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Intellectual Capital (IC) Determinants: Impact on Productivity of Islamic Banks

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ABSTRACT

This research aimed to investigate the relationship between the Intellectual Capital (IC) efficiency empirically. It consisted of human capital, structural capital, capital employed, and relational capital with the impact on the productivity of Islamic banks in Malaysia. The Pulic's Value-Added Intellectual Coefficient (VAIC) method with the extended and modified version introduced by former scholars was used to measure IC, whereas bank productivity was measured through Assets Turnover Ratio (ATO). Three internal factors that might have determinants effect on VAIC, namely bank size, bank risks, and leverage were further tested to find their relationship. Structural stability tests and dynamic regression models for panel data were also used for the data of 16 Islamic banks in Malaysia from 2009 to 2016. The panel-corrected standard errors estimation technique was used to estimate a panel regression model with bank productivity and VAIC as the dependent variables. The regression analysis suggests that Malaysian Islamic banks are depending heavily on the capital employed component of intellectual capital, followed by human capital, structural capital, and relational capital. The results also suggest that bank's risks and leverage play a major role in determining intellectual capital. The findings may serve as a useful input for Islamic bankers to indicate whether the contribution of intellectual capital and its components needs further improvement which it has produced the best results, and internal factor might affect IC.

Keywords: Intellectual Capital (IC), Value-Added Intellectual Coefficient (VAIC), productivity, bank size, bank risks, leverage, Islamic banks

INTRODUCTION

Andriessen (2004) argued that knowledge was the primary resource of intangibles (intellectual capital resources and assets). Intangible is the most important sources of organizations' competitive advantage. However, it is difficult to properly identify which resources are intangibles and assign them with a value of the corporation. Researchers have identified five areas of concern regarding intangibles. Those are accounting and financial reporting; performance measurement and management; valuation in the finance field; the human resources strategy and planning; as well as Intellectual Capital (IC).

IC has a significant impact on organization's performance. It has a unique criterion that can influence the success rate of an organization (Ordóñez de Pablos, 2003; El-Bannany, 2008; Pulic, 1998). Thus, over the last decade, it can be seen that many researchers, especially from management and finance disciplines, have given a higher priority on IC research from various viewpoints and for different research purposes. Previous researches by Guthrie, Ricceri, and Dumay (2012) and Hermans and Kauranen (2005) have deduced that there is very few research has been done in developing countries to measure the impact of IC on value creation and to further identify relationships between IC and firms' value and performance.

Within South East Asia, this has particular importance given the establishment of the ASEAN Economic Community (AEC) and regional economic integration by 2015. AEC aims to establish a single

market and production base which is fully integrated into the global economy. The AEC promotes free movement of goods, services, investment, skilled labor, and the free flow of capital (ASEAN, 2014). Over the past two decades, natural resources-intensive products are the principal trades of ASEAN. The focus has changed to electronics and other sophisticated manufacturing items (United Nations Conference on Trade and Development (UNCTAD), 2013). This fact has emphasized the importance of IC in the ASEAN region. To achieve the expectations of those in the region, all countries in ASEAN should collaborate more efficiently and generate a higher competitive advantage, in particular through the management of IC. However, IC performance of corporations in the ASEAN is in question, and little research has been documented (Phusavat, Comepa, Sitko-Lutek, & Ooi, 2012).

With the inception of the knowledge-based economy master plan in 2002, Malaysia was introduced to a knowledge-based economy. To achieve a sustainable economic growth, Malaysia will no longer depend on investments in capital or physical capital (Institute of Strategic and International Studies Malaysia (ISISM), 2002). The increase of the economy can be achieved by human knowledge productivity and efficient management of both tangible and intangible assets, such as intellectual capital in the highest quality products to the customer for being cost-effective and efficient in banking operations (Malhotra, 2000).

IC is highly significant in Islamic banks due to the fact that the framework of Islamic banking is based on the intangible intellectual ideology of Sharia, the Islamic religious law, which guides Islamic economics. For example, it does not deal with interest-based (*riba*) activities, it is not allowed to undertake speculatively (*gharar*) activities; and it is prohibited from financing specific illicit (haram) activities (Aziz, 2015). Besides that, Islamic banks are based on trust. Hence, safeguarding reputation, credibility, and legitimacy are the alternative performance objectives for Islamic banks rather than attaining real financial outcomes. Therefore, Islamic banks are expected not to cause moral hazard and suffer from agency problem. Furthermore, the risk-sharing principle and actual economic transactions in Islamic banks have also put a great emphasis on human capital development alongside the development of the Islamic financial industry to ensure the availability of talent in Islamic finance (Bank Islam Malaysia Berhad, 2012).

According to Pulic (1998), valuation estimates using traditional accounting only without looking into intellectual capital are deemed to underestimation and inaccurate firm's value to shareholders. He further argued that by including IC measurement in the traditional financial reporting, managers would be well-informed of IC management and help to benchmark against companies. This approach would encourage companies to be a learning organization to achieve its strategic objective.

