

# Intellectual Capital & Firm Performance: An Empirical Study on the Oil & Gas Sector of Pakistan

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## Abstract

Knowledge has become power now a days and organization in the ever changing world now a day consider knowledge and intellect of tier employees as a competitive edge which enables such organizations to compete effectively in the marketplace. The literature in the domain of intellectual capital management has received considerable evidence as to whether the intellectual capital contributes towards the firm performance and value or not. This study

extends the evidence in this regard by conducting research on Oil & Gas sector of Pakistan.

Using VAIC model of intellectual capital measurement and ROA, ROE, EPS, Sales growth and M/B ratio as proxies of internal and external performance of the company this study documents a positive impact of intellectual capital on the organizational performance and value in the Oil & Gas sector of Pakistan. Thus, intellectual capital could be considered an intangible asset and spending with regard to the development and establishment of intellectual capital should be considered asset with long term value. Recommendations and implications of the study are also provided in the end.

**Keywords:** Intellectual capital, Firm performance, Oil and Gas sector

## 1. Introduction

Business environment has considerably been changed in past few decades. The mounting competition is the main characteristic within every industry and organizations need to cope up with this intense competition by building up core competencies which previously were not considered that important. The focus of the corporations is also shifting from the production to service business around the globe and importance of intangibles has also increased. Customers now demand innovative products and services which have the ability to surprise them which is not possible without innovation and research and development. In this context organizations are recognizing the importance of managing all of their resources particularly their human resource which is considered key driver of the innovation of any organization. This human capital management is now considered an unbeatable competitive advantage for any of the organization and superior performance of the human capital is considered a guarantee to future sustainability and success of the organization. Thus, it is the need of the era that organizations maximize their value through efficient utilization of their human or intellectual capital thus, as a consequence organizations are increasing their investments in the intangible assets and importance of tangible assets is being declined (Roos, Pike & Fernstrom, 2012).

Debate as to how this intellectual capital should be measured and quantified is raging and despite certain development, researchers have failed to build consensus in this regard (See Bontis, 1998; Pulic, 2004). Apart from that the causal link as to how intellectual capital could contribute towards the value of the firm is still not clear and this particular aspect has gained considerable research attention whereby many researchers have tried to assess the extent to which intellectual capital contributes towards the performance of the organization (Pennings, Lee & Witteloostuijn 1998; Becker, Huselid & Ulrich, 2001; Ali, Akhter, Afzal and Zia, 2010; Makki, 2010). This study also contributes to the existing evidence in this regard by conducting an empirical study to determine the impact of intellectual capital on the performance of the firm in the Oil & Gas sector of Pakistan.

### 1.1. Objectives of the study

This study is being conducted for the Oil and Gas sector of Pakistan and aims at following objectives:

- The core objective of the study is to understand and determine the value of intellectual capital in terms of organizational performance in Oil & Gas sector of Pakistan.
- The other objectives of the study include to highlight the importance of the intellectual capital as a driver of value of the firm and to provide policy implications and recommendations for the better management of intellectual capital.

### *1.2. Significance of the study*

Pakistan is a developing country which has a small stock market. Oil & Gas sector is considered a primer sector of Pakistani stock market which has been performing very well from the beginning. The segment of corporate sector is also quite mature and investors prefer to invest in the stocks of the companies in this sector as these companies are considered among the blue chip companies of Pakistani stock market. Thus, it is an ideal sector to explore whether the performance of this sector is explained by the intellectual capital possessed by the companies of this sector.

This study has dual contribution as it not only provides the empirical evidence in the domain of a hot research area for a developing country like Pakistan where draught of knowledge and related evidence is prevailing but also it also has practical value in context of human resource development and its implications. The established relationships in this study would guide the practitioners and human resource managers as to how much valuable human resource of an organization could be and how more value could be ascertained by managing this particular resource.

## **2. Literature review**

Literature review provides the summaries of the studies which are conducted to establish the relationship between intellectual capital and firm performance around the world. It would be more elaborative to provide a derailed summary of each study conducted within this domain of research. The studies are organized in chorological order and in the last studies conducted in Pakistan are provided as to provide insight of the phenomenon in the local context.

