J. Appl. Environ. Biol. Sci., 4(6S)56-63, 2014

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Intellectual Capital Efficiency and Performance: Study on Malaysian Federal Statutory Bodies

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Received: October 10, 2014
Accepted: November 21, 2014

ABSTRACT

The purpose of this study is to reduce the gap exist and provide further insight into the role of intellectual capital (IC) in public sector performance. Value added intellectual coefficient (VAIC) model is used to measure the IC efficiency. This study is using a sample of Malaysia federal statutory bodies (FSB) that listed between 2008 and 2010. Relationship between VAIC components namely Human Capital Efficiency (HCE), structural capital efficiency (SCE) and Capital employed efficiency (CEE) and financial performance (productivity and profitability) are analysed. The empirical findings from this study show the IC is an asset that can be utilized as a vehicle for statutory bodies' improvement particularly the profit.

KEYWORDS: Intellectual Capital, VAIC, Federal Statutory Bodies, Organizational Performance, Malaysia.

INTRODUCTION

Intellectual capital (IC) has becomes a critical success factor since the transition of the economy from agricultural and industrial economy to knowledge economy. Over the decades, many researchers have defined the IC based on their thought and interpretation. Up until today, there is no single acceptance of the accurate way to define IC. ICs are hidden value [1] or strategic assets which do not reveal directly in traditional financial report.

Studies on IC have resulted in a mixture of results across different countries, industries and years. However, the inconsistence evidence does not lead to a compelling conclusion regarding the relationship between IC and performance. Therefore, a further investigation should be undertaken to provide evidence of any relationship between IC and firm performance. Even though, there are significant research interests in the field of intellectual capital, more attention has been paid to IC predominantly in private sector including in Malaysia study. A review of the IC literature yields only a few studies conducted concerning the IC in public sector. It is argue in this study whether the IC efficiency also contribute to enhance the performance of the public sector. Therefore, this study aims to fill this gap by examining the IC efficiency relating to the Malaysian federal statutory bodies (FSB). Moreover, the study also attempts to analyze the relationships between IC efficiency and these organizations performance in term of profitability and productivity. Further, it is aimed to confirm that the existence of IC enhance the productivity and profitability in the federal statutory bodies in Malaysia. Other than that, the findings from this study also would show the IC performance within FSB. Results also can be use as a benchmarking for FSB to enhance their IC efficiency performance.

IC is measured by using value added intellectual coefficient (VAIC) [13]. Although VAIC was widely used by previous researcher, so far no study used FSB as a sample selection. Therefore, this study provides a starting point for future researches that use VAIC methods to enhance the sample selection. Relationship between VAIC and financial performance (profitability and productivity) are analysed. Two accounting ratios: return on assets (ROA) and asset turnover (ATO) were used as the indicators of FSB performance. Different regression models were constructed to examine the relationship between VAIC components with financial performance.

LITERATURE REVIEW

Intellectual Capital

IC is introduced in late 1960s by John Kenneth Galbraith [30]. Since that, it was interpreted and explained in many ways. In [2] stresses that, despite the fact that the IC is defined from various perspectives, it does not disqualify others. This is due to most of them highlight the same characteristics which are something invisible, related to knowledge and it offers better opportunities for an organisation to succeed in the future.

The well-known classification of IC is established by [31] which stated that there are three elements of IC, namely individual competence, internal structure and external structure. Most of the researchers afterwards use the three sub-categories. Dissimilarity may arise because some researcher might use different terms for each sub-categories and also a lot of attributes are used to measure each sub-categories.

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Intellectual Capital in Public Sector

IC resources are significant in value creation within public sector. Currently, a lot of study on analyzed IC in the private sector but less of effort on analyzed IC within public sector. Public sector are not serious on investigate their IC resources and measures the impact of IC to their performance [3]. It is importance for public sector to value, identify and manage their intangible assets. These hidden resources are basic for the success of public entities which can improves decision making and show the quality of public entities management process to the users [4].

According to [3], there are major differences between public and private sector in validating the usefulness of IC resources. They added, the main differences regarding their output, the private sector output is a product while public sector outputs are services. As a result, private sector validates its IC with firm market value. Since public organization does not have market value, this approach cannot be applying to the public organizations. The authors suggest that, to validate the IC resources in public organization is through evaluating its performance and reputation.

Previous Study Intellectual Capital in Public Sector

In [5] used scaling techniques to measure intangible assets in Spanish city councils. Using these techniques, they indentify five strategic groups of councils and three intangible assets namely service, image and transparency. They conclude that to provide councils services by remote link and removing red tape. Public entities require the know-how, culture and willingness to do so. They state that all these intangible assets related to internal organizations.

