Intellectual Capital Efficiency and Its Impact on Financial Performances of Ethiopian Commercial Banks

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Abstract

Mostly the knowledge, result of knowledge like patent, customer satisfaction, links with suppliers, commercial power, negotiating capacity, and competency of employees used as competitive advantage in service sectors like banks. This all called intellectual capital which can be decomposed as human capital and structural capital. The capital employed used as third because of the intellectual capital only alone do not create value without capital i.e. intellectual capital create value by put pressure on the capital employed. The purpose of this study is to analyses the effect of intellectual capital and capitals employed on the profitability and productivity of the firms using data for Ethiopian commercial banks for five years from 2009/10-2013/14. From the Ethiopian commercial banks 10 banks were included in the sample by purposive sampling technique i.e. those which have five year balanced annual data selected for the study. The value added intellectual capital coefficient which is developed and used by Pulic has been used to measure the intellectual capital efficiency of each firms and different financial ratio has also been used for performance measures like return on asset, return on equity and asset turn over. Based on the intellectual capital efficiency analysis the largest and governmental bank in the country which is Commercial Bank of Ethiopia have highest among sampled banks and Cooperative bank of Oromia have least. Based on the regressions done the value added intellectual capital coefficient have significant and positive effect in all measures of financial performances. But when value added intellectual capital coefficient treated by dividing into the components it have different effect on the financial performance measures. Human capital efficiency have no significant effect on the profitability measures return on equity and productivity measure asset turn over, but it have negative significant effect on the profitability measures return on asset. The structural capital on the other hand have strong and positive effect on the profitability measures of return on equity and return on asset, but it have no significant effect on productivity measure asset turn over. Moreover the capital employed efficiency have significant effect on both financial measures return on equity and return on asset, and productivity measures asset turn over.

Keywords: value added intellectual capital coefficient, Human capital efficiency, Structure capital Efficiency, Capital employed efficiency, firm's financial performance

INTRODUCTION

Intellectual capital is driving force which takes the business into success (Pulic, as cited in Goh, 2005) as well as the main source of competition in the modern economy especially in the knowledge intensive industry (Shih et al., 2010). The Banking industry is one of the service industry which mainly compete by using knowledge. Bharathi (2010) argued that the effect of using financial and physical assets is diminished in developing value, rather the intangible assets assumed their importance. These intangible assets are mostly not observed in the organization, for this reason these resources are not counted as value creation. Pulic(as cited in Bharathi, 2010) expressed that only physical and financial assets treated asresources and intellectual capital as least effect in creating value and helping to success the firm, because of this there is no consistent measuring models for intellectual capital. Goh (2005) added that the abstract feature of intellectual capital that make it more difficult to measure and treat in the accounting methods. Especially firms are unable to control and own the intellectual capital due to their abstract features and aligned to something,the knowledge and experience of workers are implication for this.

Different authors tried to define what do mean by the intellectual capital because of its "multidisciplinary growing research area many organization abide by their own individual definition", hence there is no agreed definition in the world(Shamsudin&Yian, 2013, p. 330). Nevertheless most of the definition captures similar meaning. Stewart (as cited in Iswati&Anshori, 2007) define the intellectual capital as the individuals knowledge which makes the firm to compete in its industry, furtherly it consists of knowledge, information, intellectual property right, experiences which add value to the firm owners. Marvardis(2005) added that intellectual capital is a potential means of enhancing and transforming the value of the enterprises and the society at all. Rezaiand Mousavi (2012) also define the intellectual capital as expertise, knowledge and firm's organizational learning ability, which isdifficult to measure and to value in monetary terms. Kok (2007) forwarded its definition for intellectual capital as the results of the human ability in converting thoughts or abstracts into tangible things and the   intellectual assets which make later impact on tangible things and this tangible things are not treated separately instead they supplement each other. So based on this explanation intellectual capital is the force which transform human thought in to invaluable thing of the firm. It consists of

employees work experience, organization knowhow, customer loyalty& professional judgment that forms unique feature for firms in its industry.

In resource based view of the firm Riahi-Belkaoui(2003) stressed that, the success of the firm comes from both intangible assets as well as tangible assets of the organizations. The intangible asset consists of the intellectual capital which implicit and not observed in the organization, on the other hand the physical asset composed of assets witheasily observed by our sense and main focus for competition and, success of many company in the past. But now the main focus of competition and success of any organization mainly service company changed to intangible assets especially intellectual capital. These intangible assets have been mostly not available in market and treated as confidential for firms, because this intangible asset could make a difference in market and in the success of the company.More over this assets are unique by their nature i.e. rare, changed with environment, make difference in competition, difficulty of changing it by other assets and unseen in organizations success (Godfrey & hill, as cited inRiahi-Belkaoui, 2003). This characteristics makes it unique to each firms and used as product differentiation in service market specially in banking industry, which is banking sector a service sector where it is customer services rely heavily on intellectual capital efficiency.

Even though physical and financial capital is essential for banking sector to operate, it is intellectual capital efficiency that determines the quality of services provided to customers, especially human capital efficiency (Goh, 2005). Now the use of intellectual capital in the organization is realized as value creator but the effect is difficult to measure due to lack of accurate measure (Chen et al., 2005).There are about 20 different measurement methods used in the previous studies. These methods are their own pros and cons.

