

# Intellectual Capital Efficiency And Corporate Market To Book Value Of Non-Financial Firms Listed In Amman Stock Exchange

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**Abstract**— The primary objective of this empirical study is to examine the relationship between intellectual capital efficiency (ICE) and corporate market to book value. The study population covers all non-financial firms listed in the Amman stock exchange across the years (2013-2017), the sample covers all listed non-financial firms that disclosed required data which is related to the variables under study. The main results reveal significant relationship between each of human capital efficiency (HCE), structural capital efficiency (SCE), and capital employed efficiency (CEE) as elements of value added intellectual capital model (VAIC) and the corporate market to book value. The current study contribute to the literature in intellectual capital area in context of developing countries. Also, recommends that standards setters may expand the efforts to have better measurement and evaluation of the intangibles as it contributes majorly to the firm created market to book value.

**Index Terms**— Human capital efficiency, Structural capital efficiency, Capital employed efficiency, Market to book value, empirical study, Jordan.

## I. INTRODUCTION

THE intellectual capital (IC) is an intangible asset that is introduced as a “knowledge-based equity” maintained by organizations. Over the last decades, this issue has attracted researchers and specialists due to its significant amount of implications including improved performance and maximized profits [1], [2]. Although, IC significance is persistently growing, many organizations experience limitations in ICs’ management, commonly due to measurement complications and inadequate agreement across those measurements [3], [4], [5], [6]. It is notable, the gaps between the market and the book values across the published reports of organizations this drew attention towards inspecting missing values and fundamental limitations of financial statements where IC is evaluated as a hidden value even it leads the organizations to attain their competitive advantage and economic value [7], [8], [9], [10], [11], [2]. Therefore, a new direction followed by leading organizations distinguishes and treat the IC as an essential source of their strategic directions, as IC is core concern across accounting principles [12]; [6]. As per the previous published research, there are noticeable improvements and growth in the adoption of “knowledge-based economy” after introduced firstly by Stewart’s [13] who defined the IC as “sum of knowledge, information, intellectual property, and experience held by every person in any enterprise, which is employed to create a competitive edge.” In contrast, organizational performance is determined by having efficient management of IC, since making an application appraisal of the returns on IC investment is an obstacle to turn these assets into growth and acquire competitive advantage. Undeniably, the mainstream of organizations faces dilemmas in evaluating how much it is ought to spend on IC and what are the paybacks of such investments. Hence, the analysis results are highly credible to reflect a situation of either fruitless or under-invest cases [14]. However, since there are dramatically increasing gaps between the financial book value and the market value as the

figures presented in financial statements, firms ought to consult the information from IC indicators, such as human capital, relationship capital and innovation capital. Thus, the real value of any firm has to consider its intangible assets, such as; human resources skills, knowledge, processes and innovation capabilities which are hidden in its financial statements. Accordingly, this research investigated this relationship profoundly. As a joint base across researchers, IC is a knowledge that could be transformed into value across all firms regardless of the sector and country [15]. IC is brought up as a collection of knowledge assets that serves an entity to refine the competitive also economic power of it also it adds value to all recognized stakeholders [16]. The objective of this research is to examine the relationship between ICE and the corporate market-to-book value of the non-financial firms listed in ASE, this examination is accomplished based on the objective data presented in the firms’ financial statements during the period (2013-2017).

## 2 LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

### 2.1 Intellectual Capital

Intangible assets consider as a vital concern in many business fields involving finance, accounting, and management. Furthermore, government agencies, academic researchers, professional bodies and standard setters paid enormous efforts in inspecting this issue over the last decades [17]. Thus, a great extent of terminologies adopted in discussing intangible assets, like; “knowledge assets,” “intangibles,” “intangible capital” [17], [18]. By reviewing the literature, IC demonstrated an important role in organizational success. As a result of business markets developments, physical assets become less scarce. Yet, IC especially the elements of innovation are gradually treated as a generator of competitive advantage over the rivals. Thus, patents, trademarks, customer data, and copyrights represent an essential elements of firms’ value [19], [18]. Moreover, Steenkamp & Kashyap [20] defined it as “non-physical sources of value generated by innovation, unique organizational designs, brands, and human resources”. Other researches defined IC as “all the assets/resources, elements, and capacities that are attributed to an organization and contributed to the delivery of the organizational strategy, which is not currently recognized