Bontis, Keow and Richardson (2000) provided evidence with regard to impact of intellectual capital on firm performance in both manufacturing and service sector of Malaysia. The study constructed a theoretical model which proposed the causal link between all three dimensions of intellectual capital i.e. human capital, structural capital and customer capital. The model propose the direction of causation from human capital to structural capital and customer capital and from customer capital to structural capital and in the last structural capital is proposed to cause firm performance which was measured using various financial and industry related measures. By conducting survey the study, the study confirms that human capital is more important with regard to the structural efficiency of business in the manufacturing sector as compared to services. Apart from that customer capital was also found to have a significant impact on the structural capital with in both industries i.e. services and manufacturing and in the last development of the structural domain of any business which is caused by development of human and customer capital is found to have significant association with the performance of the firm in both of the industry types.

Cohen and Kaimenakis (2007) sought to investigate the relationship between intellectual capital and corporate performance in Greek SMEs which are operating in service sector and are knowledge intensive. The study built structural model which sought to investigate the impact of human capital on organizational and customer capital and impact of organizational capital on customer capital. The study further categorized intellectual assets into categories of hard, soft and functional assets and proposed a direct impact of these three types of intellectual assets on firm performance which was measured through after tax profits and sales per employee of the company. The results of the survey conducted, indicated a direct impact of human capital on organizational as well as on customer capital. Moreover, hard intellectual asset measure was found related significantly with profits of the company, while functional intellectual asset measure was found significant in relation to the sales measure of performance. The soft intellectual asset measure however, was found insignificant with regard to performance of the SMEs in Greece.

Kehelwalatenna and Gunaratne (2010) empirically analyzed the impact of intellectual capital on firm performance and investor response for manufacturing firms and financial sector firms in Sri Lanka. Intellectual capital was measured using Pulic's VAIC model by considering dimensions of human capital, structural capital and capital employed, while performance was measured using return on equity (ROE) and holding period return (HPR) and investor response was measured using market to book (M/B) ratio. The results indicated that intellectual capital is significantly associated with the variables of firm performance and investor response in both manufacturing firms and financial sector firms.

In anticipation of the increasing interest of the researchers with regard to the measurement and value of intellectual capital, Veltri (2009) provided meta-analysis as to provide a synthesis of development relating to the intellectual capital and firm performance. The study put forwards that the research on the intellectual capital has significantly increased after development of VAIC model as this model make measurement of constructs related to intellectual capital with the help of published accounting data. The author argued about the mediating role of VAIC complements between intellectual capital and financial performance and indicated towards the inconsistency with regard to the measures that were used by previous studies to quantify intellectual capital and varying proxies used to measure financial performance. The moderating effect of human capital with regard to relationship between intellectual capital and firm performance is quite evident in the literature. Moreover, there was another problem relating to duality of measurement as some authors measured firm performance with proxies like Economic Value Added (EVA), Tobin's Q, Market to Book (M/B) ratio and other's used these as proxy of intellectual capital. The Meta analysis overall indicate that there is considerable theoretical as well as empirical work to be done in the domain of intellectual capital and its impact on the performance of the firm.

Emadzadeh et al. (2013) provided evidence with regard to the impact of intellectual capital in firm performance in automobile sector of Iran using survey approach. Intellectual capital was measured using three dimensions of human capital, structural capital and relational capital while firm performance was measured using four performance dimensions as proposed by the Balanced Scorecard performance measurement framework i.e. learning & growth of

employees, internal business processes, customer satisfaction and financial performance. The study found a significant and positive impact of intellectual capital as a whole on all four dimensions of organizational performance.

Chang (2007) empirically elaborated the value of intellectual capital for IT firms in Taiwan. His study in this regard proposed that IT firms in Taiwan have the ability to transform their intangibles to high value added products or services. The study modified VAIC model as proposed by Pulic (2000) by including innovative capital (as measured by research and development expenses) and protective capital (as measured by intellectual property assets such like patents, copy rights, trademarks etc.) along with the traditional VAIC dimensions. The performance construct on the other hand was measured using accounting measures of profit margin. The study indicated that the explanatory power of the modified model is higher than that of the traditional model of intellectual capital with regard to the explanation of variation in performance within IT sector of Taiwan. This study overall found that investors give higher value to firms having greater intellectual capital efficiency as the firms having greater intellectual capital efficiency yield better profits and market returns.

Muhammad and Ismail (2009) explored the impact of intellectual capital efficiency on the performance of financial sector firm of Malaysia. By using VAIC to measure intellectual capital efficiency and ROA along with profitability to measure performance, the study documents a strong and positive impact of intellectual capital efficiency on the financial performance of the financial sector of Malaysia. Moreover, it was also found that within financial sector banking sector of Malaysia relies more heavily on the intellectual capital efficiency, which is followed by insurance sector and brokerage firms in a subsequent manner.