Pulic (1998 &2001) developed a measurement method called value added intellectual capital coefficients (VAIC^{TM}), which measures efficiency of value added created by corporate intellectual ability. This method i.e. VAIC^{TM} have three components which are viewed from a firm's resource base view. These are human capital efficiency, structural capital efficiency from intellectual capital and capital employed efficiency or physical capital employed efficiency from the tangible assets side. According Chen et al. (2004) human capital is employees' capability in changing the company by developing new things or by using the existing firm resource efficiently. The structural capital explained by Goh (2005) as, things done by employee for the benefit of the company and remains within the company when employees go home. The third components of VAIC^{TM} is capital employed efficiency which used for value creation. All two components of VAIC^{TM} create value through capital employed, so they are interdependent each other. The purpose of the study is to investigate the intellectual capital performance of commercial Banks using Value added intellectual capital coefficient which was introduced by the Pulicand to analyze the impact of value added intellectual capital coefficients on profitability (i.e. Return on equity (ROE) & Return on asset (ROA)) and productivity (i.e. Asset Turn Over (ATO)) of the banks. Different studies were conducted on this area and come up with different results.

RESEARCH METHODOLOGY, DESIGN AND HYPOTHESIS DEVELOPMENT
Hypothesis Development
Kemal et al. (2012) examined that there is positive and significant relationship between intellectual capital and financial performance which is measured by ROA & ROE. More over Shamsudin and Yain (2013) added that intellectual capital have positive and significant effect on ROA and ROE on their study which was conducted on Malaysian commercial banks. Furthermore the study conducted in Iran by Fathi et al. (2013) indicated that intellectual capital relates with ROA and ROE positively and significantly. Based on this the following Hypotheses were developed for the study:-

H_1:- There is a positive and significant effect of VAIC^{TM} on the ROE, *ceteris Paribus.*

H_2:- There is a positive and significant effect of VAIC^{TM} on the ROA, *ceteris paribus.*

On their study, Gan and Saleh (2008) indicated that value added by Intellectual capital has positive and significant effect on the productivity, which is measured by ATO. Mehri et al. (2013) added that VAIC^{TM} have positive significant effect on the ATO on their study which they conducted in Malaysian high intangible industry. Based on this the following Hypotheses was developed for test.

H_3:- There is a positive and significance effect of VAIC^{TM} on the ATO, *ceteris paribus.*

Moreover each component of intellectual capital efficiency which is measured by VAIC^{TM} have positive and significant effect on ROE, ROA and ATO. Hence different researchers found that each component of VAIC^{TM} has different effect on financial performance & productivity (Yusuf, 2013; Fathi et al., 2013; Latif et al., 2012). Mehri et al. (2013) stated that HCE, SCE and CEE positively and significantly affect the ROA, but only CEE positively affect ATO. Beside this ROE affected by the SCE and CEE significantly and positively. On other study by Gan and Saleh (2008) indicated that ROA and ATO is positively and significantly affected by the HCE and CEE. Based on this the following hypotheses would be tested on this study.

H_4:- There is a positive and significance effect of HCE, SCE &CEE on ROE, *ceteris paribus.*

H_5:- There is positive and significance effect of HCE, SCE &CEE on ROA, *ceteris paribus.*

H_6:- There is positive and significance effect of HCE, SCE &CEE on ATO, *ceteris paribus.*

Research Design & Research Approach

The research uses explanatory research design, which explains the effect of the resources used by firms on their performance. The research approach for the study on the other hand would have been a deductive approach, which examine the previous different literatures and their findings. Based on these previous study, different hypotheses would be formulated and tested to make inference from them.

Population and Sampling Technique

In this study, researcher uses the banking sectors in Ethiopia. There are about 19 banks in the country from this three are owned by the government and the rests are owned privately (NBE, 2014).The sampling method used for the study has been purposive which would be the balanced panel data used for each banks. Those which have not full annual data for five years from 2008/09 to 2012/13 would have been excluded from the study to make the data balanced for the study.Moreover five year panel data convenient to include many banks those founded recently. So five years panel would be best fit for the study on both numbers of banks and numbers of years. On the other hand Development Bank of Ethiopia, which is governmental bank was excluded because of it could not fulfill the information required.Based on this 10 banks were selected purposefully, from this 8 are private and 2 are owned by government.

Data Source and Method of Data Collection

This study has been used secondary data, which was collected from national bank of Ethiopia annual publication. Since the national bank of Ethiopia is an independent of each banks and audited annual financial reports submitted to it, the data taken from NBE are reliable. The Book Value of the financial report of each commercial Banks has been used from the National Banks publications for five years i.e. from 2008/09 – 2012/13 on series.

Model Specifications

On this section several important issue are addressed to justify the models and measurements.

<u>Dependent Variables</u>

Many previous Studies use different measuring methods to measure the performance of the firms, especially their financial outputs to their owners. These measuring methods are Return on Assets, Return on equity and Asset turn over. The formula for these methods is as follows:-

$ROA_{it} = Net\ income_{it}/Total\ assets_{it}$

$ROE_{it} = Net\ Income_{it}/\ shareholders\ equity_{it}$

$ATO_{it} = Total\ Revenue_{it}/\ Total\ Assets_{it}$

<u>Independent Variables</u>

In order to see the effect of intellectual capital value creative on the financial performance of the banks, the researcher has use the VAIC coefficient which is introduced by Pulic (1998) to measure independent variables. This method produces how much values are created by using the different resources as inputs both physical Assets & intangible Assets, which is called intellectual capital efficiency, for its stakeholders. To make use for VAIC coefficient which is introduced by Pulic (1998) method the data collected from NBE publication arranged and calculated in convenience with the methods adopted. $VAIC^{TM}$ have five steps to make convenient for the study:-

1<u>st</u> steps: - calculating the value added (VA_{it}) for all of its stakeholders. According to stockholders view, which stated in (Riahi-Balkaoui, 2003) the stakeholder's are any group that can affect the achievement of a firm's objectives.