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and disclosed in their balance sheet." Numerous instances of IC are the organizational capabilities, know-how, customers' relationships and employees' innovativeness [20], [21]. By going through the array of previous studies targeted large-sized firms across all sectors, some academics approve the expectations that IC are critically crucial in organizations since they add value to their growth, success, wealth and sustainability. Given that, it was argued that it is vital to mention that the IC needs to be genuinely recognized, measured, and appropriately accomplished [22], [23] [21]; [20]. However, the managed IC has paybacks of enhancing the customer acquisition, staff motivation, competitiveness and extents of resources allocation [2]. Considering the above-explained significances, management desires to distinguish which IC is highly relevant to their firms. Therefore, they supposed to collect useful information about how to effectively utilize these ICs to generate the anticipated value and sustain the competitive advantages by learning from other firms' experience [2].

## 2.2 Intellectual Capital Dimensions

According to earlier studies [24], [25], [26] have classified IC into three main components, namely, human capital (HC), relational capital (RC) and structural capital (SC). As a clarification of the IC components, HC encompasses dimensions related to competencies, skills, experiences and mental abilities of the teams. In addition, RC makes knowledge about the groups and networking of knowledge capitals either embedded within or derived from the networks and connections [13]. Lastly, SC entails a group of methods, processes, intellectual property structure, brands and other intangibles owned by firms. The most distinguishing attribute of SC has hidden values in the statement of financial position [13], [27]. In this research SC decomposes into three main elements in addition to relational capital via the innovation capital [30], protected capital which is recognized as intellectual property [28] and process capital [13], [29]. The innovation capital is considered as part of firms' culture and capability of generating different knowledge from the existing ones [30]. Referring to Brooking [31] intellectual property is a comprehensive mean for up keeping enterprise intellectual assets. Hence, an intellectual asset as being covered by legal protection is entitled the protected capital. Lastly, the process capital is the workflows, the operational processes, the specific set of methods, the business development plans, the information systems, and non-resistance culture [29]. Based on Resource-Based View theory, firms maintain their resources as the primary reason to obtain the competitiveness and performance. Such resources take in both tangible and intangible assets. Thus, the capital employed (CE) is a proxy to measure firms' substantial resources which measured explicitly by a sum of physical capital and financial assets ([29]). One of the broadly used approaches to measuring the IC is the value added intellectual capital model (VAIC) which was principally developed to measure the contributions of each resource – human, structural, physical and financial – to make a VA by the enterprise as per stakeholder's theory introduced by Donaldson & Preston [32] and [33]. Other empirical studies attempt to demonstrate the know-how IC contributes in the created VA by the enterprise and therefore inquire about whether it positively associated with its performance indicators. For example, a study by Pulic [34] using data from Austrian firms and settled out that the VA is

very highly correlated with IC, even that the correlation between VA and capital employed (physical and financial) is low. These results propose that IC must become the primary source of value creation in the new knowledge-based economy. Furthermore, Stewart [13] stated that the firms' performance depends on its resources capability to create the value added which shall be measured and reported clearly with no subjective assessment [9], [35]. Likewise, Chen et al [36] mentioned that the investigation of IC across Taiwanese listed firms revealed a positive impact on the market value of these entities by classifying the IC into; HC and SC. Before that, Bontis et al [24] differentiated the HC and SC. They argued that, HC is employee-dependent determinates including; employees' competence, commitment, motivation, and loyalty. HC is recognized as being the cornerstone of creating the whole IC; a distinctive feature of HC is that it may disappear as employees exit. In opposition, SC belongs to organizations including their innovative, relational capital, and organizational infrastructure, which owned by the firm.

