International Journal of Social Science Archives

ISSN: 2707-8892

Available at www.ijssa.com

International Journal of Social Science Archives, Jan-March, 2024, 7(1), 382-394

Intellectual Capital, Climate Risk and Financial Performance: Firm Level Analysis

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***Abstract*:** The objective of this study is to examine the influence of both internal and external factors on the performance of firms by employing the two-step system GMM model for the period spanning from 2009 to 2019.The findings empirically prove that internal factors-the components of the value-added intellectual coefficient (VAIC™): Structural Capital Efficiency (SCE) and Capital Employed Efficiency (CEE) have a significant positive impact on performance. While Human Capital Efficiency (HCE) has an insignificant impact on performance. External factors included in this study are industry concentration, and climate risk. The climate risk significantly negatively impacts firm performance, while the impact of industry concentration is insignificant. These findings support the Resource-Based View (RBV) and are robust to using different measures of the same explanatory variables. The results are helpful for stakeholders, including investors, managers, regulators, policymakers, etc., to make better and well-informed decisions.

Keywords: Human Capital Efficiency, Structural Capital Efficiency, Capital Employed Efficiency Industry, Concentration, Two Step System GMM Model

1. Introduction

Investors view performance of any firm a key consideration while making investment decisions since it is a potential source of long-term economic growth (Vieira, Neves and Dias, 2019). Firms that operate within the same industry are subject to comparable external factors yet exhibit variations in their financial performance. A firm's financial performance largely depends on its internal and external factors. Managerial decisions predominantly influence internal factors and are widely recognised as the firm's internal environment. Conversely, a firm's external environment includes industry-specific characteristics that lie beyond the purview of administrative control (Chandrapala and Knápková, 2013). Therefore, a firm's financial performance is impacted by many factors unique to the business and the industry in which it operates. The topic at hand has garnered significant attention within the business economics literature (Bobenič-Hintošová et al., 2020).

The conventional perspective of evaluating the performance of firms solely based on tangible assets presents a limited analysis of a firm's competitive ability (Pulic, 2000). Firms that extensively depend on physical assets as their primary means of gaining a competitive advantage face substantial risks of imitation by competitors and are

particularly susceptible to losing their competitive edge (Madhani, 2012). The existing body of literature presents compelling data indicating that intellectual assets are more important than tangible firm value (Pitelli et al., 2014; Marr & Roos, 2012; Khalique et al., 2011; 2012; Cheng et al., 2010). Hence, creative firms must place utmost importance on cultivating and safeguarding strategic resources that can facilitate the attainment of a competitive advantage and outstanding financial performance. In modern dynamic market environments, acquiring competitive advantages relies on a firm's capacity to engage in transformative procedures by consistently generating creative solutions. The efficient development and utilization of knowledge resources or intellectual capital enhances the ability to achieve this capacity. Pulic (2000) proposed a conceptual framework for assessing the intellectual capital (VAIC™) of a firm, which involves evaluating the effectiveness of Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE), and Capital Employed Efficiency (CEE). The reliability of the information utilized in calculating the VAIC™, stems from financial statements provided for audit purposes.

Many factors have been discussed in a firm's external environment that can affect its financial performance, such as economic, social, political, legal, and environmental factors (Janković, Mihajlović & Cvetković, 2016). The industry to which the firm is affiliated is an example of an economic environment that can influence a firm's financial performance (Ruefli & Wiggins, 2003). Similarly, another major external environmental factor is associated with any country's climate. The climate is considered an unexpected phenomenon, and risk associated with climate affects developing and developed regions equally. Climate risk refers to the occurrence of climatic disparities. Climate risk, or losses from extreme weather events like hurricanes, typhoons, and heat waves, may significantly influence a firm because of the impossibility of fully insuring against it (Huang, Kerstein & Wang, 2018). It's also possible that businesses won't be able to immediately identify the monetary effects of climate risk (Cavlack et al., 2021). Therefore, there is a need to examine these factors deeply to help make successful strategic decisions that ultimately help increase financial performance.

