THE IMPACT OF INTELLECTUAL CAPITAL ON FINANCIAL PERFORMANCE AND FIRM VALUE IN ISLAMIC COUNTRIES[*]

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ABSTRACT

This study analyzes the effect of intellectual capital (IC) efficiency on firm value and financial performance indicators for companies in Islamic countries. Sample consists of 1,681 firms from eleven Islamic countries, covering eight years between 2010 and 2017. We use value-added intellectual capital (VAIC) methodology and run OLS regressions with panel data. Findings reveal that IC positively affects firm profitability and liquidity, and negatively affects leverage. Furthermore, both IC and the components of IC positively affect firm value. Lastly, Shariah-compliance has a positive impact on firm value, profitability and liquidity and a negative impact on leverage. This is the first study to analyze the effect of IC efficiency on firm value and on financial performance aspects for a very broad sample covering 11 Islamic countries at the same time. Last, this is the first study to investigate the effect of Shariah-compliance on value and financial performance attributes of firms in Islamic countries.

Keywords: Intellectual Capital; Firm Value; Tobin's Q; Profitability; EBITDA; Liquidity; Leverage

JEL Classification: G30, G32

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İSLAM ÜLKELERİNDE ENTELEKTÜEL SERMAYENİN FİNANSAL PERFORMANS VE FİRMA DEĞERİNE ETKİSİ

ÖZ

Bu çalışma, İslam ülkelerindeki şirketler için entelektüel sermaye verimliliğinin firma değeri ve finansal performans göstergeleri üzerindeki etkisini analiz etmektedir. Örneklem, 11 İslam ülkesinde yer alan 1,681 firmadan oluşmakta ve 2010-2017 yılları arasındaki sekiz yılı kapsamaktadır. Bu çalışma kapsamında katma değerli entelektüel sermaye metodolojisi uygulanmış ve sıradan en küçük kareler regresyonları panel veriler ile analiz edilmiştir. Bulgular, entelektüel sermayenin firma karlılığını ve likiditesini olumlu yönde etkilediğini, kaldıraç oranını ise olumsuz etkilediğini ortaya koymaktadır. Ayrıca, hem entelektüel sermaye hem de entelektüel sermayenin bileşenleri firma değerini olumlu yönde etkilemektedir. Son olarak, yapılan çalışma, şeriata uyumun, firma değeri, karlılık ve likidite üzerinde olumlu, kaldıraç üzerinde ise olumsuz bir etkiye sahip olduğunu ortaya koymaktadır. Bu çalışma, aynı anda 11 İslam ülkesini kapsayan çok geniş bir örneklem için entelektüel sermaye verimliliğinin firma değeri ve finansal performans göstergeleri üzerindeki etkisini analiz eden ve şeriata uyumun İslam ülkelerindeki firmaların değer ve mali performans özellikleri üzerindeki etkisini araştıran ilk çalışmadır.

Anahtar Kelimeler: Entelektüel sermaye; firma değeri; Tobin's Q; Karlılık; EBITDA; Likidite; Kaldıraç
JEL Sınıflandırması: G30, G32

1. INTRODUCTION

In the contemporary world, knowledge has become the primary driver in helping the business world reach its financial goals. A company's intellectual capital (IC) is, in general, in its knowledge-based resources, activities, and transactions (Itami and Roehl 1991; Teece 2002; Curado et al. 2011; Subramaniam and Youndt 2005). A company's resources are what will give it a competitive advantage in the marketplace and define that company's value. It is assumed that the better the acquisition and management of these resources, the better the financial outcome and competitive advantage of the company.

Knowledge is observed as a company's main resource by Spender and Grant (1996) and Drucker (1988), who have posited that knowledge has replaced land, labor, and other tangible assets as being the critical input for efficient production. The productivity level and competitive advantage of companies tend to depend on intangible assets rather than physical and financial assets (Oppong and Pattanayak 2019), and among these intangible assets, intellectual assets such as competencies, processes, and people appeared as hidden sources of corporate value (Guthrie 2001). Intellectual assets are considered as "hidden," since it is hard (almost impossible) to post and quantify them in financial statements, which creates a large gap between the book and actual market value of corporations.

The core competencies, corporate culture, reputation, organizational experiences, skills embedded in the management team, and the capability to exploit all these constitute the principle of IC (Bontis 1999). Despite the general acceptance of the importance of IC, methods of defining, determining, and measuring IC and its effects are still being argued about and remain highly challenging. The literature suggests several different definitions of IC, since the topic of IC has been focused on by many disciplines, such as finance, information systems, finance, human resources, management, and many others (Bontis 1999).

A number of studies conducted in the intellectual capital literature evaluate the association between Intellectual Capital and corporate financial performance, reporting a positive association between IC and corporate performance and firm value (Tan et al. 2007; Chen et al. 2005; and Nimtrakoon 2015; Riahi-Belkaoui 2003). However, concentrating at only one country or a few countries at a time, previous literature lacks a comprehensive overview of the topic for the emerging markets, specifically for firms in Islamic countries. This empirical study has the purpose of enlarging the prior research by considering the publicly quoted manufacturing and service companies from eleven Islamic countries. According to a study conducted by Pew Research Center, Islam has 1.6 billion adherents, making up over 23 percent of the world's population. The Organization of Islamic Cooperation reports that as of 2017 the total gross domestic product (GDP) of Islamic countries makes up approximately 9 percent of the total world's GDP, and the Islamic countries' GDP average growth rate for the last five years is measured at 5.9 percent. Although Islamic countries notably contribute to the world economy, very few field studies are aimed at studying how firms in Islamic countries approach intellectual capital, which is an important gap in the literature that this study aims to fill (Pew Research Center 2016).

