Audit committee characteristics: an empirical investigation of the contribution to intellectual capital efficiency

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Abstract

Purpose – *In a knowledge economy, it is generally agreed that audit committees play a significant role in supporting the overall firm's knowledge, particularly enhancing the reporting process. In this respect, this paper aims to examine the effect of audit committee characteristics on intellectual capital efficiency.*

Design/methodology/approach – *This study examined 59 banks for five years (2011-2015), obtaining 295 observations. The study's independent variable is audit committee characteristics. The dependent variable is intellectual capital components (Human: human capital efficiency [HCE]; Structural: structural capital efficiency [SCE]; Relational: relational capital efficiency [RCE]; and Physical/Financial: capital employed efficiency [CEE]). In addition, the study used four bank-specific control variables.*

Findings – *The findings deduced from the empirical results demonstrate that there is a significant positive impact of audit committee characteristics on intellectual capital. Moreover, the relationship between audit committee and intellectual capital components (HCE, SCE, RCE and CEE) also has a significant positive relationship if measured individually.*

Originality/value – *The study provides insights about the relationship between audit committee characteristics and the improvement in intellectual capital efficiency, which might be used by firms to re-arrange the roles within audit committee, to reassign internal priorities and to escalate position in their environment.*

Keywords *Banks, GCC countries, Intellectual capital, Audit committee, MVAIC*

Paper type *Research paper*

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1. Introduction

Intellectual capital (IC) can be defined as a business asset (Tejedo-Romero and Ferraz Esteves de Araújo, 2016) that has become an essential resource and the main competitive advantage (Rodrigues *et al.*, 2017). IC can have different origins, such as people, organization, technology and market or socio-economic environment, that form it (European Commission, 2006). Many researchers argue that IC significantly increases a firm's value (Hamdan *et al.*, 2017; Buallay, 2017).

Firms are becoming aware of the importance of effective corporate governance (CG) that should provide the mechanisms necessary for improving their IC efficiency. It is generally agreed that audit committees play a crucial role in governance practices, particularly in enhancing the boards' effectiveness in monitoring management (Smith Report, 2003; Spira, 2003). In this regards, the purpose of this study is to examine the association between audit committee characteristics, such as independence, number of meetings, financial expertise and size (as measures of its effectiveness), and IC efficiency, such as human, structural, relational and financial capital efficiency.

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Some prior studies have addressed the IC efficiency and its relationship with firm performance (Celenza and Rossi, 2014; Inkinen, 2015; Singh *et al.*, 2016). The studies showed that firms still suffer from inefficient utilization of IC. However, these studies did not empirically test who contributes toward IC efficiency inside firms. Therefore, this study aims to determine the contribution of the audit committee towards the IC efficiency.

Because the focus on IC and adoption of CG are the main drivers of banks' success in emerging market and Gulf Cooperation Council (GCC) countries, significant empirical research is not yet adopted. Therefore, this study provides the earliest empirical research that discusses the relation between audit committee characteristics and IC in GCC countries.

This study investigates the capability of audit committee characteristics to better support IC and improve bank performance directly or indirectly through the contribution of audit committee toward IC efficiency.

We selected GCC countries because they have favourable commercial environment, good levels of competitiveness, low taxation, a developed judicial system and a robust investment environment. Presently, the banking sector plays an important role for the development and growth of the national economy by facilitating financial transactions. In Gulf countries, where there is competitive environment and globalization business challenges, banks are forced to reshape into becoming knowledge-intensive rather than being traditional to capitalize bank resources, especially IC. These countries' aims are to become knowledge-based economies and to reduce their high reliance on the export of fuel and gas as main revenue sources by transforming from the rent-seeking economies to knowledge-based economies (Al-Obaidan, 2008).

Audit committee characteristics and ICs are assumed to be significant for all stakeholders; hence, factors affecting the relationship between audit committee characteristics and IC need to be highlighted. This study contributes to IC literature in different directions. First, this study sheds light on the rare prior IC studies in relation to governance in GCC countries. Second, it provides empirical evidence on the relationship between audit committee characteristics and IC and shows whether an effective audit committee contributed to IC, which has not been sufficiently examined in relation to this topic earlier. Third, this study uses the modified value-added intellectual coefficient (MVAIC) model that can be an important tool used by many parties to integrate IC in their decision-making process. Finally, the study results will be helpful to bank stakeholders, investors, decision-makers, regulators, policymakers and scholars to improve their awareness of IC and the importance of incorporating CG and increasing its adaption level.

The study is divided into the following sections: Section 1 is the introduction; the remaining part of this paper is divided into five sections: Section 2 discusses the literature review and develops the hypotheses; Section 3 presents the design and research methodology; Section 4 shows the descriptive statistics; Section 5 presents the empirical analysis results; Section 6 presents the study's conclusion, recommendations and the scope for further research.