Academic researchers have shown considerable interest in examining the association between a firm's financial success, IC, and industry competition. However, a limited corpus of scholarly literature has investigated the precise impacts of IC and industrial competition on company performance, specifically within developing countries. This study analyses impact of different components of IC, industry concentration, systematic risk (climate risk), on performance of firm through these objectives:

a) To analyse the impact of human capital efficiency (HCE) on firm’s performance (ROA) in Pakistan
b) To analyse the impact of structural capital efficiency (SCE) on firm’s performance (ROA) in Pakistan.
c) To analyse the impact of capital employed efficiency (CEE) on firm’s performance (ROA) in Pakistan.
d) To analyse the impact of Industry concentration (CR4) on firm’s performance (ROA) in Pakistan.
e) To analyse the impact of Climate risk (CRI score) on firm’s performance (ROA) in Pakistan.

2. Literature Review

Opportunities for productivity arise from the mutual influence of the firm's internal and external environment (Penrose, 1959). According to the Resource-Based View (RBV), the key determinants of ways aimed at attaining high performance are the internal resources and the internal environment. Strategic resource acquisition, according to RBV, is the key to a company's success in the marketplace. When it comes to understanding the connection between IC and performance, RBV provides helpful insights (Wernerfelt 1984). The second important theory of this study is the Industrial Organisation Theory (IO) which states that the firm's activities and outcomes are influenced by the industry structure in which it operates. The primary attention of scholars has been directed towards analysing the industry's system, including factors such as the degree of competition, concentration, and its impact on the performance of firms operating within that particular industry. (Fernández et al. 2019). Hence, business performance is heavily influenced by the industry's characteristics, as per the fundamental principles of Industrial Organization (IO) theory. In this study, the influence of industry concentration has been studied in the context of industrial-organisational theory.

IC is an intangible resource that may be utilised for monetary gain via skills, training, and education. Value-added intellectual coefficient (VAIC™) is the best way to quantify IC, as Pulic (2000) explained. Academics have increasingly come to view VAIC™ as the most compelling criteria to measure IC (Asare et al., 2017; Setianto & Sukmana, 2016; Iazzolino & Laise, 2016).Their main point is that the VAIC metric may be used to gauge IC efficiency.VAIC™ evaluates a performance factor that is not typically considered by traditional methodologies. The utilisation of components of IC is employed in this research through VAIC™ due to its ability to assess IC efficiency's influence on firm performance (Babajee et al., 2020; Albertini et al., 2019; Xu, 2019; Forte et al., 2019).

Following the work of Bontis et al. (2000), human capital (HC) is a term that developed from the idea of IC. A firm's most valuable resource is its employees. It stands for the human element in an organisation, which consists of the people who give it its unique character through their intellect, skills, knowledge, aptitudes, and expertise. Raising a company's IC shows that its human resources are well-managed, which in turn attracts and retains hardworking, skilled workers. The end result is an improvement in the company's overall performance.

Firms should rely on cutting-edge technology to succeed and remain competitive, necessitating careful management of their structural capital (Aramburu, Saenz & Blanco, 2013). Structural capital has been found to favourably impact organisational performance and contribute to value generation (Hsu & Wang, 2012).While, CEE quantifies the value created by the investment in fixed assets. According to Pulic (1998), a firm is more likely to use capital efficiency (CE) effectively if each unit of capital CE produces greater profits for the business. Several pieces of research have proved CEE positively influences a firm's financial performance (Hamdan, Buallay & Alareeni, 2017; Costa, Silva & Paula, 2020). In the context of external factor, concentration-based measurements, such as the HHI, four firms' concentration ratio (C4), have been widely employed in previous researches (Wang et al., 2014; Yasser & Mamun, 2017). Prior studies have established an inverse relationship between industry concentration as well as performance of firm (Fosu et al. 2013; Liu, Qu & Haman 2018). Worsening weather patterns have increased the systemic risk enterprises face globally.