Wang (2011) also tried to investigate the impact of the intellectual capital on the performance of the firms in Taiwan. Using three dimensional conceptualization of intellectual capital i.e. human capital, structural capital and customer capital, this research also seeks to add research and development in the intellectual capital-Firm performance nexus where performance of the firm was measured using proxies of return on assets, market to book value and total firm productivity. The research found that Taiwanese firms neglect the human element of intellectual capital and focus more on the accounting performance aspect of the firms.

Tayles, Pike and Sofian (2007) on the other hand tried to quantify perceptions of the managers as to whether there exist a causal link between the intellectual capital and management accounting practices such like risk management, capital budgeting, planning & control and performance measurement. This research also looks into the ability of firms having higher intellectual capital to respond to the market and economic changes and that whether such firms perform better in comparison to other firms or not. Using survey methodology, the study confirms a better management accounting infrastructure of the firm having higher intellectual capital capabilities. The evidence provided by the research also indicate that firms which are driven by intellectual capital are better able to respond to the changes in the external environment and also have better performance than firm having lower intellectual capital profile.

Zehri, Abdelbaki and Bouabdellah (2012) conducted a research in the same phenomenon in context of Tunisia. VAIC model was used by the study to measure intellectual capital efficiency, while performance of the organization was seen in context of financial performance (return on assets), economic performance (operating margin) and market performance (Market to book ratio). On the whole, this study confirms prevalence of a direct impact on financial and economic performance of the company. The direct relationship between intellectual capital and market performance however, was not confirmed by the study.

Iswati and Anshori (2007) conducted a similar kind of study for the insurance companies listed in Jakarta Stock Exchange, Indonesia. The study measured intellectual capital by subtracting average of five year book value of the firm from average of five year market value of the firm while financial performance of the insurance firm is measured through their profitability. The study found a positive relationship if intellectual capital with profitability of insurance companies in Indonesia.

Abdulai, Kwon and Moon (2012) targeted software firms in order to assess the impact of intellectual capital on their performance in region of West Africa as software companies are driven by their intellectual capability rather than the physical assets of other capital intensive firms. By using the intellectual capital classification of human, structural and relational capital the study used questionnaire approach to validate the impact of intellectual capital on competitive capabilities and ultimately on the performance of the firm. The study confirms the direct impact of intellectual capital on both internal and external competitive capabilities of the firms and also on the performance of the sampled firms. Moreover, transformational leadership was found to have a partial moderating impact between the relationship of intellectual capital and both internal and external competitive capabilities of the firms. Part from the commitment of management also moderated this relationship in a significant manner. This study overall confirms the propositions of literature advocating the value of intellectual capital as a competitive advantage and prerequisite of performance. Moreover, the role of management and leadership in channelizing the intellectual capital to build competitive competencies is also elaborated by this study.

Jalilian, Hassani, Ghanbari, Jalilian and Moradi (2013) took the initiative to conduct a case study to investigate the impact of intellectual capital on the financial and non-financial performance of West Cement Company of Kermanshah, Iran. The variable studies in the research were intellectual capital as measured through human capital, structural capital and relational capital, organizational learning capability and firm performance; which were measured through financial and non-financial performance. The study found an inter-relationship between all three dimensions of intellectual capital. All three dimensions of intellectual capital also yielded a direct correlation with organizational learning capability, financial and non-financial performance

Mavridis (2004) based his study on the banking sector of Japan, Greece and Australia as to understand the implications of intellectual capital performance. The study used VAIC model of intellectual capital and hypothesizes a causal link of dimensions of human capital and



physical capital with value based performance of banks. The study found that banking using their intellectual capital (human capital) more as compared to their physical capital was performing considerably better. The study also confirm performance differences among the organizations representing banking sector of Japan, Greece and Australia and these differences could be explained through the utilization of the human component of the intellectual capital.

Yusoff, Jantan and Ibrahim (2003) also investigated the issue by investigating the moderation of environment and strategy for impact of intellectual capital on firm performance in Malaysia. The human, structural and social capital was used to conceptualize intellectual capital and perceptual measures of performance such like overall performance, industry leadership, technological development, increase in customer base, profitability and revenue growth. Using survey questionnaire the study found that impact of intellectual capital is more pronounced on firm performance in dynamic performance as compared to stable environment. Moreover, impact of intellectual capital on firm performance is also moderated by the type of strategy being used by the organization. Impact of intellectual capital on the performance of firm is also stronger for firms pursuing strategies such like segmentation, product diversity and differentiation than the firms pursuing cost leadership strategy. Thus, it is concluded that intellectual capital has a role to play in the dynamic environment of today which is getting complex with time and it could prove to be an effective tool for organizations operating in hostile environment to better respond to the changing external environment.

