"The impact of intellectual capital on firm's financial performance: empirical evidence from Bahrain"

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THE IMPACT OF INTELLECTUAL CAPITAL ON FIRM'S FINANCIAL PERFORMANCE: EMPIRICAL EVIDENCE FROM BAHRAIN

Abstract

This study contributes to the intellectual capital (IC) area of literature by investigating the impact of IC on the firm's financial performance of two main sectors in the Bahrain Bourse, financial and service sectors, during five years, 2013–2017. The study employs canonical correlation analysis as a unique statistical method to analyze data gathered from 29 sampled companies, representing 145 firm-year observations over the five years. Two groups of variables are employed. The first represents the firm's financial performance with two variables (return on equity – ROE and return on assets – ROA), while the second includes three intellectual capital components, namely human, customer, and structural capital. Findings related to the financial sector reveal that all IC components (human capital, customer capital, and structural capital) have positive correlations with firm performance except for the labor costs variable (the sub-variable of human capital), which has a negative correlation with firm's performance. Human capital is also found to be the most significant component of the IC, while structural capital is reported as the lowest effect on the firm's performance, consistent with some previous research findings. Furthermore, the services sector results revealed that IC is significantly associated with the firm's performance. Moreover, two sub-variables of human capital (number of Bahraini employees and labor costs) have the most significant impact on the firm's performance.

INTRODUCTION

The term intellectual capital (IC) has received the most attention of many researchers in various disciplines and practitioners in industrial and economic fields. This is due to the vital role that IC can play in achieving better financial performance, creating competitive advantages, and achieving companies' sustainability. IC is seen as a strategic asset, which is recommended to be well managed so that the organization can obtain their maximum benefits (Holmen, 2005). It was argued that managers or investors have difficulty in understanding how firms' resources, where some of them are intangible or IC, can create value in the future because accounting models failed to reflect such a fact (Gogan, 2014). Chen et al. (2005) provided evidence on the positive impact of IC on revenues and profitability for 30 Taiwanese companies. A similar result was reported by Sharabati et al. (2013) who examined the effect of IC on firms' financial performance (FFP) of the Jordanian telecommunication sector. Further, Sydler et al. (2014) explored the association between IC and firm's profitability in the long-term and reported that firms with an increase in IC are more profitable.

This study is expected to provide additional empirical evidence on the relationship between IC and FFP, which is considered an important subject in the accounting literature. This study tries to fill the gap in the existing accounting literature because there are fairly few empirical published studies investigating the topic of the current study in developing countries in general and Bahrain in particular. The current study empirically investigates the association between IC and FFP for two sectors in the Bahraini capital market (financial and service sectors) using a sample of 29 listed firms in a period of five years, 2013–2017, representing 145 firm-year observations over the five years. The importance of the current study arises from the following justifications. First, to our best knowledge, this study is considered one of the first studies which explore the association between IC factors and FFP in Bahrain in general and financial and service sectors in particular. Second, the current study contributes to the accounting literature related to IC in emerging markets, as unlike developed countries, there is a scarcity of empirical IC studies in emerging markets, including Bahrain. The study is to address this imbalance by having a closer look at this issue in Bahrain. Third, the importance of this study is supported by the growing interest in the IC research area.

1. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

1.1. Classifications of IC

The literature offers different classifications for IC. For example, Abdullah and Sofian (2012) in Malaysia categorized IC into four core components: spiritual capital, human capital (HC), customer capital (CC), and structural capital (SC). Sveiby (1997) pointed out that IC includes external structure, internal structure, and employee competence. Roos et al. (1997) stated that IC is an economic value with two elements: SC and HC. Moreover, Edvinsson and Malone (1997) and Riahi-Belkaoui (2003) argued that IC is a combination of three factors: internal capital or SC, external or relational capital or CC, and HC. Following previous literature (e.g., Edvinsson & Malone, 1997; Riahi-Belkaoui, 2003; Sydler et al., 2014; Mousa & Elamir, 2015; Mousa, 2015), the current study classifies IC into three factors: HC, SC, and CC. To form a strong IC base, these factors should be interrelated and work in an interactive way to create the firm's competitive position (Stovel & Bontis, 2002).