Another important factor discussed as the external environment of firm is the climate risk, which is also an example of systematic risk. Therefore, climate change represents an existential threat to firms. Plenty of evidence exists regarding the macroeconomic effects of climate change at the national level; however, research on the specific impacts of climate change on firms is limited. It is anticipated that climate risk directly and indirectly influences firm performance by lowering the values of their physical assets (Huang et al., 2018). Climate risk can diminish tangible assets' value through at least two distinct mechanisms: firstly, there exists a strong correlation between this phenomenon and severe weather occurrences such as floods and wildfires, which have the potential to amplify the devaluation of capital assets. Secondly, it can potentially impact the efficiency of capital assets, knowledge, and labour, diminishing the quantity of output that may be generated relative to a particular amount of input (Graff Zivin & Neidell, 2014). Furthermore, as climate risk is complex to hedge fully, it might cause adverse shocks to a firm's financial performance (Sun et al., 2020). Very few studies are available (Chathoth & Olsen, 2007; Alvarez, 2012; Russo & Pogutz, 2012; Huang, Kerstein & Wang, 2018; Secinaro et al., 2020; Cavlak et al., 2021; Thai et al., 2023) that have investigated the direct impact of climate risk on firm's financial performance. This study intends to address this gap by studying the effect of climate change sensitivity on business performance using a suitable panel dataset of Pakistani-listed enterprises.

We employ the Global Climate Risk Index (CRI) developed by Germanwatch (Kreft et al., 2014). This index quantifies, on a country-by-country basis, the potential for damage from extreme weather.

2.1 Hypothesis

H1: HCE has a positive impact on firm's financial performance
H2: SCE has a positive impact on firm's financial performance
H3: CCE has a positive impact on firm's financial performance
H4: Industry concentration has a negative impact on firm's financial performance
H5: Climate risk has a negative impact on firm's financial performance

2.2 Conceptual Framework

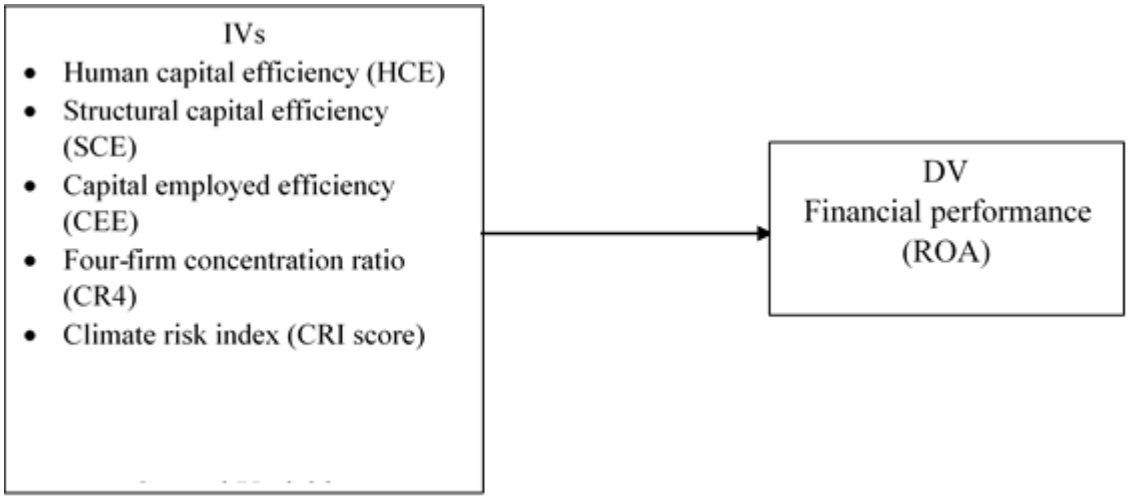

Figure 1: Conceptual Framework

3. Research Methodology

We utilise secondary data obtained from the yearly publication of the Pakistan Stock Exchange; "Financial Statement Analysis of non-financial firms listed in the Pakistan Stock Exchange for the Period 2009-2019". The primary source of data collection involved the utilisation of financial statements from non-financial companies, explicitly focusing on balance sheets and income statements; the sample comprised 206 non-financial firms.

The initial data sample was then narrowed down using the following criteria:

- The research does not include firms with a negative net income or negative book value of equity.
- Firms that do not possess adequate data are being excluded from analysis. (Annual reports unavailable due to merger or delisting).

Data on macro variables (GDP growth) was collected from the World Bank website. The data on climate risk is directly collected from the Germanwatch (2020) website. The data is compiled in the form of an index termed "Global Climate Risk Index (CRI)", compiled by Germanwatch (2020) to measure the climate risk of countries all over the world. Consistent with Ding, Liu, Wang and Wu (2021) CRI score of each year is multiplied by -1; thus, a higher score indicates a greater degree of climate risk.