Sofian, Tayles and Pike (2011) conducted another study on the elaboration of the benefits of intellectual capital for Malaysian firms as to establish relationship between different forms and degrees of intellectual capital and management counting practices particularly corporate performance and performance measurement. The study also examined whether firms investing in intellectual capital give more consideration to non-financial measures of performance or not? The study on the whole found a significant impact of intellectual capital on corporate performance. Moreover, the firms investing in intellectual capital also tend to consider non-financial measures for their performance management in Malaysia.

Reed, Lubatkin and Srinivasan (2006) integrated all three dimensions of intellectual capital i.e. human, organizational and social and hypothesized that each of three dimensions of intellectual capital exert draws strength from other dimensions with regard to its impact on the financial performance of the organization. Moreover, the impact of intellectual capital is also contingent on the external industry condition in which the firm is being operated. Using the data of banking sector of USA, the study found industry effects in the relationship between intellectual capital and performance. Moreover, different dimensions of intellectual capital were found to have an integrated impact on the performance of the banks in USA. There is also indication that too much intellectual capital could also hinder the performance of the banks in some cases. The study also argued that banking sector is witnessing significant technological shifts where human capital is being replaced by technological capital so in baking industry, managers should consider the appropriateness of investment in the human capital and technological innovations. This also indicates towards the importance of industry consideration with regard to the potential that intellectual capital could offer to a

specific type of organization.

Chen, Chang and Hwang (2005) investigated the role of intellectual capital in value creation for the firm both in terms of financial and market performance. Using VAIC to measure efficiency of intellectual capital and market to book ratio as indicator of market performance along with other ratios of financial the authors elaborated the role of intellectual capital in value creation for companies listed in Taiwan Stock Exchange. The results indicated a positive impact of intellectual capital on both financial as well as market performance of the firms in Taiwan. It was also found that investor may weight three components of intellectual capital in a different manner. Another study conducted by Ahangar (2011) investigated the same phenomenon in Iranian corporate sector. The study used VAIC model to measure intellectual capital efficiency and used profitability, sales growth and employee productivity as performance proxies. The study indicated that human capital is most important component of intellectual capital and all three dimensions as proposed by VAIC are significant explanatory variables for profitability as measured by return in asset. Clarke, Seng and Whiting (2011) conducted same type of study in Australian business context. Using VAIC model as proposed by Pulic, the study found a direct impact of intellectual capital and firm performance and dimensions of capital employed efficiency and to a lesser extent human capital efficiency are important in this regard. Moreover, Lags of dimensions of intellectual capital also found to have correlation with performance of firms in Australia. A moderating impact of physical and financial capital on intellectual capital-firm performance relationship was also put forward by the study.

The studies presented above are mostly related to the developing economies which are in close proximity of Pakistani local context. The studies elaborated the concepts using various operational definitions of intellectual capital, methods and proxies of performance. Most of the studies indicated towards a direct impact of the various dimensions of intellectual capital on internal as well as market performance of the organization. Following section provides theoretical discussion as to elaborate the theoretical relationship between the variables under consideration.

### 3. Methodology

This study is conducted in order to see the impact of intellectual capital on the firm performance thus, following model is specified:

Firm Performance = f (Intellectual Capital)

Or

$$FP_{it} = \beta_0 + \beta_1 IC_{it} + \mu$$

Where,

FP = Firm performance

IC = Intellectual Capital

Firm performance which is the dependent variable is measured using the proxies of ROA,



ROE, Sales growth and EPS. While intellectual capital is measured using VAIC model developed by Pulic (1998, 2000). The model provides following procedure to measure intellectual capital.

$$VAIC = ICE + CEE$$

Where

VAIC = Value added intellectual coefficient

ICE = Intellectual capital efficiency

CEE = Capital employed efficiency

So, VAIC is basically sum of these two components i.e. intellectual capital efficiency and capital employed efficiency and intellectual capital efficiency is further broken down into two components:

$$ICE = HCE + SCE$$

Where

HCE = Human capital efficiency

SCE = Structural capital efficiency

Thus, basically VAIC is additive value of three components i.e. human capital efficiency (HCE), structural capital efficiency (SCE) and capital employed efficiency (CEE). These three components of VAIC are calculated as follows:

$$HCE = VA / HC$$

$$SCE = SC / VA$$

$$CEE = VA / CE$$

Where

VA = Value added

HC = Human capital

SC = Structural capital

CE = Capital employed

The above variables of the model are calculated by following procedure:

$$VA = \text{Output} - \text{Input}$$

Where inputs of the organization are represented by its resources and costs and output on the other hand consist revenues of the organization. Ståhle, Ståhle&Aho (2011) also provided another way to calculate the value added:

$$VA = P + C + D + A$$

Where

P = Operating profits of the organization

C = Cost of salaries of employees

D = Depreciation expense

A = Amortization expense

The second important variable used in calculation of VIAC is human capital which is said to be equal to the costs incurred on the human resource of organization in shape of salaries & wages. Thus,

