.82	1
TD	440	0.42	0.42	0	2.64

Correlation Matrix

Correlation coefficient explains the strength of correlation
among variables. The finding of correlation matrix implies that
human capital efficiency has weak positive relationship with
ROE. Further, structural capital efficiency and capital
employed efficiency has negative relation with all performance
proxies (ROE and EPS). While, all performance measures (ROE
and EPS) are positively correlated with each other but their
relation is weak. Correlation matrix also tells about that firm
size and firm growth have a positive relationship with return
on equity and earnings per share. While there is a negative
relation between total debt and firm performance measures
(EPS & ROE).

Table 2: Correlation matrix for dependent and independent variables

	HCE	SCE	CEE	ROE	FS	FG	TD
HCE	1						
SCE	0.0715	1					
CEE	-0.0164	0.0055	1				
ROE	0.1991	0.0037	-0.0120	1			
FS	0.0881	0.0218	-0.1798	0.0250	1		

| FG | 0.0522 | 0.0480 | 0.0148 | 0.0646 | 0.1279 | 1 | |
| TD | 0.0649 | 0.0418 | 0.1348 | -0.1396 | 0.3025 | -0.0722 | 1 |

Testing for Multicollinearity

Multicollinearity means when two or more variables are strongly correlated in a regression analysis. Results of correlation analysis indicate that maximum coefficient value is 0.3025 showing that research data has no concern of any multicollinearity problems. Multicollinearity should consider as a serious problem when correlation coefficient is more than 0.99 (Goyal October. 2013).

Regression analysis and discussion

Regression analysis is a statistical process for estimating the relationships among variables. Generally, regression analysis evaluates the impact of any change in dependent variable when one of independent variables varies while all other remains constant.

For taking comprehensive view to determine the association among value added intellectual coefficient (VIAC) and its components (HCE, SCE, CEE) and firm performance (ROE), breusch and pagan lagrangian multiplier test and hausman test are applied. Than it is decided either simple pooled OLS regression is applied or fixed or random is selected to for analysis purpose.

The significant results of the breusch and pagan lagrangian multiplier test suggests random effects model, otherwise pooled OLS regression is useful. To find out either fixed or random model is appropriate, hausman specification test is applied on the panel data. If the value of hausman specification test is significant than fixed effects is taken for the analysis, otherwise random effects model is used to analyze the relationship.

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Estimation Regression Results for the Model 1

Breusch and pagan lagrangian multiplier test is applied to check which model is used for analysis of the relationship between ROE and VAIC for the non-financial sector of the companies. In Table 3, the insignificant value of 0.47 ($p>0.05$) suggest simple OLS regression give better results. The P value is 0.00 showing that VAIC has a significant relation with ROE. That's why, alternate hypothesis H1 is accepted. It means intellectual capital has positive perception among the investors. These results are consistent with the (Clarke, Seng and Whiting 2011); (Chu and Chan 2011) and (Chen, Cheng and Hwang 2005). The total debt level (td) has also a significant and significant relationship with the return on equity. It means that if companies increase intellectual capital efficiency than company performance is also increased ultimately.

Table 3: Robust regression results for ROE and VAIC

ROE	Coef.	Std. Error	t	p >|t|	[95% Conf. Interval]	
Const.	-43.23	47.94	-0.90	0.368	-137.45	50.99
VIAC	1.59	0.40	3.92	0.000	0.79	2.38
FS	9.30	7.13	1.31	0.193	-4.70	23.31
FG	12.30	16.82	0.73	0.465	-20.75	45.36
TD	-74.85	23.09	-3.24	0.001	-120.24	-29.46

Estimation Regression Results for the Model 2

The below table shows that human capital efficiency (HCE) has a significant and positive relationship with firm performance measured by ROE. Therefore H2 hypothesis is accepted. These results are consistent with past studies Goh (2005); Chu & Chan (2011); Moditinos, Chatzoudes, Tsairides & Theriou (2011) and Saeedi, Masouleh & Mousavian (2012).

