

An Examination of Intellectual Capital and Corporate Financial Performance: Canonical Correlation Analysis

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Abstract

This study aims to examine the relationship between intellectual capital and corporate financial performance of Mobinil as an example of Egyptian telecom companies over sixteen years (from 1998 to 2013). The study identified three factors for intellectual capital as a first set of variables. They are structural capital, customer capital and human capital. Corporate financial performance variables represent the second set of the study which is earnings per share, earnings before interest, tax, depreciation and amortization (EBITDA) and revenue growth. To achieve the study's objective, the study employs the Canonical correlation analysis as an appropriate statistical analysis. It analyses relationships between two sets of variables and maximises the correlation between linear composites of the intellectual capital and corporate performance variables. The findings of the study provide insights into the components of intellectual capital on an Egyptian Telecom Company and their influence on corporate financial performance. The Canonical correlation analysis provides evidence on a noteworthy relationship between intellectual capital, that is most influenced by customer capital and structural capital, and corporate financial performance that is most influenced by revenue growth and earnings per share. Furthermore this relationship was largely captured by the first two functions in the Canonical model. In conclusion, the results suggest that both customer capital and structural capital have a significant impact on corporate financial performance when measured by earnings per share and revenue growth, in contrast, human capital has no significant impact on corporate financial performance.

Keywords*¹:

Intellectual Capital; Corporate Financial Performance; Customer Capital; Human Capital; Structural Capital.

¹ Definitions with all details for keywords are presented in section 2.1 in the paper.

1. Introduction

The 1990s has witnessed the emergence of the intellectual capital topic, then a voluminous literature has continued to expand including accounting where the term ‘intangibles’ is often used as a synonym for it. However, a number of scientific journals have the name intellectual capital as well as being addressed within the pages of many leading businesses, accounting and management journals. Organizations need a good capacity to retain, develop, organize, and utilize their employees’ capabilities. Intellectual capital appears to be regarded as increasingly important features for organizational survival (Gogan, 2014). Lev (2003) argues that it is due to the increased business competition resulting from market globalization, complemented by the development of new information technologies. Firms based on material assets are unable to achieve further economies of scale and therefore unable to gain competitive advantage with tangible assets alone. Although the topic of intellectual capital became a prominent area in the 1990s, traditional accounting systems failed to present information on how intangible resources can create value in the future therefore, managers or investors lack knowledge on the importance of intellectual capital. It appears to be regarded as increasingly important features for organizational survival (Gogan, 2014; Draghici, 2013, Lev, 2003). Many studies have suggested that corporate disclosure on intellectual capital can inform investors about the firms’ future earnings (see: Ashton, 2005; Lev, 2001).

Intellectual capital is comprised of knowledge, information, intellectual property and experience (Stewart, 1997). Petty and Guthrie (2000, p. 158) argue that intellectual capital is the economic value of two categories of intangible assets of a company: (a) organisational (structural) capital; and (b) human capital. While, another study by Guthrie et al., (2004) describe intellectual capital as being made up of the three components: internal (structural/organisational) capital; external (relational/customer) capital; and human capital. Similarly, Cañibano et al. (2002, p. 83) classify intellectual capital into three components human capital, structural capital and customer capital. Also, Sydler et al. (2014) identify the same three factors for intellectual capital and show not only that all three factors independently lead to the creation of intellectual capital but also, more importantly, their interaction.

This study provides an empirical examination of the association between intellectual capital and corporate financial performance in the Egyptian context using the Mobinil company as an example for Egyptian telecom companies over sixteen years (from 1998 to 2013). The

study employs the Canonical Correlation Analysis as a unique statistical analysis. It has two advantages over multiple regression. First: it deals with two sets where each one has a number of variables while regression needs one dependent variable and a number of independent variables. Second, the Canonical Correlation Analysis identifies the preference variable in each set of variables. The Canonical Analysis indicates a noticeable relationship between intellectual capital and corporate financial performance.

The aim of the study is to gain insight into the relationship between intellectual capital and corporate financial performance of Mobini as an example of Egyptian Telecom companies. Three major factors motivated the current study. First, examining such a relationship in a developing country, and selecting Egypt as an empirical site. Second, there is a dearth of research into intellectual capital of firms in developing nations. Third, the need for knowledge on intellectual capital in developing countries has become increasingly evident because of increasing competition with firms in developed countries due to rapid globalisation and more freely available capital (Draghici, 2013).

The remainder of this study proceeds as follows. Section 2 presents a review of the literature, followed by hypotheses development, while Section 3 presents the case of Mobinil as an example of Egyptian telecom companies. Section 4 describes the research method employed to test the relationship between intellectual capital and corporate financial performance. The empirical results of the study are presented in Section 5. Finally, in Section 6, conclusions are presented and suggestions are made for further research.

2. Literature review and hypotheses development

In the light of the objective of the current study, the relevant literature can be classified into two groups of research. The first group of research presents studies on identifying intellectual capital. The second group of research examines the association between intellectual capital and corporate financial performance as follows:

2.1 The composition of intellectual capital

Intellectual capital takes a broad view of intangibles to include any non-physical asset that has an economic value to the firm (Skinner, 2008). Sveiby (1997) categorises intangibles into three groups: internal structure; external structure; and employee competence. Abeysekera (2011,

p.332) defines intellectual capital as the intangible resources embedded in the corporate structure, external capital is the intangibles generated by firms through their interaction with the external environment and stakeholders, and human capital is the intangibles generated for the firm by its staff. However, intellectual capital is seen as a collection of resources that has the potential to create economic value. In the absence of a global accepted definition of intellectual capital, several proposals for models highlight the importance of intellectual capital and provide ways to quantify it using different data from a variety of environments. Studies to evaluate intellectual capital have resulted in the emergence of a large number of models and proposed procedures without a generally accepted theoretical model for measuring intellectual capital. Some models focus primarily on financial metrics and others require subjective judgment in determining a composite index. For example, Kaplan and Norton (1996) identify a number of measures (such as financial; customer; internal process; learning and growth). Financial measures: how do we look to shareholders, for example, cash flow and profitability; customer measures: how do our customers see us, for example, price as compared to competitors and product ratings; internal process measures: what must we excel at, for example, length of cycle times and level of waste; and learning and growth measures: can we improve and create value, for example, percentage of sales derived from new products.

