

Intellectual Capital and Corporate Performance of Technology-Intensive Companies: Malaysia Evidence

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Abstract

This paper examines the association between Intellectual Capital (IC) and corporate performance of technology-intensive companies (MESDAQ) listed on Bursa Malaysia by investigating whether value creation efficiency, as measured by Value Added Intellectual Capital (VAIC™), can be explained by market valuation, profitability, and productivity. Correlation and regression models were used to examine the relationship between corporate value creation efficiency and firms' market valuation, profitability and productivity. The findings from this study show that technology-intensive companies still depend very much on physical capital efficiency. The study also suggests that individually, each component of the VAIC commands different values compared to the aggregate measure, which implies that investors place different value on the three VAIC components. The results also indicate that physical capital efficiency is the most significant variable related to profitability while human capital efficiency is of great importance in enhancing the productivity of the company. This study concludes that VAIC can explain profitability and productivity but fails to explain market valuation.

Keywords: Intellectual Capital; Market Valuation; Productivity; Profitability; Value Added Intellectual Coefficient

JEL classification: G14, M41, O34

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1. Introduction

During the industrial age, organizations counted on physical assets and natural resources as their source of wealth. Land, buildings and properties were of great importance then. However, in the knowledge-based economy, also known as the new economy, the force of globalization has emerged so strongly that knowledge and communication have become the most critical resources for an organization. The revolution or transformation into globalization, computerization and information technology has called for the urgent need to recognize intellectual capital, or intangibles¹ in an organization's financial reports.

Brennan and Connel (2000) reported that intellectual capital assets (IC) account for a substantial proportion of the discrepancy between book and market value. It is estimated that the market-to-book ratio of the Standard & Poor's 500 companies is in excess of 6.0, compared to just over 1.0 in the early 1980s (Lev, 2001). While some of this difference is attributable to the current value of physical and financial assets exceeding their historical cost, a large proportion is due to the rise in the importance of intangible assets. Intangibles have, therefore, become the major value driver for many companies. These assets are generated through innovation, organizational practices, human resources or a combination of these sources and may be embedded in physical assets and employees (Lev, 2001).

It cannot be denied that intellectual capital has become a crucial factor in helping companies gain competitive advantage. Bontis (1998) points out that one distinguishing feature of the new economy that has developed as a result of powerful forces such as global competition, is the ascendancy of intellectual capital. However, despite its importance, the appreciation of intellectual capital is still at the lower end, especially in the eyes of the preparers such as the accountants. As stressed by Eccles et al. (2001), corporate reporting remains firmly rooted in the industrial age. This may be partly due to the rigid requirements of the accounting concepts and principles developed since the rules of double entry were set up.

Many researchers (Edvinsson and Malone, 1997; Stewart, 1997; Pulic, 1998; Pulic, 1999 and Sveiby, 2000) advocate that traditional measures of a company's performance, which are based on conventional accounting principles, may be unsuitable in the knowledge-based economy which is driven by intellectual capital. They further state that the use of traditional measures may lead investors to make inappropriate economic decisions.

In tandem with the development of ICT and the knowledge-based economy, the Malaysian Exchange of Securities Dealing & Automated Quotation (MESDAQ) counters are chosen as the sample population for

¹ Intangibles and Intellectual Capital (IC) are used interchangeably in this study.

intangible-intensive companies. The Government's continuing support to the development of ICT in the country is outlined in the recently announced 9th Malaysia Plan by the Prime Minister of Malaysia, Datuk Abdullah Badawi – the Government will give support to strengthen Malaysia's worldwide position as the preferred destination for information and communications technology (ICT) investment. This study aims to investigate whether value creation efficiency of the technology-intensive companies, as measured by VAIC^{TM2}, can be explained by market valuation, profitability and productivity.

This paper is organized into seven sections. The next section provides an overview of the Stock Exchange in Malaysia followed by Section 3 which explains the terms of IC. Section 4 discusses the literature review, while Section 5 explains the conceptual frameworks, hypotheses development, data collection and regression models of the study and Section 6 discusses the results. The final section discusses the conclusions that can be drawn from this study.