1.2. Human capital (HC)

HC is defined as "the capacity to act in a wide variety of situations to create both tangible and intangible assets" (Sveiby, 1997, p. 73). The main component of HC is employees who can create knowledge through instinctive skills, educational skills, competence, and attitudes (Roos et al., 1997; Edvinsson & Malone, 1997). It is argued that HC is the entirety of the workers' skills, capabilities, tacit knowledge, and experience. Further, Chen et al. (2005) stated that employees' competence, loyalty commitment, and motivation are the main components of HC. Employees use tacit knowledge and their traits that accumulate from these forms to create value in their firm. Bontis (1998) added that HC is a strategic renewal and a source of innovation. It gives the firm its unique nature and reflects its human factor, combined intelligence, expertise, and skills (Bontis, 2002).

Employee flexibility, creativity, innovation capacity, teamwork capacity, education, experience, satisfaction, formal training, motivation, and loyalty have been suggested as examples for HC (G. Roos & J. Roos, 1997). Namasivayam and Denizci (2006) pointed out that HC interacts with SC and employs CC, enabling to maintain the firm's success. HC can improve the relationship between the firm and its customers by supporting employee creativity to increase the delivery of value to customers, consequently facilitating "insourcing" of external knowledge assets, in other words, CC. Using a sample of Malaysian companies, Bontis et al. (2000) reported that the highly critical IC in Malaysian companies is HC. Concerning the impact of HC, Wang and Changa (2005) concluded that HC is indirectly influencing firm's performance. Different proxies are used in the literature to measure HC, among them labor costs used by Sydler et al. (2014) and Lajili and Ze´ghal (2006).

Consistent with the literature, the current study uses three proxies for HC, namely labor costs, number of Bahraini (local) employees, and number of foreign employees.

1.3. Customer capital (CC)

The term "CC" has lately been replaced by relational capital or external capital (Sveiby, 1997). It refers to the firm's relations with its suppliers and customers (Sveiby, 1997). In this respect, Welbourne (2008) argued that CC depends on maintaining and developing quality relationships with other firms, individuals, or groups that influence a company. Joshi et al. (2013, p. 267) pointed out that "CC is an organization's ability to create relational value with its external stakeholders. Organizations gain manifolds when they build relational capital, e.g., customer and brand loyalty, customer satisfaction, market image and goodwill, power to negotiate, strategic alliances and coalitions". Tsui et al. (2014) indicated that the interaction between firms and their external environment, including marketing channels, governmental and industrial networking, supplier relationships, customer relationships, customer loyalty, intermediaries or partners, customers, and competitors, leads to creating knowledge acquired by firms, which refers to CC. Based on the above, it can be argued that CC comprises external relationships with a variety of customers, strategic partners, banks, stakeholders, suppliers, market channels, government, and business networks, reflecting customers' perceptions of the firm. In measuring CC, Sydler et al. (2014) and Klock and Megna (2000) used advertising expenditures as a proxy, while the market share was used by Mousa (2015). The current study used firm market capitalization as a proxy for CC.

1.4. Structural capital (SC)

According to Sveiby (1997), SC includes patents, concepts, models, computers, and administrative systems. Roos et al. (1997, p. 42) stated that "SC is what remains in the company when employee go home for the night". Bontis (1998) suggested organizational learning capacity, documentation service, the general use of information technologies, and organizational flexibility as SC examples. Besides, Bontis et al. (2000, p. 88) stated that "all non-human storehouses of knowledge, including databases, organizational charts, process manuals, strategies, and routines are examples for components of SC". Sharabati et al. (2013) surveyed 84 managers at Jordanian telecommunication firms to explore the effect of IC on firm's performance. They found that CC has the greatest significant and positive influence on Jordanian firms' performance, followed by HC and SC as second and third in the significance.