## 2.3 Value Added Intellectual Capital (VAIC)

Using the VAIC method measures the efficiency of firms' three types of inputs: physical and financial capital, human capital, and structural capital, namely the Capital Employed Efficiency (CEE), Human Capital Efficiency (HCE), and Structural Capital Efficiency (SCE). The sum of the three measures is the value of VAIC, as firms employ their human, structural, physical and financial capitals, their value is added to such firms. The most efficiently such capitals are exploited, the most value is added to the firms and the better VAIC [37]. The three types of inputs illustrated as follows:

### Human Capital Efficiency (HCE)

Generally, HC involves the pool of experiences, skills, knowledge, and abilities of their staff. In association with the choice of adopted the VAIC model in this current research, the HC defined as the salaries and wages of the staff [34]. Though the controlling role of the firm size, the case of having higher salaries (as a proxy) also employing a high-qualified workforce together mirror to the value to such firms rather than the case of paying lower wages, i.e., HCE confirms how much the value added (VA) is created by each dollar spent on the employee and it calculates as follows:  $HCE = VA / HC$ . As argued by Clarke [38], HCE has three analytical cases. If the salaries are "low" and the VA is "high" then the firm is exploiting its human capital in efficient manner. If the VA value is low in comparison to salaries, then the human capital has not been utilized efficiently and HCE will be low. If the HC value is low, then it is supposed to have better HCE caused by the effective utilization of the staff, which, in turn, adds value throughout the operating profit.

### Structural Capital Efficiency (SCE)

The structural capital involves dimensions of strategic directions, patents, organizational networks, and brands. According to Pulic [34], the SCE is calculated as:  $SC = VA - HC$ . As VA is influenced by HCE and SCE, the structural capital (SC) depends on HC, and greater HC translates into improved internal structures [37] besides as HCE grows then SCE grows as well, thus, Pulic [34] calculated SCE as:  $SCE = SC / VA$ . SCE is consequently shows how much VA is generated by a dollar spent on structural capital.

### Capital Employed Efficiency (CEE)

Using CEE is justified that SCE and HCE fail to capture the whole efficiency. Given that, Pulic, [34] claimed that the IC could not generate value by its own. Accordingly, it ought to combine with the capital employed (CE) (i.e., physical and financial). Therefore, the CE calculated as total assets minus intangible assets, the CEE shows how much VA is generated by a dollar spent on capital employed and it is calculated as:  $CEE = VA / CE$ .

### 2.4 Market-To-Book Value

The market value evaluates the value of organizations with high intangibles to be important more than calculated book value [9]. Consequently, it is theorized that the higher the intangibles, the better the ratio of "market-to-book" value of such organizations [35]. Market to book ratio is used to find the value of a company by comparing the market value of a firm to its book value. Book value is calculated by firm's historical cost, or accounting value. Market value is determined in the stock market through its market capitalization. This drew attention towards inspecting missing values and fundamental limitations of financial statements where IC is evaluated as a hidden value even that it leads the organizations to attain their competitive advantage and economic value ([7]; [8]; [9]; [10]; [11]; [2], 2017). This mean, if the market value of a company is trading higher than its book value, it is overvalued, while, if the book value is higher than the market value, analysts consider the company to be under evaluated. To compare a company's net asset value or book value to its current or market value, the market to book value ratio is used. In opposite, the book value of a firm is its historical cost or accounting value calculated from the company's balance sheet. Book value can be calculated by subtracting total liabilities, preferred shares, and intangible assets from the total assets of a company. In effect, the book value represents how much a company would have left in assets if it went out of business today. Some analysts use the total shareholders' equity figure on the balance sheet as the book value [2]. The market value of a publicly traded company is determined by calculating its market capitalization, which is simply the total number of shares outstanding multiplied by the current share price. The market value is the price that investors are willing to pay to acquire or sell the stock in the secondary markets. Since it is determined by supply and demand in the market, it does not always represent the actual value of a firm.

### 2.5 The Relationship between IC and Market-To-Book Value

Previous research had investigated the relationship between IC and Market- to- book value in different context. Adesina [39], for example, examines the impact of IC on all the technical, allocative and cost efficiencies. The researcher relays on a panel that involves 339 commercial banks operating in 31 African countries over the years (2005–2015). The study findings provide evidence that IC has positive effects on the bank technical, allocative and cost efficiencies. Aftab et al. [35] examine the relationship between intellectual capital and firm value empirically, also, they examine the moderating role of managerial ownership. The study sample entails the panel data taken from non-financial firms listed on Pakistan Stock Exchange over the years (2010-2015) with a sample of 79 firms. The VAIC model was adopted, in their