2. Literature review and hypothesis development

2.1 Significance of audit committee

CG has generated many changes in both the business environment and in particular in the accounting and auditing profession. In the past few years, there has been an interest and focus upon the role of audit committees. As it is a tool of corporate governance with the aim to increase the questioning of management and to increase independence of auditors (Hamdan and Mushtaha, 2011).

During the recent years, the interest in the role of audit committees has expanded in terms of their role in preparing financial statements. Pucheta-Martínez and De Fuentes (2007) found that an audit committee is more dynamic in reviewing financial statements and decreasing differences between managers and external auditors. This lessens the likelihood of a firm having qualified opinions from the external auditor resulting from accounting errors and non-commitment to accounting standards.

Audit committees play a crucial role in implementing CG practices. Audit committees have the role in monitoring internal control systems through associations with internal auditors, as external reporting and compliance are completed by external auditors. Amongst all aspects of relationships between internal auditors, external auditors and the board of directors, audit committees have a crucial role (Saibaba and Ansari, 2013).

2.2 Audit committee characteristics

Prior literature on audit committees stated that the effectiveness of an audit committee depends on its characteristics (Akhtaruddin and Haron, 2010; Dhaliwal *et al.*, 2010; Li *et al.*, 2012). Therefore, a reliable mixture of experience, expertise and capabilities is crucial for supporting an audit committee's ability to efficiently carry out its responsibilities (Madi *et al.*, 2014).

Baxter and Cotter (2009) stated that an audit committee's independence is a key characteristic that influences a committee's competence and effectiveness in the process of managing financial statements. Also, an audit committee's independence is greatly related to the measurement of earnings quality. An independent audit committee is expected to play a key role in financial reporting, auditing and CG; independent directors put an effort in enhancing the processes conducted by board members and even bring in specialists to make use of their expertise and knowledge, to provide continuity and to assist in recognizing alliances and acquisitions; those directors help sustain a morally ethical climate within the organization (Kantudu and Samaila, 2015).

The efficiency of an audit committee is enhanced by financial expertise of committee members; this is a key characteristic that ensures effective operation (Baxter and Cotter, 2009). Lisic *et al.* (2011) suggested that is the presence of a financial expert on the audit committee does not mean that there is more effective monitoring. Rather, monitoring effectiveness of the audit committee financial expertise depends on the authority of top management. Thorough financial expertise allows audit committee members to categorize and debate questions that challenge managers and external auditors to a bigger scope of financial reporting quality (Bédard and Gendron, 2010). In response, this will improve the clarity and reliability of corporate reporting and therefore lessen issues that are related to the flow of information. A study conducted by Kent *et al.* (2010) found a positive relation between an audit committee's financial expertise and the quality of financial reporting. Baxter and Cotter (2009) stated that the level, activities and responsibilities of an audit committee are crucial in terms of improving the reliability in enhancing earnings quality.

Also, the size of any given audit committee has a positive effect on earnings quality. A bigger audit committee is more effective because of the fact that they comprise members with diverse knowledge and expertise to perform more reliable monitoring of financial practices (Hamdan *et al.*, 2013). Thoopsamut and Jaikengkit (2009) found that the audit firm size is not significantly related to earnings management. In their previous work, Allegrini and Greco (2013) stated the fact that the resource dependency theory argues that a large audit committee is more eager to dedicate resources and authority to effectively carry out

responsibilities. The more number of directors there are on an audit committee, the more diversity and expertise and capabilities there are that would guarantee operative monitoring (Bédard and Gendron, 2010). Therefore, a large number of audit committee members are more likely to aid a committee to expose and solve issues and dilemmas in corporate reporting processes (Li *et al.*, 2012). This means that size is an integral factor for an audit committee to oversee corporate disclosure practices (Persons, 2009). Persons found evidence that numerous directors on audit committees tend to improve the level of voluntary disclosures.

DeZoort *et al.* (2002) define the frequency of meetings as an evaluation of an audit committee's due diligence. The frequency of meetings is a core element in the reliability and efficiency of a company's activities and processes, although there are few studies that acknowledge the connection between the performance of the company and the number of meetings (Ioana, 2014). The frequency of meetings is an important characteristic of audit committees. Board members that regularly meet are more likely to accomplish their work and responsibilities attentively and successfully. Boards would more effectively improve the level of oversight of the process of financial reporting both directly and indirectly through choices of external auditors and the audit committee (Yatim *et al.*, 2006). Raghunandan and Rama (2007) and Sharma *et al.* (2009) found that the frequency of audit committee meetings is positively associated with growth and profitability. Also, Abbott *et al.* (2000) and Beasley *et al.* (2000) found that the increasing frequency of meetings is related to better quality of financial statements.