There are many researches contributed to IC. However, it can be seen that empirical tests on the contribution of IC efficiency to companies' financial performance remain focused on certain geographical areas and industries such as banking and finance (Mention & Bontis, 2013). In particular, there are very few researches related to Islamic banks' IC in Malaysia, despite a few researches have been conducted related to conventional banks' IC (Goh, 2005; Wei & Hooi, 2009), IC disclosures (Abdifatah & Nazli, 2012; Abdifatah & Nazli, 2013; Goh & Lim, 2004; Ousama & Fatima, 2015) and IC in other business sectors (Bontis, Chua, & Richardson, 2000; Chen *et al.,* 2005).

As one of the most knowledge-intensive industries, banking industries represent an ideal setting for research on IC (Firer & Williams, 2003; Mavridis, 2005); in which banks can take advantage by establishing relationships with their customers and making valuable investments in the soft skills and human technologies (Fiordelisi, Monferra, & Sampagnaro, 2014; Sampagnaro, Meles, & Verdoliva, 2015). Kamath (2007) observed that banks depended on their investments in items related to IC such as its human resources, brand building, systems and processes, and efficient utilization of IC capability. It provided customers with high-quality products and services. Therefore, banks need to manage their IC as efficiently as possible.

Intellectual capital efficiency in the Malaysian Islamic banking sector is a suitable segment to be analyzed because it relies more on the latest technology and prioritizes on skills and knowledge of employees rather than just focusing on physical and financial assets. Due to the liberalization and globalization era, the Islamic banking sector in Malaysia has experienced high competitive pressure in offering the innovative and the most top quality products to the customer for cost-effective and efficient in business operations (Ernst & Young (EY) Global Limited, 2016).

The goal of this quantitative research is to discover the influence of intellectual capital on the productivity of Islamic banks in Malaysia. In the meantime, the internal factors that may affect IC will be tested further. The research is conducted by a quantitative research whose data is quantified for analysis. The correlation design method is selected based on the need to look for the relationship between the perceived bank's performance variables, Value Added Intellectual Capital (VAIC) and its components and VAIC determinants. Valid data from Islamic banks in Malaysia are used to measure VAIC and its components, productivity, and internal affecting factor. Moreover, data are derived from yearly financial reports of all Islamic banks in Malaysia (secondary sources).

METHODS

This research uses quantitative research method by applying quantifiable data from official published

record as the research design to obtain objectivity of the research. Objectivity can be achieved using numbers, statistics, structure, and control (Vogt, 2007). A non-experimental research design is selected to describe situations that have occurred, and examine the relationships between the positions without the direct manipulation of conditions experienced (McMillan & Schumacher, 2010).

Moreover, a descriptive research method is used to provide a summary of the data. Using a descriptive study design, an overview of an existing situation can be presented using numbers to describe the current situation as individuals or groups of individuals. Most detailed analysis has been used to describe the situation as it is without modification (McMillan & Schumacher, 2010). A correlation research design is used to analyze the influence of intellectual capital usage on the banks' financial performance. The correlation research can assess relationships between two or more situations. In this research, the conditions/variables are VAIC and its components, the productivity of the banks, and identified internal factors such as size, risks, and leverage. This correlation research design uses a statistical method of correlation to analyze the degree of relationship between the variables.

This research analyzes a unique and distinctive dataset of 16 Islamic banks in Malaysia over the period of 2009 to 2016 (eight years) collected from available data from financial statements in banks covering 128 observations. The data, which contains information related to bank balance sheet, is used to compute the measurement of IC efficiency, and independent and dependent variables.

According to Bank Negara Malaysia (2017a), there are 27 conventional banks, 16 Islamic banks, 2 international Islamic banks, 11 investment banks and two other financial institutions. From these numbers, 19 are foreign-owned conventional banks, and 6 are foreign-owned Islamic banks. There are also Development Finance Institutions (DFIs) governed by the Development Financial Institutions Act 2002, which provides financing especially to certain strategic sectors of the economy.

Even though some of the banks under DFI category are involved in Islamic banking business (Bank Kerjasama Rakyat, Agro Bank, Bank Simpanan Nasional), for this research, definition of Islamic banks by Bank Negara is used as the basis for selection. Thus, all 16 Islamic banks in Malaysia are utilized in this research (L – local-owned; F – foreign-owned). Those banks are Affin Islamic Bank Berhad (L); Al Rajhi Banking & Investment Corporation (Malaysia) Berhad (F); Alliance Islamic Bank Berhad (L); AmBank Islamic Berhad (L); Asian Finance Bank Berhad (F); Bank Islam Malaysia Berhad (L); Bank Muamalat Malaysia Berhad (L); CIMB Islamic Bank Berhad (L); HSBC Amanah Malaysia Berhad (F); Hong Leong Islamic Bank Berhad (L); Kuwait Finance House (Malaysia) Berhad (F); Maybank Islamic Berhad (L); OCBC Al-Amin Bank Berhad (F); Public Islamic Bank Berhad (L); RHB Islamic Bank Berhad (L); and Standard Chartered Saadiq Berhad (F) (Bank Negara Malaysia, 2017b).