To the best of our knowledge, this is the first empirical analysis to provide a broad synopsis of the relationship between intellectual capital, financial performance, and firm value for companies in eleven Islamic countries, at the same time. Moreover, it is also the first study that investigates the impact of Shariah-compliance rules on value and financial performance attributes of firms in Islamic countries. Another major contribution of the present empirical analysis is that it captures the effect of IC efficiency on different financial performance (i.e., profitability, leverage, and liquidity) aspects for firms in eleven Islamic countries, at the same time.

2. LITERATURE REVIEW

IC, which can be defined as the knowledge-based asset of establishments, appears to be one of the key determinants of firm performance and corporate value, and as a result, a vast stream of literature has evolved on the topic in the past 35 years (Campisi and Costa 2008). The early stream of literature, which had its origins in the early 1990s, helped to develop the theoretical framework of the topic and

focused on the fundamentals of how IC creates competitive advantage, improves financial performance, and increases corporate value (Petty and Guthrie 2000; Guthrie et al. 2012). To conceptualize the contribution of IC to financial performance and to corporate value, the scholars tried to summarize the approaches by which knowledge is accumulated and used in organizations (Subramaniam and Youndt 2005). By analyzing the key papers written on the subject, Schiuma et al. (2008) concluded that the five pillar concepts that constitute IC are human capital, social capital, structural capital, organizational capital, and stakeholder capital. (Schiuma et al. 2008).

IC, though proven to be an important intangible asset, is not recognized in financial reports, and as of yet, there is no agreement on how to measure and report intangible assets by accounting standards. The most widely used measurement technique is value-added intellectual capital coefficient (VAIC), which was developed by Pulic in 1998. He claims that the market value of establishments is formed by the efficiency of capital employed, as well as by its intellectual capital and the Intellectual capital involves human and structural capital efficiencies. The method Pulic (2000) suggested aimed to deliver information regarding the value creation efficiency of not only the tangible (capital employed), but also the intangible (human and structural capital) assets of an establishment. Pulic's method aims to indirectly measure IC efficiency through measuring capital employed efficiency (VACA), human capital efficiency (VAHU), and structural capital efficiency (SCVA). Pulic (1998 and 200) proposes that higher levels of VAIC results in better employment of the value creation potential of a company (Pulic 1998 and 2000).

Many shortcomings and disadvantages concerning VAIC were proposed in literature. VAIC is first criticized for reducing the human capital valuation to its labor costs, which leads to an underestimation of its value. The method treats all expenses related to employees as assets, but in general, only a part of these expenses contributes to future company benefits; all others are just expenses and not assets. Another problem of the VAIC method arises with the reverse association between human capital and structural capital, which can create problems in establishing the exact proportion of each element when measuring the overall IC valuation. Finally, the methodology is widely criticized for not including relational capital efficiency, which is among the key elements of IC (Fijałkowska 2014).

Despite its shortcomings, VAIC is widely used, as it is reliable, simple, objective, and comparable. Other methods developed to measure IC are, in general, customized to be appropriate for certain types of companies, and hence, lack generalization opportunities and have limited comparability. VAIC methodology uses audited financial data that is objective, verifiable, and comparable (Firer and Williams 2003).

Many studies conducted to investigate the association between IC efficiency and both financial performance and corporate value by using VAIC methodology have been conducted, and they reached conflicting results.

While Riahi-Belkaoui (2003) found a positive and significant association between IC efficiency and firm performance for the multinational companies from United States, Firer and Williams (2003) concluded there was no significant relationship between a firm's VAIC and performance for companies in South Africa. On the other hand, Tan et al. (2007), Chen et al. (2005), and Nimtrakoon (2015) report a positive relationship between IC efficiency and corporate value and profitability for the Taiwanese, Singapore and five Asian countries, respectively. Moreover, Bozbura (2004) analyzed the association between IC and the market value of companies on the Istanbul Stock Exchange, concluding that human capital and relational capital of Turkish companies had a positive impact on their market-to-book value. Finally, Mehralian et al. (2012) and Siah (2014) both conclude that IC efficiency positively affects profitability and firm value in Iran and Malaysia, respectively.

3. HYPOTHESIS DEVELOPMENT

The financial performance of a company is an important input which will have considerable impact on the firm's value in present and future years. Moreover, intellectual capital is valued as a significant source of the company's competitive advantages, and therefore it is expected to positively contribute not only to value of a company, but also to its financial performance. In line with this reasoning, the financial performance of corporations, which ultimately affects firm value, will be analyzed within the scope of this empirical study. Although there are different aspects of financial performance, in this paper, we measure financial performance of a company through its profitability, liquidity and leverage.

In the era of knowledge, the accumulation of intellectual capital is anticipated to have important impact of firm profitability. Irrespective of the industry the firm is operating, Bontis et al. (2000) claim that, structural capital positively affects business performance. In line with this study, Riahi-Belkaoui's (2003) study also demonstrate a positive relationship between IC and financial performance. Moreover, Chen et al. (2005), Shiu (2006) and Maditinos (2011) provide empirical evidence that companies with higher levels of intellectual efficiency, reach higher levels of profitability and revenue. Taking into consideration the fact that IC is a valuable resource for the competitive advantage of firms, and consistent with the literature, intellectual capital is expected to positively contribute to the companies' profitability, leading to our first hypothesis:

H1: Value-added intellectual capital efficiency positively affects the profitability level of firms.