Previous studies presented different proxies for SC. For instance, Sydler et al. (2014) and DeCarolis and Deeds (1999) used to research and development expenditures, while Mousa (2015) used total intangible assets and capital expenditures. OECD (2008) indicated that SC is a non-physical asset that has the ability of economic profits, short in physical materials, and could be traded and retained by a firm. In light of the above, the firm's total of non-physical assets was selected as a proxy for SC in the current study.

The resource-based theory claims that the difference between FFP and profit levels is due to the difference between these firms' resources and how they are used and managed (Wernerfelt, 1984). Such resources may include the benefits of both types of assets: intangible and tangible (Canibano et al., 2000). Based on the resource-based theory, firms that acquire and effectively manage their intangible assets (as strategic assets) enjoy competitive advantages (Spender, 1996). Such advantages are raised from the use of intangible, scarce, and firm-specific assets. Moreover, Godfrey and Hill (1995) claimed that firms' capability to possess all the characteristics of strategic assets derives from the inclusion of intangible assets. However, Mouritsen (1988) pointed out that most intangible assets are not considered strategic assets except for IC, a very important strategic asset. On the other hand, IC is a fundamental driver of the firm to get future competitiveness, increase firm value, and achieve a higher performance level (Wang & Changa, 2005). Riahi-Belkaoui (2003) argued that qualifying IC could achieve the relationship between IC and firm performance as a strategic asset.

In light of the above, the existence of different IC levels as a strategic asset within firms can explain the different performance levels of such firms. The resource-based theory utilizes IC as an essential

concept which reflects the dynamic and core capabilities of strategic resources (G. Roos & J. Roos, 1997). The IC classification into three factors (HC, SC, and CC) might play a substantial role in generating a sustainable competitive advantage and create a superior FFP. The literature from a wide range of countries provides empirical evidence on a positive relationship between IC from one side and firm's performance from the other (Jordão and De Almeida (2017) in Brazil, Rahman (2012) in England, Chu et al. (2011) in China, Wang (2011) in Taiwan, Kavida and Sivakoumar (2010) in India, Cohen and Kaimenakis (2007) in Greece, Mavridis (2004) in Japan). The current study uses the resource-based theory to explain the association between components of IC and FFP.

In the past decades, the accounting literature provided many studies on several aspects of the IC area of research. Related literature in this issue falls into several main categories, including the general disclosure of IC (Caputo et al., 2016; Hamed & Omri, 2013; Ousama & Fatima, 2012; Bhasin & Shaikh, 2011). Another main category includes studies investigating the correlation between IC and other variables, including FFP, the concentration of the current study. The literature review on the association between IC and FFP revealed different and conflicting results. Many studies from a wide range of countries documented a positive relationship between IC and FFP. For instance, Phusavat et al. (2011) who examined the above relationship in large industrial firms in Thailand reported a positive association between FFP and IC. Similar results were reported by Zeghal and Maaloul (2010) in the UK, Pulic (2004) in Australia, and Al-Musali and Ismail (2016) in Gulf Co-operation Council (GCC). In contrast, other researchers reported an opposite relationship between IC and FFP, a negative or a weak association (Kujansivu and Lonnqvist (2007) in Finland; and Muhammad and Ismail (2009) in Malaysia. Table 1 shows a summary of some recent studies on the relationship between IC and FFP. It is clear from Table 1 that the previous literature presented somewhat mixed results on the relationship between IC and FFP.