$VA_{it} = OUTPUT_{it} – INPUT_{it}$

$OUTPUT_{it}$ = total income from all products and services sold during the period of "t" for firm"i"

$INPUTS_{it}$ = all expenses (except labor, taxations, interests, dividends, which all are treated as value added for the stakeholders (Donaldson & Preston, 1995: cited in Chen et al., 2005)

The value added by the firm "i" for period "t" can be calculated by rearranging the profit equation as

$R = S – B – DP – W – I – DD – T$

$S – B = W + I + DP + DD + T + R$ or $S – B – DP = W + I + DD + T + R$

Where = R = change in retained earning

S = sales revenue or premium for banks

B = bought in materials & services – Administrative expenses

DP = Depreciation

W = Wages

I = Interests

DD = Dividends

T = Taxes

The left hand side shows the value created by the stake holders or by the groups involved in impacting the

managerial productive team (workers, shareholders, the bond holders & the government) the right hand side shows the distribution of wealth to the same members of the team (Riahi – Bolkaoui, 2003).

2nd **step**: - deal with the calculation of value added capital employed coefficient (VACE $_{it)}$. The capital to stockholders' fund or equity capital plus long term liabilities or loan capital, or it can be seen from Assets side as the addition of working capital & fixed Assets. This component of VAIC coefficient measures the value of assets that contribute to a company's ability to generate revenue and it is also known as operating assets (Kemal et al., 2012).

So value added by capital employed coefficient $_{it}$ (VACE $_{it}$)

Capital employed $_{it}$ (CE $_{it}$) = Total assets $_{it}$ – Intangible assets $_{it}$ or

Fixed assets $_{it}$ + working capital $_{it}$ or

Long term loan $_{it}$ + Stock Holders Equity $_{it}$

VACE $_{it}$ = VA $_{it}$/CE $_{it}$

VACE $_{it}$ = the value created by one unit capitals employed during period t.

3rd **step**: - is about the value added human capital coefficient (VAHC $_{it}$). Under this step the human capital value added coefficient is calculated by treating all expenses for employees as investments and not any more treated as costs in this study (Yusuf, 2013: Pulic, 1998, 2001). So human capital $_{it}$ is investment in human capital during the t period or total salary and wage including all incentives.

VAHC $_{it}$ = VA $_{it}$/HC $_{it}$

VAHC $_{it}$ is value added by one unit of human capital invested during the period of t.

4th **step**: - is about the value added structural capital coefficient (STVA it). Structural capital and human capital are always goes in opposite direction (Jan et al; cited in Clerk et al., 2010). This means when HC increase the SC decreasing, which is logically inconsistent with the theoretical definition of SC (Clarke et al., 2010). Based on this STVA $_{it}$ calculated as:

SC $_{it}$ = VA $_{it}$ – HC $_{it}$

STVA $_{it}$ = SC $_{it}$/VA $_{it}$

So STVA $_{it}$ shows proportion of total VA accounted by structural capital.

5th **step**: - dealt with calculation of value added intellectual coefficient (VAIC $_{it}$)

VAIC $_{it}$ = VAHC $_{it}$ + VACE $_{it}$ + STVA $_{it}$

Efficiently this would indicate how the firm resources used would create value.

Therefore based on the above steps we can conclude that = value added (VA) = Operating profit + Employee cost + Depreciation + Amortization

Control variables

These are leverage or debt structure and the size of the firms to reduce the impact of this variables that should be explain the change in the dependent variables. The size of the company mostly related to the economic scale advantage & cost efficiency of operation. On the other hand if the firm have large debt, it may lack the belief from investors, and will require high interests payments, which reflects riskiness & reduce the returns of the firms (Clarke et al., 2010).

Leverage $_{it}$ = total debt $_{it}$/Total Assets $_{it}$

Size = Natural log of total assets

Models

Based on the Hypothesis developed and the objective settled the following six models has been tested in this study.

Model 1 = $\ln ROE_{it} = \beta_0 + \beta_1 VAIC^{TM}_{it} + \beta_2 Leverage_{it} + \beta_3 Size_{it+} \eta_{it+} u_{it}$

Model 2 = $ROA_{it} = \beta_0 + \beta_1 VAIC^{TM}_{it} + \beta_2 Leverage_{it} + \beta_3 Size_{it+} \eta_{it} + u_{it}$

Model 3 = $ATO_{it} = \beta_0 + \beta_1 VAIC^{TM}_{it} + \beta_2 Leverage_{it} + \beta_3 Size_{it+} \eta_{it} + u_{it}$

Model 4 = $\ln ROE_{it} = \beta_0 + \beta_1 HCE_{it} + \beta_2 SCE_{it} + \beta_3 CEE_{it} + \beta_4 Leverage_{it} + \beta_5 Size_{it} + \eta_{it} + u_{it}$

Model 5 = $\ln ROA_{it} = \beta_0 + \beta_1 HCE_{it} + \beta_2 SCE_{it} + \beta_3 CEE_{it} + \beta_4 Leverage_{it} + \beta_5 Size_{it} + \eta_{it} + u_{it}$

Model 6 = $ATO_{it} = \beta_0 + \beta_1 HCE_{it} + \beta_2 SCE_{it} + \beta_3 CEE_{it} + \beta_4 Leverage_{it} + \beta_5 Size_{it} + u_{it}$

Where:-

$\ln ROE_{it}$ = Return on equity for bank "i" while the time period is in "t" form, which was transformed to natural logarithm.

ROA $_{it}$ = Return on Assets for bank "i" while the time periods in "t".