Moreover, Edvinsson and Malone (1997) point out that intellectual capital increasingly provides the roots of a company's value, being the invisible factors that contribute to create it in the firm, over and above the stock of visible or tangible assets. The authors also suggested four key dimensions of intellectual capital (financial; customer; process and renewal and development focus). Lynn (1998) and Marr (2005) identify that organisations employ three types of capital: physical; financial; and intellectual capital. These combine to form an organisation's resources, and as such need to be well managed. Moreover, Abdullah and Sofian (2012) categorize intellectual capital into four core components: spiritual capital, human capital, structural capital and customer capital. This study uses questionnaire survey as the data collection method. The questionnaire comprises three parts which was designed to capture information on intellectual capital practices of Malaysian PLCs, the perception on the relationship of intellectual capital and corporate performance and the respondent's demographic information. Sveiby (1997) categorises intangibles into internal structure, external structure and employee competence. Roos et al. (1997) define intellectual capital as the economic value of two elements in particular: structural capital and human capital. Based on the knowledge source and structure, several studies have divided intellectual capital into three categories: structural capital, human capital, and customer capital (see; Edvinsson and

Malone, 1997; Maeques et al. 2006; Sydler et al. 2014). Following a number of these studies (see, Edvinsson and Malone, 1997; Wexler, 2002; Roos et al., 2005; Maeques et al., 2006; Sydler et al., 2014), the current study classifies intellectual capital into three factors as structural capital, human capital and customer capital.

Concerning structural capital, Pandey and Dutta (2013) find that structural capital plays an important role in developing the culture of knowledge and adds value to the company. Petty and Guthrie (2000) argue that structural capital refers to elements like business processes, software systems, supply chains. Structural capital represents the intellectual asset that remains when employees leave the company; hence, SC is independent of individuals and is generally explicit (Hormiga et al., 2011). Tsui et al. (2014; p. 1316) point out that structural capital composes of organization's routines, procedures, strategies, and policies that are in charge of organization's daily operations whereas organizational capital is the collective and institutionalized knowledge and experience residing within and utilizing through databases, patents, manuals, structures, systems, and processes of an organization. Similarly, Edvinsson (1997) and Cohen and Kaimenakis, (2007) point out that structural capital is created by containing and retaining knowledge to become company property. It includes intellectual properties consisting of patents, licenses, trademarks, etc. Consistent with previous arguments, the current study argues that structural capital composes everything inside the company after excluding human resources costs. Structural capital includes intellectual properties consisting of patents, licenses, trademarks, systems and structures. Thus, structural capital was measured from annual reports of Mobinil as the total intangible assets and total capital expenditures.

Moreover, a number of studies (Roos et al., 2005; Tayles et al. 2007; Marr, 2008) argue that customer capital is the value of a firm's relationships with people, external stakeholders, network partners and investors and organizations with which it conducts business including innovation capital, databases, software systems, distribution networks, networks with suppliers, organizational charts, corporate culture, strategies and policies. On the other hand, Leslie and Holloway (2006) also Vargo and Lusch (2004) indicate that companies must develop their relationships with customers to create new products. Consequently, companies can change tangible elements (e.g., products) to intangible elements, such as skills, information, and knowledge, and therefore towards interactivity, connectivity and on-going relationships. Tsui et al. (2014; p. 1316) point out that customer capital refers to all knowledge acquired by organizations because of their interaction with the external environment such as competitors, partners, customers, regulators, etc. customer capital includes marketing channels, customer relationships, supplier relationships, customer loyalty, governmental and industrial

networking, intermediaries or partners (Sullivan, 1999; Tayles et al. 2007; Wall et al., 2004; Roos et al., 2005). In line with the previous discussion, customer capital refers to a firm's relationships with external parts. The more relationships the company has with strong external partners such as customers, partners, regulators and investors, the greater the market share percentage of the company increases. Consequently, the market share percentage of Mobinil was used as a proxy of customer capital in the current study.

Finally, regarding human capital human capital, Mouritsen et al. (2001) suggest that human capital incorporates employee knowledge, customer confidence, company infrastructure, and information technology. Moreover, a number of studies (see; Wall et al., 2004; Tayles et al. 2007; Marr, 2008) refer that human capital includes knowledge, professional skills and experiences, expertise, educational level and creativity of employees. Petty and Guthrie (2000) identify human capital as staff competencies and the competencies of external stakeholders available to the firm. According to the above, in this study, human capital was measured by total expenses related to human resources (board of directors and employees). These expenses include salaries of board members, remuneration, allowances and dividends, salaries of employees, employees' dividends, training and education program for employees and employee pension plan.

2.2 The relationship between intellectual capital and corporate financial performance

Intellectual capital is seen as the main resource and a key driver in managing profitability (Marr et al, 2003). The relationship between intellectual capital and corporate financial performance of companies has been addressed by a number of studies (Belkaoui, 2003; Chen et al, 2005; Muhammad and Ismail, 2009). The results of these studies have shown a positive relationship between intellectual capital and corporate financial performance. For example, Chen et al. (2005) provide evidence on intellectual capital increases for both revenues and profitability for 30 Taiwanese companies using four models of corporate financial performance, return on ownership, return on assets, growth in net sales, and net value added per employee.

