

ANALYZING THE IMPACT OF INTELLECTUAL CAPITAL ON FINANCIAL PERFORMANCE OF FOOD & PERSONAL CARE AND TEXTILE SECTORS: A COMPARATIVE ANALYSIS

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Abstract. This paper has examined the role of intellectual capital in profitability of firms belonging to food & personal care and textile sectors in Pakistan. From each of the chosen sectors, seven firms are selected using systematic random sampling technique and data have been gathered from audited statements of these firms for financial years 2012 to 2016. We have employed modified value added intellectual coefficient (MVAIC) model to measure intellectual capital. We have used Stata software version 14, for conducting multiple regression analysis and paired sample T test. The findings propose direct and significant influence of capital employed efficiency (CEE) on selected firms' financial performance. The influence of intellectual capital efficiency (ICE) is found to be significant in certain cases investigated through different models employed in the study. Result of paired sample T test demonstrate that MVAIC score in the textile sector is greater than food & personal care sector. The findings of this study have highlighted the need for formulation of such

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policies which encourage allocation of financial resources for development of firms' intellectual capital.

Keywords: Intellectual capital, financial performance, food & personal care sector, textile sector

JEL Classification: GOO, G39

I. INTRODUCTION

Human society has been moving through different phases. The recent visible phase is industrialization. The post-industrialization phase is marked by a shift from the industrial to service sector in the developed countries. Now many countries get most of their GDP from the services sector. Another visible change observed during last two decades was the shifting of human society towards a society based on information and digital technology (Tarigan, Listijabudhi, Hatane, & Widjaja, 2019). This gave rise to better access and use of knowledge. As the digital knowledge accumulated, there was unprecedented access to knowledge and gaining of skills. In such digital and information era, intellectual capital (IC) has become more important and effective. Global market is shifting from capital-intensive industries to knowledge industries. These industries are comprised of more virtual resources. Such intangible assets are not part of the balance sheet of the companies. Hence, their effect is underestimated if even accounted for.

In an economy where knowledge is important, it is norm to consider information technology, innovation, creativity, and research and development as strategic assets. With strongly developed mediums of communication, storage and accumulation of knowledge, combined with easy access to knowledge; IC has become more and more important (Khalique, Ramayah, Shah, & Iqbal, 2019). According to World Bank (1998, p.1), "Knowledge is like light. Weightless and intangible it can easily travel the world enlightening the lives of people everywhere." In this context, majority of the knowledge-based firms have invested a significant amount of their wealth in the form of intangible assets. Physical and manual systems are shifting day by day in automated and computerized systems that can use knowledge in a way that was never possible before (Poh, Kilicman, Ibrahim, & McMillan, 2018). As a result,

fewer people have to do physical work, while majority of the people have to perform mental work (Akpinar & Akdemir, 1999). The problem with mental work is that it does not appear in the financial statements of the company because we cannot exactly estimate the price of mental work. The measurement of such intangible asset is not only difficult but also sometimes impossible. This type of mental work is usually known as IC that is used by firms for creating wealth through production of greater valued assets (Stewart, 1991).

Studies conducted in the past acknowledge the significant and affirmative contribution of IC in financial performance of firms (see for instance, Arslan & Zaman, 2014; Mondal, 2016; Ulum, Rizqiyah, & Jati, 2016). Information and knowledge have been converted into an asset that is taken care of and protected from theft. IC is valuable asset for every business. It may not be shown in the balance sheet but has an influence on the working and culture of a business firm (Ozkan, Cakan, & Kayacan, 2017). Spending money on training the staff for increasing their skills may not make sense given high employment turnover. However, its importance is evident from the fact that, today firms are spending significant money on human capital. Accumulation of knowledge in any way, such as in the form of training employees, is a form of capital that is additive in nature. Therefore, training someone means influencing others when such skill may trickle down and benefit quick accumulation of knowledge collectively.

This study aims to (a) examine the effect of intellectual capital efficiency (ICE) and capital employed efficiency (CEE) on firms' financial performance and (b) compare and contrast the performance of food & personal care and textile sectors in terms of their MVAIC scores. In accordance with research objectives, the present study is expected to provide a unique contribution to extant literature on IC. It is the first study in Pakistan in which researchers have compared the role of both IC and capital employed using MVAIC model. This comparison has been undertaken by focusing on two major sectors that make significant contribution in Pakistan's economy i.e., Food & personal care and textile sectors.

Pakistan is an emerging economy in South Asian region and its economic development is based on strong manufacturing industry. The

manufacturing sector makes 13.6% contribution towards GDP of Pakistan and includes two major sectors crucial for society i.e., textile and food & personal care sectors. According to Economic Survey of Pakistan (2017-18), textile sector is important for Pakistan's economy as it contributes 0.47% in GDP growth and 60% in total exports (Finance Division, 2018). Textile sector also helps in providing employment opportunities to around 40% of industrial labor force. After getting GSP plus status in 2019, demand for innovative textile related products is continuously increasing in local and foreign markets, which requires investment in IC in order to utilize available resources in an efficient way. Food & personal care, is another important sector, which, according to the Economic Survey of Pakistan (2017-18), has 2.33% contribution in GDP growth. Also, according to US Department of Agriculture's Economic Research, Pakistani people spend almost 46.99% of their wealth on food & personal care related items (Seale, Regmi & Bernstein, 2012). This is a feature common in low income and middle-income economies that a major portion is spent on necessities. Likewise, they also spend significant proportion of their incomes on textile related products. Therefore, there is a need to study how firms from both of these sectors preserve human competencies, improve internal processes and develop exemplary relations with stakeholders. This could be done by ascertaining the investment in IC made by both sectors because it is proved that investing a significant proportion in IC enhance firms' profitability (Khalique et al., 2019).