$\ln ROA_{it}$ = Return on Assets for bank "i" while the time periods in "t", which was transformed to natural logarithm.

ATO $_{it}$ = Asset Turn over for Bank "i" while the time period in "t".

VAIC^{TM} $_{it}$ = value added intellectual capital efficiency coefficient

HCE $_{it}$ = Human Capital efficiency

SCE $_{it}$ = structural Capital efficiency

CEE $_{it}$ = capital Employed efficiency

β_0 = constant

η_{it} = the unidentified intercept/cut off for the each company or unobserved individual effect.

U_{it} = error component for bank "i" at time t and it assumed to have zero mean $u_{it} = 0$

$\beta 1, 2, 3, 5$ -parameters to be estimated

i = Banks

t = time periods

RESULTS AND DISCUSSIONS
Econometrics Diagnostic Test

The normality of residual for each model shows the models have normally distributed residuals. The Shapiro Wilk test for normality of the error term for all models shows that the residuals were normally distributed (W= 0.96317, Prob>z = 0.12065 for model 1, W= 0.97866, Prob>z = 0.49687 for model 2, W= 0.98657, Prob>z =0.83625 for model 3, W= 0.97831, Prob>z = 0.48304 for model 4, W= 0.97673, Prob>z = 0.42388 and W= 0.97190, Prob>z = 0.27619). (See appendix 1)

The hausmantestfor the 1 to 5 models indicated that the fixed effect model was best fitted model after the hausman test shows the significant p-value (0.0000 for model one to three and 0.0002 and 0.0322 for four and five models)in order to reject the null hypothesis which states the random effect is appropriate model. The last model shows insignificant p-value (0.2441) which is no evidence to reject the null hypothesis that states the random effect model is appropriate, hence the random effect is appropriate. (See appendix 2)

The F-test for fixed effect models shows p-value small which rejects the null hypothesis that states all dummy variable for the companies are zero. The F-test for the all model is less than five percent which rejects the null hypothesis to choose the fixed effect. The p-value is 0.0000 for one to four models and 0.0001 for the last model, which enable us to reject null hypothesis at 0.01 significance level. (See appendix 3)

To test whether random effect or pooled OLS best for this model the breush and pagan langrangian multiplier tests was done for the null hypothesis the pooled OLS is appropriate. The p-value (0.0003) on the test indicated that the random effect is appropriate. (See appendix 4).

Based on the variance inflation factors (VIFs) computation all models have no the problems of multicollinearity. The VIF for all independent variables included in the models 1to 3 are all less than 5 and for models 4 to 6 are less than 10. According to the Gujarati (2003) the variables considered as highly collinear if the VIF exceeds 10, consequently all models have not highly collinear based on this rule of thumb. (See appendix 5).

Based on the user written test which is Modified Wald statistic (xttest3), models 1-5 have heteroskedasticity problems by rejecting the null hypothesis which say error variance are homoscedastic by p-value of 0.0000 for models one to five. For the last models i.e. models six, the xtgls method of testing used to test heteroskedasticity and base on this test the models error were not constant by the p-value 0.0001. To overcome this problem all models used cluster robust to correct the heteroskedasticity. (See appendix 6).

Based on the users' written test which is Lagram-Multiplier test for panel data all models have no serial correlation problems. The p-value (0.1467, 0.4866, 0.6347, 0.1939, 0.1462, and 0.3044 respectively from mode 1 to 6) for all models is insignificant which fails to reject the null hypothesis which states there is no first order autocorrelation. (See appendix 7).

Intellectual Capital Efficiency of Banks

Commercial Bank of Ethiopia which is the government owned bank have higher VAIC[TM], HCE and SC which is 11.442, 10.479 and 0.904 respectively on average during five yearand followed by private bank called Dashen Bank by 8.002, 7.070 and 0.857 respectively for VAIC[TM], HCE and SCE on average during five year. Wegagen Bank is efficient in using its capital by creating 0.083 birr for each birr invested capital on average for five year followed by Awash International Bank and Nib International Bank by creating value of 0.077 and 0.075 birr for five year on average respectively. On the other hand Cooperative Bank of Oromia have least in all value creating efficiency measurements by 4.922 for VAIC[TM], 4.144 for HCE, 0.724 for SCE and 0.054 for CEE.Lion International is second from least having 5.218 of VAIC[TM], 4.414 of HCE and 0.741 for SCE, but Commercial bank of Ethiopia second least by the CEE only creating 0.059.

Table 4.1 Rank of banks based on the value added intellectual capital efficiency result from the analysis using VAIC^{TM} for year 2009-2013 on Average.

No	Company Name	Average HCE	Average SCE	Average CEE	Average VAIC^{TM}	Average VA
1	Commercial Bank of Ethiopia	10.479	0.904	0.059	11.442	7309.54
2	Dashen Bank	7.070	0.857	0.074	8.002	1124.55
3	Awash International Bank	6.122	0.835	0.077	7.034	810.803
4	United Bank	5.728	0.822	0.071	6.621	534.800
5	Nib International Bank	5.698	0.822	0.075	6.595	533.635
6	Construction and Business bank	5.473	0.812	0.066	6.351	279.868
7	Bank of Abyssinia	5.371	0.813	0.068	6.252	517.321
8	Wegagen Bank	5.215	0.807	0.083	6.105	625.701
9	Lion International Bank	4.414	0.741	0.064	5.218	133.004
10	Cooperative Bank of Oromia	4.144	0.724	0.054	4.922	188.569

Source:authors own computation

LINEAR MULTIPLE REGRESSION RESULTS

R-squared for fixed effect models based on the tests done indicated that the model explains the variation of dependent variable by 90.66, 89.06, 83.54, 98.93 and 98.29 percent's respectively for models one to five, and the sixth model which is random effect model based on the test done, explain the variation of asset turn over by 80.44 percent for Ethiopian commercial banks. The fixed models p-value (0.0000 for all fixed models) shows that the models variables were jointly significant at the 0.01 significance level, and the random effect probability for Wald test shows that again significant at 0.01 significance level. This p-value shows the F-test is significant at minimum significance level even at less than 0.0001 significance level.