study, to calculate the IC and Tobin's Q was used to measure the firm value. The results conclude that the relationship between intellectual capital and firm value is positively significant. In 2018, Anifowose et al [40] studied the association between IC disclosure and corporate market value, and controlling the firm age, size, profitability, and risk. In addition to examining the moderating role of the ethnic and religious composition of the board of directors' members on this relationship. The researchers targeted a sample involves "91" listed firms in Nigeria Stock Exchange over the years 2010 to 2014. Their study's findings pointed out a significant and positive association between IC disclosure and market capitalization and a negative relationship with the cost of capital. Also, their results confirmed the moderating effect of ethnic and religious composition of the board of directors' members. Moreover, Komnenic and Pokrajcic [41] empirically scrutinized the significant impact of the HCE, SCE, and CEE on organizational performance. Using a sample involved (37) multinational organizations operating in Serbia over the years 2006 till 2008, they concluded that, HCE is associated positively with ROA, ROE, and productivity. Ahangar [42] responded to the lack of literature in terms of the relationship between the IC and organizational success, the study provide additional insights into the IC role in obtaining better financial performance indicators. In context of Spain, Díez et al [43] studied the effect of HCE and SCE on the generation of the business value. The findings confirm having a positive relationship between the using of HC and SC indicators, and the value creation (measured by the sales growth). Simultaneously, and higher VAIC levels are related to improvements in value creation as well. However, the results did not indicate any relationship between HC and SC and other dependent variables like the return on assets (ROA) and productivity. In UK, Zeghal and Maaloul [44] examine the role of VA (as IC measurement) and its influence on the financial and stock market performance. The results designated that the IC has positive implications on financial and holistic economic performance. In opposition, the association between the IC and the stock market performance is significant only for the case of high-tech industries. Ting and Lean [45]) also, confirmed the association between IC performance and the financial performance by targeting the financial institutions operating in Malaysia over the years 1999 till 2007. Thus, after reviewing related studies, it is noticeable that the interest regarding ICE and its implication is common across researchers from old time till the current time [35] due to the implications of critical aspects like the performance and the value. Also, it can be concluded that, the ICE issue is common interest across developing and developed countries. In addition to that, it can be noted that, VAIC considered as reliable a measurement of ICE. Therefore based on the previous studies and RBV theory assumptions, the relationship between ICE and Market-to-Book value has hypothesized as follow:

H1: There is a significant relationship between ICE and corporate market-to book value.

Within this broad theme, the study has the following specific sub hypotheses:

H1.1 There is a significant relationship between HCE, and corporate market-to book value.

H1.2 There is a significant relationship between SCE and

corporate market-to book value.

H1.3 There is a significant relationship between CEE and corporate market-to book value.

### 3 Methodology

#### 3.1 Research Sample and Data Source

The current research entails all non-financial firms listed in the ASE from 2013 to 2017. The population consists of the service and the manufacturing sectors. The nominated firm must be listed for the whole period, and the required data is found in the annual reports and financial statements. The research sample contain 46 service firms and 49 manufacturing firms, with a total of 95 non-financial firms. Data were extracted from the annual reports over five years from 2013 till 2017. The data keyed-in according to the firms' name and the years for each variable. The initial number of observations after filtered were 475, however, this number of observations was dropped to 385 after eliminating the missing data and outliers observations.

#### 3.2 Variables Measurements

The Independent Variable: Intellectual Capital Efficiency (ICE), as mentioned early in this research, the independent variable is ICE which is measured by the VAIC coefficient model developed by Pulic [34] and used in other researches [46], [47], [6]. VAIC could be considered as an analytical technique intended to assist the management, the internal and external stakeholders to successfully monitor and assess the efficiency of VA by a firm's total resources and each major resource component [6]. Following is the illustration of VAIC measurement;

VAIC is a compound calculation of three elements including:

Human Capital Efficiency (HCE) – indicator of VA efficiency of human capital.

Structural Capital Efficiency (SCE) – indicator of VA efficiency of structural capital.

Capital Employed Efficiency (CEE) – indicator of VA efficiency of capital employed.