HC = C = Cost of employee salaries & wages

The third variable in this regard is the structural capital which is calculated by subtracting human capital from value added as follows:

$$SC = VA - HC = P + D + A$$

Capital employed could also be calculated by subtracting value of intangible assets from total assets:

$$CE = TA - IA$$

Where

TA = Total assets of the organization

IA = Intangible assets of the organization

### *3.1 Sample selection and data source*

Data was collected from the annual reports of companies representing Oil & Gas sector in Pakistan. According to the list provided by Karachi Stock Exchange, there are 12 companies listed in the KSE which represent oil and gas sector. The data from the company was collected for a period of 9 years starting from 2005 to 2013. Some of the companies did not provide financial reports for some years on their websites thus, a balanced panel could not be constructed for the study and data collected was organized as pooled data. Total observations comprising the sample of the study are 78. Thus, on average more than 6 years data is considered for each company considered in the sample.

### *3.2 Analysis technique*

The primary objective of the study is to assess the impact of the intellectual capital on the performance of the firm. The data collected for the study is pooled in nature, thus pooled OLS technique is deemed suitable for the estimation. Moreover, correlation analysis is also conducted in order to establish primary relationship between the variables and see whether all proxies of performance correlate significantly in order to further ensure robustness of the results. SPSS 16 is used for the estimation and related empirical analysis in this research.

#### 4. Analysis and discussion

The data collected has been analyzed using different statistical tests. First of all descriptive statistics relating to the variables of the study are presented. After that correlation analysis is provided and in the end regression analysis is provided in order to establish relationships between the variables.

Descriptive statistics in the study are used to compare the means and standard deviation of the variables which are being considered in the study for oil and gas sector. The variables considered in the study are return on assets (ROA), return on equity (ROE), sales growth, earning per share (EPS), value added intellectual capital coefficient (VAIC) and market to book ratio (M/B ratio).

Table 1 provides descriptive statistics of the variables considered in the study for oil and gas sector of Pakistan. The minimum of the first dependent variable i.e. ROA is -.1897 along with a maximum of .5572. The mean and standard deviations of the variable are .174569 and .1801 respectively. The minimum and maximum for ROE, on the other hand are -1.6535 and .9995 respectively and mean for the variable is .2979 along with a standard deviation of .4631. The next variable of the study is sales growth which has minimum of -.5005 and maximum of 2.4024 along with a mean of .219286 and standard deviation of .3501. EPS is the next variable in line which has a minimum of -108.78 and a maximum of 159.33. The mean of the variable on the other hand is 38.034 and a standard deviation of 44.5842. VIAC has a minimum of -9.12 and maximum of 33.19. The mean average for this variable is 10.6425 along with a standard deviation of 9.1625. The last variable which is considered in the study is M/B ratio which has a minimum of .66 and maximum of 13.91. The mean average of the variable is 2.5575 and standard deviation is 1.9929.

Table1. Descriptive Statistics (Oil & Gas Sector)

	Minimum	Maximum	Mean	Std. Deviation
ROA	-.1897	.5572	.174569	.1800551
ROE	-1.6535	.9995	.297901	.4630730
Sales Growth	-.5005	2.4024	.219286	.3500587
EPS	-108.78	159.33	38.0343	44.58425
VAIC	-9.12	33.19	10.6425	9.16251
M/B Ratio	.66	13.91	2.5575	1.99291

Correlation analysis has primarily been used in this study to establish the primary relationship among variables. Table 2 on the other hand provides correlation matrix for the oil & gas sector. For oil & gas sector, all the performance variables expect sales growth are significantly correlated with each other. The correlation however, is moderate between variables of ROA and ROE and between variables of ROE and EPS. The relationship between ROA and EPS on the other hand is significant but weak. EPS and M/B ratio also have a negative weak and significant correlation. All the independent variables expect sales growth are found to be significant predictors of intellectual capital efficiency in oil & gas sector of Pakistan.