In line with the anticipation that the rise in intellectual capital will augment the profitability level of firms, we expect the rise in intellectual capital to decrease the debt level of firms following the pecking order hypothesis. Firms that tend to invest more in IC have a tighter debt capacity imposed by the market or by the bondholders than those firms that tend to invest more in tangible asset investments (Bolek and Lyroudi 2015). Firms tend to avoid external financing in order to avoid the associated high costs and hence maintain high profitability rates, leading them to finance their investments through internally generated funds. In this context, the second hypothesis is built as follows:

H2: Value-added intellectual capital efficiency negatively affects the debt level of firms.

The financial markets in emerging countries tend to be weaker as compared to the financial markets in developed countries. As the development in financial markets lags behind, firms in emerging markets have poor access to all kinds of financing means, including external capital, debt, or equity (Fan et al. 2011). Hence, besides profitability and leverage, liquidity also emerges as an important dimension to measure companies' financial performance. Strischek (2003) shows that firms investing more in liquid assets are subject to lower default risk, lower risk premiums, and consequently, lower cost of capital compared to their peers that invest less. Similarly, Wasiuzzaman (2013) differentiated between financially constrained and unconstrained firms and concluded that for companies facing difficulties in obtaining external funds, liquid assets are the means to free up cash to get additional capital for investment purposes. In this study, we expect the rise of intellectual capital to lead firms to have more funds to invest in liquid assets under financially constrained Islamic markets, leading to the third hypothesis of this analysis:

H3: Value-added intellectual capital efficiency positively affects the liquidity level of firms.

It is widely agreed that in the era of technology, IC, which is the accumulation of knowledge, has become one of the most important factors in generating value. Furthermore, conservative accounting practices prevent firms from demonstrating their investment in IC in their financial statements, which results in rising discrepancy between the companies' book and market values (Chen et al. 2005). According to Alcaniz et al. (2011), traditional accounting cannot meet the new challenges of IC. Nonetheless, if the markets are efficient, there is a tendency by the investors, to value higher those firms with greater IC (Firer and Williams 2003; Riahi-Belkaoui 2003).

The book value of an organization is usually calculated through deducting a company's liabilities from total assets. Within this methodology, intellectual capital, which is one of the most significant intangible assets, is not taken into consideration (Sveiby 2000 and 2001). The non-recognition of intangible assets' value in balance sheets results in the gap between the market and book value of organizations to widen. As a consequence of this, for companies with high intangible assets, firm value

estimations tend to be significantly higher as compared to their book value calculations (Riahi-Belkaoui 2003; Firer and Williams 2003; Chen et al. 2005), leading us to our last hypothesis:

H4: Value-added intellectual capital efficiency positively affects the market value of firms.

As stated in the literature review section, studies on emerging markets conclude that there is a positive association between IC efficiency and corporate value. Examples are the findings of Nimtrakoon (2015) in the ASEAN market, Bozbura (2004) in the Turkish market, Chen et al. (2005) in the Taiwanese market, and Mehralian et al. (2012) in the Iranian market.

However, as can be depicted from the literature review section, no studies so far have covered the impact of intellectual capital efficiency on firm value in Islamic countries analyzing multi-countries at the same time. The authors believe that in this highly globalized environment, firms in Islamic countries need to invest in IC to increase their firm value and, therefore, the presence and the efficiency of IC will have a significant role in developing the value of corporations.

The VAIC method sustains that value-added intellectual capital is the sum of three constituents: capital employed efficiency, human capital efficiency, and structural capital efficiency. Some studies found that components of VAIC demonstrate diverse results. For example, Huang and Hsueh's (2007) findings show that relational capital and structural capital result in better performance, whereas human capital presents the poorest performance. Nimtrakoon (2015) reported that technology firms from different countries tend to place a different degree of emphasis on components of IC when generating firm value. Hence, as a test of robustness, in this study we also analyze the effect of each constituent of VAIC on firm value separately. It is expected that the three components of VAIC will exert a positive effect on firm value.

4. RESEARCH METHODOLOGY

The purpose of this study is to analyze intellectual capital in Islamic countries. There are 47 Islamic countries in the world as of 2019 year-end and within these 47 countries, only eleven countries use International Financial Reporting Standards in their financial reporting systems. For consistency and comparability purposes, we take these eleven countries into our sample, while excluding the rest of the countries from our sample. The eleven countries in the sample are Malaysia, Nigeria, Bahrain, Bangladesh, Jordan, Kuwait, Oman, Pakistan, Qatar, Turkey, and United Arab Emirates. Furthermore, only the publicly quoted companies in these countries are included in our sample, to be able to reach their financial and accounting data. The time frame analyzed covers 8 years from 2010 to 2017. In line with this, the companies that started to be publicly traded after 2010 and those that stopped being traded

before 2017 are excluded from the sample, as a consequent to which the final sample consists of a total of 1,681 firms.

The distribution of the sample according to countries and industries (manufacturing -service - technology) is presented in Table 1.

Table 1. Distribution of the sample

Countries	Manufacturing	Service	Technology	Total
Bahrain	3	14	0	17
Bangladesh	138	20	3	161
Jordan	57	40	0	97
Kuwait	26	29	1	56
Malaysia	456	208	48	712
Nigeria	52	30	0	82
Oman	53	25	0	78
Pakistan	208	27	4	239
Qatar	5	15	0	20
Turkey	137	42	14	193
United Arab Emirates	13	13	0	26
Total	**1,145**	**466**	**70**	**1,681**

The dependent variables of this study are the market value of firms and financial performance indicators, including profitability, leverage, and liquidity, the details of which may be found below:

i. **Firm Value**: To measure firm value, Chung and Pruitt's (1994) Tobin's Q approximation is used. The details of Tobin's Q calculation can be found in Table 2.