2. An Overview of the Stock Exchange in Malaysia

Following the demutualization of the then Kuala Lumpur Stock Exchange (KLSE), on 5 January 2004, KLSE was converted from a non-profit "mutual" entity limited by the guarantee of its members into a company limited by shares. Subsequently, since 14 April 2004, it is known as Bursa Malaysia Berhad. KLSE was demutualized in response to a more competitive environment as well as to meet clients' expectations. With the demutualization exercise, Bursa Malaysia hoped that it would enhance the adaptability of the capital market in offering products and services for local and international investors and markets. Companies can be listed either in the Main Board, Second Board or MESDAQ counters. As at the end of 2005, there were in total 1,021 counters with 107 listed under MESDAQ markets. MESDAQ was introduced in 2002, with the objective of enabling high-growth companies to raise capital and promote technology intensive industries and hence assist in developing a science and technology base for Malaysia through indigenous research and development.

3. Explanation of the Term IC

There has been some confusion regarding the terms intangibles and intellectual capital (IC). According to Mouritsen et al. (2001), "intellectual

² VAICTM is also known as Value Creation Efficiency Analysis. It is considered a universal indicator showing the abilities of a company in value creation and representing a measure for business efficiency in a knowledge based economy (Pulic, 1998).

capital is attributed to intangible assets which create value.” Financial Reporting Standards (FRS) 3 on business combination and FRS 138 on Intangibles Assets deal with intangibles. Intangibles are defined as identifiable non-monetary assets without physical substance and shall be treated as meeting the identifiability criterion in the definition of an intangible asset when it is (a) separate or (b) arises from contractual legal rights (FRS 3, para. 46). FRS 138 allows for recognition of purchased or internally-generated intangibles provided they are purchased. The problems that surface here are in fulfilling the issue of estimating future economic benefit and in measuring the cost reliably. This rigid requirement of FRS 138 make it virtually impossible or at least very unlikely that IC may surface in the current reporting system as it fails to fulfil the conditions required of an asset. Nevertheless, the importance of IC information should not be neglected and an alternative way of reporting should be looked into.

Literature reviews also show that there is no consistent definition of intangibles or intellectual capital. According to IASB (2004), IC are “non-financial fixed assets that do not have financial substance but are identifiable and controlled by the entity through custody and legal rights.” Specifically, in this definition, IC refers to patents, trademarks and goodwill. One of the earlier promoters of IC, Stewart (1997, pp. xi) defines IC as “the intellectual material – knowledge, information, intellectual property, experience – that can be put to use to create wealth. It is collective brainpower. It’s hard to identify and harder still to deploy effectively. But once you find it and exploit it, you win”.

Previous literature has divided IC into three components; human capital, relational capital and organizational capital. Guidelines produced by researchers from universities across Europe, collectively known as the MERITUM Project give the following definition for the components of IC:

Human capital is defined as the knowledge that employees take with them when they leave the firm. It includes the knowledge, skills, experiences and abilities of people. Some of this knowledge is unique to the individual, some may be generic. Examples are innovation capacity, creativity, know-how and previous experience, teamwork capacity, employee flexibility, tolerance for ambiguity, motivation, satisfaction, learning capacity, loyalty, formal training and education. Structural capital is defined as the knowledge that stays within the firm at the end of the working day. It comprises the organizational routines, procedures, systems, cultures, databases, etc. Examples are organizational flexibility, a documentation service, the existence of a knowledge centre, the general use of Information Technologies, organizational learning capacity, etc. Some of them may be legally protected and become Intellectual Property Rights, legally owned by the firm under separate title. Relational capital is defined as all resources linked to the external relationships of the firm, with customers, suppliers or R&D partners. It comprises that part of Human

and Structural Capital involved with the company's relations with stakeholders (investors, creditors, customers, suppliers, etc.), plus the perceptions that they hold about the company. Examples of this category are image, customers loyalty, customer satisfaction, links with suppliers, commercial power, negotiating capacity with financial entities, environmental activities, etc. (MERITUM, 2002, p13)

From the definitions, it can be summarized that there are two aspects of IC; one as indicated in the standards, which refers to patent, intellectual property, brand and trademarks. The second aspect is the soft asset such as knowledge, information, and experience, which forms much of the IC today and which needs to be further understood and researched. The following section discusses the literature review on studies related to IC.