In [6] examines five key strategic management concepts (industrial organization, resource-based view, knowledge-based view, balance scorecard and intellectual capital) to determine which is most applicable in the non-profit sector. Result suggests that IC concept is more effective for non-profit organization. The research states that intellectual resources help the organizations to focus on their objective and avoid resource diffusion. Therefore, non-profit organizations need to develop IC to gain sustained strategic advantages.

In [7] study the relations between IC and performance in Greek municipalities. The finding indicates that IC improved financial and performance.

Intellectual Capital Efficiency Measurement Methods

IC measurement has been identified as one of the most important issues for today's business success [8]. Although, there a lot of IC measurement method was introduces. So far, there a no universally accepted IC measurement exists. Currently, there are 34 methods of IC measurement which are broadly categorized into five generic approaches [9].

VAIC apply in this study to measure the IC efficiency. Although there are still many arguments whether VAIC is suitable for IC measurement or not, this approach is better compared to other approach at this moment. The main problems with most IC measurement are most of approaches require information that is not available publicly, qualitative and are based on individual judgment which cannot be translated into quantitative values. VAIC produces quantifiable, objective and quantitative measurement that provide indicators that are relevant, useful and informative to all stakeholders, simple and straight forwards computation; standardized measurement and use published financial data [9].

According to [10], VAIC is a better tool of analyzing IC compared to other approaches because the data is available publicly. Besides, the data used in the calculation of VAIC is based on audited financial statement hence increasing the reliability of the data. Moreover, VAIC standardizes and consistent basis of measure, enabling comparison analysis across firms and countries [11]. Most importantly, this methodology is developed not only for enterprise level but also for sector, regional, country and other different level [12].

In [13] proposed VAIC as an indirect measure of efficiency of value added by corporate IC. It is an analytical procedure designed to enable the stakeholders to effectively monitor and evaluate the efficiency of value added by a firm's total resources (tangible and intangible assets) and each major resource component [13]. Value added (VA) is a measurement of the success of company since it shows the capability of the company to create and increase its value. VAIC does not provide the money value of intellectual capital. VAIC is calculated as the sum of three different efficiency factors of IC namely capital employed efficiency (CEE), human capital efficiency (HCE), and structural capital efficiency (SCE). CEE represents the efficiency of VA on physical resources, while the total of HCE and SCE represents the efficiency of VA on intellectual capital. The compositions of these three components of IC vary from sector, industry and firm, depending on the nature of business and strategy.

Previous Study Intellectual Capital Efficiency and Performance

A number of studies have used the VAIC approach in examining the IC performance and their relationships with other financial performance have not been consistent. There is several studies conduct in Malaysia in different industry. In [14] found positive but not significant correlation between human capital and capital employed with the Malaysia communication technology companies' performance. Similarly, in [15, 16, 17] found that IC had a positive impact on firm financial performance. However, in [18] conclude that VAIC can explain profitability and productivity but fails to explain market valuation.

Other studies [19, 20, 21] have found company IC can explain profitability but not productivity and market valuation. However, in [22] reveals that Iranian businesses are not influenced by intellectual capital. In [23] discovered strong evidence that the three components of VAIC have a strong impact on the net profit of a firm, suggesting that a firm with greater IC efficiency would fare better in terms of profitability. In [24, 25], it finds that the human capital efficiency is more important than structural capital efficiency and capital employed efficiency in enhancing the performance. Almost similar results reported by [26], human capital efficiency plays a significant role in IC performance of both life and non life insurance sector in Pakistan.

Research Hypotheses

Although empirical tests of this theory provide mixed results, it is hypothesized that there is a direct positive relationship between IC efficiency and firm performance given. The IC creates value that a firm can use to enhance its performance. Therefore, the higher VAIC are expecting to increase profitability and productivity. Based on the above argument, the following two hypotheses are developed:

H1a: VAIC is positively related to Federal Statutory Bodies' profitability
H1b: VAIC is positively related to Federal Statutory Bodies' productivity

Prior studies have found that different aspects of IC have a greater impact on firm performance than others. Previous studies have shown the associations of these components with financial performance indicators are not uniform. Therefore, it is hypothesized that the positive impact on IC components on performance:

H2a: HCE is positively associated with Federal Statutory Bodies' profitability
H2b: SCE is positively associated with Federal Statutory Bodies' profitability
H2c: CEE is positively associated with Federal Statutory Bodies' profitability
H3a: HCE is positively associated with Federal Statutory Bodies' productivity
H3b: SCE is positively associated with Federal Statutory Bodies' productivity
H3c: CCE is positively associated with Federal Statutory Bodies' productivity

The framework for this study is shown in Figure 1. It measures the IC efficiency and its relationship with performance. The dependent variables are profitability and productivity which are the proxies of a company's financial performance.