Table 1 Regression result of Models 1 to 3

Model 1(lnROE)				Model 2 (ROA)				Model 3 (ATO)			
Variables	Coefficient (Robust Std. error)	t-value.	p-value	Coefficient (Robust Std. error)	t-value.	p-value	Coefficient (Robust Std. error)	t-value.	p-value		
Constant	-20.30968* (4.279357)	-5.29	0.000	-0.06584 (0.0336632)	-1.96	0.082	-0.07505 (0.0581848)	-1.29	0.229		
VAIC^{TM}	0.3390136* (0.0639221)	5.30	.000	0.005979 * (0.0007152)	8.36	0.000	0.00482 * (0.0010449)	4.62	0.001		
Control variables											
Leverage	13.31106* (3.990573)	3.34	0.009	-0.0096993 (0.0373684)	-0.26	0.801	0.0246916 (0.0727461)	0.34	0.742		
Size	0.5483225* (0.0654054)	8.38	0.000	0.007197 * (0.0014105)	5.10	0.001	0.01260* (0.0027384)	4.60	0.001		
Observation = 50 F(3, 9) = 19.71* Prob> F = 0.0003 R-squared = 0.9066 Adj. R-squared = 0.8762 Root MSE = 0.2332				Observation = 50 F(3, 9) = 35.96* Prob> F = 0.0000 R-squared = 0.8906 Adj. R-squared = 0.8551 Root MSE = 0.0033				Observation = 50 F(3, 9) = 15.83* Prob> F = 0.0006 R-squared = 0.8354 Adj. R-squared = 0.7820 Root MSE = 0.0054			

*Significant at 0.01 significance level**Significant at 0.05 significance level
Source: from stata 13 software output

Each variables indicate on table measures that VAIC^{TM} measures how firms use the resources and it is the sum of HCE, SCE and CEE, leverage is the ratio of total debt for total assets and size is natural logarithm of total assets.

Table 2 Regression result of Models 4 to 6

Model 4 (lnROE)				Model 5 (lnROA)				Model 6 (ATO)			
Variables	Coefficient (Robust Std. error)	t-value.	p-value	Coefficient (Robust Std. error)	t-value.	p-value	Coefficient (Robust Std. error)	z-value.	p-value
Constant	-17.4433* (0.9210676)	-18.94	0.000	-11.8675* (1.020761)	-11.63	0.000	-0.02803 (0.03569)	-0.79	0.432
HCE	-0.038322 (0.0242017)	-1.58	0.148	-0.05532** (0.0229847)	-2.41	0.039	-0.00166 (0.00095)	-1.75	0.081
SCE	6.462856* (0.5760508)	11.22	0.000	6.529142* (0.2366846)	27.59	0.000	0.0017 (0.02195)	0.08	0.937
CEE	11.55707* (3.263319)	3.54	0.006	11.55766* (2.867726)	4.03	0.003	0.943188* (0.0966)	9.76	0.000
Control variables									
Leverage	9.724329* (1.312542)	7.41	0.000	2.044137 (1.158025)	1.77	0.111	0.09843** (0.0452)	2.18	0.030
Size	0.187037* (0.0344278)	5.43	0.000	0.083202 (0.0467355)	1.78	0.109	-0.0025* (0.00078)	-3.21	0.001
Observation = 50 F(5, 9) = 852.14* Prob> F = 0.0000 R-squared = 0.9893 Adj. R-squared = 0.9850 Root MSE = 0.0813				Observation = 50 F(5, 9) = 960.67* Prob> F = 0.0000 R-squared = 0.9829 Adj. R-squared = 0.9761 Root MSE = 0.0787				Observation = 50 Wald chi2(5) = 917.36* Prob> chi2 = 0.0000 R-squared = 0.8044 SEE or σ_v = 0.00306765 sigma_e (σ_u) = 0.0038907 theta (θ) = 0.50663395		

*Significant at 0.01 significance level **Significant at 0.05 significance level*
Source: from stata 13 software output

The variables on table indicated measures that HCE the efficiency of using human capital, SCE is the proportion of VA accounted to structural capital, CEE is the efficiency of using capital to create value, leverage is the ratio of total debt for total assets and size is natural logarithm of total assets.

Value Added Intellectual Capital Coefficient

The p-value 0.000 for relationship between ROE and VAIC[TM] shows that the relationship is significant at 0.01 significance level. More over this result supports the hypothesis developed that says there is positive and significant relationship between the VAIC[TM] and ROE other things remain constant.

The results depicted on table 1 for the model two shows that the impact of VAIC[TM] on ROA is positive and significant at the 0.01 significance level. Even if the p-value 0.000 shows the relationship is significant at small significance level i.e. 0.0001 significance level, the coefficient for the VAIC[TM] is very small. The coefficient of VAIC[TM] stated on table 1 based on the fixed effect model suggests that the intellectual capital efficiency leads the return on asset to increase at lower rate. The result stated here support the hypothesis developed by the author as the relationship exists between the VAIC[TM] and ROA, citrus paribus.