The producers of computing VAIC are along these lines ([9]):

$$VA = \text{OUTPUT} - \text{INPUT}$$

According to the stakeholder view [32] this research adopts a comprehensive description in computing VA. The stakeholder view indicates that "any group that can affect or be affected by the achievement of a firm's objectives should have a "stake" in the firm." These stake sets include stockholders, employees, lenders, government, and society; so, in evaluating a firm performance, a broader measure of value added by stakeholders is better than accounting profit that only calculates returns to stockholders. Thus, according to Belkaoui [48] and Adesina [49] the calculation of value added can be stated as equation (1):

$$R = S - B - DP - W - I - DD - T \dots\dots\dots (1)$$

Where:

R is the change in retained earnings.

S is net sales revenues.

B is bought-in materials and services (costs of goods sold).

DP is depreciation.

W is wages and employee salaries.

I is interest expenses.

DD is dividends.

T is taxes.

Equation (1) can be re-arranged as equations (2) and (3):

$$S - B = DP + W + I + DD + T + R \dots\dots\dots (2)$$

$$S - B - DP = W + I + DD + T + R \dots\dots\dots (3)$$

Equation (2) is the gross value-added approach, whereas equation (3) is the net value added approach. The left-hand side of the equations calculates the gross (or net) value added, and the right-hand side of the equations represents the distribution of the value created by firms, including employees, debt-holders, stockholders, and governments. As Chen et al. [50] the VA defined as "the net value created by firms during the year", and because DD plus R is equal to net income under the clean surplus assumption, equation (4) can be stated as follows:

$$VA = [S - B - DP] = [W + I + T + NI] \dots\dots (4)$$

According to Pulic [46] "The VAIC represents the extent that the new value has been created per invested monetary unit in each resource" which are:

HC: the total salaries and wages paid to employees as the proxy of human capital. Thus, HCE is computed in this study as a percentage of total value added over total paid salaries and wages to employees [46], [47], [6] as following equation:

$$HCE = VA/HC$$

SC: is composed into relational capital, innovation capital, protected capital, process capital as following equation:

$$SC = RC + InC + PtdC + PrC$$

This equation includes the below components:

RC (Customer Capital (CC)): is a relational capital measured by promotion and advertisement expenses (Marketing cost) which are paid to improve and manage external (customer capital) relationships [51], [6] as following sub-equation:

$$RCE = (RC/VA) = (\text{Marketing costs}/VA)$$

InC: is the innovation capital which is measured by R&D expenditures and has been used widely in the previous studies [52] as following sub-equation:

$$InCE = (InC/VA) = (\text{R\&D expenditures}/VA)$$

PtdC: it is intellectual property namely defined in this research as "protected capital which is legally protected rights concerning ownership of specific assets such as trademark, patent, industrial design and copyright" [52] and its efficiency is calculated as below sub-equation:

$$PtdCE = (\text{trademark value} + \text{patent cost} + \text{industrial design} + \text{copyright})/VA$$

Process capital efficiency would be calculated as SCE minus relational capital efficiency minus innovation capital efficiency minus protected capital efficiency denoted as below sub-equation:

$$PrcCE = SCE - RCE - InCE - PtdCE$$

The efficiency of these capitals is assessed in consistent with Pulic assumption as following equation:

$$SCE = (RC/VA) + (InC/VA) + (PtdC/VA) + (PrC/VA)$$

$$SCE = RCE + InCE + PtdCE + PrcCE$$

Capital Employed (CE): it is a proxy for firms' tangible resources as following equation ([9]);

$$CE = \text{physical capital} + \text{financial assets}$$

$$CE = \text{Total assets} - \text{intangible assets}$$

$$\text{Then, } CEE = VA/CE$$

The VAIC counts the three efficiency measures into a single index: The inclusive value creation efficiency is merely the sum of all value creation efficiency indicators Therefore, the following equation formalizes the relationship algebraically [40]:

$$VAIC_i = HCE_i + SCE_i + CEE_i$$

Dependent Variable: Market-to-Book- Value (DV)

Market to book value ratio (M/B), measured by the index of market expectation of a firm's future performance compared to book value (i.e., market value of the stock = number of shares outstanding \* stock price at year-end) [53]. In addition, the book value of common stocks = book value of stockholders' equity - paid in capital of preferred stocks.