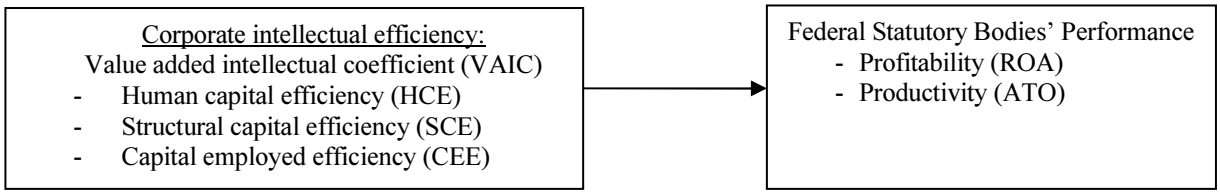

Figure 1: The conceptual framework

METHODOLOGY

Sample and Data Selection

The research focuses on the annual report of 31 Malaysian FSB. The sample period is from 2008 to 2010. FSB is one of the important components of government organization in the administration. It is placed under the ministry depending on its objectives and mission. The main reason for choose this sample because FSB are one of the major recipients of Federal government assistance annually [27].

Measurement of Variables

Prior studies measured performance in a number of ways. FSB performance was measured by traditional accounting indicators on profitability and productivity. Profitability shows the degree to which a firm's revenues exceed over the costs. Productivity describes how inputs are converted into output efficiently.

IC efficiency is measure using VAIC model. The computation of VAIC starts with the VA calculation. Then, proceed with the calculation of VAIC components starting with HCE, followed by SCE and CEE. Lastly, the VAIC calculation by combine these three components. The summary of operational definitions of variables is reported in Table 1.

Table 1: The definition and measurement of variables

Variables	Definitions	Measurements
Dependent variables		
ROA	Return on asset	Profit before tax / Total assets
ATO	Asset turnover	Total income / Total assets
Independent variables		
HCE	Human capital efficiency	VA / HC
SCE	Structural capital efficiency	SC / VA
CEE	Capital employed efficiency	VA / CE
VAIC	Value added intellectual coefficient	HCE+SCE+CEE

Regression Model

In order to measure the relationship between independent and dependent variable, multiple regression tests were conducted. There are four (4) models run to support the objective of this study. Model 1 and 3 were used to examine the relationship between the VAIC components and two dependent variables. Model 2 and 4 were run to analyze the association between VAIC and the dependent variables. These models are illustrated in the regression equations of Table 2.

Table 2: Regression model

Model	Regression equation
1	Productivity (ATO) = $\alpha_0 + \alpha_1$ HCE + α_1 SCE + α_1 CEE + ε
2	Productivity (ATO) = $\alpha_0 + \alpha_1$ VAIC + ε
3	Profitability (ROA) = $\alpha_0 + \alpha_1$ HCE + α_1 SCE + α_1 CEE + ε
4	Profitability (ROA) = $\alpha_0 + \alpha_1$ VAIC + ε

RESULTS AND DISCUSSION

Descriptive Analysis

For better numerical understanding of the data, basic descriptive statistics is applied. Table 3 shows the descriptive statistics for the sample selection. IC efficiency consists of three separate indicators. The first efficiency components, HCE is an indicator of the efficiency of value added by human capital resources employed. Second, SCE shows how much of the company's added value is generated by the structural capital. Lastly, CEE described how much of the company's value added is generated with capital employed. Comparison of HCE, SCE and CEE values suggest that the FSB is generally more effective in generating value from its human resources asset compared to physical and structural assets. By referring to table 3, the reported mean of HCE is 8.0134 while the minimum and the maximum HCE are 1.5329 and 46.9795 respectively. This finding is consistent with most of the previous studies.

VAIC measures the total value creation efficiency in organization, the better a company's resources has been utilized the higher the company value creation efficiency will be. A higher value for VAIC coefficient shows a greater efficiency in the use of firm capital. It indicates a better management of physical (CE) and intellectual (HC and SC) resources. A minimum acceptable VAIC is zero. Since company with a VAIC less than 1 unit (VAIC < 1) implies that it is not creating value, but is destructing value. This is because for one ringgit invested, the company is generating added value that is less than the investment. It is then accepted that a company with a VAIC greater than 1 (VAIC > 1) is performing efficiently. The mean of VAIC is 8.99 which indicate that the FSB create RM8.99 for every RM employed. This finding suggests on average most of FSB able to manage their IC.