The dependent variable, productivity (Assets Turnover Ratio (ATO)), which is recognized by Kehelwalatenna and Premaratne (2014) and Kehelwalatenna (2016) as best models to estimate the impact of IC on firm performance. This has been adopted in this research which. Productivity is measured by using ATO (total revenue/book value of total assets) as it shows how efficiently a company can use its assets to generate sales. Selection of this variable follows the approach to measuring productivity in previous attempt in the IC literature (Firer & Williams, 2003; Mondal & Ghosh, 2012; Kamath, 2007). The ATO is calculated by this equation.

$$ATO = Total\ revenue/Total\ assets \quad (1)$$

In addition, for independent variable, the VAIC methodology is used to analyze the efficiency of companies under banking sector in Malaysia. The VAIC model adopted in this research is elaborated from the original work of Pulic (2004) and modified or extended version by Kehelwalatenna (2016), Nimtrakoon (2015), Ulum *et al*. (2014), and Vishnu and Vijay (2014). There are (1) Capital Employed Efficiency (CEE) is VA/CE, (2) Human Capital Efficiency (HCE) is VA/HC, (3) Relational Capital Efficiency (RCE) is RC/VA, (4) Structural Capital Efficiency (SCE) is [(VA-HC)/VA] – RCE, and (5) Value-Added Intellectual Coefficient (VAIC) is HCE + SCE + RCE + CEE. Furthermore, Value Added (VA) is operating profit + employee costs + depreciation + amortization. Capital Employed (CE) is physical capital (gross fixed assets – accumulated depreciations) + financial capital (total assets – [physical capital + intangible assets]). Human capital (HC) is personnel costs, and Structural capital (SC) is VA – HC. Last, Relational Capital (RC) is sales, marketing and advertising expenses.

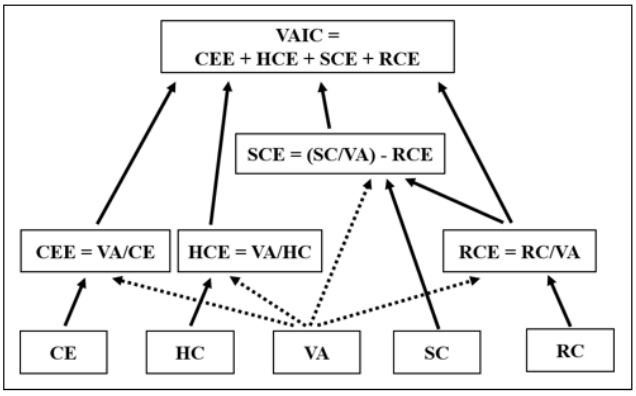

Figure 1 Construction of VAIC

Moreover, Figure 1 represents the schematic diagram of the construction of VAIC. To be consistent with previous research (Alhassan & Asare, 2016; Chen *et al.,* 2014; Guerrini *et al.,* 2014; Yalama, 2013), bank size (measured as the log of total assets value) is included in regression as a control variable to minimize its interaction with dependent variables.

This variable will also be tested to ascertain its effects on VAIC along with other internal determinants such as bank size, bank risks, and leverage.

For bank size, it can be argued that larger firms, which have better facilities such as access to external funds and visibility in the economy, will perform better than their smaller counterparts. These facilities reflect the importance of the business. Hence, it is possible to gain government support (El-Bannany, 2012; Kehelwalatenna, 2016). With the better facilities and government support, more investors and better-qualified staff will be attracted. Hence, it can be reasoned that the IC performance for bigger banks will be greater than small ones. Different measures have been used in the banking literature to measure bank size, but total assets can be seen as most convenient to represent the size of the bank as it reflects all resources including internal, external, and human resource (El-Bannany, 2008).

Next, for bank risk, risk can be defined as the potential loss arising from different circumstances like transaction risk, translation risk, or economic risk (El-Bannany, 2008). A better IC performance can mitigate the adverse effect of higher risk efficiency by managing these risks. Thus, it can be argued that banks in more unwarranted positions will perform better intellectually than those in less fragile areas as they seek to minimize the potential negative effect of these risks. Firms create reserves to use them as a giant shield to protect the company from risks, regardless of its source. Hence, total reserves can be seen as a proper measure to reflect the level of bank risks (El-Bannany, 2012).

Then, a company's leverage relates to how much debt it has on its balance sheet, and it is another measure of financial health. The more debt a company has, the riskier its stock is since debtholders have the first claim to a company's assets. In line with previous VAIC literature, firm leverage is measured using the ratio of total debt to book value of total assets (Dzenopoljac *et al.,* 2016; Guerrini *et al.,* 2014; Maji & Goswami, 2016; Mondal & Ghosh, 2012; Yalama, 2013). Figure 2 represents the overall conceptual framework developed in this research.

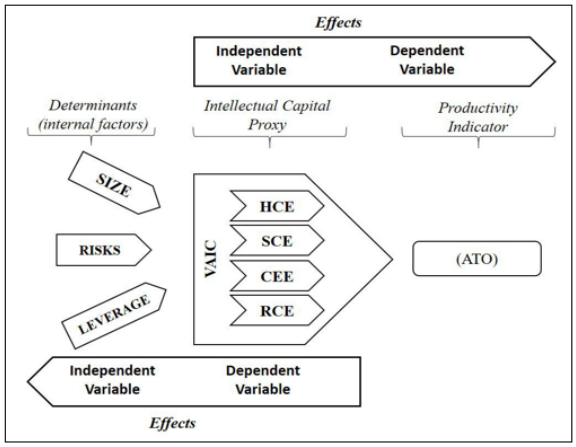

Figure 2 Conceptual Framework

There are two analyses to address the research question. First, an analysis of efficiency uses VAIC model which evaluates IC level of Islamic banking sector in Malaysia. Second, investigating IC potential related to business performance will indicate intellectual assets' relative importance of performing well in the banking industry. The empirical findings will be based on multiple regressions of Islamic banks' financial performance measure on VAIC.