4. Literature Review

In Malaysia, an early empirical study on intellectual capital performance was carried out by Bontis, William and Richardson (2000), which focused on the inter-relationship of intellectual capital within the service and non-service industries in Malaysia. This study used the psychometrically validated questionnaire which was administered in Canada by Bontis (1998). Data collected was tested for reliability using the Cronbach alpha test. The partial least squares method was used to test the intellectual capital model. They found that structural capital has a great influence on business performance and human capital is of significance, especially in non-service based industries.

A later study by Goh (2005), aimed at measuring intellectual capital performance of commercial banks in Malaysia over the period 2001 to 2003, found that all banks, generally, have relatively higher human capital efficiency than structural and capital efficiencies. She further suggested that there are significant differences in terms of the rankings based on efficiency using VAIC and traditional accounting measures.

It is widely advocated by many researchers that IC comprises non-financial measures and other related information which is the value driver of an enterprise (Amir and Lev, 1996; Edvinsson and Malone, 1997; Stewart, 1997; Bontis, 1999, 2001). They also claimed that IC assists enterprises in sustaining its competitive advantage. Pulic (2000a, 2000b) proposed a measure of the efficiency of value added by corporate intellectual ability i.e. Value Added Intellectual Coefficient (VAICTM). This model has been adopted by Firer and Williams (2003), Goh (2005) and Chen et al. (2005).

Firer and Williams (2003) investigated the association between efficiency of value added by major components of a firm's resource base; physical capital, human capital and structural capital; and three traditional dimensions of corporate performance; profitability, productivity, and market

valuation. The data in their study was drawn from 75 publicly traded companies. There were contrasting findings between Firer and Williams (2003) and Chen et al. (2005) on the role of IC. Firer and Williams did not find any association between IC and profitability; however, Chen et al. found that IC enhances firms' value and profitability.

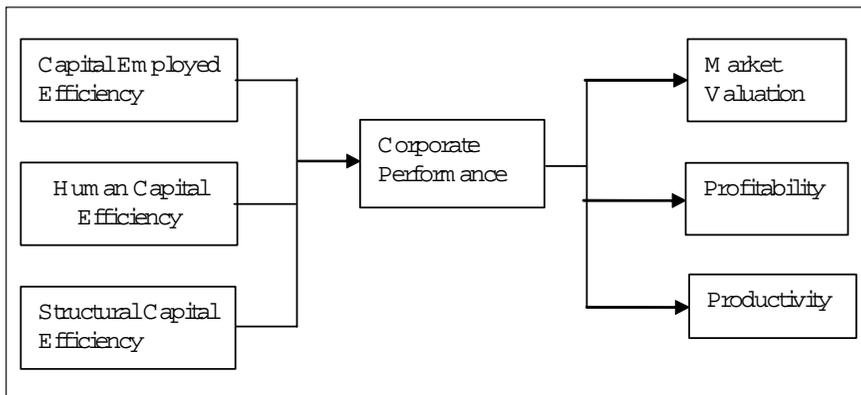
An interesting finding by Huang and Liu (2005) revealed that innovation capital has a non-linear relationship (inverted U-shape) with performance. It means that the investments of innovation capital have a positive effect on performance, but when the investments exceed the optimal level, these investments will bring a negative influence on performance. They concluded the need to coordinate between capital investments in IT and other components of intellectual capital in order to gain competitive advantage.

The most recent findings were obtained from Shiu's (2006) study using the VAIC™ model to examine the correlation between corporate performances based on 80 Taiwan listed technological firms. Shiu found that VAIC had a significant positive correlation with profitability (measured by return on assets, ROA) and market valuation (measured by market to book value ratio, M/B). However, a negative correlation with productivity (measured by asset turnover, ATO) was reported. The relevant literature reviews above, which show contrasting findings further motivates this study by exploring IC in technology intensive companies in Malaysia.