2.3 Definition and valuation of intellectual capital

In 1996, IC was defined by Edvinsson and Sullivan as knowledge that can be converted into value. In 1997, Stewart (1997) broadened the definition of IC to the collection of knowledge, information, intellectual property rights and experience of each person in a business entity. In the same year, Edvinsson and Malone (1997) added few concepts to the definition "IC is the possession of the knowledge, applied experience, organizational technology, customer relationships and professional skills that provide a company with a competitive edge in the market". Later, Zéghal and Maaloul (2010) defined IC as "the sum of all knowledge a firm is able to use in the process of conducting businesses to create value for the company". Recently, Alipour (2012) defined IC as "the group of knowledge assets that are owned and/or controlled by an organization and most significantly drive organization value creation mechanisms for targeted company key stakeholders". More recently, Chen *et al.* (2014), by summarizing previous literature, concluded that IC can be defined as "knowledge-related intangible assets embedded in an organization that include intellectual competences, intellectual property, and intellectual resources".

Arguably, the last two decades have been exposed the importance of intellectual capital (IC) efficiency to firms' performance. The debate of IC has been approved as an important academic discipline to be considered all over the world (Serenko and Bontis, 2013). Therefore, the IC discipline has become a crucial factor of firms in enhancing their competitive advantage and attaining better performance (Wang and Chang, 2005). IC efficiency is hard to be identified, disclosed and measured in firms' financial reporting. According to the International Accounting Standards (IAS 38), which addressed the issues regarding the intangible assets, it is not easy to measure IC components of firms by adopting the current traditional accounting practice. This led to a gap between firms' values as reported in financial reporting and actual market value (Rahman, 2012). The call for IC efficiency valuation has increased; there are different methods established to measure the value of IC and its efficiency, such as Skandia IC report (Edvinsson and Malone, 1997), intangible asset monitor approach (Sveiby, 1997), value-added intellectual coefficient

(VAIC) (Pulic, 1998). The VAIC is widely used in calculating IC efficiency; Laing *et al.* (2010) showed that VAIC is a strong tool in assessing the value of IC.

2.4 Intellectual capital and bank performance

Mavridis (2004) examined the relationship between IC and performance of Japanese banks and found it to be useful for evaluating differences in human capital efficiency (HCE) and structural capital efficiency (SCE) performance among different banks in Japan. Singh *et al.* (2016) measured the relationship between IC and return on assets (ROA) of Indian banks' performance, and compared the IC performance of public and private banks. The results revealed that the private sector banks have better IC efficiency than public sector banks. As for GCC countries, Al-Musalli and Ismail (2012) examined the relationship between IC and the performance of 74 listed banks. They tested the effect of CG variables, bank-specific characteristics and banking industry characteristics on IC performance. They found that board size, number of independent directors, family ownership and domestic strategic institutional ownership have a significant relationship with IC performance. Abdulsalam *et al.* (2011) measured IC of the banking sector in Kuwait. They ranked the findings of Kuwaiti banks based on HCE and capital employed efficiency (CEE). Ismail and Karem (2011) examined whether IC affects banks' performance in Bahrain. They found that IC has a positive impact on banks' financial performance. Moreover, they found that HCE and SCE are positively associated with banks' performance. However, there was no significant association between SCE and banks' performance. In Saudi, Al-Musali and Ismail (2014) examined the impact of IC on Saudi banks' performance. They found that IC performance is low and has a positive relationship with return on equity (ROE) and ROA. Recently, another study conducted by Razak *et al.* (2016) tested the IC performance of Saudi commercial banks. The study examined 12 commercial banks in 2014. The study revealed that Saudi banks have a higher HCE than SCE and CEE.

As aforementioned, arguments on IC and banks' performance are an important issue. Therefore, it is interesting to further explore the effect of audit committee characteristics – as an indirect driver for better performance – on the IC of listed banks in GCC countries. Therefore, we construct our main hypothesis as follows:

H0. Audit committee characteristics do not affect IC of GCC listed banks.

H1. Audit committee characteristics affect IC of GCC listed banks.

And the sub-hypotheses are constructed as follows:

H1a. Audit committee characteristics affect the human capital of GCC listed banks.

H1b. Audit committee characteristics affect the structural capital of GCC listed banks.

H1c. Audit committee characteristics affect the relational capital of GCC listed banks.

H1d. Audit committee characteristics affect the capital used of GCC listed banks.

3. Research methodology

3.1 Study population, sample and resources of data

The study depends on the selected sample which included 295 observations for 59 listed banks in GCC stock exchange (Saudi, Bahrain, Kuwait, UAE, Qatar and Oman) for five years from 2011 to 2015.