Statistical methods process the measured data collected from the financial reports. Descriptive statistics and correlation analysis are performed on the data. Descriptive statistics describe the main characteristics of the data gathered from the survey (Agresti & Franklin, 2009). The analysis provides summaries of the data and the measurements. It reduces a significant amount of data into simple summaries and presents a description of the research in a soft form (Mann & Lacke, 2010). The result of descriptive statistics becomes the basis of quantitative analysis of the data. The multiple linear regression analysis will be used to find out the strength of the relationship between the variables and discover the factor among the various elements of IC which has a significant impact on the productivity, profitability, and growth of Islamic banks in Malaysia.

Model 1 examines the association between VAIC and productivity. Meanwhile, models 2 replaces the aggregate of IC measure with three components of VAIC. Model 3 tests relationship between internal determinants of VAIC (Table 1). The bank size is included as control variable in model 1 and model 2.

Table 1 Regression Models

Model	Regression Equation
1	$ATO = \beta_0 + \beta_1 VAIC + \beta_2 SIZE + \varepsilon$
2	$ATO = \beta_0 + \beta_1 HCE + \beta_2 SCE + \beta_3 CEE + \beta_4 RCE + \beta_5 SIZE + \varepsilon$
3	$VAIC = \beta_0 + \beta_1 SIZE + \beta_2 RISK + \beta_3 LEV + \varepsilon$

Where:

ATO = Assets turnover ratio (total revenue/total assets)	$\beta_0 - \beta_5$ = Variables to be estimated
VAIC = value of VAIC calculated	SIZE = size of bank (log of total assets)
HCE = Human Capital Efficiency	LEV = Leverage (total debts to total assets ratio)
SCE = Structural Capital Efficiency	RISK = bank's risk (credit to deposit ratio)
CEE = Capital Employed Efficiency	ε = Error term
RCE = Relational Capital Efficiency	

RESULTS AND DISCUSSIONS

In correlation analysis, parametric correlation methods are used to find the relationships between the variables. Using EViews 9.5, the Pearson Product Moment method is used as it is more suitable for linear data that have a normal distribution (Fabian, 2010). The magnitude of the correlation coefficient (Pearson *r*) ranges between -1 and +1 and quantifies the direction and strength of the linear association between the two variables. The correlation between two variables can be positive (an increased value of one variable are associated with the increase levels of the other) or negative (an increased value of one variable are associated with lower levels of the other). The sign of the correlation coefficient indicates the direction of the association (Mann & Lacke, 2010). The following scale is selected to indicate the level of relationship based on the correlation coefficient (Larson & Farber, 2006; Steinberg, 2011). First, 0,00 – 0,25 shows weak or no connection. Second, >0,25 – 0,50 shows the moderate relationship. Third, >0,50 – 0,75 demonstrates a strong relationship. Fourth, >0,75 – 1,00 demonstrates a very strong relationship.

The variables in this correlation analysis are ATO which signifies productivity), bank size (SIZE), bank risks (RISK), leverage (LEV), VAIC as a proxy of IC, and the components of the VAIC. VAIC components consist of Human Capital Efficiency (HCE), Relational Capital Efficiency (RCE), Structural Capital Efficiency (SCE) and Capital Employed Efficiency (CEE). Table 2 presents the result of the correlation analysis using Pearson Product Moment technique. The significance value determines whether a correlation coefficient can be used with confidence (Triola, 2010).

In Table 2, the relationship between productivity variable (ATO) and VAIC is negative and moderate (r = - 0,299). On closer look, ATO has a significant association with all VAIC components except for RCE. A positive and strong relationship is recorded with CEE at 1% significance, whereas a negative and moderate relationship has been registered on SCE. ATO has a positive and weak relationship with HCE. However, there is a very strong connection with a VAIC component; CEE at correlation value of more than 80%. Out of three determinants tested, only SIZE and RISK have a significant relationship with VAIC with a moderate correlation for the former and a very high correlation for the latter.

Table 2 also shows that SCE has a positive and very strong relationship with VAIC at the coefficient value of 0,786. Meanwhile, CEE has a negative and moderate relationship with VAIC (r = -0,348). SCE and CEE are the components that makeup VAIC. Thus, they will have the greatest impact on VAIC value.

Regression analysis is a widely used technique which is useful for evaluating multiple independent variables. As a result, it is particularly useful for assessing and adjusting for confounding. It can also be used to determine the presence of effect modification (James & Mark, 2011). Multiple linear regression techniques are selected to find a model fit between productivity (ATO) with VAIC. This technique is also chosen to find a model fit between productivity (ATO) with the components of VAIC (SCE, HCE, CEE, and RCE). Additional multiple regression is used to a model fit between VAIC and its perceived determinants namely SIZE, RISK, and LEV.