In Egypt, few studies have conducted on the measurement and reporting of intellectual capital such as Seleim et al. (2004) who focused on the measuring of intellectual capital indicators. Also, Seleim et al. (2006) investigate the relationship between human capital and corporate performance in software companies. However, Ismail (2008) addresses corporate disclosure of intellectual capital in Egyptian companies' annual reports. Recently, Seleim and Khalil (2011) examine associations between knowledge management processes and

intellectual capital in the Egyptian software industry. Abeysekera (2011) investigates the effect of the current-period intellectual capital disclosure on earnings and current annual stock return during the civil-war period using the top 30 firms listed on Colombo Stock Exchange over six years (from 1998 to 2003), the study finds that intellectual capital disclosure activity has no influence on earnings included in the current stock return.

In Romania, Gogan (2014) suggests a model of the intellectual capital evaluation then conducted a case study on an organization acting as a construction company founded in 2006. Its turnover is EUR 56.000.000 and it has 440 employees (data available in the end of 2012). The company encourages employees to be innovative and adopt a number of policies for sharing knowledge. All results of the case study lead to the conclusion that the success of the organization lies in the high degree of investment and recognition of intellectual capital. Using 69 publicly traded pharmaceutical and biotechnology companies from the fiscal year 2002 until 2009, Sydler et al. (2014) provide the answer for the question whether intellectual capital supports the knowledge-based view of the firm that explains long-term differences in firm profitability? The authors show a significant positive correlation between the firms' intellectual capital over time and their profitability. These findings support that companies with increasing intellectual capital over time will become more profitable. Consequently, intellectual capital operates as a critical strategic lever for profitability and may be instrumental in sustaining a competitive advantage. In the same line, Cabrita and Bontis (2008) Cohen and Kaimenakis (2007) by using surveys investigate the impact of intellectual capital on corporate financial performance. Their results show that intellectual capital has a significant positive impact on corporate financial performance and should receive corresponding attention from researchers and managers.

In Malaysia, Abdullah and Sofian (2012) determine the association of the intellectual capital on corporate performance of Malaysian public listed companies (PLCs). The findings of the study confirm that all intellectual capital components has a significant positive relationship with corporate performance of Malaysian PLCs. Customer capital emerged as an intellectual capital component that has the strongest relationship with corporate performance, followed by other components. This result suggests that intellectual capital is vital to business success and performance. The respondents agreed that high intellectual capital indicates a higher performance. Also, customer capital is the most influential, followed by spiritual capital, structural capital and human capital. This is inconsistent with findings by Bontis et al. (2000)

which concluded that human capital is the most important intellectual capital in Malaysian companies. The overall correlation analysis results clearly show that all four intellectual capital components do have a significant positive relationship with corporate performance consistent with the results of Tayles et al. (2007). Lu et al. (2014) evaluate the performance of 34 Chinese life insurance companies for the period 2006–2010. Regression analysis of the study reveals that intellectual capital is significantly positively associated with a firm operating efficiency. The results of this study show that intellectual capital can make a company rich. In a dynamic business such as life insurers' managers should invest and fully utilize intellectual capital to gain a competitive advantage. In the light of the above discussion, it is clear that previous studies regarding the impact of intellectual capital on corporate financial performance provided a variety of results. In the current study, intellectual capital is presented throughout three factors (customer capital, structural capital, and human capital) and also corporate financial performance is presented by three financial measures. Accordingly, the following main hypothesis can be suggested:

H1. There is a significant relationship between intellectual capital and corporate financial performance.

The main hypothesis can be broken into the following sub-hypotheses as follows:

H1a. There is a significant relationship between customer capital and corporate financial performance

H1b. There is a significant relationship between structural capital and corporate financial performance

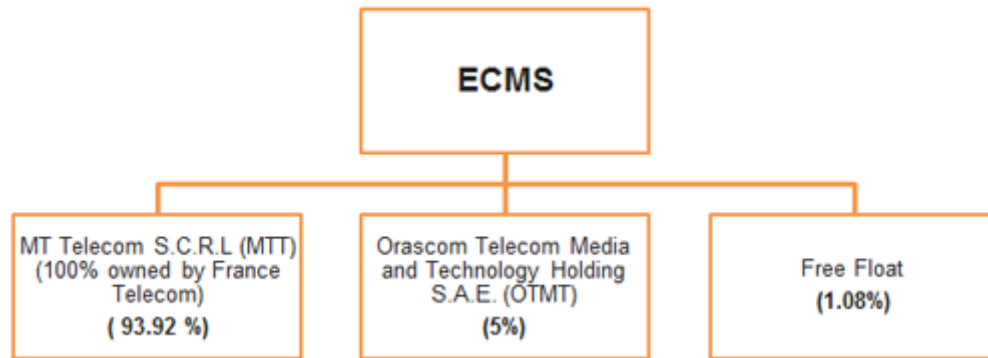
H1c. There is a significant relationship between human capital and corporate financial performance

3. The case of The Egyptian Company for Mobile Services (Mobinil)

The telecom market in Egypt is a fast-growing, intensely competitive market, open to international investment and dominated by the private sector. Egypt telecom's industry is one of the country's great success stories. The mobile sector is predominantly driven by prepaid customers. According to Business Monitor International, the proportion of prepaid subscribers increased from 94.7% in 2007 to an average of 97.5% by the end of 2011 and then declined to around 96% in 2012. Egypt is one of the most developed internet markets in Africa in terms of users, international bandwidth and services offered. It has some of the lowest prices for services

on the continent; the result of a highly competitive climate. It is worth noting that the strongest growth is currently seen in mobile broadband services, which offers to the mobile operators' new revenue streams. The telecom industry, is relatively resilient both to political and economic unrest and is regarded as one of the more "recession-proof" sectors worldwide. Over the last two years, the Egyptian telecom sector has been less negatively affected than others. Nevertheless, it is being exposed to considerable challenges, including a slow-down in growth and potential investment.