Table 1. Studies on the association between IC and FFP

No.	Author(s) and year	Country	Sample size, firm types, and period covered	Main focus of the study	Positive impact found for IC
1	Dženopoljac et al. (2017)	Middle East countries	100 publicly traded firms (2011–2015)	Profitability, earnings, efficiency, and market performance	Yes
2	Jordão and De Almeida (2017)	Brazil	227 listed firms (2005–2014)	Profitability, financial stability, and corporate return	Yes
3	Nawaz and Haniffa (2017)	18 countries	64 Islamic financial institutions (2007–2011)	Profitability and market performance	Yes
4	Al-Musali and Ismail (2016)	GCC countries	Commercial banks (2008–2010)	Profitability and market performance	Yes
5	Kehelwalatenna (2016)	USA	191 US listed banks (2000–2011)	Productivity and profitability	No
6	Lopes et al. (2016)	Worldwide	Top 30 airlines worldwide	Profitability	Yes
7	Nimtrakoon (2015)	Five stock exchanges*	213 technology listed firms	Profitability and market performance	Yes
8	Osman (2014)	Malaysia	Small and medium-sized ICT firms	Innovation, profitability, and market performance	Yes
9	Joshi et al. (2013)	Australia	Financial listed firms (2006–2008)	Market performance and profitability	Yes
10	Rahman (2012)	UK	100 UK listed firms	Profitability	Yes
11	Chu et al. (2011)	China	333 listed firms in Hong Kong (2001–2009)	Productivity, market valuation, and profitability	Yes
12	Clarke et al. (2011)	Australia	2,161 listed firms	Productivity and profitability	No
13	Wang (2011)	Taiwan	Taiwanese listed firms	Profitability and market capitalization	Yes
14	Baklouti et al. (2010)	Tunisia	24 Tunisian listed firms (2001–2004)	Financial performance	Yes
15	Diez et al. (2010)	Spain	211 listed firms	Profitability	No
16	Kavida and Sivakoumar (2010)	India	Indian IT firms	Profitability and market performance	Yes

Table 1 (cont.). Studies on the association between IC and FFP

No.	Author(s) and year	Country	Sample size, firm types, and period covered	Main focus of the study	Positive impact found for IC
17	Zeghal and Maaloul (2010)	UK	300 UK listed firms (2005)	Economic and financial performance	Yes
18	Erickson and Rothberg (2009)	USA	3 US hi-tech industries (1993–1996 and 2003–2006)	Market performance	Yes
19	Chan (2009)	China	Listed firms (2001–2005)	Market valuation, profitability, and productivity	Yes, only for profitability measures
20	Cleary (2009)	UK	Irish ICT sector	Market performance	Yes
21	Young et al. (2009)	Eight Asian countries**	Commercial banks (1996–2001)	Firms' value and market performance	Yes
22	Kamath (2008)	India	25 Indian pharmaceutical firms (1996–2006)	Profitability productivity and market valuation	No
23	Cohen and Kaimenakis (2007)	Greece	Small and medium-sized firms in the service sector	Profitability	Yes
24	Chen et al. (2005)	Taiwan	4,254 listed firms	Firms' value and profitability	Yes
25	Mavridis (2004)	Japan	141 listed banks (2000–2001)	Profitability	Yes
26	Firer and Williams (2003)	South Africa	75 South African IC-intensive enterprises	Profitability, productivity, and market value	No

Note: * are Hong Kong, Indonesia, the Philippines, Malaysia, and Thailand, ** are Thailand, Malaysia, Indonesia, the Philippines, and Singapore.

In light of the findings provided in the previous literature, the following key hypothesis is suggested:

H: *There is a significant association between IC and FFP.*

As discussed in section 1, IC is classified into three categories. Consequently, the key hypothesis is fractured into the following sub-hypotheses:

H1: *HC is the most significant component of IC affecting FFP.*

H2: *CC is the most significant component of IC affecting FFP.*

H3: *SC is the most significant component of IC affecting FFP.*

The above hypotheses were tested using a sample, which represents two sectors: financial and services.

2. RESEARCH METHODOLOGY

This section includes the sample selection, variables definitions, and statistical analysis.

2.1. The sample selection

Based on the Annual Trading Bulletin of BHB in 2017, the total number of listed firms is 43 (7 commercial banks, 12 investment firms, 10 services, 3 industrial firms, 4 tourism, 4 insurance; 1 non-Bahraini firm, and 2 closed). The first most important and active sectors are the commercial banks sector, representing 48.35 % of the total trading volume, followed by investment sector as second with 26.08%, and the services sector as third, representing 10.67% (Annual Trading Bulletin of BHB, 2017). The performance of the above three sectors representing about 85% of the total trading volume in BHB. Therefore, it was decided to select these three sectors and re-classify, based on the business's nature, into two main sectors, namely financial and services sectors. The final sample consists of 29 firms (19 financial and 10 services firms) for a period of five years (2013–2017), resulting in a total number of 145 firm-year observations). The main source of the collected data is the annual reports and the websites of the sampled firms.