3.1 Measurement of Variables

Most of the variables in this study have been computed using various formulas. Several metrics may be used to evaluate a firm's financial performance, but profitability ratios are frequently used in financial research since they provide a clear picture of a business's health (Pervan & Višić, 2012). Return on asset (ROA) is one of the profitability ratios and shows a firm's efficiency in turning its assets into profit. This study calculates the return on asset ratio by dividing net operating profit before tax (NOPBT) by average total assets. NOPBT means operating profit made from "operating assets." It represents the firm's actual economic return after adjusting for the influence of certain factors to show the outcome of the primary business activity (Karpáč et al., 2021).

ROA is computed through the following formula:

$$ROA = \frac{\text{Net operating profit before tax(NOPBT)}}{\text{Total assets}} \quad (1)$$

HCE, SCE and CEE are components of VAIC. According to Chen et al. (2005), Value-added refers to the disparity

between the outputs and inputs of a business.The output is the amount of money made through sales, and the input is everything that went into making that money, less the value-adding cost of labour. In the first step, we use the following formula to determine VA:

$$VA = NI + I + T + W + DP \quad (2)$$

VA shows the value added and calculated from the above formula, where NI is net income after tax, I means interest expense, T means taxes, W means personnel wages and salaries, and DP is depreciation. This calculation is consistent with the study of Riahi-Belkaoui (2003). Now from VA we can further calculate HCE, it is the measure of VA to the amount of money paid to all the workers by the firm. Existing studies used salary and wage expenditures to measure human capital (Yalama & Coskun, 2007; Clarke, Seng &Whiting, 2011; Molodchik et al., 2012). Human capital is the total amount that the firm spends on salaries and wages; therefore, HCE is described as:

$$HCE = \frac{VA}{HC} \quad (3)$$

The ratio of SC to VA is SCE. The concept of structural capital encompasses several elements like as software systems, transport networks, the supply chain, brands, trademarks, and management approaches (Pulic,2000),empirically it can be describes as:

$$SC = VA - HC \quad (4)$$
$$SCE = \frac{SC}{VA} \quad (5)$$

What is missing from SCE and HCE is included in CEE. Pulic (1998) argues that intellectual capital (IC) alone is inadequate for creating value without the inclusion of other types of capital employed (CE). CE refers to the aggregate value of the company's assets:

$$CEE = VA / CE \quad (6)$$

In this study, the most widely used measures of concentration is being used; it is the four-firm concentration ratio (CR4). It is most accepted method because of its simplicity and ease of calculation. Prior studies have demonstrated that the CR4 ratio is the most precise measure for assessing competition in the market. Firms compete with one another in terms of sales in the market, which demonstrates competitiveness in the sector regarding profitability. Furthermore, the CR4 concentration ratio has been utilised by several researchers to compute industry competition by using firm-level data (Biancov & Casavola, 1999; Kapopoulos & Lazaretou, 2007; Lee, 2009; Al Arif & Awwaliyah, 2019; Khairurrahman et al., 2023)

$$CR4 = MS1 + MS2 + MS3 + MS4 \quad (7)$$

Where, the symbol "MS" represents the market share of the industry's major enterprises. Market share of a business is the percentage of the industry's total revenue that it generates (Awoyemi & Ihesiaba, 2020):

$$\text{Market share (MS)} = \frac{\text{Sale of Firm i}}{\text{Total sales of industry j}} \quad (8)$$

Total industry sales were calculated by adding the sales figures for all firms in the market. Damage caused by natural disasters, including floods, droughts, and typhoons, can be quantified nationally using the German watch's Climate Risk Index (CRI).

Firm-level control variables included in this study are the size and leverage. Specifically, firm size serves to control for possible economies of scale. The country-level macroeconomic factor included in this study is the annual growth of total GDP (GDPGROW). The inclusion of control variables serves the purpose of mitigating the potential influence of unforeseen factors on performance.The size of the business was ascertained by applying the natural logarithm function to the book value of all assets at the end of of the fiscal year. Financial leverage, often known as leverage, refers to the proportion of long-and short term debt to the book value of total shareholder's equity.