The Egyptian Company for Mobile Services is a leading wireless telecom service provider in Egypt. It operates under the brand name Mobinil and has 32.6m subscribers as of March 2012 (32.9 m as of December 2011), which translates into a market share of approximately 34%. Its network of 5299 sites at the end of 2011 and 34 switches currently covers most of the urban areas in Egypt, or 99.66% of the population. The Egyptian Company for Mobile Services was initially established in November 1997 by the state-owned Arab Republic of Egypt National Telecommunication Organization (ARENTO), which was succeeded by Telecom Egypt (TE). The company commenced its operations in May 1998, Mobinil is Egypt's first mobile operator, when all the mobile-related assets of TE were sold off to Mobinil Telecommunications, a consortium comprised of one local and two international telecom giants, Orascom Telecom Holding (OTH) France Telecom (FT), and Motorola. Going forward, the company was owned by two of its founding shareholders OTH and FT/Orange Group, with direct and indirect ownership of 34.6% and 36.4% respectively. The remaining 29% of the shares represented free float. The OTH name was changed to Orascom Telecom Media Technology (OTMT) in light of the acquisition of VimpelCom Ltd. In a recent action, FT acquired an additional stake in Mobinil, ultimately gaining majority control of the company with a total shareholding of 93.92%. As a result, OTMT's share was reduced to only 5% and the balance represents free float, publicly traded on the Egyptian Exchange. Mobinil's coverage extends to more than 99.65% of the Egyptian population. Mobinil has international roaming agreements with 390 operators in 150 countries. Mobinil was the first Egyptian operator to establish roaming agreements with the U.S. and Canada, as well as non-GSM operators in South America extending its services to countries such as Argentina, Brazil, Peru, and the Philippines, to name a few (Middle East Rating & Investor Service, 2012; 2013 Annual Report Mobinil).



Mobinil has strived to maintain a strong market position. Honouring the trust of more than 30 million customers, it is recognized as one of the leading mobile service providers in the region due to the quality of its services and its contributions towards the development of the country. Throughout the years, Mobinil has been honoured by receiving numerous awards presented by both national and international institutions. It was recognized for the quality of its operations, the development of its human resources, the transparency of its disclosure practices and investors' relations, and for the reliability of its health and safety systems. Mobinil was the first telecom company to receive the ISO 14001 certificate in Egypt and the Middle East. It has also obtained official renewal of the ISO 14001 for the fifth consecutive year. Mobinil is the first mobile operator in Egypt to implement the technology provided by HP "Next Generation Operation Support System [NGOSS]". It has successfully deployed phase 2 of this cutting edge technology, which offers for customers, assured service quality and availability in addition to a reduction in network problem-solving time.

Mobinil was honoured to receive two distinguished awards on June 19, 2007 for the Best Website and the Best Annual Report for 2006 presented by the Egyptian Institute of Directors in cooperation with the International Finance Corporation. Both awards recognize Mobinil for leading the way in transparency and disclosure of information to all stakeholders, by following best practices in corporate governance, quality of information, featured results and operational highlights, management discussions and analyses, indicators on prospects, and employee relations. Mobinil financial statements are dually audited by Ernst & Young and Hazem Hassan, a member of the KPMG firm. The company's financial statements have been prepared in accordance with Egyptian Accounting Standards. However, in the auditor's opinion, there are no material differences between Egyptian Accounting Standards and the International Accounting Standards.

4. Research method

This section is devoted to explain the methodology adopted in the current study and the form of data analysis being undertaken to test the hypotheses developed earlier in this study. Since the objective of the study to examine the relationships between intellectual capital and corporate financial performance of Mobinil as an example for Egyptian telecom companies over sixteen years (from 1998 to 2013), the age of Mobinil. Variables for both intellectual capital and corporate financial performance are identified in the following sub-section (4.1). Then, the relationships between these variables are examined by Canonical Correlation Analysis in sub- section (4.2).

4.1 Variables of the study

The current study identified intellectual capital using three components (structural capital, human capital, and customer capital) as a first set of the study. Measuring these components in the current study is based on the general knowledge of literature and the data of 16 annual reports of Mobinil. Following (Tsui et al. 2014; Tayles et al. 2007; Roos et al., 2005; Wall et al., 2004; Petty and Guthrie, 2000), it can be argued that structural capital composes everything inside the company after excluding human resources costs. Structural capital includes intellectual properties consisting of patents, licenses, trademarks, systems and structures. Thus, structural capital was measured from annual reports of Mobinil as the total intangible assets and total capital expenditures. Literature on customer capital refers to a firm's relationships with external parts. The market share percentage that was presented in Mobinil's annual reports was used as a proxy of customer capital. It can be a sign of the relative competitiveness of the company's products or services. As the total market for a product or service grows, a company that is maintaining its market share is growing revenues at the same rate as the total market. A company that is growing its market share will be growing its revenues faster than its competitors. In the light of figures and facts that were presented in Mobinil's annual reports, human capital was measured by total expenses related to human resources (board of directors and employees). These expenses include salaries of board members, remuneration, allowances and dividends, salaries of employees, employees' dividends, training and education program for employees and employee pension plan.

On the other hand, there are several proxies of corporate financial performance used in prior research (Lu et al. 2014; Gogan, 2014; Belkaoui, 2003; Chen et al, 2005; Muhammad and Ismail, 2009), including return on asset, return on ownership, growth in net sales return on equity, total sales, growth revenue turnover, market capitalization, net income before tax,

earning per share. Literature does not provide criterion to choose among these proxies. In the current study three proxies of corporate financial performance will be used. Firstly; earnings before interest, tax, depreciation and amortization (EBITDA) divided by total revenue, is a measurement of a company's operating profitability. Because EBITDA excludes depreciation and amortization, it can provide an investor with a cleaner view of a company's core profitability. Secondly: earning per share is the portion of a company's profit allocated to each outstanding share of common stock. Thirdly: revenue growth illustrates the percentage of sales increases/decreases over time. It is used to measure how fast a business is expanding. Revenue growth equals current period – previous period sales/ Previous Period Sales. The three proxies of corporate financial performance (earnings per share, EBITDA and revenue growth) represent the second set of the study.