The hypothesis developed for ATO that states there is significant and positive effect of VAIC[TM] on ATO is not rejected based on the results found and presented on table 2. Based on the results of the fixed effect model there is significant and positive relationship between the VAIC[TM] and ATO at 0.01 significance level. The p-value 0.001 for this relationship is small which makes to fail to reject the hypothesis developed but the coefficient for VAIC[TM] is small, which implies that ATO increases at lower rates as the VAIC[TM] increases in one efficiency level for Ethiopian commercial banks averaged from 2009 to 2013.

The results found on this empirical study supports the results found on previous study. The results for ROA is supports the result found by Fethi et al. (2013) in Iran, Gan and Saleh (2008) in Malaysian for technology intensive industry, Clarke et al. (2010) in Australia and Mehri et al. (2013) in Malaysia for high intangible intensive industries. On the other hand this finding is against the result found by the Latif et al. (2012) in Pakistan for banks and UlRehman et al. (2013) in Pakistan for insurance company, which was found there is no significant relationship between the VAIC[TM] and ROA. The results for ROE also congruent with results found by the Fethi et al. (2013) in Iran, Clarke et al. (2010) in Australia and Mehri et al. (2013) in Malaysia for high intangible intensive industries. But similarly with the ROA, the finding for ROE is not support the results found by the Latif et al. (2012) in Pakistan for banks and UlRehman et al. (2013) in Pakistan for insurance company. Finally the results for ATO on this study is similar to that of Gan and Saleh (2008) in Malaysian for technology intensive industry and Mehri et al. (2013) in Malaysia for high intangible intensive industries, but it

is contrast to results found by the Latif et al. (2012) in Pakistan for banks.

Over all this empirical result shows that the financial profitability and productivity of the banks would be enhanced by the intellectual resources used by the banks based on the data collected from Ethiopian commercial banks for year 2009 to 2013. Efficient use of this resources could determine the financial performance of banks for five year. The costs incurred for the human capital, structural capital and capital employed jointly determines the financial performance of the company if this variables were efficient in creating value by controlling the size and leverage. This should be because the value creation efficiency of one can make the other better and efficient. Like the SCE could make the HCE to perform better and the HCE & SCE make the CEE to create large value so jointly they add value even if individually they don't perform well. The money paid for the organizational arrangement, procedures and cost of making working environment convenient and treated under SCE helps human capital to perform better, then this two efficiencies put pressure on capital of the company to enhance overall value of the company.

Human Capital Efficiency
The impact of HCE on the ROE is negative which shows increasing efficiency of human capital reduces the ROE but this relationship is insignificant at the 0.05 significance level (p-value = 0.148). This result is not congruent to the hypothesis developed for the study i.e. there is positive and significant impact of HCE on ROE. This empirical result supports the results found by Shamsudin and Yain (2013) in Malaysia for commercial banks, Mehri et al. (2013) in Malaysia for high intangible intensive industries, Yusuf (2013) in Nigeria for banks and Latif et al. (2012) in Pakistan for banks. But it is in contrast result to results found by the Fethi et al. (2013) in Iran, which states there is positive and significant relationship between the HCE and ROE.

The results for relationship between the HCE and ROA depicted on table 2 indicates that there is significant negative relationships at 0.05 significance level (p-value = 0.039). The coefficient for HCE on the table 2 shows that the value creation efficiency of human capital negatively affects the ROA based on data taken from Ethiopian commercial banks on average for five year from 2009 to 2010. The results found is not congruent to the hypothesis developed which states there is significant and positive effect of HCE on ROA. Similar to the ROE, this empirical result supports result found by the Shamsudin and Yain (2013) in Malaysia for commercial banks and Puntillo (2009) in Italia for banks. But this results is against the result found by the Mehri et al. (2013) in Malaysia for high intangible intensive industries, Fethi et al. (2013) in Iran and Latif et al. (2012) in Pakistan for banks.

The p- value for the relationship between HCE and ATO is 0.081 which suggests it is insignificant at the 0.05 significance level. This is against the hypothesis developed for this study which is hypothesized as there is positive and significant relations between the HCE and ATO. The results found here supports the results of Mehri et al. (2013) in Malaysia for high intangible intensive industries. But it is in contrast to the results of Latif et al. (2012) in Pakistan for banks and Gan K. and Saleh Z. (2008) in Malaysian for technology intensive industry.

Over all the results for HCE indicated that the human capital efficiency is not significant to put impact on the productivity which is measured by the ATO and profitability which is measured by the ROE, but it relates with the profitability measures of ROA negatively and significantly based on the data from Ethiopian commercial banks for five year. The payment for the employees who creates value should not determine the profitability of the banks that is measured by the ROE and productivity that is also measured by the ATO.

Structural Capital Efficiency
The results for the relationships of ROE and SCE depicted on table 2 indicates that the impact of SCE on ROE is positive and significant by the 0.000 p-value at the 0.01 significance level. Moreover the coefficient depicted on the table based on the fixed effect model for the SCE shows that the SCE have powerful explaining variable for ROE based on the data collected from the Ethiopian commercial banks for five years. This means that the hypothesis developed for the study which says there is significant positive effect of SCE on ROE is supported. More over this result is the same to results found by Shamsudin and Yain (2013) in Malaysia for commercial banks, Fethi et al. (2013) in Iran and Mehri et al. (2013) in Malaysia for high intangible intensive industries. But it is contrasted to the result found by the Latif et al. (2012) in Pakistan banks.