Table 2 .Correlation Matrix (Oil & Gas Sector)

		ROA	ROE	Sales Growth	EPS	VAIC
ROE	Pearson Correlation	.567**				
	Sig. (2-tailed)	.000				
Sales Growth	Pearson Correlation	-.088	-.054			
	Sig. (2-tailed)	.482	.667	0.5line		
EPS	Pearson Correlation	.301**	.505**	-.016		
	Sig. (2-tailed)	.007	.000	.899		
VAIC	Pearson Correlation	.772**	.496**	-.044	.449**	
	Sig. (2-tailed)	.000	.000	.725	.000	
M/B Ratio	Pearson Correlation	.220	-.091	.130	-.297*	.248*
	Sig. (2-tailed)	.078	.469	.349	.016	.046

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Regression analysis in the study is the final step of analysis which provides the estimation of the variables by considering performance related variables dependent variables and VAIC as independent variable. Five models are constructed for the study the first four models consider

various measures of performance as dependent variables i.e. ROA, ROE, sales growth and EPS and the last model takes into account the market performance of the firms sampled for the study by taking market to book ratio as dependent variable.

*Model 1: Impact of VAIC on Return on Assets (ROA) in Oil & Gas Sector*

Table 3 on the next page provides model summary for the regression estimates relating to the model 1 which sought to establish the impact of VAIC on return on assets (ROA) for the oil & gas sector of Pakistan. The R square of the model is .596 which is quite good as it associates more than 50% explanation of variation in ROA with VAIC. The adjusted R square of the model on the other hand is .591 along with a standard error of .1152.

Table 3. Model Summary (Model 1)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.772 <sup>a</sup>	.596	.591	.1152015

a. Predictors: (Constant), VAIC

Table 4 following provides the ANOVA results of the model 1 which considers ROA as dependent variable and VAIC as independent variable. The F statistics of the model is 112.098 which is quite good and indicates that model is a good fit at a significance level of 1%. This again ensures the reliability of the estimation.

Table 4. ANOVA (Model 1)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1.488	1	1.488	112.098	.000 <sup>a</sup>
	Residual	1.009	76	.013		
	Total	2.496	77			

a. Predictors: (Constant), VAIC

b. Dependent Variable: ROA

Table 5. Coefficients (Model 1)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.013	.020		.654	.515
	VAIC	.015	.001	.772	10.588	.000

a. Dependent Variable: ROA

Table 5 above provides the regression coefficient of the regression model which assumes ROA dependent variable and VAIC as independent variable. The beta coefficient of VAIC is found to be .015 along with a t statistics of 10.588 which confirms that VAIC has a positive and significant impact on return on assets of the firms in oil & gas sector of Pakistan. That leads us to accept our first hypothesis  $H_{a1}$  for oil & gas sector; which states there is a positive impact of VAIC on return on assets.

*Model 2: Impact of VAIC on Return on Equity (ROE) in Oil & Gas Sector*

Table 6 on provides the model summary of the model 2 which estimates the impact of VAIC on return on equity of firms in oil & gas sector of Pakistan. R square for the model is estimated to be .246 which indicates that independent variable i.e. VAIC causes almost 25% variation in the dependent variable i.e. return on equity. The adjusted R square and standard error of the model are .236 and .4048 respectively.

Table 6. Model summary (Model 2)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
2	.496 <sup>a</sup>	.246	.236	.4048092

a. Predictors: (Constant), VAIC

Table 7 provides the ANOVA results of the model 2. The F statistics of the model 2 is found to be 24.76 which indicate that model is a good fit at the significance level of 1%.



Table 7. ANOVA (Model 2)

Model		Sum of Squares	Df	Mean Square	F	Sig.
2	Regression	4.057	1	4.057	24.760	.000 <sup>a</sup>
	Residual	12.454	76	.164		
	Total	16.512	77			

a. Predictors: (Constant), VAIC

b. Dependent Variable: ROE

Table 8 provides the beta coefficients of the model 2 which assumes VAIC as independent variable and return on equity dependent variable. The beta coefficient of VAIC for return on equity is estimated to be .025 along with a t statistics of 4.976 which indicates that VAIC has a positive and significant impact on the return on equity. This leads us to accept our second hypothesis for oil & gas sector; which proposed a positive and significant impact of VAIC on the variable of return on equity.

Table 8. Coefficients (Model 2)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
2	(Constant)	.031	.071		.443	.659
	VAIC	.025	.005	.496	4.976	.000

a. Dependent Variable: ROE

#### *Impact of VAIC on Return on Sales Growth in Oil & Gas Sector*

Table 9 provides the model summary for the regression estimating the impact of VAIC on sales growth. The R square for the model is quite low i.e. .002 indicating towards a low predictability power of VAIC with regard to dependent variable of sales growth. Adjusted R square is negative for this model and standard error is .3524.