Table 2 Pearson Correlation Coefficient
for All Islamic Banks (N=16)

	ATO	ROA	RG	SCE	HCE	CEE	RCE	VAIC	SIZE	RISK	LEV
ATO	1	0,695 ***	0,208 *	-0,309 **	0,228 *	0,526 ***	0,027	-0,299 **	-0,504 ***	-0,301 **	0,091
SCE	-0,309 **	-0,104	-0,162	1	0,161	-0,257 **	-0,118	0,786 ***	0,286 **	0,713 ***	0,177
HCE	0,228 *	0,041	0,451 *	0,161	1	0,009 **	-0,338 ***	-0,006	0,041	-0,116	-0,071
CEE	0,526 ***	0,801 ***	0,275 **	-0,257 **	0,009 **	1	0,080	-0,348 ***	-0,111	-0,265 *	-0,150
RCE	0,027	-0,027	-0,171	-0,118	-0,338 ***	0,080	1	-0,017	0,265 **	0,147	0,102
VAIC	-0,299 **	-0,115	-0,275 **	0,786 ***	-0,006	-0,348 ***	-0,017	1	0,251 **	0,753 ***	0,174
SIZE	-0,504 ***	-0,196	0,074	0,286 **	0,041	-0,111	0,265 **	0,251 **	1	0,252 **	-0,026
RISK	-0,301 **	-0,153	-0,348 *	0,713 ***	-0,116	-0,265 *	0,147	0,753 ***	0,252 **	1	0,364 ***
LEV	0,091	-0,061	-0,305 **	0,177	-0,071	-0,150	0,102	0,174	-0,026	0,364 ***	1

Note: *** Significant at 1% (p<0,01);
** Significant at 5% (p<0,05);
* Significant at 10% (p<0,1)

These regression analyses are performed on the combined data of all banks with initial 16 valid data and 128 observations. However, due to statistical reliability process on all variables such as normality and stationarity tests, all variables are converted into natural logarithm value with SIZE, HCE and RCE. Those are converted into first difference form. Thus, the final valid data and the number of observations are varied across regression models. The analysis uses software tool of EViews version 9.5 to process the data and produce the report. The variables used in the research are in Table 3.

Table 3 Variables Used in Regression Analysis

Variable Symbol	Description	Statistical Data Transformation		Variable Symbol in Regression Output
		Natural Logarithm	First Difference	
Dependent Variables (Performance)				
ATO	Asset Turnover Ratio	√		LGATO
Dependent / Independent Variables				
VAIC	Value Added Intellectual Capital	√		LGVAIC
Independent Variables (Performance)				
SCE	Structural Capital Efficiency	√		LGSCE
HCE	Human Capital Efficiency	√	√	D1LGHCE
CEE	Capital Employed Efficiency	√		LGCEE
RCE	Relational Capital Efficiency	√	√	D1LGRCE
Independent Variables (Determinants)				
SIZE	Bank Size	√	√	D1LGSIZE
RISKS	Bank Risks	√		LGRISKS
LEV	Leverage	√		LGLEV

Note: SIZE is also used as the control variable

The following regression analysis will adhere the standard hypothesis test and confidence intervals interpretations as explained by James and Mark (2011). The R-squared of the regression measures how well the OLS regression line fits the data. An R-squared near one indicates the regressor (independent variable) is good at predicting the dependent variable. Meanwhile, an R-squared near 0 indicates that the regressor is not very good at predicting the dependent variable. A *p*-value of t-statistics that is less than the perceived confidence level will show that the coefficient of the independent variable is significant and can be accepted. The *F*-test of the overall significance is a particular form of *F*-test. It compares a model with no predictors to the model that has been specified. A regression model that contains no predictors is also known as an intercept-only model. If the *p*-value for the *F*-test of an overall significance test is less than the confidence level, it can be concluded that the regression model provides a better fit than the intercept-only model and can be accepted. For the subsequent regression tests, a confidence level of less than 1% (strong), less than 5% (moderate), and less than 10% (weak) will be accepted as the significance level.

Next, the subsequent regression tests are done to analyze the relationship between productivity with VAIC. A multiple linear regression analysis is performed using ATO as the dependent variable, VAIC as independent variable, and SIZE as a control variable.

With F-test value at 1% confidence level, VAIC and SIZE explained around 14,4% of the value of ATO. The *t*-test value for VAIC is more than 5% significant level, which indicates that VAIC does not have a significant effect on ATO. Based on the result of the analysis, the model for ATO and VAIC interaction is as follows. Then, results of multiple linear regression of ATO and VAIC can be seen in Table 4.

$$ATO = -3{,}0703 - 0{,}0071*VAIC - 0{,}4379*SIZE \quad (2)$$

Table 4 Results of Multiple Linear Regression of ATO and VAIC

Regression Model 1 : $ATO = \beta_0 + \beta_1 VAIC + \beta_2 SIZE + \varepsilon$
Total panel (unbalanced) observations : 110

Variable	Coefficient	*p*-value (*t*-stat.)
C	-3,0703	0,0000
VAIC	-0,0071	0,6201
SIZE	-0,4379	0,0001
R-squared	0,1444	
Adjusted R-squared	0,1284	
F-Statistics	9,0281	
p-value (*F*-stat.)	0,0002	