The fixed effects regression results for p-value (0.000) indicates that the relationship between the SCE and ROA is significant at even 0.0001 significance level. Likewise the coefficient from fixed effect regression models for the SCE explains that the relationship is highly elastic and ROA is positively determined by the SCE. This supports the hypothesis developed for the study which was stated as the ROA is affected by the SCE significantly and positively. The empirical result found here supports the result of Shamsudin and Yain (2013) in Malaysia, Fethi et al. (2013) in Iran, Mehri et al. (2013) in Malaysia and Latif et al. (2012) in Pakistan, but it is in contrast to the results found by the Puntillo (2009) in Italia.

The p-value 0.937 indicates that the relationship of SCE and ATO is not significant at even 0.2 significance level. The hypothesis developed for the study which says there is positive and significant

relationship between the SCE and ATO is not supported. Furthermore this empirical result supports the result of Gan and Saleh (2008) in Malaysian for technology intensive industry and Mehri et al. (2013) in Malaysia for high intangible intensive industries.

Over all the results of this empirical study suggest that there is strong and significant positive relationship between the profitability measures ROE and ROA with SCE, but it is positively and insignificantly relates with productivity measures ATO for the Ethiopian commercial banks for years 2009 to 2013. Hence the SCE affects more the profitability measures than the productivity measures. The value creation efficiency by the costs incurred for the organization structure, procedures, intangible assets, working environment, various plans and policies determine the profitability of the banks.

Capital Employed Efficiency

Based on the results from the table 2 the p-value 0.006 is significant at the 0.01 significance level which signify the relationship between the CEE and ROE is significant. The coefficient form the regression indicates that this relationship is highly elastic to determine the ROE. So the coefficient implies that the ROE highly explained by the CEE. This supports the hypothesis developed that states there is significant positive impact on ROE by the CEE. The result found here is congruent to the result of the Shamsudin and Yain (2013) in Malaysia, Fethi et al. (2013) in Iran and Mehri et al. (2013) in Malaysia. It is also contradicts to the results of Latif et al. (2012) in Pakistan that states there is no significant relationship between CEE and ROE.

The p-value 0.003 from the regression of fixed effect shows the relation of CEE to ROA is positive and significant at the 0.01 significance level. Moreover the coefficient found for CEE suggests that the relationship is strong, which is highly powerful to explain the ROA based on the data taken from the Ethiopian commercial banks for five year. This support the hypothesis developed which states there is positive and significant impact of CEE on ROA. Furthermore this empirical result is similar with results of Puntillo (2009) in Italia, Shamsudin and Yain (2013) in Malaysia, Fethi et al. (2013) in Iran and Mehri et al. (2013) in Malaysia.

Finally the impacts of CEE on the ATO is positive and significant based on the random effect models regression by the p-value 0.000 at the 0.01 significance level. Moreover the coefficient of the CEE on the table 2 explained that the CEE highly determines the ATO. The hypothesis developed for this relationship is supported by the results i.e. the hypothesis which states there is positive and significant effect of CEE on ATO is not rejected. The result found here also the same to the result found by Gan and Saleh (2008) in Malaysian, Latif et al. (2012) in Pakistan and Mehri et al. (2013) in Malaysia.

Over all the empirical results suggests that there is strong and significant relationship between the profitability measures ROE and ROA, and productivity measures ATO with that of CEE for Ethiopian commercial banks for five year. So this implies that the value created by the money invested in different area of the banks determine the financial performance over period. Over all the CEE determines the financial performance of the banks more than the other dependent variables i.e. HCE and SCE.

CONCLUSION

Now a days business compete to get advantage in all matters, resources toward suppliers to get cheap and quality inputs, products toward customers to get loyal customers and profits, and technology toward its employees innovative ability and competency. The competency and innovative become more vulnerable to obsolete due to change time or improved by competitors. Any firm in knowledge intensive industry invest millions of dollars to research and development. That's why today most developed countries shift their attention to knowledge and technology.

Mostly the knowledge, result of knowledge and competency of employees used as competitive advantage in service sectors like banks. This all called intellectual capital which can be decomposed as human capital and structural capital. The capital employed sometimes used as third because of the IC only alone do not create value without capital i.e. IC create value by put pressure on the capital employed.

Based on the results from the models selected the VAIC^{TM} is positive and significant effect on both financial performance measures i.e. profitability measures ROA and ROE, and productivity measures ATO after controlling leverage and size. So the total intellectual capital efficiency when treated aggregately for the banks, they would enhances the financial performances of the banks. On the hand when treated separately as components some the variables are highly significant and others are insignificant toward the financial performance measures of the banks. The human capital efficiency of the bank is not significant to predict the ROE and ATO. Moreover the impact of HCE on the ROA is significant but like other financial performance measures i.e. ROE and ATO the relationship is negative. This suggests that the HCE have no effect on the profitability measures ROE and Productivity measures ATO for the banks. But it have negative significant effect on the ROA. Generally the value created by the salary and related payments have no effect on the profitability measures ROE and productivity measures ATO, and negative impact on the ROA based on the data collected from the Ethiopian commercial banks for five years. The other variable SCE is significant and positive influence

on the profitability measures ROE and ROA, but it have no significant effect on the productivity measures ATO. This suggest that the value created using the money paid to make convenient environment to the employees, customers and management and intangible goods are significant effect on the profitability measures and have insignificant positive effect on the productivity measures. Finally the CEE have significant effect on all financial performance measures. This implies that the value created by using money paid for capital is significantly affects the financial performance measures i.e. profitability measures ROE and ROA and productivity measure ATO for banks. Generally the capital employed efficiency is the most significant variable to determine the financial performances of the Ethiopian commercial banks for five year.