The data used in this study were collected from the annual reports of listed banks. Banks used in the sample were selected according to the following: data are available in the period from 2011 to 2015. Banks have not been turned off or merged with other banks during the research period. We used in our sample pooled data that combine both time series data and cross-sectional data (Table I).

Table I Sample selection

Country	*No. of banks*	*No. of annual reports*
Bahrain	7	35
Kuwait	9	45
Oman	8	40
Qatar	9	45
Saudi	12	60
UAE	14	70
GCC	59	295

3.2 Study variables

The independent variable (audit committee characteristics) has been measured using the audit committee members' financial expertise, audit committee size, independency of audit committee and audit committee frequency of meetings (Hamdan *et al.*, 2013; Al-Sartawi *et al.*, 2013) .

According to the MVAIC model, the dependent variables are divided into four main components (HCE, SCE, CEE and relational capital efficiency [RCE]). Based on this, the study used the MVAIC model as the independent variable. This method has been followed by many prior studies (Celenza and Rossi, 2014; Singh *et al.*, 2016; Inkinen, 2015). The calculation of each component of the MVAIC model (e.g. HCE, SCE, CEE and RCE) is presented in Table II.

Finally, four types of control variables have been used in this study: bank age (BAG), bank size (BSZ), bank type (BTYP) and audit quality (ADT) (Buallay *et al.*, 2017).

3.3 Study model

To measure the relationship between audit committee characteristics and IC, this study estimated the model as follows:

$$IC_{itg} = \beta_0 + \beta_1 ACFE_{it}g + \beta_2 ACSZ_{it}g + \beta_3 ACIND_{it}g + \beta_4 ACM_{it}g + \beta_5 BSZ_{it}g + \beta_6 BAG_{it}g + \beta_7 ADT_{it}g + \beta_8 BTYP_{it}g + \varepsilon_{itg}$$

Where IC is a continuous variable, measured using MVAIC, and the MVAIC model is measured using four components (e.g. HCE, SCE, HCE and IR). HCE is a continuous variable; the dependent variable is the ratio of value added divided by human capital for the bank (i), in the period (t), in the country (g). SCE is a continuous variable; the dependent variable is the ratio of structure capital divided by value added for the bank (i), in the period (t), in the country (g). RCE is a continuous variable; the dependent variable is the ratio of value added divided by relational capital, for the bank (i), in the period (t), in the country (g). CEE is a continuous variable; the dependent variable is the ratio of value added divided by capital employed for the bank (i), in the period (t) in the country (g). β_0 is the constant and β_{1-8} is the slope of the controls and independent variables. ACFE: is the dummy variable, the independent variable, 0 if a member has less than five years of experience as an audit committee member and 1 otherwise for the bank (i), in the period (t), in the country (g). ACSZ is the dummy variable, the independent variable, 0 if the audit committee members are not between three and seven members and 1 otherwise for the bank (i), in the period (t), in the country (g). ACIND is the dummy variable, the independent variable, 0 if the audit committee members are not controlled by greater than 50 per cent independent outside members and 1 otherwise for the bank (i), in the period (t), in the country (g). ACM is the dummy variable, the independent variable, 0 if the audit committee meets fewer than five times in a year and 1 otherwise for the bank (i), in the period (t), in the country (g). BAG is

Table II Data and model validity

Variables	*Labels*	*Measurements*	*Normality Shapiro–Wilk/ Kolmogorov–Smirnov*	*Collinearity VIF test*	*Stationarity ADF/ Phillips–Perron*	*Autocorrelation D-W test*	*Heteroskedasticity Breusch–Pagan test*
Dependent variables							
Human capital efficiency	HCE	The ratio of value added divided by HCE. Where: Value added = operating profit + employee cost + depreciation. Where: HCE = total costs invested on employees	0.277		−6.284***	1.363	0.005
Structural capital efficiency	SCE	The ratio of SCE divided by value added. Where: SCE = value added − HCE	0.098		−2.113***	2.001	0.025
Capital employed efficiency	CEE	The ratio of value added divided by CE. Where: CE = equity + long-term liabilities	0.379		−4.080***	1.898	0.034
Relational capital efficiency	RCE	The ratio of value added divided by RC. Where: RC = marketing and sales expense	0.188		−3.332***	1.338	0.042
Independent variable							
Audit committee members' financial expertise	ACFE	0 if a member has less than five years of experience as audit committee member 1 otherwise	0.203	1.520	−1.994***		
Audit committee size	ACSZ	0 if the audit committee members are not between three and seven member and 1 otherwise	0.097	2.004	−2.200***		

(*continued*)