2.2. Variables of the study

This study employs two variables groups. The first represents FFP, including two variables (return on

assets – ROA and return on equity – ROE). These two variables were employed in some research in firm's performance (Desoky & Mousa, 2018), whereas the second group is IC that includes three components (CC, HC, and SC) with five variables. For the current study, SC includes total non-physical assets from annual reports of the sampled firms in 2013–2017. The literature on CC refers to relationships among the firm and external parts; consequently, market capitalization may be seen as a sign of a good relationship between the firm and different partners in its surrounding environment; thus, it was used as a proxy of CC. HC was measured by three proxies, namely labor costs, number of Bahraini employees, and number of foreign employees. The details of these variables and their related proxies are given in Table 2.

Table 2. Variables definitions

Variables	Proxy
Group 1: FFP	
Firm's ROA (%)	Firm's net profit to total assets
Firm's ROE (%)	Firm's net profit to total equity
Group 2: IC variables	
Human capital (HC) variables	
HC1	Number of Bahraini employees
HC2	Number of foreign employees
HC3	Labor costs (BD)
Customer capital (CC)	Market capitalization (BD)
Structural capital (SC)	Total non-physical assets (BD)

2.3. Canonical correlation analysis (CCA)

The CCA is employed in the current study as a unique statistical analysis with several advantages over multiple regression. According to Green (1978), the CCA helps explore the linear interrelationships between two groups of variables as a multivariate statistical model where one group of variables considers dependent while the other is independent variables. The number of CCA functions or variates is equivalent to the number of variables in the smaller group (Chaudhuri et al., 2009; Sharma, 1996). CCA has several advantages over multiple regression. For example, it can apply many dependent variables, while multiple regression is conducted with only one dependent variable. Green (1978) and Hair et al. (1998) explained

the mechanism of CCA. It forms a canonical variate for each group of independent and dependent variables included in each canonical function as linear groupings signify the optimally weighted total of two variables or more. CCA extends the correlation coefficient between the two canonical variates, and these coefficients measure the power of the association between the two canonical variates.

3. STATISTICAL ANALYSIS AND RESULTS

This section presents the statistical analysis for the sampled firms from the two sectors: financial and services[1].

3.1. Canonical correlation analysis (the financial sector)

As mentioned earlier, the current study employed CCA on two groups of variables. Group 1 represents FFP (the dependent variable) with two variables (ROA and ROE), while group 2 represents IC (the independent variable) with 5 variables (HC1, HC2, HC3, CC, and SC). Since the first group has two variables, the number of canonical dimensions equals two (Sharma, 1996; Chaudhuri et al., 2009).

Table 3 shows that the first canonical function has a correlation of 0.5557 between the two groups of variables, and it explains about 91% of the variation between the two groups. Similarly, the second canonical function has a canonical correlation of 0.2077 and explains about 91% of variations between the two groups. Hair et al. (1998, p. 5) stated that "canonical correlation measured the strength of the overall relationship between the two linear composites (canonical variates), one variate for the independent variables and one for the dependent variables". Furthermore, CCA provides a significant level of the two canonical functions, as shown in Table 4.

Table 4 shows that the first test of the canonical function is significance at 0.01 (where p-value = 0.001025 < (0.01 and 0.05). In contrast, the

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1   CCA was conducted via a software analysis available at https://onlinecourses science.psu.edu

Table 3. The canonical correlation (the financial sector)

Canonical function	Canonical correlation	Canonical correlation square	Eigen (canonical roots)	Percent	Cumulative
1	0.5557	0.30879	0.4467	90.831	90.83
2	0.2077	0.04315	0.0451	9.169	100.00

Table 4. Canonical dimensions (the financial sector)

Canonical function	Wilks' lambda	F	Df1	Df2	p
1	0.55569	0.66138	12	154	0.001025**
2	0.20773	0.95685	5	78	0.622463

Note: **Correlation is significant at 0.01 and * at the 0.05 levels (two-tailed), respectively.