4.2 The statistical analysis (Canonical correlation Analysis)

Canonical Correlation Analysis is the general procedure for investigating the relationships between two sets of variables. If we have two vectors $X = (X_1, \dots, X_n)$ and $Y = (Y_1, \dots, Y_n)$ of random variables, and there are correlations among the variables, then Canonical Correlation Analysis will find linear combinations of the X_i and Y_j which have maximum correlation with each other. Canonical Correlation Analysis is the appropriate technique for identifying relationships between two sets of variables. The Canonical Correlation Analysis has two advantages over multiple regression. First: it deals with two sets where each one has a number of variables while regression needs one dependent variable and a number of independent variables. Second, Canonical Correlation Analysis identifies the preference variable in each set of variables. In general, the number of Canonical dimensions is equal to the number of variables in the smaller set; however, the number of significant dimensions may be even smaller (see, Anderson, 1984; Sharma, 1996; Borga, 1999; Chaudhuri et al. 2009). All the Canonical Correlation Analysis is done using the package Canonical correlation analysis in R-software (website: <http://cran.r-project.org>). The following Figure 1 shows the correlations between intellectual capital first set (structural capital, customer capital and human capital) and corporate financial performance second set (earnings per share, revenue growth, and EBITDA). From figure 1, there are a number of positive correlations between customer capital and earnings per share (0.37), revenue growth (0.51) and EBITDA (0.47), structural capital and earnings per share (0.15) and human capital and earnings per share (0.13). On the other hand,

structural capital has a negative correlation with revenue growth (-0.11) and EBITDA (-0.40). Also, customer capital has a negative correlation with revenue growth (-0.07) and EBITDA (-0.42).

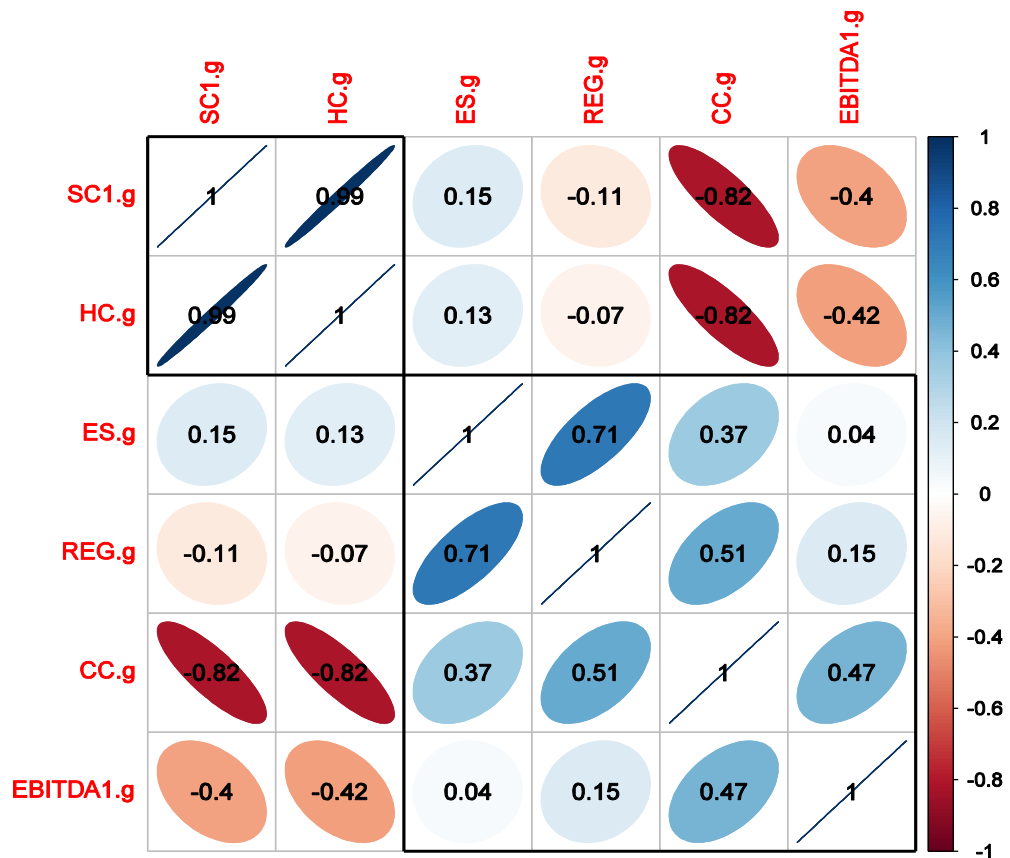


Figure 1: Correlations between intellectual capital (structural capital, customer capital and human capital) & corporate financial performance (earnings per share, revenue growth and EBITDA)

Table 1 below shows the three dimensions of Canonical correlation analysis where the current study includes two sets (intellectual capital and corporate financial performance) with three variables for each one. Figure 2 below presents these dimensions.