Next, the subsequent regression tests are done to analyze the relationship between productivity with VAIC components (HCE, SCE, CEE, and RCE). The fourth test is a multiple linear regression on ATO and VAIC components with the following results in Table 5. The regression model 2 indicates only CEE and RCE have a positive and significant effect on ATO with overall regression significance each at 1% and 5% confidence level. The regression equation 2a can be represented as follows.

$$ATO = -2{,}3279 + 0{,}0686*HCE - 0{,}0013*SCE + 0{,}1638*CEE + 0{,}0398*RCE \quad (3)$$

Table 5 Results of Multiple Linear Regression of ATO and VAIC components

Regression Model 2 : $ATO = \beta_0 + \beta_1 HCE + \beta_2 SCE + \beta_3 CEE + \beta_4 RCE + \beta_5 SIZE + \varepsilon$ Total panel (unbalanced) observations : 104		
Variable	Coefficient	*p*-value (*t*-stat.)
C	-2,3279	0,0000
HCE	0,0686	0,1047
SCE	-0,0013	0,9588
CEE	0,1638	0,0000
RCE	0,0397	0,0502
SIZE	-0,4459	0,0000
R-squared	0,4575	
Adjusted R-squared	0,4298	
F-Statistics	16,5272	
p-value (*F*-stat.)	0,0000	

Table 6 Results of Multiple Linear Regression of VAIC and Its Determinants

Regression Model 3 : $VAIC = \beta_0 + \beta_1 SIZE + \beta_2 RISKS + \beta_3 LEV + \varepsilon$ Total panel (unbalanced) observations : 109		
Variable	Coefficient	*p*-value (*t*-stat.)
C	-8,7775	0,0000
SIZE	-0,4679	0,3641
RISKS	0,7467	0,0000
LEV	-1,4435	0,0021
R-squared	0,5617	
Adjusted R-squared	0,5492	
F-Statistics	44,8626	
p-value (*F*-stat.)	0,0000	

Last, a regression test is also done to analyze the relationship between VAIC and its determinants (bank size, bank risks, and leverage). Results of the multiple linear regression tests are presented in Table 6. Both LEV (negative) and RISKS (positive) have a significant relationship with VAIC at 1% confidence level. The overall model is valid with around 56,2% of representation of independent variables on VAIC. Moreover, F-test value is at a strong 1% of confident level. Thus, regression model 3 can be represented by the following equation.

$$VAIC = -8{,}7775 - 0{,}4679*SIZE + 0{,}7467*RISKS - 1{,}4435*LEV \quad (4)$$

CONCLUSIONS

Based on the results, it is concluded that VAIC does not has any significant effect on the performance variable which is productivity (assets turnover ratio, ATO). This finding is contrasting with previous research by Lee and Mohammed (2014) on agriculture sectors, and Mondal and Ghosh (2012) on banking sectors.

The second discovery is on the different significant relationship between each VAIC components namely human capital (HCE), structural capital (SCE), capital employed (CEE) and relational capital (RCE) on the performance indicators. Productivity is only affected by CEE and RCE in a significant positive relationship which does not in line with other research such as Kehelwalatenna (2016) on the banking sector in the US, Lee and Mohammed (2014), and Mondal and Ghosh (2012). However, their research does not include RCE as one of the components of VAIC. This finding is in line with research results by Al-Musali and Ku Ismail (2016) on the banking sector in GCC, and Rahman and Ahmed (2012).

The third discovery is made on the significant positive relationship of bank risks and the significant negative relationship between leverage on VAIC. These findings are supported by Guerrini *et al.* (2014), Kehelwalatenna (2016), Maji and Goswami (2016), and Yalama (2013) and among others.

The result of the correlation analysis indicates the mixed relationships between productivity and VAIC with its components. In general, intellectual capital (IC) correlates moderately negative with productivity. Out of four VAIC components, which are a proxy of IC, only three elements have a relationship with productivity namely SCE (negative), HCE (positive) and CEE (positive). Further analysis of internal factors that may affect IC shows a strong positive relationship with IC whereas leverage has a negative effect on IC.

The empirical findings of this research reveal an exception to the theoretical expectation, as the impact of VAIC on the performance of Islamic banks in Malaysia is inconsistent across selected performance factors. This behavior emerges mainly because of the incapability of HCE, the main component of VAIC regarding value, to create significant impact for the sample firms.

REFERENCES

Abdifatah, A. H., & Nazli A. M. G. (2012). Intellectual capital disclosure trends: Some Malaysian evidence. *Journal of Intellectual Capital, 13*(3), 377-397. http://dx.doi.org/10.1108/14691931211248927.

Agresti, A., & Franklin, C. (2009). *Statistics: The art and science of learning from data*. Upper Saddle River, NJ: Pearson Education.

Alhassan, A. L., & Asare, N. (2016). Intellectual capital and bank productivity in emerging markets: Evidence from Ghana. Management Decision, *54*(3), 589-609.

Al-Musali, M. A., & Ku Ismail, K. N. I. (2016). Cross-country comparison of intellectual capital performance and its impact on financial performance of commercial banks in GCC countries. *International Journal of Islamic and Middle Eastern Finance and Management, 9*(4), 512-531. http://dx.doi.org/10.1108/IMEFM-03-2015-0029.