Table 9. Model Summary (Model 3)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
3	.044 <sup>a</sup>	.002	-.014	.3524400

a. Predictors: (Constant), VAIC

Table 10 provides the results of ANOVA for the model estimating the impact of VAIC on sales growth. F statistics for this model is quite low i.e. .125 and indicates that model is not a good fit.

Table 10. ANOVA (Model 3)

Model		Sum of Squares	Df	Mean Square	F	Sig.
3	Regression	.015	1	.015	.125	.725 <sup>a</sup>
	Residual	7.950	64	.124		
	Total	7.965	65			

a. Predictors: (Constant), VAIC

b. Dependent Variable: Sales Growth

Table 11 provides the beta coefficient of VAIC with regard to its impact on the sales growth of the companies operating in oil & gas sector of Pakistan. It is found that beta coefficient of the VAIC is -.002 along with a T statistics of -.353 which indicates that the relationship of VAIC and sales is negative but insignificant that leads towards the rejection of third hypothesis of the study i.e. H<sub>c1</sub> for oil & gas sector which advocated a positive and significant impact of VAIC on sales growth of the companies.

Table 11. Coefficients (Model 3)

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
3 (Constant)	.239	.070		3.422	.001
VAIC	-.002	.005	-.044	-.353	.725

a. Dependent Variable: Sales Growth

Model 4: Impact of VAIC on Earning per Share (EPS) in Oil & Gas Sector

Table 12 provides the model summary of the estimation with regard to the impact of VAIC on earning per share in the oil & gas sector of Pakistan. R square of the model is estimated to be .201 which indicates that VAIC explains more than 20% variation in earning per share of the companies in oil & gas sector of Pakistan. Moreover, adjusted R square and standard error of the model are .191 and 40.108 on a respective sequence.

Table 12. Model Summary (Model 4)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
4	.449 <sup>a</sup>	.201	.191	40.10821

a. Predictors: (Constant), VAIC

Table 13 provides ANOVA results of model estimating the results relating to the dependency of earning per share on VAIC. The F statistic as provided by ANOVA results is 19.145 which indicate that model is a good fit at a significance level of 1%.

Table 13. ANOVA (Model 4)

Model		Sum of Squares	Df	Mean Square	F	Sig.
4	Regression	30798.329	1	30798.329	19.145	.000 <sup>a</sup>
	Residual	122258.836	76	1608.669		
	Total	153057.165	77			

a. Predictors: (Constant), VAIC

b. Dependent Variable: EPS

Table 14 provides the beta coefficients of model 4 which estimates the impact of VAIC on earning per share of the company. The coefficient for VAIC is estimated to be 2.183 along with a t statistic of 4.376 indicating a positive and significant impact of VAIC on earning per share of the firms under domain of oil & gas sector. Thus, fourth hypothesis of the study H<sub>d1</sub> is accepted which proposed a significant a positive impact of VAIC on earning per share.

Table 14. Coefficients (Model 4)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
4	(Constant)	14.804	6.986		2.119	.037
	VAIC	2.183	.499	.449	4.376	.000

a. Dependent Variable: EPS

#### Model 5: Impact of VAIC on Market to Book Ratio (M/B ratio) in Oil & Gas Sector

Table 15 provides the model summary for the regression conducted to see the impact of the value added intellectual coefficient (VAIC) on market to book ratio (M/B ratio). The R square of the model is found to be .062 which indicated that VAIC predicts about 6% of the variation in M/B ratio. The adjusted R square of the model is .047 along with the standard error of 1.94569.

Table 15. Model Summary (Model 5)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
5	.248 <sup>a</sup>	.062	<b>.047</b>	1.94569

**a. Predictors: (Constant), VAIC**

Table 16 provides the ANOVA results of the model 5 which assumes M/B ratio to be dependent variable and VAIC to be independent variable. F statistic of the model is found to be 4.144 which indicate that model is a good fit at the significance level of 5%.