Control variables

The study uses two control variables: firm size and firm profitability (ROE) as it is recommended by previous studies (Aboody and Lev, 1999; Omil et al., 2011). Firm size measured by the natural logarithm of total Assets (El Ghoul, et al., 2011) and Firm profitability measured as the ratio of profit after tax over equity of the firms namely ROE.

## 4 Results

### 4.1 Descriptive, Normality and Multicollinearity

Table (1) shows the results of normality, the table shows that all variables are normally distributed except the HCE with Kurtosis value 9.442 and VAIC with Kurtosis value is 9.112, which are higher than the accepted cut off points, this can be justified according to the nature of data across the Jordanian market and due to testing the normality for both sectors as none financial firms where there are difference between these sectors in terms of study variables. Moreover, the independence of the independent variables is one of the essential prerequisites of the regression test. Hence, this research uses the variance inflation factor (VIF) test to multicollinearity the results. The accepted cut off point for VIF

TABLE 1  
DESCRIPTIVE, NORMALITY AND MULTICOLLINEARITY

Variable	Mean	S.D	Skewness	Kurtosis	VIF
HCE	3.79	6.39	1.874	9.442	1.059
SCE	.66	.62	.912	6.186	1.061
CEE	.08	.089	1.076	2.084	1.103
VAIC	4.54	6.48	1.912	9.112	-
M/BV	1.16	.75	1.708	4.256	-
Size	17.20	1.18	.533	.863	-
ROE	3.63	10.8	-1.028	3.794	-

*S.D= Standard Deviation, Skewness standard error= 0.124, Kurtosis standard error= 0.248. HCE= Human Capital Efficiency, SCE = Structural Capital Efficiency, CEE = Capital Employed Efficiency. VAIC = Value Added Intellectual Capital. M/BV = Market to book Value. ROE = Return on Equity, VIF = variance inflation factor.*

test is less than 10 [54]. As shown in Table 1, the VIF values fall in the acceptance range below the cut off (10). This confirms that there is none of multicollinearity cases for the variables exist. Moreover, Table (1) illustrates the values of means and standard deviation which reflect the vast extent of harmonization and show the impact of removing the extreme values in reducing the spreading. For instance, for HCE, the mean over five years from 2013 to 2017 equals 3.79, with the lowest value of -30.73 and highest recorded value of 39.13. This specifies that the firm with value -30.73 pays salary and

wages to the employees with no paybacks as they are facing loss. The mean value is low as well which specifies that the majority of the sampled firm experience the same inefficiency case. The standard deviation value stood at 6.39, which confirms there was a dispersion in the values across the sampled firms. Also, the mean values were (0.66, 0.08) respectively for the SCE and CEE. For the standard deviations, the values were (0.62, 0.089) which all are less than the mean as a good indicator. Finally, the dependent variable (market-to-book value) indicates high values in terms of mean (1.16) and 0.75 as standard deviation value less than the mean as well as a proof of harmonization on the observations. Lastly, for the VAIC, the overall efficiency shows the differences across the non-financial sector as the min value is -29.70 and the max value is 40.20, this is confirmed by the high std. deviation value. The Bivariate Pearson correlation test is conducted in this research to examine if the dependent variable is correlated with the independents, and for assessing the correlations across independent variables. In the situation of having a significant correlation, it indicates the strength of such a correlation; According to Cohen [55], the absolute value of  $r$  less than 0.1 is considered as low, the absolute value of  $r$  between 0.1 and 0.3 is considered as medium, and lastly the absolute value of  $r$  more than 0.5 and above is classified as high. The Bivariate Pearson correlation also designates the relationship direction.

Lastly, it supports the direction of research hypotheses. Consequently, the results of correlation analysis is illustrated in Table (2). The results in Table (2) indicate the Person correlation matrix for the sampled non-financial firms that help in understanding the correlation coefficients amongst the independents in order to apply the regression analysis. It is observed that there is a low correlation coefficient between the HCE and SCE = 0.068, there is also a low correlation coefficient between the HCE and CEE = 0.208. This result reveals that there is no problem of multicollinearity between the independent variables. Furthermore, Table 2 shows that the market to book value has the highest positive correlation with the ROE as well at ( $r = 0.404$ ) as control variable and with CEE as an independent variable with  $r=0.376$ . Though, none