5. Conceptual Framework and Development of Hypotheses

According to resource-based theory, a company is perceived to achieve a sustainable comparable advantage by controlling both its tangible and intangible assets (Belkaoui, 2003). Firer and Stainbank (2003) advocate

Figure 1. Theoretical Framework



that value added is a “more appropriate means for conceptualizing a company’s performance”

The framework for this study as in Figure 1, shows that VAIC influences corporate performance and the market value of companies. This study is the adaptation of the study by Chen et al. (2005) of which the theoretical framework (modified) is depicted in Figure 1.

The information asymmetry on financial statements and the increasing gap between organizations’ market and book value have drawn much attention to the credibility of the current reporting system. This widening gap between the market value and the book value of organizations has raised questions on the adequacy of the current reporting system. The difference between the market value and the book value of a company is said to represent its intellectual capital (Edvinsson and Malone, 1997). Instead of directly measuring intellectual capital, Pulic (2000a, b) advocates that a firms’ market value is created by capital employed and intellectual capital. Under Pulic’s VAIC model, the efficiency of firms’ inputs; physical and financial, human capital and structural capital are measured. The value of VAIC comprises the Capital Employed Efficiency (CEE), the Human Capital Efficiency (HCE), and the Structural Capital Efficiency (SCE).

It is believed that investors will place a higher value for firms with greater intellectual capital (Belkaoui, 2003; Firer and Williams, 2003). As such, it is expected that intellectual capital plays an important role in enhancing financial performance and corporate value. Using VAIC as a proxy measure for corporate value, it is hypothesized that:

H₁. There is a significant relationship between IC and market-to-book value ratios, *ceteris paribus*.

Chen et al. (2005) advocate that although VAIC is an aggregate measure for corporate intellectual ability, if investors place different values for the three components of VAIC, the model using the three components of VAIC will have greater explanatory power than the model using the aggregate one. As such, the following hypotheses are proposed:

H_{1a}. There is a significant relationship between physical capital efficiency and market-to-book value ratios, *ceteris paribus*.

H_{1b}. There is a significant relationship between human capital efficiency and higher market-to-book value ratios, *ceteris paribus*.

H_{1c}. There is a significant relationship between structural capital efficiency and market-to-book value ratios, *ceteris paribus*.

Companies which show good financial performance are believed to have greater IC, as such it is hypothesized that;

H₂. There is a significant relationship between IC and profitability, *ceteris paribus*.

If investors place different values for the three components of VAIC, the following hypotheses are proposed:

H_{2a}. There is a significant relationship between physical capital efficiency and profitability, *ceteris paribus*.

H_{2b}. There is a significant relationship between human capital efficiency and profitability *ceteris paribus*.

H_{2c}. There is a significant relationship between structural capital efficiency and profitability, *ceteris paribus*.

It is also envisaged that a company that is more efficient in productivity, will also have higher IC. The aggregate and the individual component of the hypotheses are as shown below:

H₃ There is a significant relationship between IC and productivity, *ceteris paribus*.

H_{3a}. There is a significant relationship between physical capital efficiency and productivity, *ceteris paribus*.

H_{3b}. There is a significant relationship between human capital efficiency and productivity, *ceteris paribus*.

H_{3c}. There is a significant relationship between structural capital efficiency and productivity, *ceteris paribus*.

5.1. Regression Models

The models in this study are an adaptation from the studies carried out by Firer and Williams (2003), Chen et al. (2005) and Shiu (2006). The formulas used were duplicated from these studies. It should be noted that the analysis does not control for size or other effects.

Model 1 examines the relationship between market-to-book value (M/B) ratios and the aggregate measure of intellectual capital, VAIC. Models 2 and 3 examine whether the aggregate measure of VAIC is associated with firms' profitability and productivity. The dependent variables are market-to-book value, profitability as measured by returns on assets (ROA); and productivity as measured by returns on assets turnover (ATO).

$$M/B_{it} = \alpha_0 + \alpha_1 VAIC_{it} + \varepsilon_{it} \quad (1)$$

$$ROA_{it} = \alpha_0 + \alpha_1 VAIC_{it} + \varepsilon_{it} \quad (2)$$

$$ATO_{it} = \alpha_0 + \alpha_1 VAIC_{it} + \varepsilon_{it} \quad (3)$$

Model 4, 5 and 6 on the other hand, examine the relationship between market-to-book value (M/B) ratios, ROA and ATO and the individual components of VAIC.