Table II

Variables	*Labels*	*Measurements*	*Normality Shapiro–Wilk/ Kolmogorov–Smirnov*	*Collinearity VIF test*	*Stationarity ADF/ Phillips–Perron*	*Autocorrelation D-W test*	*Heteroskedasticity Breusch–Pagan test*
Audit committee independence	ACIND	0 if the audit committee members are not controlled by greater than 50% independent outside members and 1 otherwise	0.052	2.058	−1.203***		
Audit committee meetings	ACM	0 if the audit committee meets fewer than five times in a year and 1 otherwise	0.091	1.648	−1.007***		
Control variables							
Bank type	B.typ	0 if bank is an Islamic bank and 1 if bank is a conventional bank	0.197	1.815	−3.777***		
Bank size	B.size	Total assets of the bank	0.098	1.534	−2.063***		
Audit quality	ADT	Company's external auditor is one of the big four audit firms (KPMG, E&Y, PWC, Deloitte)	0.159	1.554	−2.114***		
Bank age	B.age	The number of years since the company was established	0.387	2.285	−4.228***		

Note: Significant at ***1 levels

the control variable, the number of years since the bank was established, for the bank (i), in the period (t), in the country (g). BSZ is a control variable, the total assets of the bank, for the bank (i), in the period (t), in the country (g). ADT is the control variable (dummy variable), where the bank's external auditor is one of the big four audit firms, for the bank (i), in the period (t), in the country (g). BTYP is the control variable (dummy variable), 0 if the bank is an Islamic bank and 1 if the bank is a conventional bank, for the bank (i), in the period (t), in the country (g). ε is the random error.

3.4 Model validity

Linear regression model was used to test the relationship between the audit committee characteristics and disclosure. We, therefore, run several tests to check whether the data of this study could meet the conditions of the linearity assumptions.

As presented in Table II, to secure approximation of data to normal distribution, Shapiro–Wilk parametric test and Kolmogorov–Smirnov non-parametric test were used. The null hypothesis of these tests is that the population is normally distributed. Thus, if the p-value is less than the chosen 0.05, then the null hypothesis is rejected, and there is evidence that the data are not normal. As is shown Table II, we noticed that the value for all variables was more than 0.05. This ascertains that the study data are normally distributed.

However, empirical research that uses time series, like the case of this study, presupposes the stability of these series. Autocorrelation might occur in the model because the time series on which this study is based is non-stationary (Gujarati and Porter, 2003). To check stationarity of the time series, unit root test, which includes the parametric augmented Dickey–Fuller test (ADF) and the non-parametric Phillips–Perron (PP) test, was used. As is presented in Table II, we can notice that the ADF test and the PP test are statistically significant at the level of 1 per cent, which meant that the data of time series (2011-2015) were stationary.

As for the strength of the linear model, basically depends on the hypothesis that every variable from the independent ones is by itself independent. If this condition is not realized, the linear model will be inapplicable. This can never be considered good for parameters' evaluation. To actualize this, collinearity diagnostics standard used incessant tolerance quotient for every variable of the independent ones. Variance inflation factor (VIF) needs to be calculated after this step. This test is the standard that measures the effect of independent variables. Gujarati and Porter (2003) stated that getting a VIF higher than 10 indicates that there is a multicollinearity problem for the independent variable of concern. As presented in Table II, it can be noticed that the VIF values for all independent variables is less than 10, which means that we do not have any collinearity problems in the study models.

To test the autocorrelation problem in the study models, we used the Durbin–Watson (D-W) test. Table II shows that the D-W values of the models are within 1.5-2.5. This indicates that there is no autocorrelation in this model.

Finally, one of the significant assumptions of the regression models is the presence of homoskedasticity. Its mean the value should be equal to zero. If heteroskedasticity is present in the model, then some statistical methods, such as the Breusch–Pagan test, will be used to overcome this problem. As shown in Table II, we find that the p-value of the four models is more than 0.05 which indicates admitting the null hypothesis; these models do not suffer from actual heteroskedasticity.

4. Descriptive analysis

In this section, we used the descriptive statistics to describe the study variables. Thus, we first show the mean, maximum, minimum and standard deviation of the variables. Also, skewness was used to measure the lack of symmetry, and kurtosis was used to measure

whether the data are heavy-tailed or light-tailed relative to the normal distribution. Finally, we adopt path analysis to show more advanced results.

4.1 Descriptive statistics

As shown in Table III, the values for asymmetry and kurtosis between −2 and +2 are considered acceptable to prove normal univariate distribution (George, 2011) (Table III).

The descriptive analysis of MVAIC and its components (HCE, SCE, CEE and the RCE) shows that the HCE is the most influential component in creating wealth with the greatest mean value of 1.680, compared to CEE, SCE and RCE with mean scores of 0.624, 0.137, and 0.103, respectively. This is in line with prior findings that human capital is the most effective driver of value creation compared to other IC components (Rahman, 2012).