The present study is an effort to assist academia in exploring different aspects of IC and develop more suitable proxies for the measurement of IC using MVAIC model. This study can also help practitioners by providing useful insights and motivation for making policies related to better investment for formulation and development of IC. The next part of article discusses the theoretical and empirical review of the pertinent literature, which is followed by conceptual framework. After this, research design ~~and methods used~~, and the operational definitions of key constructs are provided. Next section contains findings of the study and discussion with reference to extant literature. Last section is about conclusion, limitations and future directions.

II. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

THEORETICAL BACKGROUND

The term IC has originated from strategic management views namely; Resource Based View (RBV), that focuses on internal resources, and Knowledge Based View (KBV) (Lentjusenkova & Lapina. 2016; Ulum *et al.*, 2016). Before RBV, it was considered that an organization can gain competitive edge if it changes itself according to the dynamic environment in which it operates (Porter, 1981). This view was called Industrial Organizational View. Later on, a new view emerged that focused on internal resources being rare, inimitable and scarce (Wernerfelt, 1982) and this view was referred to as RBV. The theme behind RBV was that an organization could gain competitive edge if it managed its internal resources efficiently and effectively (Xu & Wang, 2018).

It is observed that RBV does not deal with the development of human resources with the objective to create competitive advantage. It is more static in nature as it is intrinsic to environmental changes (Daou, Karuranga, & Su, 2013; Teece & Pisano, 1994). Moreover, RBV does not put major emphasize on knowledge and IC; rather it treats these as generic sources. To overcome the deficiencies of RBV, a new concept emerged which came to be known as KBV, that considers knowledge as a valuable source for competitive edge (Grant, 1986). According to KBV, management of knowledge creates IC which is important for an organization. In this regard, it is stated that a firm can attain competitive advantage; if it manages its knowledge and IC simultaneously (Akpinar & Akdemir, 1999).

Every firm wants to maximize its profits by utilizing its resources efficiently and effectively. Resources can be tangible and intangible and are required to obtain a competitive advantage (Mohammadi, Sherafati, & Ismail, 2014). Given the scarcity of tangible resources, gaining competitive advantage over rivals requires greater emphasis to be placed on intangible resources (Albertini & Berger-Remy, 2019). IC can be calculated through subtracting book value of assets from their market value (Akpinar & Akdemir, 1999). Also, IC is basically comprised of

three major categories namely; human capital, relational capital and structural capital (Chowdhury, Rana, & Azim, 2019).

Human capital basically refers to the knowledge, qualification, intuition, skill, capabilities, innovative style, proactivity, intellectual agility and experiences which are retained by employees (Akpinar & Akdemir, 1999). It is multidimensional phenomenon that may include education, training, health, productive habit development, and benefit of more social interaction. Better social interaction may increase the spread of knowledge without putting in much effort. Normally, an organization can't preserve this capital, as employees take it with them when they retire or resign from the organization (Edvinsson & Malone, 1997). Human capital, being a significant part of IC, helps a company in strategic renewal and innovation; which shows its importance for a business. Organization may try to preserve this capital by offering lucrative salaries, bonuses and vocational benefits (Akpinar & Akdemir, 1999). According to Human Development Index (HDI) 2019, Pakistan is ranked at 152 out of 189 nations and its HDI value is 0.56 which is lower than medium level (UNDP, 2019). These statistics highlight lesser investment in human capital in Pakistan which is central aspect of IC.

Structural capital refers to organizations' competencies that are required to fulfill market requirements. It consists of the procedures and configurations that encourage employees for optimum performance; which in turn enhances business performance (Akpinar & Akdemir, 1999). According to Van and Mark (1999), process capital and innovation capital are two components of structural capital. Process capital consists of systems, tools and techniques of an organization. The innovation capital, on the other hand, refers to capability of an organization to innovate new products and service. The emphasis on innovation in business is not a new idea. Again, as above, better relations and interaction of staff may lead to innovative ideas. The structural capital can be protected through various strategies such as registration of patents, copyrights, trademarks, brands, and trade secrets (Akpinar & Akdemir, 1999).

Relational capital refers to the knowledge gained through inter-connection, not only with consumers, but also with outside stakeholders including; partners, suppliers, competitors and government (Akpinar &

Akdemir, 1999; Arslan & Zaman, 2014; Cohen & Kaimenakis, 2007). Relational capital consists of customer capital and external capital (Akpinar & Akdemir, 1999). Customer-relational capital is based on how a company manages good relations by fulfilling the needs of its customers. External-relational capital can be created by managing good relations with external stakeholders (Cheng et al., 2010). It is created by fulfilling their needs and through participation of company in corporate social responsibility (CSR) activities. Both types of relational capital are crucial for maintaining good relations which influence corporate life (Arslan & Zaman, 2014).

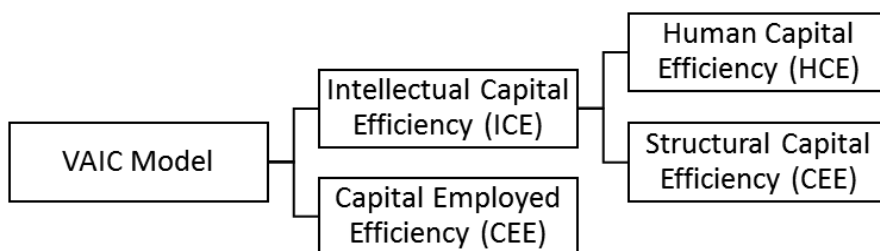
Capital employed is another important variable that has been studied in relation to financial performance of firms (Arslan & Zaman, 2014; Fijalkowaska, 2014; Mondal, 2016; Nimtrakoon, 2015; Sledzik, 2013; Ulum et al., 2016). Capital employed (CE) can be described as the book value assigned to net assets of a firm (Sharma & Naqvi, 2017; Pulic, 1998) and capital employed (CEE) is the capital employed divided by the value added (Mondal, 2016).