Table 3: Descriptive statistics of the variables

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
HCE	93	1.5329	46.9795	8.0134	10.0456
SCE	93	0.3476	0.9787	0.7364	0.1660
CEE	93	0.0091	0.8417	0.2457	0.2042
VAIC	93	2.0476	48.0119	8.9956	10.0826
ATO	93	0.0174	2.7479	0.3749	0.3889
ROA	93	0.0024	0.2551	0.0526	0.0478
Valid N (listwise)	93				

Value-Added Intellectual Coefficient (VAIC)

Figure 2 demonstrates the minimum, average and maximum VAIC values for the three years. VAIC is a tool that is used to measure the efficiency of the allocation of the firms' resources. As reported, the minimum IC for three year is 2.2529 (2008), 2.0668 (2009) and 2.0476 (2010) respectively.

The results indicate that, in year 2008, the maximum IC efficiency is 41.4418 and increases by 6.5701 (↑15.85%) in year 2009. The maximum IC efficiency decreases from 48.0119 to 45.7073 (↓4.80%) in the following year. The result reveals that the deterioration of the RM generated for every RM1 invested by the FSB. Generally, the findings suggest that FSB most efficient in creating its IC efficiency in year 2009.

Previous studies on IC performance for Malaysia perspectives report the following findings. In [17] which study on Malaysia financial institutions from 1999 to 2007, the highest IC efficiency for Malaysia bank is 2.9990 while for non-bank is 5.8848. In [28] that study on commercial banks (2001 to 2003), it reports the highest VAIC for domestic banks is 11.36 and 14.62 for foreign bank. In [16] which study on financial sector for 2007 report that the highest VAIC value for commercial banks is 10.78, insurance company with 9.46 and security brokerage with 7.65. Finally, a research based on banking sector from 2000 to 2010 [29], it reports that the highest IC efficiency for bank is 20.86.

Based on the previous study, the FSB IC efficiency is considering highest compare to other sectors. This result also suggests that, Malaysian FSB is less dependent on physical and financial capital but mainly dependent on employees to provide services.

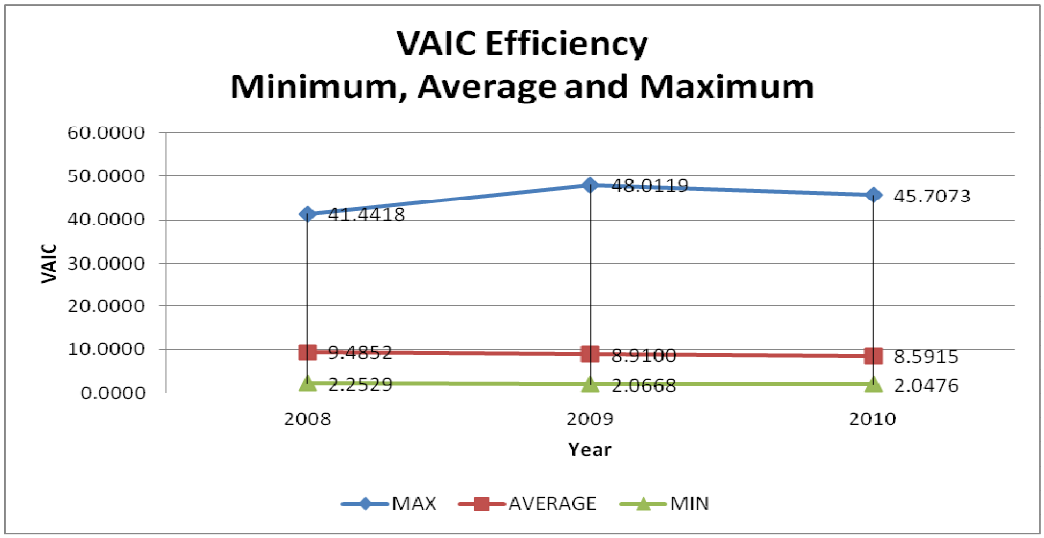

Figure 2: VAIC efficiency (minimum, average and maximum) for year 2008-2010

Multiple Regression

Model 1

Table 4 shows the highest variance inflation factor (VIF) value is 1.671 and the lowest tolerance value is 0.598. As a result, no multicollinearity exists between variables. The adjusted R square value indicates that 74.7% of the variance in the ATO has been significantly explained by the independent. The p-value is statistically at the 1% level implying that the regression model is reliable for prediction. All three components of the VAIC have significant relationship with ATO. HCE and CEE show positive directional sign. In contrast, SCE show negative relationship with productivity. The result shows that an increase in RM1 for human capital and capital employed will increase the productivity by RM0.28 and RM 0.48 respectively.