$$M/B_{it} = \alpha_0 + \alpha_1 CEE_{it} + \alpha_1 HCE_{it} + \alpha_1 SCE_{it} + \varepsilon_{it} \quad (4)$$

$$ROA_{it} = \alpha_0 + \alpha_1 CEE_{it} + \alpha_1 HCE_{it} + \alpha_1 SCE_{it} + \varepsilon_{it} \quad (5)$$

$$ATO_{it} = \alpha_0 + \alpha_1 CEE_{it} + \alpha_1 HCE_{it} + \alpha_1 SCE_{it} + \varepsilon_{it} \quad (6)$$

5.2. Measurement of Variables

5.2.1. Dependent variables

The traditional measures of financial performance in this study are based on accounting measures, despite the susceptibility of its use. In this study, return on assets (ROA) is used as the measure of profitability, where:

- Returns on Assets (ROA): Ratio of net income divided by book value of total assets
- Asset turnover (ATO): Ratio of total revenue to book value of assets
- Market-to-book value ratios of equity (M/B): M/B is the total market capitalization to book value of net assets
- Market value of common stock = Number of shares outstanding x Stock price at the end of the year
- Book value of common stocks = book value of stockholders' equity

5.2.2. Independent variables

The Value Added Intellectual Coefficient (VAIC) forms the measurement for the independent variables in this study. VAIC measures how much new value has been created per invested monetary unit in resources. It is an analytical procedure designed to enable the various stakeholders to effectively monitor and evaluate the efficiency of Value Added by a firm's total resources and each major resource component. A high coefficient indicates a higher value creation using the company's resources, including IC.

VAICTM is a composite sum of three indicators of physical capital employed efficiency (CEE), human capital efficiency (HCE) and structural capital efficiency (SCE).

The procedures for computing VAIC are as follow:

Step 1

Calculate Value Added, which is derived from the difference between output and input.

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

Consistent with Belkaoui (2003), value added is expressed as:

$$VA = S - B - DP = W + I + T + D + NI$$

Where S is the net sales revenues; B is cost of goods sold; DP is depreciation; W is staff costs; I is interest expense, D is dividends; and T is taxes and NI is the net income.

Step 2

Calculate physical capital employed (CE), human capital (HC) and structural capital (SC). Pulic (1998) states that CEE is:

$CE_i = \text{book value of the net assets for firm } i;$

Edvinsson and Malone (1997) and Pulic (1998) stressed that total salary and wage costs are an indicator of a firm's HC, as such,

$HC_i = \text{total investment in salary and wages for firm } i;$

To derive the value of SCE, the value of a firm's structural capital needs to be established first. Under Pulic's model, SC is VA minus HC. The lesser the contribution of HC in value creation, the greater is the contribution of SC. Pulic proposes calculating SC as:

$SC_i = VA_i - HC_i;$ structural capital for firm i .

Step 3

The final step is to compute physical capital employed efficiency (CEE), human capital efficiency (HCE) and structural capital efficiency (SCE). These values are derived using the formulae given below:

$CEE_i = VA_i / CE_i;$ VA capital employed coefficient for firm i

$HCE_i = VA_i / HC_i;$ VA human capital coefficient for firm i

$SCE_i = SC_i / VA_i;$ VA structural capital coefficient for firm i

In this study, physical capital employed efficiency (CEE), shows how much new value has been created by one unit of investment in the capital employed. Human capital efficiency (HCE) on the other hand, indicates how much value added has been created by one financial unit invested in the employees. Finally, structural capital efficiency (SCE) is the indicator of the VA efficiency of structural capital.

6. Empirical Results

The research sample is drawn from companies listed in Bursa Malaysia under the MESDAQ counters for the years 2004 and 2005. These two years were chosen as MESDAQ counters were only recently introduced in 2002, as such there were too few companies listed in the earlier years (25 companies

in 2003, 12 companies in 2002). Only one particular market, (MESDAQ Market) is investigated to examine a homogenous sample. A final sample totalling 89 companies was maintained after eliminating for companies with insufficient data for analysis. The data was extracted from DataStream as well as annual reports on the respective websites in Bursa Malaysia. In order to check for consistency and enhance reliability, data is double-checked with the information in the annual reports of selected companies in MESDAQ.