INTELLECTUAL CAPITAL MEASUREMENT MODELS

Value Added Intellectual Coefficient (VAIC) Model

To measure IC, Pulic (2000; 2008) developed VAIC model, which consisted of two components i.e., ICE and CEE.

FIGURE 1



Source: Pulic (1998)

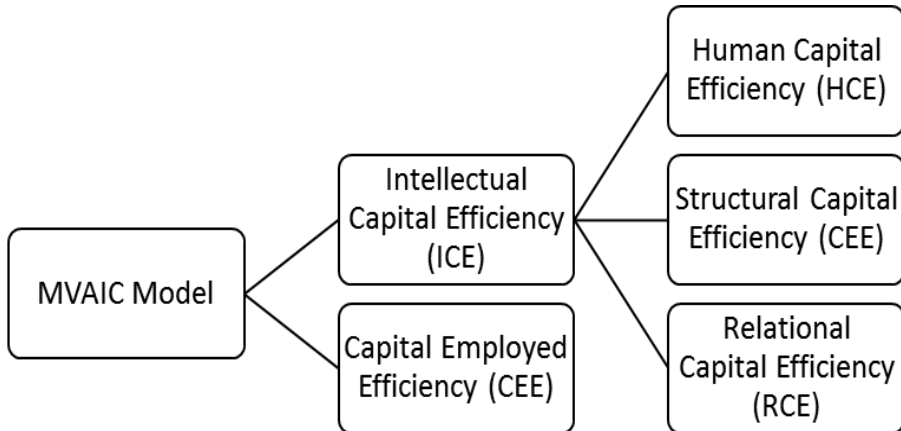
The effectiveness of key resources of an entity in terms of value added is measured by VAIC model (Setyawati, Widyastuti, Suryati, & Hartani, 2019). VAIC model uses simple procedure for the calculation of necessary coefficients and has been frequently used in the literature (e.g.,

Arslan & Zaman, 2014; Fijalkowaska, 2014; Pulic, 2008; Santoso, 2011; Ulum et al., 2016; William, 2001). However, VAIC model has also been criticized by some researchers such as; Mondal, (2016), Nimtrakoon, (2015) and Sledzik (2013). The biggest criticism on this model is that it does not consider the role played by relational capital in creating value for the firms. In addition, VAIC model calculates structural capital as the variance between value creation and human capital which is not a suitable proxy according to Mondal (2016).

Modified Value Added Intellectual Coefficient (VAIC) Model

In order to address the deficiencies of VAIC model, some researchers proposed a new model as an extension of the Pulic model (Mondal, 2016; Ulum et al., 2016; Nimtrakoon, 2015). The new modified model is known as MVAIC which is used for measuring the influence of ICE and CEE on firms' financial performance. This model includes relational capital as an indispensable tool of firms' value creation (Sharma & Naqvi, 2017). Structural capital is also considered as a separate part of IC which doesn't depend on human capital.

FIGURE 2



Source: Developed by researchers based on literature review

EMPIRICAL REVIEW

Various studies have been carried out to check association of IC with firms' performance from a financial perspective, using both primary and secondary data sources. An overview of major empirical studies in the field is provided hereafter.

Mohammadi *et al.* (2014) investigated various aspects related to IC and their relationship with firms' financial performance. They developed 14 latent variables and collected data through the questionnaire filled by 79 respondents. To check association between latent variables, they applied visual partial least square (PLS). Their findings suggested that relational capital has the greatest influence on financial performance; followed by human capital and structural capital. Another similar study carried out by Emadzadeh *et al.* (2013) used balance scorecard technique to measure IC and its relevance for corporate performance. Their findings substantiated the idea that IC had positive significant effect on firm performance. Moreover, IC was also found to affect the internal processes, customers, learning, and growth.

Suraj and Bontis (2012) examined IC management in Nigerian telecommunication firms. A sample of 29 firms was chosen and questionnaires were distributed among 320 top-level managers. Their findings revealed that Nigerian telecommunication firms should place greater emphasis on customer capital as compared to other types of IC. Another research was carried by Kojori, Aghajani, and Rasooli (2013). They studied the role of IC in Tehran based cosmetics companies' performance. They used fuzzy approach to develop the self-administrated questionnaire. Correlation and regression analyses were applied and their findings revealed that all dimensions of IC have positive significant influence on financial performance.

In addition to primary data, some researchers have used secondary data sources for IC measurement, such as; Arslan and Zaman (2014), Fijalkowaska (2014), Latif, Malik and Aslam (2012), Mondal (2016), Pal and Soriya (2016) and Santoso (2011). Such empirical evidences are found both in financial and non-financial sector firms. For example, Santoso (2011) examined the nexus between IC and financial performance of Indonesian banks. Both primary and secondary sources were used for data collection. To quantify IC, VAIC model of Pulic

(2000; 2008) was used. The dependent variable (financial performance) was measured by ROA. The data was analyzed using correlation estimates and regression technique. The findings indicated moderate and positive nexus between IC and bank performance. In addition, a questionnaire survey was also conducted with help from bank executives to collect primary data and findings of this survey were compared with those of VAIC model. It was concluded that in comparison to the questionnaire survey method, the use of VAIC model resulted in a stronger effect of IC on the financial performance.