The industry that a firm operates in may have an impact on firm value. To control for industry influences, Tobin's Q calculations are adjusted for the industry the firms operate in, consistent with Panaretou (2013). The details for calculating industry-adjusted Tobin's Q may also be found in Table 2.

On the other hand, the second set of dependent variables used in this study are financial performance indicators. A company's financial performance can be analyzed with a certain set of financial ratios that provide insights about the firm, as a result of which comparison of different firms is enabled. These financial ratios are categorized according to the information they present. Within this context of this study, the key areas of financial performance that will be used in this study are profitability, leverage, and liquidity of a company.

ii. **Profitability** is proxied with two different variables: return on assets (ROA) and EBITDA margin (EBITDA). ROA, which is defined as net income scaled by total assets, aims to measure total profitability. On the other hand, EBITDA margin is defined as earnings before interest, tax,

depreciation, and amortization as a percentage of the company's total revenue and we aim to measure operating profitability with this ratio.

iii. **Leverage** is defined as long- and short-term liabilities deflated by total assets following Akgüç and Al Rahaeleh (2018).

iv. **Liquidity**: To measure liquidity, two different measures, namely working capital (WIC) ratio and free cash flow (FCF) ratio, are employed. Working capital is the most widely used liquidity measure and indicates whether the company has enough current assets to meet all its short-term liabilities. WIC ratio is defined as the ratio of the difference between current assets and short-term liabilities to sales and demonstrates a firm's ability to pay costs stemming from new sales generation without the need to take on additional debt. On the other hand, FCF ratio represents the cash generated by a firm after cash outflows in order to support its operations and also maintain its capital assets. Following Copeland et al. (2009), free cash flow is calculated as:

FCF = Earnings Before Interest and Taxes + Depreciation Expense + Amortization Expense – Taxes – Working Capital Investments – Capital Expenditures

FCF ratio, on the other hand, is measured by dividing FCF to total assets.

In this study, we adopt the VAIC approach developed by Pulic (1998). The main independent variable, value-added intellectual capital (VAIC), is given by the sum of its components, which are:

VAIC = VACA + VAHU + SCVA

Consistent with Pulic (1998), the first component of VAIC is value-added capital employed efficiency (VACA), which is an indicator for the value added created by one unit of physical capital, and is calculated with the following formula:

VACA = VA/CA where

VA = Operating profit + employee cost + depreciation + amortization

CA (capital employed) = The book value of total assets – intangible assets.

It is essential to note that value added (VA) is defined as output less input, where output is total earnings, and input is the cost of materials and services provided, excluding salaries and wages, which have a value creation function and are regarded as capital and not cost.

The second component of VAIC is value-added human capital efficiency (VAHU), which indicates the added value of each dollar paid as employees' wages.

VAHU = VA/HU where

HU = total employee cost

The third component of VAIC is value added structural capital efficiency (SCVA). It indicates the supportive infrastructure, processes, and databases of the organization that enable human capital to function and is calculated with the following formula:

SCVA = SC/VA where

SC (structural capital) = VA – HU

The research question of this paper, on which the four hypotheses are built, takes value-added intellectual capital efficiency into account as the independent variable. In order to further elaborate on the topic, the components of VAIC (VACA, VAHU, SCVA) will also be analyzed as independent variables in the second step of the analysis, where firm value measured with Tobin's Q is the dependent variable.

Finally, several control variables, which are expected to explain the performance of the dependent variables, are also used within the analysis. Size, GDP per capita, and tangibility are added as control variables to all regressions following Gonzales et al. (2012); Rizov (2004); Crnigoj and Mramor (2009); and Busse and Hefeker (2007). Last, Shariah Compliance (SC) dummy variable is also added as a control variable.

Firm size (SIZE) is measured with the natural logarithm of the total assets of the firm, whereas tangibility is defined as total fixed assets divided by total assets. On the other hand, data for GDP per capita that is the proxy for relative country size is obtained from World Bank's databank and is measured through the natural logarithm of GDP per capita.

The last control variable we include in the analysis is Shariah-Compliance. Although the countries in the data set are all Islamic countries, the firms in the sample may or may not be compliant with Shariah rules. The compliance with Shariah rules could be a significant factor in improving firm performance in addition to its value, since investors in Islamic countries could appreciate Shariah-compliant firms more. Hence the impact of Shariah-compliance should be controlled for in the estimations to be conducted. To determine whether a company in our sample is within the Shariah-compliance rules, we use Standard No. 21 issued by the "Accounting and Auditing Organization" for Islamic Financial Institutions and the ratio screen developed by Hassan, Kayed, and Oseni (2013). According to the standard and the ratio screen, a company's shares are permissible for Shariah-compliant investors if the company complies with the following rules: 1. Principal business activity of the company should be allowed according to Islamic law (gambling, tobacco, alcohol, weapons, pork-related products and conventional financial services are not allowed); 2. Total accounts receivables of the company should be less than 45 percent of its total assets; 3. The sum of interest income and income from non-compliant activities should be less than 5 percent of the company's total revenue; 4. Financial leverage of a company should be less than 30 percent; 5. The total of cash and interest-bearing deposits should be less than 30 percent of the

company's total assets. For a company's shares to be permissible to Shariah-compliant investors (SC), it should meet all five conditions listed above; the companies that violate one or more of the above-mentioned conditions are classified as non-Shariah-compliant and these shares are not permissible to Shariah-compliant investors (NSC) (www.aaoifi.com).