6.1. Descriptive Statistics

Table 1 presents the descriptive statistics for the dependent and independent variables. The mean for M/B is 2.29, which implies that investors generally value the sample firms in excess of the book value of net assets as reported in the annual reports. Profitability (ROA) and productivity (ATO) have a mean of 10.3 and 9.2 per cent, respectively. A VAIC of 2.043 was obtained, indicating that the firm created RM2.043 out of every RM1 invested in the firm. However, if the components are examined individually, it is evident that human capital (mean = 2.46) is more efficient in comparison to physical capital (mean = 0.242). This is consistent with the findings of Firer and Williams (2003) and Ho and Williams (2002) studies.

6.2. Correlation Analysis

The output given in Table 2 below depicts that there is a significant positive relationship between VAIC and ROA, ATO, HCE and SCE at the 0.01 significance level. This means that VAIC is positively associated with profitability, productivity, human capital efficiency and structural employed efficiency. As such when the VAIC increases, it is expected that profitability and productivity, as well as human capital efficiency and structural capital efficiency, will also increase. However, although not significant, there is a negative correlation between M/B and productivity and human capital efficiency. This indicates that when M/B increases, productivity and human capital efficiency moves in the opposite direction.

The diagnostic statistic also confers that there is no multi-collinearity among the explanatory variables (CEE, HCE and SCE). This is evidenced by the results below which show low pair-wise correlation between the explanatory variables (HCE/CEE; 0.183, SCE/CEE; 0.135 and SCE/HCE; 0.182). As such the data is free from multi-collinearity problems and the measures are sufficiently independent of each other.

6.3. Linear Multiple Regression Results

Model 1 examines the relationship between market-to-book value (M/B) ratios and the aggregate measure of intellectual capital VAIC. H_1 , which

Table 1. Descriptive statistics of selected variables

Variable Description	Variable name	Mean	Median	Standard Deviation
Dependent variables Market Valuation: Ratio of the firm's market capitalization to book value of net assets	MB	2.29	1.75	1.56
Profitability: Ratio of net income to total assets	ROA	0.103	0.109	0.133
Productivity: Ratio of total turnover to total assets	ATO	0.092	0.127	0.414
Independent Variables: Value Added Capital Coefficient: Ratio of Total VA divided by the Total Amount of Capital Employed	CEE	0.242	0.224	0.227
Value Added Human Capital Coefficient: VA divided by the total salary and wages spent by the firm on its employees	HCE	2.46	2.11	2.03
Value Added Structural Capital Coefficient: Ratio of firm's structural capital divided by the total VA	SCE	-0.658	0.553	8.414
Total Value Added Intellectual Capital: Sum of CEE, HCE and SCE	VAIC	2.043	3.011	9.048

states that there is a significant relationship between IC and market-to book value, was not supported as reflected by the low F value and insignificant P value. H_1 is thus rejected and considered a rather poor model in predicting VAIC.

Models 2 and 3 examine whether the aggregate measure of VAIC is associated with firms' profitability and productivity. Results show that Model 2 is able to predict only 9.7 percent of profitability in a firm. It is even lower in the case of productivity, at only 7.5 percent. F-value also indicates poor explanation of these models. H_2 and H_3 state that there is a significant relationship between IC and profitability and productivity, respectively.

Table 2. Pearson Moment Correlations

	ROA	ATO	MB	CEE	HCE	SCE	VAIC
ROA	1						
ATO	0.871*	1					
MB	0.086	-0.119	1				
CEE	0.672*	0.574*	0.149	1			
HCE	0.490*	0.645*	-0.022	0.183	1		
SCE	0.219*	0.179	0.091	0.135	0.182	1	
VAIC	0.330*	0.326*	0.082	0.191	0.398*	0.974*	1

Note: *Correlation is significant at 0.01 levels (2 tailed test)

Despite the low, predictive power, F-statistic and significant value suggests that companies with greater intellectual capital tend to have a better profitability and show a more efficient productivity; as such H_2 and H_3 are supported.