In a similar study, Latif et al. (2012) looked into the influence that IC has on corporate performance while considering a developing country. They obtained data from Islamic and conventional banks operating in Pakistan. For operationalizing the construct of IC, VAIC model was used and corporate performance was measured through indicators of profitability, productivity, and market capitalization. The data collected were analyzed using correlation and multiple regression analysis techniques. Their findings suggested that human capital played significant role in the performance of companies.

In addition to financial institutions, various studies have been conducted on non-financial institutions using secondary data. Deep and Norwal (2014), for instance, conducted a research to see if IC is related to financial performance of textile sector firms. They measured intellectual and physical capital using VAIC model; while productivity, profitability, and market valuation were employed to measure financial performance. They collected panel data from 100 textile companies of India for the period of 2002 to 2012. Correlation estimates and regression technique were applied to gauge the nexus between performance of different textile companies and their IC. According to their results, IC has no influence on market valuation and productivity. However, their findings revealed a significant and affirmative effect of IC of firms and their profitability. Their findings suggested that IC is an important indicator to enhance the profitability of firms in the textile sector.

A study was conducted by Pal and Soriya (2012) that investigated the influence of IC on firm performance in the Indian textile and pharmaceutical sectors. IC was operationalized by VAIC model, while financial performance was measured by productivity, profitability, and

market capitalization. They selected a sample of 105 firms from pharmaceutical sector and 102 firms from textile sector. They applied multiple regression analysis on panel data. and found that profitability was significantly and positively influenced by IC; consistent with previous studies (Arslan & Zaman, 2014; Deep & Norwal, 2014). However, the role of IC in firms' productivity and market capitalization was found to be insignificant.

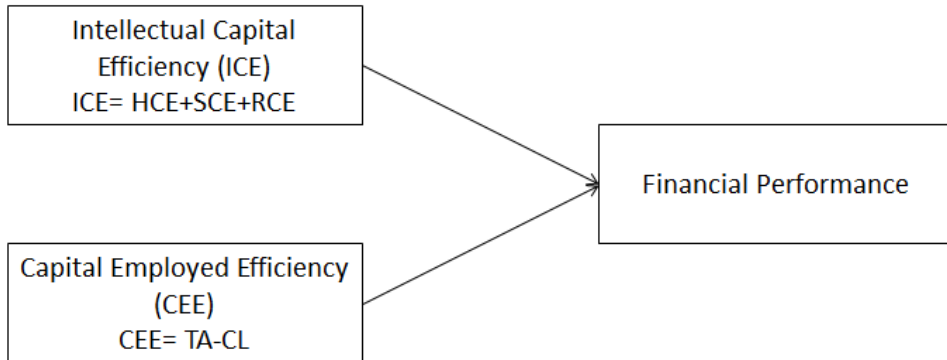
Calisir, Gumussoy, and Bayraktaroglu (2010) investigated the impact of various dimensions of IC, using VAIC model, on firm performance of information technology (IT) and telecommunication sectors. For this purpose, only those companies were selected which were registered on Istanbul Stock Exchange. To check the causal relationship between IC and financial performance, they applied regression analysis technique. Their findings suggested that out of different elements of VAIC model, only CEE had a significant on firms' performance.

Likewise, Dženopoljac, Janosevic and Bontis (2016) selected information and communication technology (ICT) industry to study the influence of physical capital and IC on firms' performance. The IC and physical capital were measured through VAIC model. On the other hand, financial performance was operationalized through such proxies as ROA, ROE, return on investment (ROI), and asset turnover ratio. They collected data from 13989 firms during the period of 2009-2013. Their findings also confirmed the positive influence of CEE on the selected firms' performance.

The findings of aforementioned studies show that although IC is found to have a significant effect on firms' performance in many cases; however, there are certain instances where such impact could not be confirmed for some sectors. Moreover, researchers have observed dearth of empirical evidence to compare the score of MVAIC using Paired Sample T test. This highlights the need to conduct comparative analysis of firms belonging to different sectors. Therefore, present study is conducted to check the effect of IC by focusing on performance of a group of firms belonging to two sectors, namely: food & personal care and textile sectors in Pakistan.

CONCEPTUAL FRAMEWORK

FIGURE 3



RESEARCH HYPOTHESES

In light of above discussion, this study has proposed following hypotheses:

H_1 : There is significant influence of ICE on firms' profitability.

H_2 : There is significant influence of CEE on firms' profitability.

H_3 : MVAIC scores of food & personal care and textile sectors are significantly different.

III. RESEARCH METHODS AND DATA COLLECTION

To achieve desired research objectives, researchers have collected quantitative data, using secondary sources from annual report of firms listed in Pakistan stock exchange (PSX) belonging to two sectors namely: food & personal care and textile sectors. Out of total population (see Appendix A), seven companies have been selected from each sector using systematic random sampling technique (see Appendix B).