second test for the second canonical function is not significant at both levels of significance (0.01 and 0.05), where *p*-value = 0.622463. Hair et al. (1998, pp. 5-6) declared that "the level of significance of a canonical correlation generally considered to be the minimum acceptable for interpretation is the 0.05 level, which (along with the 0.01 level) has become the generally accepted level for considering a correlation coefficient statistically significant. Also, many measures for assessing the significance of discriminant functions can be used, including Wilks' lambda. Hence, only a single pair of canonical variates at alpha values of 0.01 and 0.05 can be accounted for CCA between the two groups of variables.

The results of CCA provide the following equations for the first group (two variables of FFP):

$$U1 = -0.374 ROA + 0.138 ROE,$$

$$U2 = 0.365 ROA - 0.017 ROE.$$

Besides, the results provide the following equations for the second group (five variables of IC):

$$V1 = 0.000001 CC + 0.003\, HC1 + 0.0001 HC2 - 0.00000057 HC3 - 0.0000015 SC,$$

$$V2 = 0.000001 CC + 0.0012\, HC1 - 0.00012 HC2 + 0.0000027 HC3 - 0.0000098 SC.$$

In light of the significant levels of the two canonical functions, the first canonical variates V1 and U1 only are considered. The coefficients are explained in a way analogous to interpret coefficients of regression (i.e., for the CC variable, a raise of one unit in CC leads to a 0.000001 raise in the first canonical variate of group 2 when the entire of the other variables are maintained constant. Like HC1 and HC2, an increase in one unit of any of them will lead to an increase of 0.003 and 0.0001, respectively, in the first canonical variate of group 2 when the other variables are maintained constant.

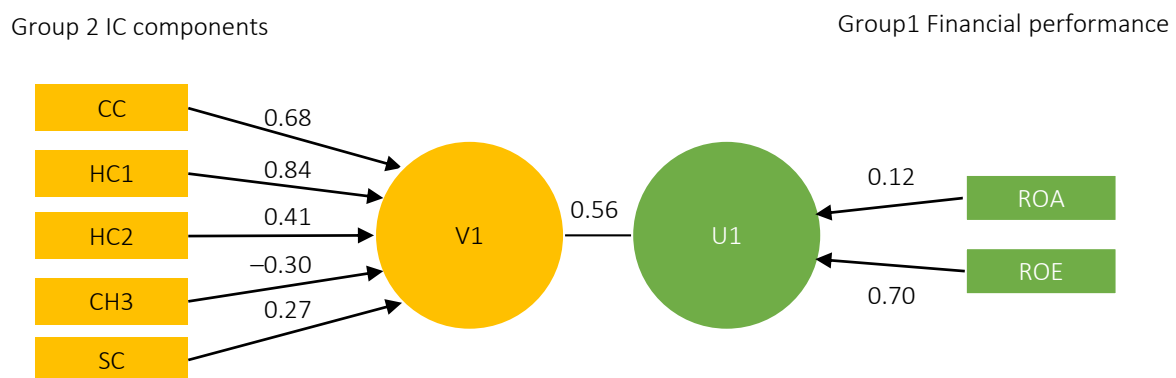Figure 1 reveals the association between the first canonical variate (V1 and U1), as well two groups

Group 2 IC components   Group1 Financial performance

Figure 1. CCA between the first variate and two groups of variables

of variables IC (SC, CC, and HC) and firm's performance (ROA and ROE). The first association accounts for the strongest association (around 0.84) between the HC1 and the firm's financial performance. Figure 1 implies that HC1, CC, HC2 variables are more powerful in forming the canonical variate in group 2, while ROE has the most effect in group 1.

In Table 5, the variables HC1 and HC2 have positive and significant correlations of 0.84, 0.41 with the firm's performance ROA and ROE, respectively. In contrast, SC has a lower correlation of 0.27 with the firm's performance. Since one of the most important CCA technique features is that it determines the most influential factor in each group of study variables, from group 1, HC1 is the most influential factor followed by CC then, HC2, while ROE (0.70) is the most influential factor in group 2. All variables of group 2 have positive correlations with firm performance except for HC3, which represents labor costs, which has a negative correlation with group 1. It should be noted that SC was reported as the lowest effect on the firm's performance, which is similar to what was reported by Sharabati et al. (2013).