The data for all variables is gathered from financial statements and footnotes obtained from the official websites of the companies in the sample. Table 2 summarizes the calculations of all the variables used in analysis.

Table 2. Variables

Variable Type	Variable Name	Abbreviation	Measurement
Independent	Value Added Capital Employed	VACA	VA/CA VA (Valued Added) = EBIT + Employee Cost + Depreciation + Amortization CA (Capital Employed) = Total Assets – Intangible Assets
Independent	Value Added Human Capital	VAHU	VA/HU HU (Human Capital) = Total Employee Costs
Independent	Value Added Structural Capital	SCVA	(VA-HU)/VA
Independent	Value Added Intellectual Capital	VAIC	VACA + VAHU + SCVA
Dependent	Industry – adjusted Tobin's Q	Ind-Adj TQ	TQ = (Market value of common equity + preferred stock + book value of total liabilities / book value of total assets) Ind-Adj TQ = ln (TQ_{firm}) – ln (med. TQ_{ind})
Dependent	Return on Assets	ROA	Net Income / Total Assets
Dependent	EBITDA margin	EBITDA	(EBIT + depreciation + amortization)/Net Sales
Dependent	Leverage	LEV	(S/T Liabilities + L/T Liabilities) / Total Assets
Dependent	Working Capital Ratio	WIC	(Current Assets-S/T Liabilities)/ Net Sales
Dependent	Free Cash Flow Ratio	FCF	(EBITDA after taxes-investment in WIC-investment in capital expenditure)/Total Assets
Control	Shariah Compliance	SC	SC Dummy = 1 if the firm is Shariah-compliant SC Dummy = 0 if the firm is non-Shariah-compliant
Control	Firm Size	SIZE	ln(Assets)
Control	Country Size	GDPPC	Gross Domestic Product per capita
Control	Leverage	LEV	(S/T Liabilities + L/T Liabilities) / Total Assets
Control	Tangibility	TANG	Total Fixed Assets / Total Assets

First, the impact of VAIC on the dependent variables (i.e., ROA, EBITDA, LEV, WIC, and FCF) is analyzed (***H1***, ***H2*** and ***H3***, respectively), taking size, GDP per capita, tangibility and Shariah-compliance dummy as control variables.

The main models are as follows:

Model 1. $ROA_{it} = \beta_o + \beta_1 VAIC_{it} + \beta_2 SIZE_{it} + \beta_3 GDPPC_{it} + \beta_4 TANG_{it} + \beta_5 SC_{it} + \eta_c + \eta_t + \varepsilon_{it}$

Model 2. $EBITDA_{it} = \beta_o + \beta_1 VAIC_{it} + \beta_2 SIZE_{it} + \beta_3 GDPPC_{it} + \beta_4 TANG_{it} + \beta_5 SC_{it} + \eta_c + \eta_t + \varepsilon_{it}$

Model 3. $LEV_{it} = \beta_o + \beta_1 VAIC_{it} + \beta_2 SIZE_{it} + \beta_3 GDPPC_{it} + \beta_4 TANG_{it} + \beta_5 SC_{it} + \eta_c + \eta_t + \varepsilon_{it}$

Model 4. $WIC_{it} = \beta_o + \beta_1 VAIC_{it} + \beta_2 SIZE_{it} + \beta_3 GDPPC_{it} + \beta_4 TANG_{it} + \beta_5 SC_{it} + \eta_c + \eta_t + \varepsilon_{it}$

Model 5. $FCF_{it} = \beta_o + \beta_1 VAIC_{it} + \beta_2 SIZE_{it} + \beta_3 GDPPC_{it} + \beta_4 TANG_{it} + \beta_5 SC_{it} + \eta_c + \eta_t + \varepsilon_{it}$

Second, the impact of VAIC on firm value is analyzed (***H4***) as shown in Model 6. To further elaborate on the topic and to be able to observe the impact of the individual components of VAIC (VACA, VAHU, and SCVA) on firm value, the regression analysis will be repeated, replacing VAIC with its components, which can be seen in Model 7 below:

Model 6. $TQ_{it} = \beta_o + \beta_1 VAIC_{it} + \beta_2 ROA_{it} + \beta_3 EBITDA_{it} + \beta_4 LEV_{it} + \beta_5 WIC_{it} + \beta_6 FCF_{it} + \beta_7 SIZE_{it} + \beta_8 GDPPC_{it} + \beta_9 TANG_{it} + \beta_{10} SC_{it} + \eta_c + \eta_t + \varepsilon_{it}$

Model 7. $TQ_{it} = \beta_o + \beta_1 VACA_{it} + \beta_2 VAHU_{it} + \beta_3 SCVA_{it} + \beta_4 ROA_{it} + \beta_5 EBITDA_{it} + \beta_6 LEV_{it} + \beta_7 WIC_{it} + \beta_8 FCF_{it} + \beta_9 SIZE_{it} + \beta_{10} GDPPC_{it} + \beta_{11} TANG_{it} + \beta_{12} SC_{it} + \eta_c + \eta_t + \varepsilon_{it}$

With the purpose of analyzing the impact of IC efficiency on the financial performance and value of a company, OLS estimations with panel data analysis has been implemented as the econometric analysis technique. We check the Hausman test for each model separately. Based on the finding that the p-value for Hausman test is significant (i.e. p value < 5%), we conclude that fixed effect model is appropriate for all the regression analysis conducted within this empirical study. In order to capture the differences between countries and explain a possible correlation between country features and regressors and moreover with the purpose of taking into consideration possible macro-economic factors, including years in which economic crisis took place, we include country and time fixed effects in the estimation model.