MVAIC MODEL

This study has measured the IC using MVAIC model which is an extended and modified form of VAIC model, developed by Pulic (2000; 2008). A number of researchers have used this model in their studies such as, Mondal (2016), Nimtrakoon (2015) and Sharma and Naqvi (2017). As

elaborated in literature review section, this model has been developed to overcome the deficiencies in the VAIC model (Mondal, 2016; Nimtrakoon, 2015). The MVAIC model is designed to measure how value is created efficiently by firms (Santoso, 2011). MVAIC model can be summarized in the form given below:

$$MVAIC_i = ICE_i (HCE_i + SCE_i + RCE_i) + CEE_i$$

TABLE 1

Operational Definition of Variables

Construct	Proxies	Operational Definition	References
Value Addition	Value added (VA)	Total sales (output)-total operating expenses (input)	Nimtrakoon (2015)
Intellectual Capital	Human capital efficiency (HCE)	VA/total salaries and wages, and training and development expenses	Mondal (2016)
	Structural capital efficiency (SCE)	VA/administrative expenses	Vishnu (2015)
	Relational capital efficiency (RCE)	VA/ total marketing, selling and promotional expenses	Mondal (2016)
Physical Capital	Capital employed efficiency (CEE)	VA/(total assets-current liabilities)	Mondal (2016)
Financial Performance	Return on assets (ROA)	Net profit after taxes/total assets	Gitman and Zutter, (2015)
	Return on equity (ROE)	Net profit after taxes/total equity	Khan and Jain, (2010)

PANEL DATA EQUATIONS

The following equations have been developed to test the variables of the study:

$$ROA_{it} = \beta_0 + \beta_1 HCE_{it} + \beta_2 SCE_{it} + \beta_3 RCE_{it} + \beta_4 CEE_{it} + \mu_{1it}$$

$$ROE_{it} = \beta_0 + \beta_1 HCE_{it} + \beta_2 SCE_{it} + \beta_3 RCE_{it} + \beta_4 CEE_{it} + \mu_{2it}$$

DATA ANALYSIS

This study has analyzed the data using multiple regression analysis. Hausman test is applied for model specification (see inter alia Arslan &

Zaman, 2014; Mondal, 2016; Sharma & Naqvi, 2017) and paired sample T test for mean comparisons in line with extant literature e.g., Arora and Marwaha (2014), Feng, Huang, and Ma (2017), Khan and Masrek (2017) and Wickramasinghe and Wickramanayake (2013).

IV. RESULTS AND DISCUSSION

TABLE 2
Multiple Regression Analysis

Variables	Food & Personal Care Sector		Textile Sector	
	Model			
	1	2	3	4
Dependent Variables	Return on Assets	Return on Equity	Return on Assets	Return on Equity
Independent Variables	Coefficient (Robust Estimates)	Coefficient (Robust Estimates)	Coefficient (Robust Estimates)	Coefficient (Robust Estimates)
Constant	-0.0784	-0.3.2875	0.3855	-2.0990
HCE	-0.0298	-5.7778***	0.3478***	-0.7112
SCE	0.4470***	0.9316	-0.0358	1.2889
RCE	-0.0001	0.0009***	-0.0002	-0.0001
CEE	19.9704***	101.1527***	6.6865*	94.0979**
Adj. R-squared	0.8637	0.8397	0.4108	0.6339
Wald Chi2	414.74***	262.69***	43.83***	9.519134***

***Significant at 0.01 level, **Significant at 0.05 level, *Significant at 0.10 level.

Table 2 shows that researchers have developed separate models for each of the two related sectors¹. Researchers have presented robust estimates for heteroskedastic free standard errors. From empirical evidence of Model 1 related to food & personal care sector, it can be observed that there is significant and favorable influence of SCE on selected firms' ROA, as P value is less than 0.01. However, the same is not true about the other two components i.e., HCE and RCE, thus H_1 is

¹ Results of regression analysis, both for Random and fixed effect models, have been presented in Appendix C.

partially confirmed. CEE also has significant positive influence on ROA of firms at 1% level, which confirmed H_2 . Adjusted R square is good and shows that independent variables are able to explain 86.37% variation in ROA. Value of Wald chi2 is 414.74 which is significant at 1% level.

The results of Model 2 demonstrate significant impact of HCE and RCE on ROE of the firms, which partially confirms H_1 . However, a negative relationship is found between HCE and ROE of the firms which is consistent with the study of Hitt, Bierman, Shimizu and Kochhar (2001). Negative coefficient of HCE recommends food & personal care firms not to spend excessively on salaries, bonuses, training, and other benefits to their employees as this study suggests a negative impact of such funding on ROE, which is in line with existing literature (Gunawan & Ramadhani, 2018). The effect of CEE on ROE is found to be significant positive at 1% level, which confirms H_2 . Value of adjusted R square indicates that independent variables can explain 83.97% variation in ROE. Wald chi2 shows the goodness of fit the model at 1% significance level.

Model 3 and Model 4 are related to the textile sector. The empirical results for Model 3 show positive significant impact of only one component of ICE namely, HCE on ROA of the firms, which partially confirms H_1 . The role of CEE is found significant as well as positive at 10% level, which fully validates H_2 . Value of adjusted R square demonstrates that independent variables can explain 41.08% variation in dependent variable. Wald chi2 shows goodness of fit model at 1% level of significance. These empirical findings suggest that textile firms have utilized their human capital and capital employed in an efficient and effective way. Findings of Model 4 show significant impact of CEE on ROE of the firms which confirms H_2 . The empirical results do not show any significant impact of HCE, SCE and RCE on ROE, which means that H_2 cannot be confirmed for this model. Value of adjusted R square reveals that independent variables are able to explain 63.39% variation in ROE. Wald chi2 also shows that the model is of good fit at 1% significance level.

TABLE 3
Results of Hausman Test

Sectors	Food & Personal Care Sector		Textile Sector	
Models	Model 1	Model 2	Model 3	Model 4
Dependent variable	ROA	ROE	ROA	ROE
Chi Square (P values)	0.2624	0.0000	0.5146	0.0113
Model Applied	Random Effect Model	Fixed Effect Model	Random Effect Model	Fixed Effect Model

Researchers have applied Hausman test to select the appropriate model for regression analysis. The results of Hausman test are interpreted in a way that if P value is found to be greater than 0.05, random effect model should be used. On the other hands, where, P value is lesser than 0.05, then fixed effect model needs to be used. Based on the results of Hausman test, appropriate models have been applied in regression analysis the findings of which are given in Table 2.