The HCE, SCE and RCE are intangible components. On the other hand, the CEE is the tangible component. The combined mean score of HCE, SCE and RCE is 2.407, which is much higher than the mean CEE of 0.137. The difference suggests that firms create value more from intangible assets than from tangible assets. It is in consistent with prior studies that firms operating in the developed countries tend to create value via intangible components than via tangible or physical components (Celenza and Rossi, 2014; Inkinen, 2015; Singh *et al.*, 2016).

4.2 Audit committee, intellectual capital and bank characteristics

4.2.1 Audit committee characteristics, IC and bank size. We divided the audit committee characteristics and IC components into two categories: banks with a high asset size and banks with a low asset size (Table IV). The study used path analysis based on the value of total assets' median to identify the variance between the means of the two-sample *t*-statistic test was used. The analysis using the *t*-statistic test showed that the audit committee expertise and independency tend to be higher with banks that have few assets. However, the audit committee size and the number of meetings held in a year tend to be more with banks having more assets. The audit committee expertise, independency and size were found to be significance in variance between the means of the two samples (less than 0.05). Whereas, the result found that the variance between the means of the audit committee meetings is insignificant (more than 0.05).

Table III Descriptive analysis

Variables		*Mean*	*Descriptive* *Maximum*	*Minimum*	*SD*	*Skewness*	*Kurtosis*
Dependent variables							
Human capital efficiency	HCE	1.680	2.956	−2.300	1.389	1.004	1.079
Structural capital efficiency	SCE	0.624	0.310	0.294	0.310	1.352	−4.840
Capital employed efficiency	CEE	0.137	0.302	−0.323	0.302	0.259	1.227
Relational capital efficiency	RCE	0.103	4.099	−1.112	0.638	1.009	0.602
Independent variables							
Audit committee members' financial expertise	ACFE	3	8	2	0.471	0.076	−0.541
Audit committee size	ACSZ	3	8	2	1.251	1.005	1.055
Audit committee independence	ACIND	2	3	0	0.084	1.832	1.077
Audit committee meetings	ACM	5	10	1	2.680	1.259	1.228
Control variables							
Bank size	BSZ	22837607	670516654	4.134	1.336	0.909	−0.845
Bank age	BAG	20.738	54.000	4.000	1.004	0.770	−0.226

Table IV Audit committee, IC based on bank characteristics

	Bank size				*Bank age*			
	Mean difference by B.size		*Difference tests*		*Mean difference by B.age*		*Difference tests*	
Variables	*High asset*	*Low asset*	t-*Statistic*	p-*Value*	*Older bank*	*Younger bank*	t-*Statistic*	p-*Value*
Independent variables								
Audit committee members' financial expertise	4.228	6.475	−2.661	0.012**	4.848	2.262	−2.190	0.025**
Audit committee size	10.898	9.630	3.267	0.005***	5.114	3.164	2.246	0.041**
Audit committee independence	0.2398	3.750	−2.751	0.011**	2.558	1.584	−4.399	0.001***
Audit committee meetings	7.898	8.630	0.045	0.301	2.214	2.164	2.646	0.038**
Dependent variables								
Human capital efficiency	1.114	1.750	0.800	0.075	1.353	1.205	0.118	0.215
Structural capital efficiency	2.334	1.910	−1.777	0.094*	2.004	1.640	−3.607	0.003***
Capital employed efficiency	3.070	2.989	2.141	0.014**	3.220	2.963	4.377	0.001***
Relational capital efficiency	1.778	1.929	−1.874	0.091*	1.801	1.010	1.684	0.108

Note: Significance at: *10%, **5% and ***1 levels

In addition, the analysis using the *t*-statistic test showed that the HCE and RCE tend to be higher in banks having few assets. However, the SCE and CEE tend to be higher in banks having more assets. Only the CEE was found to be significant in the variance between the means of the two samples (less than 0.05).

4.2.2 Audit committee characteristics and bank age. Moreover, we divided the audit committee characteristics and IC components into two categories: older banks and younger banks (Table IV). The study used path analysis based on the value of the bank's age median to identify the variance between the means of the two samples t-statistic test. The analysis using the *t*-statistic test showed that the four audit committee characteristics tend to be higher with older banks and significant in the variance between the means of the two samples (less than 0.05).

Furthermore, the analysis using the *t*-statistic test showed that HCE, SCE, CEE and RCE tend to be higher in older banks. However, only the SCE and CEE were found to be significant in the variance between the means of the two samples (less than 0.05).

5. Empirical analysis

Could the audit committee characteristics be a proxy for better IC? In other words, is it possible that audit committee characteristics lead to IC efficiency?