5. FINDINGS

With this empirical study, we aim to understand the association between IC efficiency and financial performance and value of firms in Islamic countries. Within this context, to measure intellectual capital, VAIC methodology is applied, where the independent variable is defined as VAIC and financial performance indicators are taken as the dependent variable (Models 1-5). Firm value is taken as the dependent variable in Models 6 and 7, where VAIC as well as the components of VAIC (VACA, VAHU, and SCVA) are defined as independent variables in separate regression estimations. Besides the independent variables, several control variables, including size, GDP per capita, tangibility, and Shariah-compliance dummy are used in the regression analysis. Table 3 provides the descriptive statistics for all the variables used in analysis.

Table 3. Descriptive statistics

	N	Mean	Std. Dev.	Min.	Max.
VAIC	13298	3.88	4.96	-8.07	37.36
VACA	13323	0.19	0.15	-0.18	0.70
VAHU	13306	3.01	3.79	-5.36	27.00
SCVA	13329	0.54	0.72	-3.23	4.16
Ind-adj TQ	13306	0.06	0.63	-1.81	2.47
ROA	13325	0.04	0.10	-0.39	0.30
EBITDA	13282	0.12	0.30	-1.76	0.92
LEV	13325	0.44	0.24	0.03	1.28
WIC	13283	0.35	1.05	-3.80	6.62
FCF	11657	0.13	0.21	-0.73	0.71
SIZE	13325	13.32	2.32	8.32	18.88
GDPPC	13447	8.69	1.13	6.63	11.19
TANG	13318	0.52	0.23	0.03	0.96

There are about 13,300 firm year observations. While average level of ROA stands at 4 percent, average level of EBITDA stands at 12 percent for the entire sample. On the other hand, while the average leverage of the firms in the Islamic world is 44 percent, the average working capital ratio and the average free cash flow ratio of the sample stands at 0.35 and 0.13, respectively.

Table 4 provides the correlation matrix for the variables used in analysis.

Table 4. Correlation matrix

	VAIC	ROA	EBITDA	LEV	WIC	FCF	Size	GDPPC	TANG	SC Dummy
VAIC	1.000									
ROA	0.3050	1.000								
EBITDA	0.4454	0.4787	1.000							
LEV	0.0058	-0.2714	-0.123	1.000						
WIC	0.014	0.07	0.047	-0.4483	1.000					
FCF	0.2823	0.4348	0.5165	-0.1524	0.0705	1.000				
Size	0.2106	0.1862	0.2007	0.2864	-0.1147	0.2052	1.000			
GDPPC	-0.1007	-0.0545	-0.0392	-0.1682	0.0796	-0.1147	-0.437	1.000		
TANG	0.0937	-0.1379	0.0868	-0.0224	-0.273	-0.0751	0.1239	0.0281	1.000	
SC Dummy	-0.0413	0.1021	0.0477	-0.3948	0.1018	0.0156	-0.1304	0.0991	0.0573	1.000

None of the correlations between the variables are above 0.60; hence there is no multicollinearity between the variables and therefore these variables can be used in the following regression analysis as independent variables.

First, we empirically investigate whether VAIC efficiency has an impact firm performance. Profitability, leverage, and liquidity are the main attributes of financial performance: While ROA and EBITDA are taken as the dependent variables to proxy for profitability (Models I and II), leverage is taken as the dependent variable in Model III, and finally, working capital ratio and free cash flow ratio will be taken to proxy for the liquidity level of firms (Models IV and V).

Within this perspective, as the first attribute of financial performance, the effect of VAIC on firm profitability is analyzed, hypothesizing that VAIC positively affects the profitability of firms in Islamic countries. As can be depicted from Table 5, profitability, which is proxied with ROA and EBITDA ratios, are taken as dependent variables in separate regression analysis.

Table 5. Panel regression results for the impact of intellectual capital (VAIC) on performance indicators

	PROFITABILITY		LEVERAGE	LIQUIDITY	
	Model I Dep. Var: **ROA**	Model II Dep. Var: **EBITDA**	Model III Dep. Var: **Leverage**	Model IV Dep. Var: **WIC**	Model V: Dep. Var: **FCF**
Value Added Intellectual Capital (VAIC)	0.006*** [0.000]	0.027*** [0.000]	-0.003*** [0.000]	0.005*** [0.006]	0.011*** [0.000]
Size	0.014*** [0.000]	0.037*** [0.000]	0.021*** [0.000]	0.063*** [0.000]	0.027*** [0.000]
GDP per capita	-0.002 [0.853]	0.007 [0.832]	-0.058*** [0.003]	0.497*** [0.000]	-0.058 [0.102]
Tangibility	-0.103*** [0.000]	-0.059*** [0.000]	0.031*** [0.002]	-2.140*** [0.000]	-0.129*** [0.000]
SC Dummy	0.032*** [0.000]	0.051*** [0.000]	-0.174*** [0.000]	0.239*** [0.000]	0.033*** [0.000]
Constant	-0.062 [0.548]	-0.444 [0.167]	0.648*** [0.000]	-4.241*** [0.000]	0.392 [0.237]
Groups	1680	1680	1680	1680	1680
Observations	13,293	13,256	13,293	13,257	11,635
Country Dummies	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
R-squared	**20.01%**	**23.24%**	**24.16%**	**10.01%**	**13.90%**
Adjusted R-squared	**19.96%**	**23.43%**	**24.46%**	**11.05%**	**13.93%**

, ** and * indicate statistical significance levels of 10%, 5% and 1%, respectively.*
P-values are shown in brackets.