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Appendix 1

1. Normality test

H0: Variables are normally distributed

Shapiro-Wilk W test for normal data

Table 1 Normality test for model 1

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
Residual1	50	0.96317	1.732	1.172	0.12065

Table 2 Normality test for model 2

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
Residual2	50	0.97866	1.004	0.008	0.49687

Table 3 Normality test for model 3

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
Residual3	50	0.98657	0.632	-0.979	0.83625

Table 4 Normality test for model 4

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
Residual4	50	0.97831	1.020	0.043	0.48304

Table 5 Normality test for model 5

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
Residual5	50	0.97673	1.094	0.192	0.42388

Table 6 Normality test for model 6

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
Residual6	50	0.97190	1.321	0.594	0.27619

Appendix 2

For the model 1

Test: Ho: difference in coefficients not systematic

$chi2(3) = (b-B)'[(V\_b-V\_B)^{(-1)}](b-B)$

$= 167.67$

Prob>chi2 = 0.0000

(V_b-V_B is not positive definite)

For the model 2

Test: Ho: difference in coefficients not systematic

$chi2(3) = (b-B)'[(V\_b-V\_B)^{(-1)}](b-B)$

$= 23.53$

Prob>chi2 = 0.0000

(V_b-V_B is not positive definite)

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For the model 3
Test: Ho: difference in coefficients not systematic
$chi2(3) = (b-B)'[(V\_b-V\_B)^{(-1)}](b-B)$
$= 227.65$
Prob>chi2 = 0.0000
(V_b-V_B is not positive definite)
For the model 4
Test: Ho: difference in coefficients not systematic
$chi2(5) = (b-B)'[(V\_b-V\_B)^{(-1)}](b-B)$
$= 24.32$
Prob>chi2 = 0.0002
(V_b-V_B is not positive definite)
For the model 5
Test: Ho: difference in coefficients not systematic
$chi2(5) = (b-B)'[(V\_b-V\_B)^{(-1)}](b-B)$
$= 12.19$
Prob>chi2 = 0.0322
(V_b-V_B is not positive definite)
For the model 6
Test: Ho: difference in coefficients not systematic
$chi2(5) = (b-B)'[(V\_b-V\_B)^{(-1)}](b-B)$
$= 6.70$
Prob>chi2 = 0.2441
(V_b-V_B is not positive definite)
Appendix 3
For model one
F test that all u_i=0:   F(9, 37) =   13.17   Prob> F = 0.0000
For model two
F test that all u_i=0:   F(9, 37) =   14.72   Prob> F = 0.0000
For model three
F test that all u_i=0:   F(9, 37) =   18.34   Prob> F = 0.0000
For model four
F test that all u_i=0:   F(9, 35) =   12.89   Prob> F = 0.0000
For model five
F test that all u_i=0:   F(9, 35) =   5.52   Prob> F = 0.0001
Appendix 4
ato[com,t] = Xb + u[com] + e[com,t]
     Estimated results:
               | Varsd = sqrt(Var)
          ---------+----------------------------
ato | .0001353   .0116317
e | .0000151   .0038907
u | 9.41e-06   .0030676
     Test: Var(u) = 0
chibar2(01) =   11.98
Prob> chibar2 = 0.0003
Appendix 5
For the models 1-3
  Variable | VIF   1/VIF
-------------+----------------------
vaic | 3.79   0.264034
size | 3.78   0.264401
leverage | 1.60   0.625103
-------------+----------------------
  Mean VIF | 3.06

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For the models 4-6

```
 Variable |      VIF     1/VIF
-------------+---------------------
     sce |       8.25           0.121212
     hce |       7.86    0.127241
     cee |       3.87           0.258294
    size |       4.21    0.237596
leverage |       2.83           0.353574
-------------+---------------------
 Mean VIF |     5.40
```

Appendix 6

For model 1

xttest3

Modified Wald test for groupwiseheteroskedasticityin fixed effect regression model

H0:sigma(i)^2 = sigma^2 for all i

chi2 (10) = 72.91

Prob>chi2 = 0.0000

For model 2

Modified Wald test for groupwiseheteroskedasticityin fixed effect regression model

H0:sigma(i)^2 = sigma^2 for all i

chi2 (10) = 45.10

Prob>chi2 = 0.0000

For model 3

Modified Wald test for groupwiseheteroskedasticityin fixed effect regression model

H0:sigma(i)^2 = sigma^2 for all i

chi2 (10) = 119.37

Prob>chi2 = 0.0000

For model 4

Modified Wald test for groupwiseheteroskedasticityin fixed effect regression model

H0:sigma(i)^2 = sigma^2 for all i

chi2 (10) = 70.46

Prob>chi2 = 0.0000

For model 5

Modified Wald test for groupwiseheteroskedasticityin fixed effect regression model

H0:sigma(i)^2 = sigma^2 for all i

chi2 (10) = 359.40

Prob>chi2 = 0.0000

For model 6

lrtestHeteroskedasticity, df(9)

Likelihood-ratio test   LR chi2(9) = 34.07

(Assumption: Homoskedasti~y nested in Heteroskedas~y)

Prob> chi2 = 0.0001

Appendix 7

For model 1

Wooldridge test for autocorrelation in panel data

H0: no first-order autocorrelation

F(1,   9) = 2.522

Prob> F = 0.1467

For model 2

Wooldridge test for autocorrelation in panel data

H0: no first-order autocorrelation

F(1,   9) = 0.526

Prob> F = 0.4866

For model 3

Wooldridge test for autocorrelation in panel data

H0: no first-order autocorrelation

F(1,   9) = 0.242

Prob> F = 0.6347

For model 4
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F(1,   9) =   1.971
Prob> F =   0.1939

For model 5
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F(1,   9) =   2.530
Prob> F =   0.1462

For model 6
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F(1,   9) =   1.186
Prob> F =   0.3044