Our study can only assume a correlation between error and independent variables of the study sample. The Hausman test confirmed this, in which a null hypothesis assumes that the capabilities of the fixed-effect approach (FE) and the random-effect approach (EF) are same, but if a null hypothesis is accepted, then this indicates that the RE approach is appropriate, and it is therefore the preferable method to use. The Hausman chi-square model is shown in Tables 5, with *p*-value being statistically significant at less than 5 per

Table V FE results (testing main-hypothesis)

Variables	*Label*	*MVAIC model* β	t-*Statistic*
Independent variable			
Audit committee members' financial expertise	ACFE	1.022	4.022***
			0.002
Audit committee size	ACSZ	0.085	0.401
			0.102
Audit committee independence	ACIND	0.912	3.424***
			0.004
Audit committee meetings	ACM	0.609	1.014
			0.502
Control variables			
Bank size	BSZ	0.116	5.632***
			0.000
Bank age	BAG	0.311	3.008***
			0.003
Audit quality	ADT	0.155	4.011***
			0.001
Bank type	BTYP	0.161	3.001***
			0.003
R^2		0.516	
Adjusted R^2		0.499	
F-statistic		21.008	
p-Value		0.001	
Hausman test (χ^2)		4.225	
p-Value (χ^2)		0.001	

Note: Significance at: ***1% level

cent, which means that capabilities of the FE model best represent the relationship, confirming our assumption that ε_i and χ's are correlated.

5.1 Main hypothesis results

The results as shown in Table V reveal that the MVAIC regression model has high statistical significance and high explanatory power, the as *p*-value of *F*-test is less than 5 per cent (0.001). Therefore, *H1* which states that audit committee characteristics positively affect the IC of GCC listed banks is accepted.

Cerbioni and Parbonetti (2007) and Li *et al.* (2008) suggested that CG mechanism is important in shaping corporate IC strategies. The audit committee is thus regarded as the monitoring mechanism that reduces information asymmetries between a firm's management and outside board members (Rainsbury *et al.*, 2008). In this context, Beattie *et al.* (2008) report on the increasing focus on intangible asset issues by the audit committee, thus stressing the increasing importance of IC and its related information at the board and audit committee levels.

5.2 Sub-hypothesis results

The results as shown in Table VI reveal that HCE, SCE, CEE and RCE regression models have high statistical significance and high explanatory power as *p*-value of *F*-test is less than 5 per cent (0.031, 0.005, 0.022 and 0.017). Therefore, we *H1a*, *H1b*, *H1c* and *H1d*, which state that audit committee characteristics affect the HCE, SCE, RCE and CEE of GCC listed banks, is accepted.

For the audit committee member's financial expertise, we found that HCE, SCE and RCE have a significant relationship with audit committee member's financial expertise. However,

Table VI Fixed-effect results (testing sub-hypotheses)

		HCE model		*SCE model*		*CEE model*		*RCE model*	
Variables	*Label*	*β*	t-*Statistic*	*β*	t-*Statistic*	*β*	t-*Statistic*	*β*	t-*Statistic*
Independent variable									
Audit committee members' financial expertise	ACFE	−0.057	−3.066***	0.123	2.201**	0.215	0.204	0.246	3.244***
			0.002		0.012		0.116		0.006
Audit committee size	ACSZ	0.485	1.300	0.136	1.603	0.162	2.004**	0.171	1.052
			0.102		0.201		0.034		0.241
Audit committee independence	ACIND	0.512	2.424**	0.304	2.974***	0.041	2.447***	0.014	2.971***
			0.040		0.003		0.006		0.004
Audit committee meetings	ACM	0.109	2.814***	0.022	2.610**	0.131	1.117	0.182	2.933***
			0.002		0.032		0.207		0.001
Control variables									
Bank size	BSZ	0.108	3.660***	−0.062	3.226***	0.017	0.126	0.212	0.115
			0.000		0.004		0.507		0.404
Bank age	BAG	0.301	1.008	0.251	0.601	0.178	2.887**	0.161	1.744
			0.183		0.164		0.021		0.123
Audit quality	ADT	0.133	4.011***	0.211	0.211	0.274	0.022	0.243	2.097**
			0.003		0.142		0.123		0.047
Bank type	BTYP	0.313	2.401**	0.245	0.146	0.134	1.204	0.141	2.125**
			0.023		0.300		0.116		0.046
R^2		0.410		0.236		0.110		0.194	
Adjusted R^2		0.345		0.214		0.101		0.133	
F-statistic		4.008		4.945		5.277		6.327	
p-Value		0.031		0.005		0.022		0.017	
Hausman test (χ^2)		4.121		2.005		2.670		1.201	
p-Value (χ^2)		0.001		0.009		0.014		0.046	

Note: Significance at: **5% and ***1% levels

the expertise has a negative impact on the HCE. To clarify the results, when there is a financial expert on the audit committee, then that does not mean that there is more effective IC. Rather, the monitoring effectiveness of audit committee financial expertise depends on the authority of top management. Theoretically, it may be said that an increase in audit committee member's financial expertise should lead to a more IC benefiting company performance eventually. The CG code of GCC banks should consider the audit committee member's financial expertise to structure relevant strategies and policies on how to obtain, best utilize, develop and retain their HCE for better IC.