Table 1: The Canonical Correlation

Dimension	Canonical Correlation	Canonical Correlation square	Eigen	percent	Cumulative
1	0.8850	0.7832	3.6118	80.083	80.08

2	0.6306	0.3976	0.6601	14.636	94.72
3	0.4386	0.1923	0.2382	5.281	100

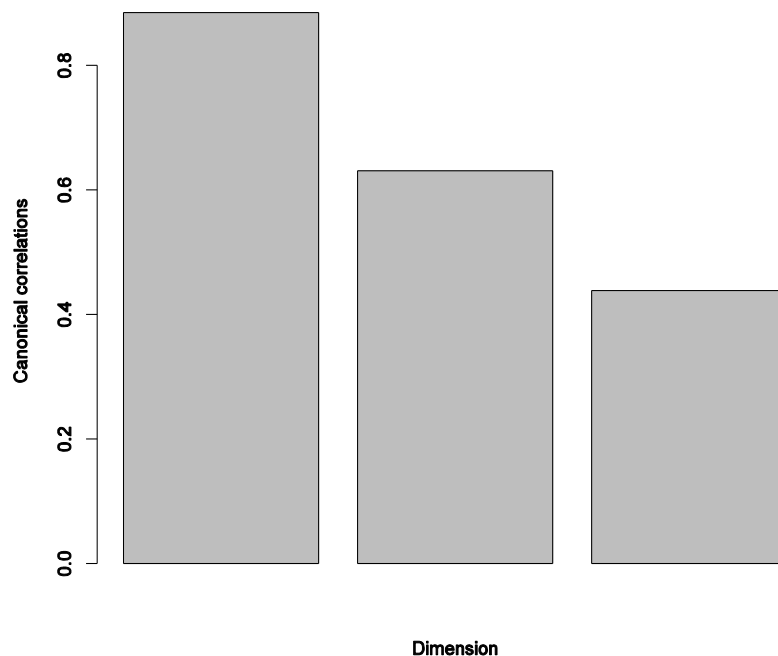


Figure 2: The Canonical Correlation for each dimension

Table 1 and Figure 2 show that dimension 1 had a Canonical correlation of 0.88 between the sets of variables; dimension 2 had a Canonical Correlation 0.63, while for dimension 3 had a Canonical Correlation 0.43.

To identify the significant level of the three dimensions of Canonical Correlation Analysis, tests of Canonical dimensions were conducted and the results were shown in Table 2 below.

Dim	WilksL	F	Df1	Df2	P
[1,]	0.10549	4.1349	9	24.487	0.00245
[2,]	0.48650	2.3853	4	22.000	0.08226
[3,]	0.80765	2.8578	1	12.000	0.11671

Table 2: tests of Canonical dimensions

Table 2 shows that the first test of the Canonical dimensions is significant at 0.01, 0.05, 0.10 (where $0.00245 < (0.01, 0.05 \text{ and } 0.10)$), the second test for dimension 2 is significant only at 0.10 (where $0.0822 < 0.10$). Finally, the last test for the dimension 3 is not significant at the three level of significance 0.01, 0.05 and 0.10 ($0.1167 > 0.10$). Therefore the value of the first

Canonical Correlation is 0.885, and the p-value indicates that it is statistically significant at an alpha level of 0.01, 0.05 and 0.10 while the value of the second Canonical Correlation is 0.63, and p-value indicates that it is statistically significant only at an alpha 0.10. The remaining Canonical Correlation is not statistically significant. Hence, the correlation between the two sets of variables can be accounted for by just one pair of Canonical variates at alpha 0.01 and 0.05 and two pairs of Canonical variates at an alpha 0.10. Where the first two Canonical correlations for intellectual capital are significance, while the third one is not, Canonical Correlation Analysis will be focused only on the first two canonical Correlations for intellectual capital and corporate financial performance (see, Anderson, 1984; Sharma, 1996; Borga, 1999; Chaudhuri et al. 2009). Consequently, the Canonical variates for intellectual capital are

$$W_1 = -0.00155 \text{ structural capital} - 26.43 \text{ customer capital} - 0.0002 \text{ human capital}$$

$$W_2 = 0.0085 \text{ structural capital} - 1.465 \text{ customer capital} - 0.0041 \text{ human capital}$$

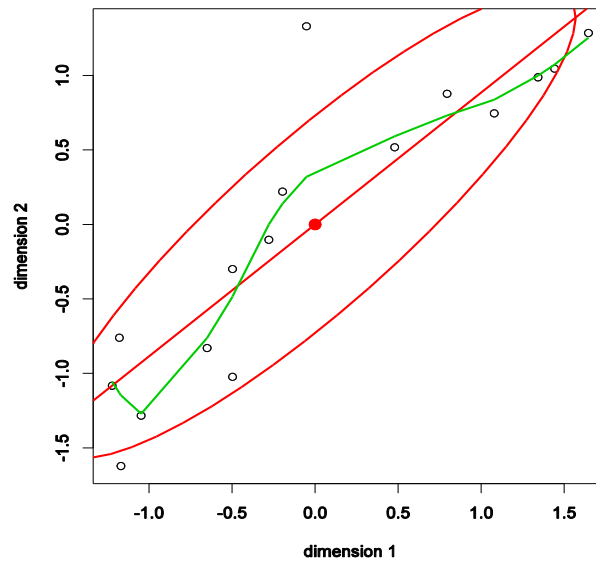
The Canonical variates for corporate financial performance are

$$V_1 = -0.1028 \text{ earnings per share} - 0.0211 \text{ revenue growth} - 0.0082 \text{ EBITDA}$$

$$V_2 = 0.1633 \text{ earnings per share} - 0.1163 \text{ revenue growth} + 0.00182 \text{ EBITDA}$$

The Canonical coefficients are interpreted in a manner analogous to interpreting regression coefficients i.e., for the variable earnings per share if a one unit increase in earnings per share this will lead to a 0.1633 increase in the second Canonical variate of set 2 when all of the other variables are held constant. Also, customer capital leads to a 1.465 decrease in the first Canonical dimension 2 with the other predictors held constant.

Figure 3 shows the scatter plot between the first two significant Canonical variates with smooth line that shows clearly they have positive high correlation.