The regression results suggest that there is a negative but significant relationship between structural capital efficiency (SCE) and return on equity (ROE). It means that if company performance is decreased than its structural capital efficiency also decreased. Thus, H3 hypothesis is accepted.

These results are also examined by (Abdul-Rehman, et al. 2011).

While, capital employed efficiency (CEE) has insignificant but positive relation with return on equity, so H4 is rejected. It means that if companies increase capital employed efficiency, than company performance also enhanced and these arguments are also suggested by (Dadashinasab, Khatirim and Mousavi 2015).

Table 4: Estimation results of ROE, HCE, S CE and CEE

ROE	Coef.	Std. Error	t	p >|t|	[95% Conf. Interval]
Const.	70.07	83.75	0.84	0.403	94.60 234.74
HCE	2.09	0.53	3.98	0.000	1.06 3.13
SCE	-21.77	10.15	-2.14	0.033	-41.7 -1.79
CEE	0.712	1.91	0.37	0.709	-3.04 4.46
FS	-0.19	11.32	-0.02	0.987	-22.44 45.15
FG	9.15	18.31	0.50	0.617	-26.85 45.15
TD	-152.67	61.69	-2.48	0.014	-273.97 -31.38

Final Remarks

The correlation and regression analysis are used to examine the impact of intellectual and its components (HCE, SCE and CEE) on the corporate performance (EPS and ROE). The finding reveals that aggregate measure of IC (VAIC) has significant and positive relationship with the firm performance (return on equity, ROE). These results are consistent with past studies. This also shows that company's managers are considering the importance of the IC in making significant decisions and strategies. The results of this study also illustrates that there is a direct and significant relationship between human capital efficiency (HCE) and proxy of the firm performance (ROE). So, Pakistani companies can get benefits by investing in human capital. Human capital is major source of competitive success for the companies. More experienced and trained company's human capital can enhance the firms overall performance.

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Structural capital efficiency (SCE) has only a significant
relationship with return on equity. Managers should give
attention to the structural capital to achieve better competitive
position in the business world. Because more efficient the
structural capital to support human capital which ultimately
lead to the higher corporate performance of the companies.
Moreover, capital employed efficiency (CEE) have no
relationship with ROE.

It can be concluded by comparing the results of the HCE,
SCE and CEE that value creation/higher performance is
primarily dependent on the human capital. This is just due to
the unique and imitable capabilities and skills of the humans
which play a significant role in success of the companies.
Therefore, Pakistani non-financial companies should provide
more opportunities of training and developing their employee's
expertise to achieve competitive advantage among competitors.

Recommendations and Future Direction
This study recommends that non-financial companies of the
KSE should realize the importance of intellectual capital and
its components which play a critical role in enhancing company
performance. This also suggests that managers should keep
balance while allocating resource among intellectual capital
and physical capital in developing country like Pakistan.

This study can be expanded by taking the data of the all
listed financial and non-financial companies of the Karachi
Stock exchange to analyze the relation of the IC and firm
performance.

Future direction after conducting this research can be
that this study can be extended by comparing the intellectual
capital efficiency of the foreign and domestic companies to have
more generalized and valid results.

Another study could be done for analyzing the
relationship of the IC and firm performance by adopting both

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quantitative and qualitative research method. Different IC measurement models might be used by future researchers to examine the impact of the ICE on the company performance.

Limitations of the Research Work

The first limitation of this study is that the results cannot be applied to the financial sector of the KSE and also not to the companies of the other stock exchanges in Pakistan. Moreover, the key limitation of this study is the use of single specific model of intellectual capital measurement instead of comparing different methods.

Appendix

Table 5: Variables measurement

No.	Variable	Formula
1	ROE	= net profit attributed to shareholders/total shareholders" equity
2	Firm size (FS)	= natural log of total book value of assets
3	Firm's growth (FG)	= (assets of current year-assets of previous year)/assets of current year.
4	Total debt (td)	= total debt/total assets
5	VAIC	= HCE+SCE+SCE
6	HCE	=human capital/value added
7	SCE	=structural capital/value added
8	CEE	=capital employed/value added

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