The impact of VAIC on ROA is significantly positive (Model I), implying that as the IC efficiency of a company increases, so does its profitability. On the other hand, there is also a size effect, meaning that larger firms in Islamic countries tend to have improved levels of profitability. While the impact of GDP per capita does not have a significant impact on ROA, the impact of tangibility on ROA is significantly negative, suggesting that possession of more fixed assets in the firm's balance sheet has a negative effect on the levels of profitability. Finally, Shariah-compliance dummy has a positive impact on ROA, implying that companies that are in compliance with Shariah standards described in the Research Methodology section, tend to have higher levels of profitability.

The second profitability indicator analyzed in this study is EBITDA, for which the analysis demonstrates very similar results, as can be seen from Model II. The impact of VAIC on EBITDA is significantly positive. Moreover, size and Shariah-compliance dummy also positively and significantly affect EBITDA levels of firms, while on the other hand, only tangibility significantly and negatively affect EBITDA levels of firms in the Islamic countries analyzed. GDP per capita has no significant

impact on EBITDA levels of companies. The fact that intellectual capital efficiency positively affects both ROA and EBITDA clearly demonstrates that our first hypothesis is empirically supported. Our findings on the relationship between IC efficiency and profitability are also in compliance with the findings of Rihai-Belkaoui (2003), Chen et al. (2005), Tan et al. (2007), Nimtrakoon (2015), and Siah (2014).

As the second attribute of financial performance, the impact of IC on leverage is analyzed. As can be depicted from Table 5 – Model III, VAIC significantly and negatively affects firms' leverage, implying that as firms' intellectual capital efficiency increases, their debt levels decrease, which is in line with our second hypothesis. Within the control variables, while firm size and tangibility significantly and positively affect leverage, GDP per capita and Shariah-compliance dummy negatively and significantly affects it.

The final attribute of financial performance of firms is liquidity, which is proxied with working capital ratio and free cash flow ratio within the scope of this analysis. As can be observed from Table 5 – Models IV and V, VAIC efficiency positively and significantly contributes to working capital ratio (WIC). Size, Shariah-compliance dummy and GDP per capita also positively affect WIC, while tangibility has a significant negative affect, which is anticipated, since the rise in the share of fixed assets would result in a weakening in working capital ratio.

Finally, free cash flow ratio is also analyzed as part of the liquidity analysis (Model V). Similar to the results obtained when working capital ratio is taken as the dependent variable, VAIC efficiency significantly and positively affects free cash flow ratio. Within the control variables, size and Shariah-compliance dummy have a significant positive effect on FCF, while tangibility has a significant and negative effect on FCF, and the effect of GDP per capita is insignificant.

Intellectual capital efficiency positively affects not only firm profitability, but also firm liquidity, while on the other hand impact of IC efficiency on leverage is negative. Next, we want to comprehend the impact of IC and the components of IC on firm value proxied with industry-adjusted Tobin's Q. Table 6 provides the results of the second stage of analysis.

Table 6. Panel regression results for the impact of intellectual capital (VAIC) and the components of VAIC (VACA, VAHU and SCVA) on firm value

	Model VI Dep. Var: Industry Adjusted TQ	Model VII Dep. Var: Industry Adjusted TQ
VAIC	0.002** [0.017]	
VACA		0.710*** [0.000]
VAHU		0.004** [0.025]
SCVA		0.011** [0.010]
ROA	0.662*** [0.000]	0.187** [0.013]
EBITDA	0.041** [0.019]	0.107*** [0.000]
LEV	0.579*** [0.000]	0.559*** [0.000]
WIC	-0.032*** [0.000]	-0.023*** [0.000]
FCF	-0.103*** [0.000]	-0.138*** [0.000]
Size	-0.018** [0.005]	0.001 [0.912]
GDP per Capita	0.613*** [0.000]	0.599*** [0.000]
Tangibility	-0.247*** [0.000]	-0.210*** [0.000]
SC Dummy	0.101*** [0.000]	0.096*** [0.000]
Constant	-5.503*** [0.000]	-5.648*** [0.000]
Groups	1681	1680
Observations	11,601	11,588
Country Dummies	Yes	Yes
Year Dummies	Yes	Yes
R-squared	**14.67%**	**17.64%**
Adjusted R-squared	**12.81%**	**20.37%**

P-values are shown in brackets.
, ** and * indicate statistical significance levels of 10%, 5% and 1%, respectively.*

As can be depicted from Table 6 – Model VI, value-added intellectual capital efficiency positively affects industry-adjusted Tobin's Q, implying that the rise in VAIC positively contributes to firm value. Among the financial performance measures, ROA, EBITDA, and leverage also have a positive effect

on value of companies. However, working capital ratio and free cash flow have a negative impact on firm value. Among the control variables, while Shariah-compliance dummy and GDP per capita have a significant positive impact; size and tangibility have significant negative effects on firm value.

To further elaborate on the effects of IC efficiency on TQ, the effects of the constituents of VAIC (VACA, VAHU, and SCVA) on the market value of firms are also analyzed. As can be observed from Table 6 – Model VII, all three constituents of VAIC (i.e., VACA, VAHU, and SCVA) positively and significantly affect firm value. Similar to the regression analysis conducted for Model VI; ROA, EBITDA, and leverage positively and significantly affect firm value. Liquidity measures, including working capital ratio and free cash flow ratio, negatively affect firm value, stemming from the fact that excess cash generated is considered to create agency issues, resulting in a negative effect in market value. While the effect of size is insignificant, that of Shariah-compliance dummy and GDP per capita is significantly positive and that of tangibility is significantly negative. The positive impact of Shariah-compliance dummy on firm value implies that firms that are in compliance with Shariah standards tend to have higher levels of firm value, which could be attributable to the fact that the shares of these firms are permissible to Shariah-compliant investors besides regular investors, basically enlarging the Shariah-compliant companies' investor base, and resulting in increased demand and hence an upsurge in firm value.