Table 5. CCA of the financial sector

Group 2 IC components		Correlation	Correlation		Group 1 (Financial performance variables)
CC	0.68				
HC1	0.84			0.12	ROA
HC2	0.41	V1	0.56	U1	
HC3	−0.30			0.70	ROE
SC	0.27				

In conclusion, the overall results of CCA revealed that IC (representing group 2) is significantly associated with firm performance (representing group 1) with a correlation of 56% at a 0.01 level. Such a result supports the main hypothesis that was formulated previously in this study. ROE is the most influential variable in group 1. While, in group 2, HC1 is the most influential variable. Consequently, the sub-hypothesis *H1* is accepted, while *H2* and *H3* are rejected. These findings support the results reported by two previous studies, Sharabati et al. (2013) and Bontis et al. (2000) who found that HC is the highly significant IC component that impacts a firm's performance. However, such findings are inconsistent with Mousa (2015) who reported that HC does not affect firm's financial performance.

3.2. Canonical correlation analysis (the service sector)

Table 6 shows that the first canonical function correlates with 0.8388 between the groups of variables (IC and the firm's performance). The canonical correlation is 0.4079 for the second canonical function, which explained about 92% of the first canonical variate variation while the second canonical variate is about 7.8%.

Regarding the significant level of canonical functions, Table 7 shows that the first test of the canonical function is significance at 0.001 (where *p*-value = 0.00000001 < 0.01 at all levels of significance. In contrast, the second canonical function is not significant at the 0.01 and 0.05 levels. Consequently, the first correlation value is 0.8388 and is statistically significant at 0.01 and 0.05 levels, while the value of the second correlation is 0.4079 and is not statistically significant.

Table 6. Canonical correlation (the services sector)

Canonical function	Canonical correlation	Canonical correlation square	Eigen	Percent	Cumulative
1	0.8388	0.7036	2.3740	92.243	92.24
2	0.4079	0.1664	0.1996	7.757	100.00

Table 7. Tests of canonical dimensions (the services sector)

Canonical function	Wilks' lambda	F	Df1	Df2	p
1	0.83882	0.24706	12	84	0.00000001***
2	0.40794	0.83359	5	43	0.1512

Note: ***Correlation is significant at the 0.001, ** at the 0.01 and * at the 0.05 levels (two-tailed), respectively.

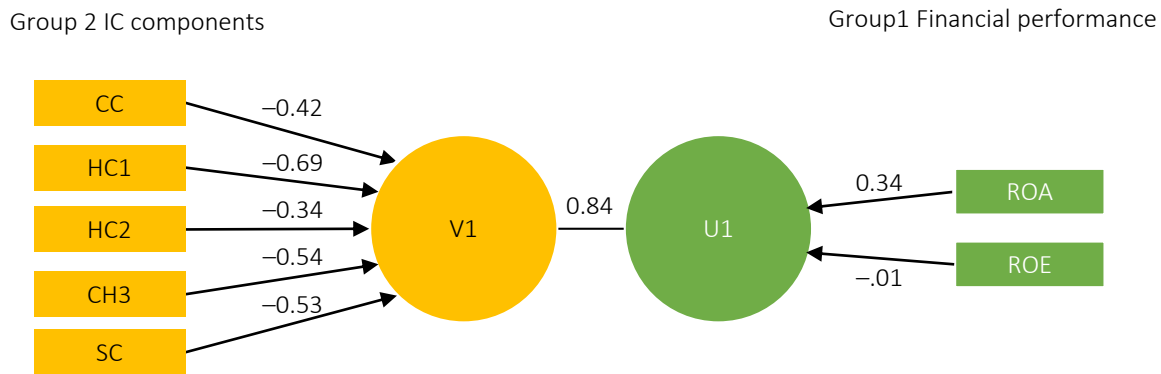Group 2 IC components   Group1 Financial performance