PAIRED SAMPLE T TEST

This study has used the paired sample T test to check the difference between average scores of MVAIC performance of the firms in the food & personal care and textile sectors.

TABLE 4
Paired Sample T Test Results

Method	Value
T-Statistic	2.828781***
Average MVAIC Scores	
Food& Personal Care sector	440.9704
Textile sector	2399.308

***significant at 1% level

The results of Table 4 show that there is significant difference in the performance of MVAIC of the two selected sectors. The findings of the study confirms H_3 that there is significant difference in the scores of MVAIC model. Furthermore, mean value of food & personal care

sector's firms is lesser than that of the textile sector firms. A possible reason is that textile is the biggest export sector of Pakistan and provides employment opportunity to 40% of industrial labor force (Economic Survey of Pakistan, 2017-18). In order to increase the share in exports, majority of the textile firms are focusing on innovation, value creation and unique products to satisfy the demand of local and foreign customers. As a result, IC performance in this sector has improved significantly.

V. CONCLUSION

In an economy relying on knowledge, human capital, structural capital and relational capital are regarded as strategic assets for an organization. In this regard, knowledge based firms tend to invest a significant proportion of their wealth in the form of these strategic assets. These assets are collectively known as intellectual capital (IC). Literature identifies different measures to quantify intellectual capital. For instance; questionnaire, balance scorecard and fuzzy approaches have been used by different researchers, such as; Kojori et al. (2013) and Sharabat, Jawad and Bontis (2010). In this study, researchers have investigated the role of intellectual capital and capital employed in financial performance of the food & personal care and textile sectors of Pakistan using modified value added intellectual coefficient (MVAIC) model. The MVAIC model is frequently used in the literature for measuring intellectual capital performance (e.g., Mondal, 2016; Ulum et al. 2016).

In present study, researchers have developed four models (two for each sector) for comparative analysis. Findings of the study demonstrate that financial performance is mostly influenced by capital employed efficiency (CEE), which is followed by human capital efficiency (HCE). Results of the study are found to be consistent with the previous literature (Calisir et al., 2010; Deep & Norwal, 2014; Dženopoljac et al., 2016; Nimtrakoon, 2015). The findings indicate that both sectors have invested a significant proportion of their wealth in the form of capital employed. Some findings of the study reveal mixed trend. For example, in food & personal care sector, human capital efficiency (HCE), structural capital efficiency (SCE) and capital employed efficiency (CEE) have shown significant and positive association with return on assets (ROA) and return on equity (ROE) of the firms. Whereas in textile sector, HCE and CEE have demonstrated a significant and positive impact on financial

performance of the firms. However, no significant association has been found among structural capital efficiency (SCE), relational capital efficiency (RCE) and financial performance of textile firms.

LIMITATIONS AND FUTURE RECOMMENDATIONS

There are certain limitations associated with this study. The first limitation is the relatively small sample size used in the study as it was based on only two sectors from the manufacturing category. Therefore, findings of the study may only be generalizable to manufacturing sector of developing countries like Pakistan. In addition, intellectual capital measurement was limited to MVAIC model, instead of other measures like balance scorecard, and questionnaire survey. These limitations can be addressed in future research in this area. In addition to larger sample size and application of different research methods, future researchers may conduct similar study for comparing the intellectual capital performance of different countries at international level. Moreover, intellectual capital performance can also be measured by comparing government and private organizations.

REFERENCES

- Akpınar, A. T., & Akdemir, A. (1999). Intellectual Capital. Third European Conference, (pp. 332-340).
- Albertini, E., & Berger-Remy, F. (2019). Intellectual capital and financial performance: A meta-analysis and research agenda. *Management*, 22(2), 216–249. Retrieved from <https://doi.org/10.3917/mana.222.0216>
- Arora, S., & Marwaha, K. (2014). Variables influencing preferences for stocks (high risk investment) *vis-à-vis* fixed deposits (low-risk investment): A comparative study. *International Journal of Law and Management*, 56(4), 333-343.
- Arslan, M., & Zaman, R. (2014). Intellectual capital and its impact on financial performance: A study of oil and gas sector of Pakistan. *International Letters of Social and Humanistic Sciences*, 43, 125-140.
- Calisir, F., Gumussoy, C. A., & Bayraktaroğlu, A. E. (2010). Intellectual capital in the quoted Turkish ICT sector. *Journal of Intellectual Capital*, 11(4), 538-554.
- Cheng, M. Y., Lin, J. Y., Hsiao, T. Y., & Lin, T. W. (2010). Invested resources, competitive intellectual capital, and corporate performance. *Journal of Intellectual Capital*, 11(4), 433-450.
- Chowdhury, L. A. M., Rana, T., & Azim, M. I. (2019). Intellectual capital efficiency and organisational performance: In the context of the pharmaceutical industry in Bangladesh. *Journal of Intellectual Capital*, 20(6), 784–806. Retrieved from <https://doi.org/10.1108/JIC-10-2018-0171>
- Cohen, S., & Kaimenakis, N. (2007). Intellectual capital and corporate performance in knowledge-intensive SMEs. *The Learning Organization*, 14(3), 241-261.
- Daou, A., Karuranga, E., & Su, Z. (2013). Intellectual capital in Mexican SMEs from the perspective of the resource-based and dynamic capabilities views. *The Journal of Applied Business Research*, 29(6), 1673-1688.
- Deep, R., & Norwal, K. P. (2014). Intellectual capital and its association with financial performance: A study of Indian textile sector. *International Journal of Management and Business Research*, 4(1), 43-54.
- Dženopoljac, V., Janošević, S., & Bontis, N. (2016). Intellectual capital and financial performance in the Serbian ICT industry. *Journal of Intellectual Capital*, 17(2), 373-396.