Table 15.ANOVA (Model 5)

Model		Sum of Squares	Df	Mean Square	F	Sig.
5	Regression	15.688	1	15.688	4.144	.046 <sup>a</sup>
	Residual	238.499	63	3.786		
	Total	254.187	64			

**a. Predictors: (Constant), VAIC**

**b. Dependent Variable: M/B Ratio**

Table 16 provides the coefficient results of the regression conducted to see the impact of VAIC on M/B ratio. The beta coefficient of VAIC for M/B ratio is found to be .065 along with a t statistic of 2.03 which indicates that VAIC has positive impact on the M/B ratio which is significant at 5% level of significance. This leads us to accept fifth hypothesis H<sub>e1</sub> for oil & gas sector which proposed a positive impact of VAIC on M/B ratio.

Table 16. Coefficients (Model 5)

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.870	.415		4.502	.000
VAIC	.056	.027	.248	2.036	.046

a. Dependent Variable: M/B Ratio

#### 4.1 Discussion

Overall, a positive impact of the intellectual capital as measured through VAIC has been indicated by this study in Oil & Gas sector of Pakistan. Only insignificant relationship found in the oil and gas sector was for the variable of sales growth which has yielded an insignificant beta. The reason for this insignificant impact could be found in the nature of the industry which is under consideration as Oil & gas sector do not have much of the sales growth potential as players in the market are quite mature and also the market has been saturated. The evidence of a significant and positive impact of VAIC on ROA and ROE has been supported by many previous studies as elaborated by Ståhle, Ståhle&Aho (2011). The relationship of intellectual capital with EPS is consistent with the theoretical and empirical explanations provided by the literature (Chang, 2007; Tan, Plowman & Hancock, 2008). The last dependent variable studied as external performance measure of the organization is M/B ratio. VAIC has provided evidence of a significant and positive beta with regard to M/B ratio which is the capability of an organization to create future value. The relationship indicates that intellectual capital has the potential to create long run value for the organization. This positive and significant relationship is consistent with the prepositions and empirical findings provided in the previous studies (See, Pulic, 2000; Bontis& Fitz-enz, 2002; Chen, Chang & Hwang, 2005).

#### 5. Conclusion

Oil & gas sector is one of the premier sectors of Pakistani stock market which is characterized by high performance. But pressure on all segments of Pakistani market is mounting and the need of efficient utilization of the resources has become more prominent in the recent era of technological innovations where intangible and intellectual assets have become more important than traditional physical assets. Human capital could be the driving force of performance in the sector under study and performance of this sector could add value to the whole economy of Pakistan. Apart from the local issues, knowledge has become power around the world and knowledge economies are being built and this knowledge is



increasingly perceived to be the driving force of the economic development of many developed countries and countries which have ignored this domain are less productive as Kaplan & Norton (2004) argued that countries like Saudi Arabia and Venezuela have considerably high amount of natural resources, but these countries have ignored the knowledge and people aspect of their economy and this is the main reason for the lower productivity of these countries. On the other hand countries like Taiwan and Singapore have invested in informational and human capital domains in a substantial manner and thus, are reaping the fruits of high productivity. Thus, human and informational capital not only has relevance in economic context but also makes a firm more competitive in the hostile environment of today. In this regard, this study seeks to study the impact of intellectual capital efficiency on the performance of Oil & Gas sector of Pakistan. The study documents a significant impact of VAIC on the performance of the firms relating to Oil & Gas sector of Pakistan.

So, it can reasonably be assessed that better intellectual capital management could lead towards greater efficiency with regard to the Oil & Gas sector of Pakistan which would not only be meaningful in individual organizational context but in overall economic context as well. The study also supports the notion that spending on intellectual and human capital should be considered investment rather than expenses as these investments are paid off by an enhanced efficiency of the processes and an improved profitability of the organization. The theoretical and empirical evidence also supports a positive impact of the intellectual capital on the value of the firm which is partially supported by this study as well. So, it is concluded that if a firm is to survive and operate efficiently, it has to invest in and build its intellectual and human capital as to ensure the long run performance and sustainability of the organization.

## **6. Recommendations**

On the basis of the findings of the study following suggestions are provided to the various stakeholders.

- Overall, this study documents a significant impact of intellectual capital efficiency on both internal and external performance of the organizations working in the sectors under study. In this regard, the importance of the intellectual capital should not be undermined and the mechanism, through which intellectual and human capital flows should be developed, maintained and improved.
- Management of the organization, specifically human resource managers should consider all possible means and resources to build a better intellectual and human work force. They should also consider improvement strategies with regard to intellectual and human resources of the organizations through training and development activities.
- More attention should be given to the human side of the intellectual capital and reliance should not strictly be focused on the numeric evaluation and improvement.
- In order to channelize the human capital in a proper way, support of the organization,

particularly top management is of utmost importance. This fact should be recognized and necessary support of the top management should be provided in this regard.

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