TABLE 2  
BIVARIATE PEARSON CORRELATION

	HCE	SCE	CEE	M/BV	Size
HCE	1				
SCE	.068	1			
CEE	.208**	-.210**	1		
M/BV	.182**	.106*	.376**	1	
Size	.363**	-.004	.138**	.216**	1
ROE	.406**	-.193**	.739**	.404**	.170**

Note: \*  $P \leq 0.05$ , \*\*  $P, \leq 0.01$

HCE= Human Capital Efficiency, SCE = Structural Capital Efficiency, CEE = Capital Employed Efficiency. VAIC = Value Added Intellectual Capital. M/BV = Market to book Value. ROE = Return on Equity

of the research variables have any negative relationships with the market to book value but the relationship between SCE and CEE was (-.210). Lastly, it is noticeable that there is a high correlation between the ROE (as a control variable) and the CEE, this is justified that ROE is the percentage expression of a company's net income, as it is returned as value to shareholders. This value permits investors and financial

analysts to assess the firm's profitability and in turn evaluate its efficiency in optimizing the funds that stockholders have invested as ROE equals net income over shareholders equity. In other words, higher ROE means that the firm is using the investors' money in more efficient manner to enhance the overall performance and growth.

#### 4.2 Hypotheses Testing

In order to examine the relationship between the ICE and its dimensions; HCE, SCE, and CEE and the corporate market to book value as a dependent variable with the existence of the control variables; ROE and firm size. The main and sub-hypotheses are examined as per Table (3) shows the main results.

Table (3) illustrates that, the test is conducted into two steps, firstly (step 1) shows only the impact of the control variables on the market to book value to limit their effect. Secondly (step 2) shows the overall impact of independent variables on market to book value. Besides evaluate the change in R and F for the independents effect. The value of multiple coefficients (R) is (0.488) in step 2 which proves a positive correlation between the market-to-book value and the independence variables. The strength of the relationship is high as per Cohen, 1988. The value of R<sup>2</sup> is (.238) in step 2, this shows that the change in independents is accounted for 23.8% of the variation in the market-to-book value. This value indicates that the independents explain in a medium amount of the variations of the market to book value as a dependent. ANOVA results show a significant value (less than 5%). There is a positive impact of all independents HCE, SCE and CEE on the market

TABLE 3  
MULTIPLE REGRESSION RESULTS

Variables	DV: market-to-book value	
	Step 1 Beta	Step 2 Beta
Control Variables		
Size	.097	.101
ROE	.026	.021
Independent variables		
H1.1 HCE		-.006*
H1.2 SCE		.250*
H1.3 CEE		.581*
F value	43.434*	23.689*
R	.430	.488
R <sup>2</sup>	.185	.238
R <sup>2</sup> change	.185	.053
F Change	43.434	8.761

Note: \*  $P \leq 0.05$

to book value at F-value (23.689). The outcomes show that  $\beta$  (impact value) of the control variables size is 0.101 and ROE is 0.021, which indicates their positive influence and there increase in one unit will increase the dependent variables (market to book value) with beta value, and this is aligned with the literature. For step 2, HCE value is -.006, SCE is .250 and CEE is 1.581. This shows that the higher impact is still for the tangible resources. Also, this infers as when the independents increase with one unit, the market to book value is expected to increase with  $\beta$  value. Except the case of HCE step 2. In step (1) analysis the R<sup>2</sup> value equal R<sup>2</sup> change which is .185 that represent just the control variables clarification impact which is proved in step (2) when subtracting R<sup>2</sup> change value from R<sup>2</sup> value [ .238 - .053] its equal .185 which reflect the accurate impact of control variables in step 1.