- Edvinsson, L., & Malone, M. (1997). *Intellectual capital: Realizing your company's true value by finding its hidden brainpower*. New York: Harper Business.
- Emadzadeh, Afzali, N., Bagheri, A., Rahimpour, M., Ezadi, F., & Rahmani, M. (2013). Effect of intellectual capital on firm performance. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 3(2), 98-103.
- Feng, Y.C., Huang, Y.C., & Ma, X.M. (2017). The application of Student's T - test in internal quality control of clinical laboratory. *Frontiers in Laboratory Medicine*, 1(3), 125-128.
- Fijalkowaska, J. (2014). Value added intellectual coefficient (VAIC) as a tool for performance measurement. *Entrepreneurship and Management*, 15(1), 129-140.
- Finance Division, Government of Pakistan. (2018). *Economic Survey of Pakistan 2017-18*. Retrieved from http://www.finance.gov.pk/survey/chapters_18/Economic_Survey_2017_18.pdf
- Gitman, L. J., & Zutter, C. J. (2015). *Principles of Managerial Finance* (14th ed.). England: Pearson Education Limited.
- Grant, R. M. (1986). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17(Winter special issue), 109-122.
- Hitt, M. A., Bierman, L., Kochhar, R., & Shimizu, K. (2001). Direct and moderating effects of human capital on strategy and performance in professional service firms: A resource-based perspective. *Academy of Management Journal*, 44(1), 13-28.
- Khaliq, M., Ramayah, T., Shah, M.T.A., & Iqbal, Z. (2019). Intellectual capital and financial performance of banks in Sialkot Pakistan. *Journal of Management Sciences*, 6(1), 50-61. Retrieved from <https://doi.org/10.20547/jms.2014.1906104>
- Khan, A., & Masrek, M. (2017). Training needs analysis based on mismatch between the acquired and required levels of collection management skills of academic librarians. *Collection Building*, 36(1), 20-28.
- Khan, M. Y., & Jain, P. K. (2010). *Financial Management* (5th ed.). New Dehli, India: Tata McGraw Hill Education Private Limited.
- Kojori, D. K., Aghajani, H. A., & Rasooli*, G. (2013). Explain the role of intellectual capital on the financial performance of cosmetics companies, with fuzzy approach. *Journal of Basic and Applied Scientific Research*, 3(5), 892-900.

- Latif, M., Malik, M. S., & Aslam, S. (2012). Intellectual capital efficiency and corporate performance in developing countries: A comparison between islamic and conventional banks of Pakistan. *Interdisciplinary Journal of Contemporary Research*, 4(1), 405-420.
- Lentjusenkova, O., & Lapina, I. (2016). The transformation of the organization's intellectual capital: From resource to capital. *Journal of Intellectual Capital*, 17(4), 610-631.
- Mohammadi, R., Sherafati, M., & Ismail, M. N. (2014). Factors affecting intellectual capital and its role in financial performance of organization. *Indian Journal of Science*, 5(1), 314-320.
- Mondal, A. (2016). Application of modified model for measuring intellectual capital performance. *International Journal of Research in Finance and Marketing*, 6(11), 19-30.
- Nimtrakoon, S. (2015). The relationship between intellectual capital, firms' market value and financial performance Empirical evidence from the ASEAN. *Journal of Intellectual Capital*, 16(3), 587 - 618.
- Ozkan, N., Cakan, S., & Kayacan, M. (2017). Intellectual capital and financial performance: A study of the Turkish Banking Sector. *Borsa Istanbul Review*, 17(3), 190–198. <https://doi.org/10.1016/j.bir.2016.03.001>
- Pal, K., & Soriya, S. (2012). IC performance of Indian pharmaceutical and textile industry. *Journal of Intellectual Capital*, 13(1), 120-137.
- Poh, L. T., Kilicman, A., Ibrahim, S. N. I., & McMillan, D. (2018). On intellectual capital and financial performances of banks in Malaysia. *Cogent Economics & Finance*, 6(1), 1453574. Retrieved from <https://doi.org/10.1080/23322039.2018.1453574>
- Porter, M. E. (1981). The contributions of industrial organization to strategic management. *Academy of Management Review*, 6(4), 609-620.
- Pulic, A. (1998). Measuring the performance of intellectual potential in knowledge economy. *McMaster World Congress on Measuring and Managing Intellectual Capital by the Austrian Team for Intellectual Potential*, (pp. 1-20).
- Pulic, A. (2000). VAIC- An accounting tool for IC measurement. *International Journal of Technology Management*, 20, 5-7.
- Pulic, A. (2008). *The Principles of Intellectual Capital Efficiency- A Brief Description*. Croatian Intellectual Capital Center, Zagreb, 1-24.
- Santoso, E. (2011). *Intellectual capital in Indonesia: The influence on financial performance of banking industry*. University of Phoenix.