4.3 Interpreting the Canonical variates

Since the current study has a small sample size (Mobinil telecom case), it uses simple correlations between the variables and Canonical variates for interpreting these variates. These correlations are referred to as loadings. Using these loadings is similar to the use of loadings in the factor analysis. To explain these loadings are correlations between variables and the Canonical variates. Figure 4 shows the correlation between the first Canonical variates W1 and V1 and the two sets of intellectual capital variables (structural capital, customer capital and human capital) and corporate financial performance variables (earnings per share, revenue growth and EBITDA). It can be seen from Figure 4 the first Canonical correlation accounts for the highest correlation (about 0.88) between the intellectual capital and corporate financial performance. Also Figure 4 suggests that the variables, earnings per share, revenue growth and customer capital, are more influential in forming the Canonical variates.

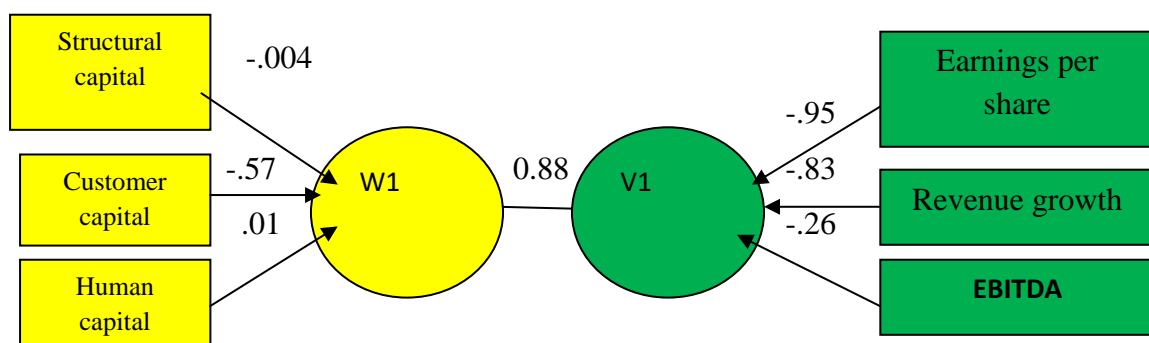


Figure 4: Correlation between the first Canonical variate and the sets of variables

Figure 5 below shows the correlation between the second Canonical variates W2 and V2 and the two sets of intellectual capital variables (structural capital, customer capital and human capital) and corporate financial performance variables (earnings per share, revenue growth and EBITDA). It can be seen from Figure 5 the second Canonical correlation accounts for the second highest correlation (about 0.63) between the intellectual capital and corporate financial performance. Also Figure 5 suggests that the variables, structural capital, customer capital, human capital and revenue growth, are more influential in forming the Canonical variate. The variables structural capital, customer capital and revenue growth have a negative effect while human capital has a positive effect.

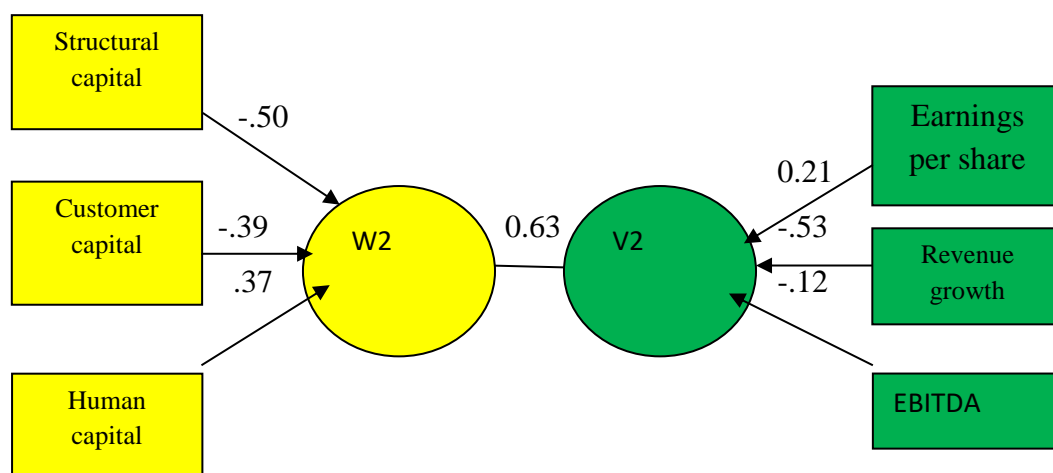


Figure 5: Correlation between the second Canonical variate and the sets of variables

4.4 Assessing the statistical significant of the Canonical correlation analysis

Since the Canonical variates are linear composites of the original variables, it should attempt to determine what the liner combinations of the significance of Canonical correlation analysis represent. Therefore, the standardized coefficients can be used for this purpose which allow for more understanding and easier comparisons among the variables. The standardized canonical coefficients are similar to the standardized regression coefficients in multiple regressions. Sharma (1996) argues that the most important variable which has standardized coefficient 0.30 or more. Table 3 computes the standardized Canonical coefficients.

Table 3: Standardized Canonical coefficients for intellectual capital and corporate financial performance

	intellectual capital		corporate financial performance	
Dimensions	[,1]	[,2]	[,1]	[,2]
[1,]	-1.150	6.282	-0.765	1.215
[2,]	-1.741	-0.096	-0.256	-1.407
[3,]	-0.279	-5.925	-0.199	0.044

In Table 3, the standardized Canonical coefficients are interpreted in a manner analogous to interpreting standardized regression coefficients. For example, if a one standard deviation of the variable ES increases this will lead to a 0.765 of standard deviation decreases in the score on the first Canonical variate for corporate financial performance when the other variables in the model are held constant. The standardized canonical coefficients for the first two dimensions across both sets of variables show that for intellectual capital variables, the first Canonical dimension is most strongly influenced by customer capital (-1.74) then structural capital (-1.150) and for the second dimension structural capital (6.28) and human capital (-5.92). For corporate financial performance variables, the first dimension was most influenced by earnings per share (-0.765). For the second dimension, earnings per share (1.215) and revenue growth (-1.407) were the most influenced. These findings show the high positive correlations between the Canonical variables W1 and V1. In other words, customer capital and structural capital (intellectual capital variables) are usually connected with high relationships with earnings per share and revenue growth (corporate financial performance variables).