Andriessen, D. (2004). IC valuation and measurement: Classifying the state of the art. *Journal of Intellectual Capital, 5*(4), 230-42. http://dx.doi.org/10.1108/14691930410533669.

ASEAN. (2014). *ASEAN economic community*. Retrieved from www.asean.org/communities/asean-economic-community/.

Aziz, M. R. A. (2015). *Islamic banking and finance in Malaysia: System, issues and challenges* (2nd ed.). Nilai, Negeri Sembilan: USIM Press.

Bank Islam Malaysia Berhad. (2012). *Islamic banking landscape*. Retrieved from http://www.bankislam.com.my/en/Documents/cinfo/SaudiCredit-SavingsBank.pdf.

Bank Negara Malaysia (2017a). *Lists of licensed financial institutions*. Retrieved from http://www.bnm.gov.my/index.php?ch=fs&pg=fs_mfs_list&ac=118&lang=en

Bank Negara Malaysia (2017b). *Islamic banking & Takaful.* Retrieved from http://www.bnm.gov.my/index.php?ch=fs_mfs&pg=fs_mfs_bank

Bontis, N., Chua, C. K., & Richardson, S. (2000). Intellectual capital and business performance in Malaysian industries. *Journal of Intellectual Capital, 1*(1), 85-100. http://dx.doi.org/10.1108/14691930010324188.

Chen, F. C., Liu, Z. J., & Kweh, Q. L. (2014). Intellectual capital and productivity of Malaysian general insurers. *Economic Modelling, 36*, 413-420. http://dx.doi.org/10.1016/j.econmod.2013.10.008.

Chen, M. C., Cheng, S. J., & Hwang, Y. (2005). An empirical investigation of the relationship between intellectual capital and firms' market value and financial performance. *Journal of Intellectual Capital, 6*(2), 159-176. http://dx.doi.org/10.1108/14691930510592771.

Dzenopoljac V., Janosevic S., & Bontis N. (2016). Intellectual capital and financial performance in the Serbian ICT industry. *Journal of Intellectual Capital, 17*(2), 373-396. http://dx.doi.org/10.1108/JIC-07-2015-0068.

El-Bannany, M. (2008). A study of determinants of intellectual capital performance in banks: The UK case. *Journal of Intellectual Capital, 9*(3), 487-498. http://dx.doi.org/10.1108/14691930810892045.

El-Bannany, M. (2012). Global financial crisis and the intellectual capital performance of UAE banks. *Journal of HRCA : Human Resource Costing & Accounting, 16*(1), 20-36. https://doi.org/10.1108/14013381211272626.

Ernst & Young (EY) Global Limited. (2016). *World Islamic banking competitiveness report 2016*. Retrieved February 7th, 2017 from http://www.ey.com/gl/en/industries/financial-services/fso-insights-world-islamic-banking

Fabian, Z. (2010). Score correlation. *Neural Network World, 20*(6), 793-798.

Fiordelisi, F., Monferrà, S., & Sampagnaro, G. (2014). Relationship lending and credit quality. *Journal of Financial Services Research, 46*(3), 295-315. http://dx.doi.org/10.1007/s10693-013-0176-0.

Firer, S., & Williams, S. M. (2003). Intellectual capital and traditional measures of corporate performance. *Journal of Intellectual Capital, 4*(3), 348-360. http://dx.doi.org/10.1108/14691930310487806.

Goh, C. P. & Lim, P. K. (2004). Disclosing intellectual capital in company annual reports: Evidence from Malaysia. *Journal of Intellectual Capital, 5*(3), 500-510. http://dx.doi.org/10.1108/14691930410550426.

Goh, P. C. (2005). Intellectual capital performance of commercial banks in Malaysia. *Journal of Intellectual Capital, 6*(3), 385-396. http://dx.doi.org/10.1108/ 14691930510611120.

Guerrini, A., Romano, G., & Leardini, C. (2014). Does intellectual capital efficiency affect financial performance the case of Italian listed firms. *International Journal of Learning and Intellectual Capital, 11*(2), 127-148. http://dx.doi.org/ 10.1504/IJLIC.2014.060805.

Guthrie, J., Ricceri, F., & Dumay, J. (2012). Reflections and projections: A decade of intellectual capital accounting research. *The British Accounting Review, 44*(2), 68-82. http://dx.doi.org/10.1016/j.bar.2012.03.004.

Hermans, R. & Kauranen, I. (2005). Value creation potential of intellectual capital in biotechnology – empirical evidence from Finland. *R&D Management, 35*(2), 171-185. http://dx.doi.org/ 10.1111/j.1467-9310.2005.00381.x

Institute of Strategic and International Studies Malaysia (ISISM). (2002). *Knowledge-based economy: Master plan*. Kuala Lumpur: ISISM.

James H. C., & Mark W. W. (2011). *Introduction to econometrics* (3rd ed.). Boston, MA: Addison - Wesley.

Kamath, G. B. (2007). The intellectual capital performance of the Indian banking sector. *Journal of Intellectual Capital, 8*(1), 96-123. http://dx.doi.org/10.1108/14691930710715088.

Kehelwalatenna, S., & Premaratne, G. (2014). Intellectual capital performance and its long-run behavior: The US banking industry case. *New Zealand Economic Papers, 48*(3), 313-333. http://dx.doi.org/10.1080/00779954.2013.867796.