- Sharabat, A.-A. A., Jawad, S. N., & Bontis, N. (2010). Intellectual capital and business performance in the pharmaceutical sector of Jordan. *Management Decision*, 48(1), 105-131.
- Sharma, J. K., & Naqvi, D. (2017). An empirical investigation of the relationship between drivers of value creation and financial performance of technology driven firms. *International Research Journal of Management and Commerce*, 4(11).
- Sledzik, K. (2013). The intellectual capital performance of polish banks: An application of VAIC model. *Financial Internet Quarterly*, 9(2), 92-100.
- Setyawati, I., Widyastuti, T., Suryati, A., & Hartani, N. H. (2019). Intellectual capital performance of Islamic banks in Indonesia: Towards competitive advantages. *Management Science Letters*, 9, 1999–2008. Retrieved from <https://doi.org/10.5267/j.msl.2019.7.006>
- Suraj, O. A., & Bontis, N. (2012). Managing intellectual capital in Nigerian telecommunications companies. *Journal of Intellectual Capital*, 13(2), 262-282.
- Tarigan, J., Listijabudhi, S., Hatane, S. E., & Widjaja, D. C. (2019). The impacts of intellectual capital on financial performance: An evidence from Indonesian manufacturing industry. *Indonesian Journal of Business and Entrepreneurship*. Retrieved from <https://doi.org/10.17358/ijbe.5.1.65>
- Teece, D., & Pisano, G. (1994). The dynamic capabilities of firms: An introduction. *Industrial and Corporate Change*, 3(3), 509-533.
- Ulum, I., Rizqiyah, & Jati, A. W. (2016). Intellectual capital performance: A comparative analysis between financial and non-financial industry of Indonesian biggest companies. *International Journal of Economics and Financial Issues*, 6(4), 1436-1439.
- UNDP. (2019). *Inequalities in Human Development in the 21st Century: Briefing note for countries on the 2019 Human Development Report [Human Development Report 2019]*. Retrieved from http://hdr.undp.org/sites/all/themes/hdr_theme/country-notes/PAK.pdf
- Van, B., & Mark, E. (1999). A yardstick for knowledge management, training & development. 53(5), 71-78.
- Vishnu, S. (2015). *Impact of IC components on firm performance: An empirical study on Indian companies (Doctoral Dissertation)*. Indian Institute of Management Indore, India.
- Wernerfelt, B. (1982). A resource-based view of the firm. *Strategic Management Journal*, 5(2), 171-180.

- Wickramasinghe, V., & Wickramanayake, N. (2013). Expectations and experience: IT jobs in offshore software development and commercial banks in Sri Lanka. *Information Technology & People*, 26(1), 50-76.
- William, S. M. (2001). IS intellectual capital performance and disclosure practice related. *Journal of Intellectual Capital*, 2(3), 192-203.
- World Bank. (1998). *Knowledge for development*, World Development Report, World Bank, Washington, DC.
- Xu, J., & Wang, B. (2018). Intellectual capital, financial performance and companies' sustainable growth: Evidence from the Korean manufacturing industry. *Sustainability*, 10(12), 4651. Retrieved from <https://doi.org/10.3390/su10124651>

Appendix A**Total Population**

Sectors	Total companies listed
Food & personal care sector	56
Textile sector	21

Appendix B**Sample**

Serial No.	Food & Personal Care Sector	Textile Sector
1	Engro Foods Ltd.	Blessed Textile Limited
2	Good luck Industries Limited	Gul Ahmed Textile Mills Limited
3	Mithchells Fruit Farms Limited	Ishaq Textile Mills Limited
4	Nestle Pakistan Limited	Mehmood Textile Mills Limited
5	Rafhan Maize Products Co. Limited	Nishat Mills Limited
6	Treet Corporation Limited	Sapphire Textile Mills Limited
7	ZIL Limited	ZahidJee Textile Mills Limited

Appendix C

Regression analysis results

The tables given below provide detail of the results of regression analysis using both fixed effect model and random effect model.

Variables	Food & Personal Care Sector			
	Model 1		Model 2	
Dependent variable	ROA		ROE	
Independent variables	Coefficient (Robust Estimates)	Coefficient (Robust Estimates)	Coefficient (Robust Estimates)	Coefficient (Robust Estimates)
Constant	-2.1571	-0.0784	-3.2875	-0.7389
HCE	-0.3651	-0.0298	-5.7778***	-5.7721***
SCE	0.6925*	0.4470***	0.9316	0.5537
RCE	-0.0001	-0.0001	0.0009***	-0.0037
CEE	21.6543*	19.9704***	101.1527***	113.0898**
Adj. R-squared	0.8426	0.8637	0.8397	0.9108
Wald Chi2	734.33**	414.74***	262.69***	262.69***
Model Applied	Fixed Effect Model	Random Effect Model	Fixed Effect Model	Random Effect Model

***Significant at 0.01 level, **Significant at 0.05 level, *Significant at 0.10 level

Variables	Textile Sector			
	Model 3		Model 4	
Dependent variable	ROA	ROA	ROE	ROE
Independent variables	Coefficient (robust estimates)	Coefficient (robust estimates)	Coefficient (robust estimates)	Coefficient (robust estimates)
Constant	3.2887	0.3855	-2.0990	-9.4775*
HCE	0.2222	0.3478***	-0.7112	0.4249
SCE	-0.2462	-0.0358	1.2889	0.4343
RCE	-0.0004	-0.0002	-0.0001	-0.0010
CEE	10.7260	6.6865*	94.0979**	115.6877*
Adj. R-squared	0.1263	0.4108	0.6339	0.7134
Wald Chi2	7.79**	43.83***	9.51***	19.28***
Model Applied	Fixed Effect Model	Random Effect Model	Fixed Effect Model	Random Effect Model

***Significant at 0.01 level, **Significant at 0.05 level, *Significant at 0.10 level