Figure 2. CCA between the first variate for the groups of variables

The canonical variates for financial performance of firm (the first group) are:

$$U1 = 0.661ROA - 0.574ROE,$$

$$U2 = -0.0092ROA - 0.207ROE.$$

The canonical variates for IC (the second group) are:

$$V1 = 0.00002CC - 0.01HC1 + 0.0003HC2 - 0.000086HC3 + 0.000088SC,$$

$$V2 = -0.000002CC - 0.0029HC1 + 0.00048HC2 - 0.00011HC3 + 0.00016SC.$$

According to Table 8, only the first canonical correlation (V1 and U1) reflects all the relationships or correlations between the two groups. Figure 2 shows correlation results between the first variate and the two groups of variables. The coefficients are explained in a way analogous to present coefficients of regression (i.e., for the CC variable, an increase of one unit in CC leads to a 0.00002 raise in the first variate of group 2 when all other variables are maintained constant. Like HC2 and SC, an increase in one unit of any of them will lead to an increase of 0.0003 and 0.000088, respectively, in the first variate of group 2 when the entire other variables are maintained constant.

Figure 2 provides the association results between the first variate (V1 and U1) and the two groups

of variables. The first association accounts for the greatest correlation of 0.69 between the HC1 and firm's performance, followed by HC3, SC, then CC as second, third, and fourth, respectively. Table 8 shows CCA for the two groups of variables in the services sector. It shows that ROA variable (0.34) is the most influential factor in forming the canonical variate in group 1.

Table 8. The CCA for the service sector

Group 2: IC components		Correlation		Correlation	Group 1: (Financial performance variables)
CC	−0.42				
HC1	−0.69			0.34	ROA
HC2	−0.34	V1	0.84	U1	
HC3	−0.54			−0.01	ROE
SC	−0.53				

The services sector results revealed that IC is significantly associated with the firm's performance with a correlation of 84% (significance at the 0.001 level). Therefore, the main hypothesis in the current study can be accepted for the service sector. Moreover, the variables of HC1 and HC3 have the most significant impact on the firm's performance, which supports *H1*. In contrast, other hypotheses (*H2* and *H3*) are not supported because the results of CCA in the services sector showed that HC is the most influential variable of IC in group 2, while ROA has the greatest effect on group 1.

CONCLUSION

The main aim was to provide additional empirical evidence on the relationship between IC and FFP by investigating the association between IC and FFP through a sample of 29 firms (with a total number of 145 firm-year observations) for a period of five years, 2013–2017 using CCA. Because of fairly few published empirical studies directly examining this topic in developing countries, including Bahrain, the research tried to fill the existing accounting literature gap. The findings of the current study revealed that IC has a significant effect on the firm's performance across the study sample, which supported the study's main hypothesis in both sectors, the financial and service sectors. The detailed results linked to the financial sector showed that mostly all components of the IC, including human capital, customer capital, and structural capital, are positively associated with firm performance (measured by ROA and ROE) except for the labor costs variable, which was found negatively associated with firm's performance. Besides, human capital was reported as highly associated with IC, while structural capital had the lowest impact on the firm's performance. Moreover, the CCA results related to the services sector showed that IC is significantly associated with the firm's performance (measured by ROA and ROE). Besides, two human capital sub-variables (number of Bahraini employees and labor costs) have the most significant effect on the firm's performance. CCA results supported the hypothesis related to HC as the most significant variable of IC that impacts the firm's performance, *H1*. In contrast, the other hypotheses (*H2* and *H3*), related to CC and SC, were rejected.

The current study has several limitations. For example, it was conducted using 29 listed firms in BHB. The sample is relatively small; consequently, the findings may not be generalized. There is a need to extend the study by conducting it with other countries. The results of the current study may be changed if one used another statistical technique instead of CCA. Besides, the use of different variables with different proxies in each group of the study variables may lead to different results. Moreover, several avenues can be suggested for potential research, such as the relationship between IC disclosure and stock return volatility or corporate governance mechanisms.

AUTHOR CONTRIBUTIONS

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