Kehelwalatenna, S. (2016). Intellectual capital performance during financial crises. *Measuring Business Excellence, 20*(3), 55-78. http://dx.doi.org/10.1108/MBE-08-2015-0043.

Larson, R., & Farber, B. (2006). *Elementary statistics: Picturing the world* (3rd ed.). Upper Saddle River, NJ: Pearson Education, Inc.

Lee, S. P., & Mohammed, S. I. (2014). Intellectual capital on listed agricultural firms' performance in Malaysia. *International Journal of Learning and Intellectual Capital, 11*(3), 202-221. http://dx.doi.org/10.1504/IJLIC.2014.063891.

Maji, S. G., & Goswami, M. (2016). Intellectual capital and firm performance in emerging economies: The case of India. *Review of International Business and Strategy, 26*(3), 410-430. http://dx.doi.org/10.1108/RIBS-03-2015-0019.

Malhotra, Y. (2000). *Knowledge management and virtual organizations*. IGI Global.

Mann, P. S., & Lacke, C. J. (2010). *Introductory statistics* (7th ed.). Hoboken, NJ: John Wiley & Sons, Inc.

Mavridis, D. G. (2005). Intellectual capital performance determinants and globalization status of Greek-listed firms. *Journal of Intellectual Capital, 6*(1), 127-140. http://dx.doi.org/10.1108/14691930510574708.

McMillan, J. H., & Schumacher, S. (2010). *Research in education, evidence-based inquiry* (7th ed.). Upper Saddle River, NJ: Pearson Education.

Mention, A. L., & Bontis, N. (2013). Intellectual capital and performance within the banking sector of Luxembourg and Belgium. *Journal of Intellectual Capital, 14*(2), 286-309.

Mondal, A., & Ghosh, S. K. (2012). Intellectual capital and financial performance of Indian banks. *Journal of Intellectual Capital, 13*(4), 515-530. https://doi.org/10.1108/14691931211276115.

Nimtrakoon, S. (2015). The relationship between intellectual capital, firms' market value and financial performance: Empirical evidence from the ASEAN. *Journal of Intellectual Capital, 16*(3), 587-618.

Ordóñez de Pablos, P. (2003). Intellectual capital reporting in Spain: A comparative view. *Journal of Intellectual Capital, 4*(1), 61-81.

Ousama, A. A., & Fatima, A. H. (2015). Intellectual capital and financial performance of Islamic banks. *International Journal of Learning and Intellectual Capital, 12*(1), 1-15. https://doi.org/http://dx.doi.org/10.1504/IJLIC.2015.067822.

Phusavat, K., Comepa, N., Sitko-Lutek, A., & Ooi, K. B. (2012). Intellectual capital: National implications for industrial competitiveness. *Industrial Management & Data Systems, 112*(6), 866-890. http://dx.doi.org/10.1108/02635571211238491.

Pulic, A. (1998). *Measuring the performance of intellectual capital in knowledge economy*. Retrieved from www.vaic-on.net/start.htm.

Pulic, A. (2004). Intellectual capital–does it create or destroy value? *Measuring Business Excellence, 8*(1), 62-68. http://dx.doi.org/ 10.1108/13683040410524757.

Rahman, S., & Ahmed, J. U. (2012). Intellectual capital efficiency: Evidence from Bangladesh. *Advances in Management and Applied Economics, 2*(2), 109.

Sampagnaro, G., Meles, A., & Verdoliva, V. (2015). Monitoring in small business lending: How to observe the unobservable. *Journal of Financial Research, 38*(4), 495-510. http://dx.doi.org/10.1111/jfir.12082.

Steinberg, W. J. (2011). *Statistics alive* (2nd ed.). Thousand Oaks, CA: SAGE Publications Inc.

Triola, M. F. (2010). *Elementary statistics* (11th ed.). Upper Saddle River, NJ: Pearson Education, Inc.

Ulum, I., Ghozali, I., & Purwanto, A. (2014). Intellectual capital performance of Indonesian banking sector: A Modified VAIC (M-VAIC) perspective. *Asian Journal of Finance & Accounting, 6*(2), 103. https://doi.org/10.5296/ajfa.v6i2.5246.

United Nations Conference on Trade and Development (UNCTAD). (2013). *International merchandise trade statistics*. Retrieved from http://comtrade.un.org/pb/.

Vishnu, S., & Gupta, V. K. (2014). Intellectual capital and performance of pharmaceutical firms in India. *Journal of Intellectual Capital, 15*(1), 83-99. https://doi.org/10.1108/JIC-04-2013-0049.

Vogt, W. P. (2007). *Quantitative research methods for professionals*. Upper Saddle River, NJ: Pearson Education.

Wei, I. K. T., & Hooi H. L. (2009). Intellectual capital performance of financial institutions in Malaysia. *Journal of Intellectual Capital, 10*(4), 588-599. http://dx.doi.org/ /10.1108/14691930910996661.

Yalama, A. (2013). The relationship between intellectual capital and banking performance in Turkey: Evidence from panel data. *International Journal of Learning and Intellectual Capital, 10*(1), 71-87. http://dx.doi.org/10.1504/IJLIC.2013.052079.