Table 4: Results of multiple regression model 1

			Collinearity Statistics	
Independent variable	**Coefficient**	**p-value**	**Tolerance**	**VIF**
HCE	0.283	0.011*	0.258	3.879
SCE	-0.285	0.009**	0.265	3.768
CEE	0.476	0.000**	0.715	1.399
R^2	0.766			
Adjusted R^2	0.747			
F-Stat. (P-value)	0.000			

Model 2

Table 5 shows that the VIF value ranged from 1.181 to 1.653, thus no multicollinearity was found among the variables. The adjusted R square value for this relationship is 0.537% which indicates that the model is able to explain nearly 54% of the variance in the dependent variable. The result reveals that VAIC not significant and shows negative relationship with ATO.

Table 5: Results of multiple regression model 2

			Collinearity Statistics	
Independent variable	**Coefficient**	**p-value**	**Tolerance**	**VIF**
VAIC	-0.52	0.540	0.752	1.329
R^2	0.558			
Adjusted R^2	0.537			
F-Stat. (P-value)	0.000			

Model 3

As seen in Table 6, no multicollinearity exists because the result showed that none of the tolerance is less than 0.2 and none of VIF value is above 10. The adjusted R square value indicates that 33.1% of the variance in the ROA has been significantly explained by independent variables. The result shows HCE and CEE have positive and significant relationship to the profitability. The regression also reveals that SCE has a positive effect on ROA but it is not significant. In addition, HCE and CEE shows the β of 0.428 and 0.589 respectively, which indicate that an increase in RM1 of human capital and capital employed can bring 0.428 and 0.589 increase in profitability.

Table 6: Results of multiple regression model 3

			Collinearity Statistics	
Independent variable	**Coefficient**	**p-value**	**Tolerance**	**VIF**
HCE	0.428	0.019*	0.258	3.879
SCE	0.068	0.704	0.262	3.813
CEE	0.589	0.000**	0.722	1.385
R^2	0.381			
Adjusted R^2	0.331			
F-Stat. (P-value)	0.000			

Model 4

Table 7 shows that no multicollinearity exists between variables. Since the lowest tolerance value is 0.591 and the highest VIF is 1.692. Model 4 is able to explain 10.5 % of the variance in FSB profitability which is considered as small effect size. Since the p-value for all models taken together as a whole at less than 0.05, there is sufficient evidence to indicate that the model is statistically useful for prediction and significantly associated with ROA. Results show that VAIC have positive relationship with ROA at 95% significant level. Standard coefficient for VAIC of 0.340 demonstrates that every RM1 increase in IC will increase FSB financial performance by RM0.340.

Table 7: Results of multiple regression model 4

			Collinearity Statistics	
Independent variable	**Coefficient**	**p-value**	**Tolerance**	**VIF**
VAIC	0.340	0.005**	0.749	1.335
R^2	0.148			
Adjusted R^2	0.105			
F-Stat. (P-value)	0.011			

CONCLUSION

The result reveals that IC efficiency is positive predictor of profitability. Thus, it can be concluded that the profitability of the FSB can be significantly improved by means of managing the IC properly. In addition, Empirical analysis also indicates that the productivity is not influenced by IC performance of the selected statutory bodies'.

The study also shows that each component of IC gives significant impact to the performance but with the different influence. CCE and HCE have a positive and significance relation with financial performance ROA and ATO of public sector. SCE appears to be longer to have an effect on FSB performance. This may serve as an indicator to the FSB of the important of IC in developing the economy on balancing the resources for investing in IC. Even though, this study found mixed and contradictory findings compared to previous research. Differences between the various research results can have many causes. The most reasonable explanation is where this sector has the competitive advantage in one country, but there is no competitive advantage for the sector in other country [12].

In summary, the empirical findings from this study show that IC is an asset that can be utilized as a vehicle for statutory bodies' improvement particularly the profit. Therefore, it is necessary to maximize the utilization of IC resources for statutory bodies' in order to maximize the organization profitability.

ACKNOWLEDGEMENT

The authors would like to thank Mr Zairi Ismael Rizman for his guidance and assistance in getting this paper published.

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