Table 3. Linear Multiple Regression Results of Independent Variable of VAIC

	Model 1: Market Valuation		Model 2: Profitability		Model 3: Productivity	
N	89		89		89	
Adjusted R ²	0.000		0.097		0.075	
F-statistic	1.003		4.192		3.386	
Significance	0.396		0.008		0.022	
	t-stat	P value	t-stat	P value	t-stat	P value
Intercept	8.478	0.000	3.828	0.000	0.864	0.390
VAIC	0.713	0.478	0.318	0.002	3.144	0.02

However, when the individual components of VAIC are analyzed, different findings are obtained, as given in Table 4. The results show that the coefficient on VAIC is significantly positive on Model 5 and 6 on profitability and productivity. Under these Models (5 and 6), CEE and HCE of VAIC are significantly positive. These support H_{2a} , H_{2b} , H_{3a} and H_{3b} . However, under Model 4, the coefficient on VAIC is not significant on M/B; as such H_{1a} , H_{1b} and H_{1c} are rejected.

The adjusted R squared shows improvement in comparison to earlier models, 57.4 percent and 61.2 percent on Models 5 and 6, respectively. This is also indicated by significant F-values of 24.675 and 28.803 as shown below. This indicates that investors may place different value on the individual components of VA efficiency.

Under Model 5, of the three VAIC components, only CEE and HCE are significant variables related to firms' profitability. Efficiency in utilizing physical capital and human capital are also important factors for achieving

Table 4. Linear Multiple Regression Results of independent variable component of VAIC

	Model 4: Market Valuation (M/B)		Model 5: Profitability (ROA)		Model 6: Productivity (ATO)	
N	89		89		89	
Adjusted R ²	0.017		0.574		0.612	
F-statistic	0.707		24.675		28.803	
Significance	0.620		0.000		0.000	
	t-stat	P value	t-stat	P value	t-stat	P value
Intercept	5.946	0.000	-2.378	0.02	-6.720	0.000
CEE	0.509	0.000	8.078	0.000	6.897	0.000
HCE	0.731	0.000	5.109	0.000	8.087	0.000
SCE	0.467	0.341	0.958	0.341	0.260	0.795

good financial performance. However, under Model 6, HCE is a more significant factor in relation to productivity. This is consistent with the findings by Firer and Williams (2003), where efficiency of VA by a firm's human resources is significantly associated.

7. Conclusion

This study shows how efficient the MESDAQ companies utilize their intellectual capital. Findings show that there is no association between market valuation and VA efficiency by a firm's major resource components. Only profitability and productivity are acceptable models for measuring the efficiency of a firm. In this study, technology-intensive firms still depend very much on physical capital efficiency. Furthermore, consistent with Chen et al. (2005), the findings of this study suggest that individual components command different values as opposed to the aggregate measure of VAIC. The results also imply that physical capital efficiency is the most significant variable related to profitability while human capital efficiency is of great importance in enhancing the productivity of the company. This may serve

as an indicator to firms of the importance of IC in developing the economy, particularly Malaysia, on balancing the resources for investing in IC and physical investments.

Findings in this study also suggest that M/B is a very poor predictor of the efficiency of a firm. This is consistent with the study carried out by Firer and Williams (2003) that indicates that the South African market continues to place greater faith and value in physical capital assets over intellectual capital assets. Furthermore, Bursa Malaysia, being a maturing market, may result in the market valuation being less fundamentally driven compared to a mature market. As suggested by Firer and Stainbank (2003), the current reporting system, which fails to capture the information on IC, maybe another reason as to why M/B fails to explain the efficiency of IC.

The present study focuses on companies listed in MESDAQ, thus it may not be reflective of all companies listed on Bursa Malaysia. As such, future research may extend the study to the whole population. Apart from the limitation in terms of the chosen sample, this present study is limited because it does not incorporate control variables such as size. Future study could look into the effect of size and leverage on the regression models. Other dependent variables may be introduced in future studies, especially in measuring the market valuation. On another note, the validity of using this method should be interpreted with caution as Andriessen³ (2004) is of the opinion that assumptions used in the mathematical equation could render flaws in the methodology.

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