## 5 DISCUSSIONS

This research examined the relationship between ICE and corporate market- to- book value across non -financial firms listed in ASE during 2013-2017. Based on theoretical foundations and literature, the current research distinguishes three dimensions of ICE; HCE and CEE as components of VAIC model. Before testing the hypotheses, the research ensured the existence of all basic assumptions entailing; normality and non-multicollinearity between all independent's variables. The HCE mean value indicates that, on average Jordanian non- financial firms over the observed five years created only 3.79 for everyone dinar was invested on employees. Moreover, the mainstream of the non –financial Jordanian firms experience inefficiency exploiting of the human capital as salaries are very high compared to the value created (profit generating vs. losses cases). Accordingly, it can be concluded that when firms suffer from net loss, then they cannot create value. Thus, this firms which suffer from net loss may are not effectively managing their human capital and consequently have issues and concerns about the continuity. For the SCE, the minimum value was negative, this specifies that this firm may has a lack of innovative capital nor protected capital. The mean value of CEE was the lowest comparing with other two components of VAIC, this can be inferred as the nation –Jordanian financial firms created low VA by a dinar spent on CE. Also, the mean value of the market to book indicates that the market value is about one and quarter the value of the registered book value, this confirms the gaps in the valuation of the intangibles as one of the critical dilemmas on the accounting research. Moreover, the results indicates that, the highest correlation strength was between the CEE and the market to book value which means that the highest value as per the disclosed data is generated from the physical and financial capital as may a sign of having lack of proper measurement of the intangibles. In addition, it is rationally recommended that HC is a particularly significant element of IC. Consequently, non- financial Jordanian firms get the advantage from investigating in their stuff skills and knowledge as those employees are precious assets who ought not to be neglected, to enhance the performance and remain competitive in the market place. The results from multiple regression showed that there is a positive and significant association between the VAIC (e.g. HCE, SCE and, CEE) with the ROE. These results are in alignment with past studies. For instance, by reviewing previous studies in the last few years, the majority of them managed to confirm a positive relationship between IC and firms' performance (see, Dzenopoljac et al. 2017; Yalama and Coskun; 2007). Other previous studies have designated that there is a significant relationship between only HCE and organizational performance (Goh 2005; Makki et al. 2008; Gan and Saleh 2008; Ting and Lean 2009; Phusavant et al. 2011; Mondal and Gosh 2012; Komneninc and Pokrajcic, 2012; Oppong and Pattanayak, 2015; Adesina, 2019 [35].

## 6 RESEARCH IMPLICATIONS

This research contributes to the accounting literature by understanding the ICE concepts, and bridges the gaps in literature by confirming the positive relationship between ICE and market-to- book value based on RBV theory, especially in context of developing countries. Future researchers could benefit from this results to expand the knowledge in this field of research. It serves as an extension to RBV as a managerial

framework aimed to define the strategic resources with the possibility to bring comparative advantage to any firm to achieve sustainable competitive advantage and higher market value. In addition to that, by responding to calls of previous studies [56], [57], [6] which confirmed the importance of VAIC as measurement for ICE, this research explained (step by step) the measurement for the ICE by VAIC. The current research, also, contributes practically to the Jordanian market as it introduced justification about the relationship between "ICE" and corporate market-to-book value among the sampled non-financial firms listed in ASE. Also, this research targets non-financial firms as an essential supporter of the Jordanian economy as they offer job opportunities, and most comprehensively contribute to the growth in the gross domestic product. Thus, they report modest market value as a lack of proper measurement and reporting of their intangibles. Hence, it is essential to analyze the relationship between ICE and the corporate market to book value. Moreover, objective data were used in the calculation of VAIC based on the financial statements, which are audited by professional auditors. This, in turn, will increase the data validity and reliability. Thus, the results help managers to act in a better way to efficiently manage their resources.

## 7 RESEARCH LIMITATIONS AND FUTURE RESEARCH

This research has some limitations. Firstly, during the data collection, some observations were excluded because of missing raw data about the intangible assets in the financial statements. Secondly, since the sample involves all non-financial firms listed on ASE, then conclusions of the current research should be treated with attention when investigating other sectors. For future research, it is recommended to investigate banking and insurance sectors, as they are a knowledge-intensive, skills-based and relationship-rich sector. In an increasingly complex and more liberal environment, the competitiveness of banking institutions will depend critically on the quality of human intellectual capital and the extent to which the industry can leverage on these talents. Organizations should be concerned about regular training and improvement of employees and ensuring the working environment is conducive for them. Finally, future research may replicate this research and expand the sample to include the financial sector and entail different countries for comparison purposes. This enrichment will not only enlarge the sample size but also, and most vitally, create an excellent opportunity for direct comparison between different populations.

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