5. The empirical results of the study

Canonical Correlation Analysis maximises the correlation between linear composites of the intellectual capital and corporate financial performance variables, and not the amount of variance accounted for in one set of variables by the other set of variables. Canonical coefficients, on the other hand, give the contribution of each variable in the presence of all other variables (Sharma, 1996; Borga, 1999; Chaudhuri et al. 2009). The findings of the study provide insights into the components of intellectual capital on Egyptian Telecom companies and their influence on corporate financial performance. The Canonical Analysis indicates a

noticeable relationship between intellectual capital and corporate financial performance which can support the main hypothesis of the current study, and generally is consistent with the results of Lu et al. (2014), Cabrita and Bontis (2008) and also Cohen and Kaimenakis (2007).

Canonical Correlation Analysis results determine the relationship amongst the intellectual capital variables and corporate financial performance, thus recognizing its direction, as either a positive or negative relationship. The finding shows a number of positive correlations between customer capital and earnings per share, revenue growth and EBITDA, structural capital and earnings per share and human capital and earnings per share. The overall correlation analysis results show that customer capital and structural capital (intellectual capital components) do have a significant positive relationship with some corporate financial performance variables consistent with the results of Tayles et al. (2007), Lu et al. (2014) and Abdullah and Sofian (2012). On the other hand, structural capital has a negative correlation with revenue growth and EBITDA. Also, human capital has a negative correlation with revenue growth and EBITDA. The more interesting finding of the current study is customer capital and structural capital are usually connected with high relationships with earnings per share and revenue growth (corporate financial performance variables). This finding shows that customer capital has the most important intellectual capital variables and has a strong impact on corporate financial performance followed by structural capital. In contrast with Bontis et al. (2000) who provide evidence on human capital as the strongest factor of intellectual capital related to corporate performances. On the other hand, in Malaysia, the results of Abdullah and Sofian (2012) show that customer capital is the most influential component of intellectual capital that is related to a higher corporate performance which is consistent with the results of the current study. In general, the Canonical Analysis indicates a noticeable relationship between intellectual capital and corporate financial performance, in line with a number of studies as Sydler et al. (2014), Cabrita and Bontis (2008) Cohen and Kaimenakis (2007). In conclusion, the above results suggest that both customer capital and structural capital have a significant impact on corporate financial performance when measured by earnings per share and revenue growth. In contrast, the results of the current study suggest that human capital has no significant impact on corporate financial performance.

5.2 Testing the hypothesis of the study

The study aims to examine the relationship between intellectual capital and corporate financial performance of Mobinil as an example of Egyptian telecom companies over sixteen years (from 1998 to 2013). Therefore, the main hypothesis is suggested as follows:

H1. There is a significant relationship between intellectual capital and corporate financial performance. The Canonical Analysis indicates a noticeable relationship between intellectual capital and corporate financial performance which can support the main hypothesis of the current study, and generally is consistent with the results of Lu et al. (2014), Cabrita and Bontis (2008) and also Cohen and Kaimenakis (2007).

Because the current study identifies three components for intellectual capital (structural capital, customer capital and human capital), there are three sub-hypotheses as follows:

H1a. There is a significant relationship between customer capital and corporate financial performance

H1b. There is a significant relationship between structural capital and corporate financial performance

H1c. There is a significant relationship between human capital and corporate financial performance

The results of

The Canonical Correlation Analysis indicates both customer capital and structural capital have a significant impact on corporate financial performance when measured by earnings per share and revenue growth consequently, H1a and H1b can be accepted. In contrast, the results of the current study suggest that human capital has no significant impact on corporate financial performance thus, H1c is rejected.

6. Conclusions and future research

This study provides an empirical examination on the association between intellectual capital and corporate financial performance in the Egyptian context using Mobinil company as an example for Egyptian telecom companies over sixteen years (from 1998 to 2013). The study employs the Canonical Correlation Analysis as an appropriate statistical analysis. It analyses relationships between two sets of variables and maximises the correlation between linear composites of the intellectual capital and corporate financial performance variables. The findings of the study provide insights into the components of intellectual capital on the Egyptian Telecom Company and their influence on corporate financial performance. The Canonical Analysis indicates noticeably the relationship between intellectual capital and corporate financial performance. There are a number of positive correlations between customer

capital and earnings per share (0.37), revenue growth (0.51) and EBITDA (0.47), structural capital and earnings per share (0.15) and human capital and earnings per share (0.13). On the other hand, structural capital has a negative correlation with revenue growth (-0.11) and EBITDA (-0.40). Also, human capital has a negative correlation with revenue growth (-0.07) and EBITDA (-0.42). Finally, findings reveal that customer capital and structural capital (intellectual capital variables) are usually connected with high relationships with earnings per share and revenue growth (corporate financial performance variables).

It is also necessary to acknowledge a number of limitations in this study. First, it is focused on a single country, Egypt. Mobinil was selected from the telecommunication sector. Therefore, caution should be practiced with the results of this study. The current study holds several implications for future research. First, future research could investigate similar phenomena in countries with different political environments. Second it would also be interesting to conduct the study in other industries, which would reveal implications regarding differences across sectors and potentially increase the sample size. Third, it would be useful to conduct the study with considering other factors such as corporate disclosure, different types of risks and corporate governance characteristics.

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