Additionally, we found that committee size has a positive relationship with CEE. Based on this result, it can be concluded that the size of the audit committee between three to seven members has a positive relationship with CEE. This evidences that bank's IC efficiency of GCC banks has been created more by CEE (physical and financial) rather than intangible assets. It is believed that a smaller board is able to create more CEE and make better decisions and that a larger committee size may lead to less CEE. The smaller audit committee size is able to direct and make better decisions regarding assets utilization, whereas the bigger AC size may lead to a less performance regarding the tangible assets.

Further, the results reveal that audit committee members' independency influenced positively the HCE, SCE, RCE and CEE, which is significant at 5 per cent. This indicates that audit committee independency and audit committee meetings in GCC banks are powerful for realizing the full potential of the intangible assets. This means audit committee independence has an influence over IC, and the majority of independent members in GCC banks may encourage IC through intangible assets, namely, HCE, SCE and RCE. On the other hand, CEE is a tangible component. The result suggests that GCC banks create value more from intangible assets than from tangible assets. It is in consistent with prior studies that firms operating in developed countries tend to create value via intangible components than via tangible or physical components (Celenza and Rossi, 2014; Inkinen, 2015; Singh *et al.*, 2016).

Last but not least, there is a significant positive relationship between audit committee frequency of meetings and HCE, SCE and RCE. This is due to the fact that as the frequency of meetings increases, awareness and experience increases among members, and there will be more encouragement of IC efficiency.

For the control variables, bank size was found to be significant with HCE and SCE models. More number of tangible assets in a firm positively affect the human capital and structural capital of the banks. In theory, large firms may perform better, as they have more resources and higher efficiency.

Bank type and audit quality positively affect HCE and RCE. However, there are variations in the significance level; HCE has greater significance than RCE.

Finally, we found that bank age positively controls CEE. However, it does not affect the three intangible models, namely, HCE, SCE and RCE.

To conclude, GCC banks should motivate the board of directors to adopt CG in general and consider the audit committee characteristics specifically to assure the IC efficiency for better performance. This can explain the fact that banks that adopt CG and concentrate on audit committee characteristics tend to have better IC efficiency.

6. Conclusion, recommendations and future research

This study examines the effect of audit committee characteristics on IC efficiency. The data collected are pooled data from annual reports of GCC listed banks during the period 2011-2015.

The descriptive analysis results on the one hand showed that the HCE is the most influential component of IC, as it has the greatest mean. On the other hand, audit committee expertise and independency tend to be higher with banks that have few assets. However, the audit committee size and meetings tend to be more in banks having more assets. In addition, the analysis showed that HCE and RCE tend to be higher in banks with few assets. However, SCE and CEE tend to be higher in banks with more assets. Furthermore, the four audit committee characteristics and the IC components tend to be higher with older banks.

The regression models' results showed that there is significant positive impact of audit committee characteristics on the IC. Moreover, the relationship between audit committee and (HCE, SCE, RCE and CEE) is also significantly positive if measured individually.

Finally, we tested the effect of the control variables on the IC and found that bank size was found to be significant for HCE and SCE. Bank type and audit quality positively affect HCE and RCE. However, bank age positively controls CEE.

We suggest that GCC banks have to focus more on audit committee as a driver for better utilization of IC to assure better performance. In the Gulf region, the laws regarding CG and IC are weak; therefore, we recommend the banks' regulator to pay more attention to CG and audit committee, especially to assure more IC efficiency. In addition, stakeholders such as investors, shareholders, creditors and debtors recommended should increase their knowledge about IC and its importance in the business to make better investment choices. Furthermore, we suggest that organizers like central banks, the Ministry of Finance, external auditors and stock exchange organizers should take audit committee characteristics into consideration to assure better utilization of IC.

Conducting the current research has been limited by a few factors. Firstly, the absence of literature offered the roles of audit committee in enhancing the IC. Secondly, the study considers only the banking sector and neglects other sectors, which may offer other useful results on the connection between AC and IC.

Several more opportunities exist for future research. First, increasing number of countries may explore the extent to which our results generalize to these different and diverse countries. Second, more research is needed to understand how IC change as a response to changes in AC characteristics. Third, other sectors than banks are recommended to examined. Finally, a fruitful avenue for future research is to investigate how other group of people within the firms are affecting the utilization of IC.

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