The VAIC methodology provides information regarding the value creation efficiency of not only the tangible (capital employed) assets, but also the intangible (human and structural capital) assets of a corporation. The findings suggest that for the corporations in Islamic countries tangible assets, structural capital, and human capital positively contribute to value creation.

The findings regarding the impact of free cash flow and leverage on firm value is consistent with propositions set forth with the agency theory proposed by Jensen in 1986. The theory states that free cash flows are most likely invested in negative NPV projects, which is known as the overinvestment problem and which leads to a decline in firm value. Debt creation, on the other hand, increases firm value due to the reduction in agency costs associated with free cash flow. The findings reveal that the contribution of intellectual capital in the accumulation of free cash flow and in the substitution of debt with internal funds are perceived as a source of agency conflicts by investors, hence, liquidity contributes negatively to firm value.

Our findings regarding the impact of IC efficiency on market value of companies comply with the findings of Chen et al. (2005), Nimtrakoon (2015), Bozbura (2004), and Mehralian et al. (2012), showing that firms in Islamic countries exhibit the same trends as the Taiwanese, ASEAN, Turkish, and Iranian samples.

The main contribution of the present study is that for the first time, to the best of our knowledge, intellectual capital efficiency is analyzed for a very broad sample of firms covering eleven Islamic countries at the same time. Furthermore, the effect of IC efficiency is analyzed not only from a firm value perspective but also from a financial performance perspective, capturing profitability, liquidity and leverage levels of firms. Last, to the best of our knowledge, for the first time, this study provides empirical evidence on the impact of Shariah-compliance on profitability, liquidity, leverage and firm value within an IC context.

6. CONCLUSION

As a consequence of the technological revolution that the world witnessed in the last quarter of the twentieth century, information became the most valuable asset for all corporations. The source of economic strength shifted from tangible to intangible assets, among which intellectual assets such as competencies, processes, and people appeared as hidden sources of corporate value. Given the importance of the subject, academicians from different parts of the world developed different measures to quantify intellectual capital, and in field studies, the relationship between IC and both financial performance and corporate value was widely investigated. In these studies, the firms in the Islamic world were neglected to a great extent. Although Islamic countries make up 23 percent of the world population and roundly 9 percent of the world's GDP, very few field studies aimed to study how firms in the Islamic countries approached intellectual capital, which remained an important gap in the literature that this study aimed to fill.

With this purpose, the data was collected for 1,681 firms from 11 Islamic countries for the years between 2010−2017. The effect of intellectual capital efficiency was measured with the VAIC methodology, value of companies with Tobin's Q statistics, and finally financial performance with five basic ratios (i.e., return on assets, EBITDA margin, leverage, working capital ratio and free cash flow) which were all analyzed with the panel regression method.

First, the impact of intellectual capital efficiency on financial performance in Islamic countries was examined. The results demonstrate that IC efficiency has a positive impact on firm profitability measured with ROA and EBITDA margin, and firm liquidity measured with free cash flow and working capital ratios, while on the other hand, the impact of IC efficiency on leverage is negative.

Second, the effect of IC efficiency on value of companies was analyzed. Besides analyzing the hypothesis set forth previously, with the ultimate aim of understanding which component of VAIC has an impact on firm value, we have also analyzed the impact of the constituents of IC efficiency on the industry-adjusted Tobin's Q. The findings from this analysis confirmed the previous results of the study,

such that the effect of all three IC efficiency components on firm value was significantly positive, implying that besides tangible (capital employed efficiency) assets of a corporation, intangible (human and structural capital efficiency) assets also contribute positively to value.

An important fact that differentiated this paper from the previous literature is that this study covers Islamic countries only and for this reason we include Shariah-compliance dummy as a control variable in all estimations conducted. The results reveal that firms that are in compliance with the Shariah standards tend to have higher levels of firm value, profitability and liquidity levels and lower levels of debt, which is an important research area for future studies.

This empirical study contributes to literature by providing a broad synopsis of the association between IC, financial performance, and firm value for companies in Islamic countries. Nonetheless, the authors assume it is the first study to capture the effect of IC efficiency on different characteristics of financial performance (i.e., profitability, leverage, and liquidity) for a very broad sample covering firms from eleven Islamic countries, which has a significant impact on the global economic environment. The paper has added different aspects of "financial performance" context into the analysis for understanding the impact of IC efficiency and, above all, focused on a large set of data covering the publicly quoted firms in Islamic countries.

IC of corporations is a source of competitive advantage. This study provides empirical evidence that business success, including being profitable and liquid and possessing a higher firm value, can partly be explained by its IC. The results of the study lead to the significance of IC management in corporations within an organization strategic management process and suggests that efficient IC management should be injected into the scheme. Effective and internalized understanding of IC management is expected to ensure development of knowledge culture in corporations that will encourage and promote innovative processes. This paper also aims to educate and build awareness in managers for nurturing organizational intellectual capital and accordingly for managing their daily businesses effectively in ways that will help create value through innovation and improved financial performance.

Given the results of the study, it would be important to find out whether the amount of present-year intellectual capital contributes positively to future profits of firms in Islamic markets, which remains an open question to be answered in future studies. Overall, the authors consider the results to be interesting, stimulating and also beneficial for establishing a baseline study for emerging markets. The study also inspires other researchers to continue with this examination.

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AUTHORS' DECLARATION

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