4. Data Analysis

The two-step system Generalised Method of Moments model (GMM) employed in the study to account for the existence of unobserved heterogeneity and endogeneity for unbalanced panel data set (Haris et al., 2019). It provides more precise and consistent outcomes than the well-known Ordinary Least Square (OLS) technique. The application of the GMM to dynamic panel data was initially introduced by Arellano & Bond (1991).
Equation 9 is the econometric model of the research that investigates the impact of independent variables on dependent variables:

$$ROA_{i,\,t} = \beta_0 + \beta_1 ROA_{t-1+}\ \beta_2 HCE_{i,\,t} + \beta_3 SCE_{i,\,t} + \beta_4 CEE_{i,\,t} + \beta_5 CR4_{i,\,t} + \beta_6 CRI_t + \beta_7 FSIZE_{i,\,t} + \beta_8 FLEV_{i,\,t} + \beta_9 GDPGROW_t + \mu_t \quad (9)$$

ROA is the return on asset, and ROAt-1 is the lagged value of ROA. i = 1, 2, 3. . . , n (number of firms), t = time period from 2009 to 2019.HCE is human capital efficiency, SCE is structural capital efficiency, CEE is capital employed efficiency, CR4 is four-firm concentration ratio, CRI is climate risk index score, FSIZE is firm size, FLEV is firm leverage, and GDPGRO is GDP growth rate.

4.1 Descriptive Statistics

Table 1: Descriptive Statistics

	Mean	Median	Std. Dev.	Observations
ROA	0.109	0.085	0.102	1699
HCE	7.142	5.389	9.414	1699
SCE	0.788	0.814	0.120	1699
CEE	0.229	0.205	0.132	1699
CR4	0.559	0.582	0.219	1699
CRI	-27.329	-28.170	17.310	1699
FSIZE	15.669	15.579	1.652	1699
FINLEV	0.521	0.542	0.197	1699
GDPGROW	0.038	0.044	0.013	1699

4.2 Correlation Analysis

Table 2: Correlation analysis

	ROA	HCE	SCE	CEE	CR4	CRI	FSIZE	FLEV	GDPGROW
ROA	1.000	0.076	0.196	0.845	-0.021	0.034	-0.011	-0.299	-0.025
HCE	0.076	1.000	0.454	0.022	0.057	0.015	0.229	0.065	0.002
SCE	0.196	0.454	1.000	0.039	0.117	0.028	0.373	0.034	-0.019

CEE	0.845	0.022	0.039	1.000	-0.053	0.004	-0.127	-0.158	-0.055
CR4	-0.021	0.057	0.117	-0.053	1.000	-0.021	-0.063	-0.151	0.010
CRI	0.034	0.015	0.028	0.004	-0.021	1.000	-0.063	0.003	-0.367
FSIZE	-0.011	0.229	0.373	-0.127	-0.063	-0.063	1.000	0.108	0.157
FLEV	-0.299	0.065	0.034	-0.158	-0.151	0.003	0.108	1.000	-0.133
GDPGROW	-0.025	0.002	-0.019	-0.055	0.010	-0.367	0.157	-0.133	1.000

The issue of multicollinearity has also been investigated, as stated by Kennedy (1985), the issue of multicollinearity arises when the correlation between dependent variables exceeds a threshold of 0.8. However, a correlation value below 0.8 between IVs in Table 2, disproves the existence of multicollinearity.

4.3 Two-Step System GMM

Table 3: Two-Step System GMM Results

ROA(-1)	0.085***(0.007)
HCE	0.007(0.010)
SCE	0.284***(0.015)
CEE	0.531***(0.017)
CR4	0.007(0.010)
CRI	-0.020***(0.006)
FSIZE	0.006***(0.002)
FINLEV	- 0.128***(0.009)
GDPGROW	0.112**(0.049)
AR(1) p value	0.08
AR(2) p value	0.55
Wald chi	8499.38
Number Of Groups	189
Number Of Instruments	63
Robust Test Results of SGMM	
ROA(-1)	0.163***(0.006)
VAIC™	0.002***(0.0005)
HHI	0.035(0.026)
AR(1) p value	0.02
AR(2) p value	0.82
Wald Chi	697.49
Number of Groups	189
Number of Instruments	57

Two-step system GMM findings are reported in Table 3The lagged performance coefficient, denoted as β1, has a positive and statistically significant value of 0.085 at a significance level of 1%. These results indicate that the ROA from the previous year has a favorable impact on the ROA of the current year. The findings presented in this study align with previous research conducted by Pradhan, Shyam, and Shrestha (2016) and Issah and Antwi (2017). The coefficient β2 value for HCE is 0.007, indicating that it is not statistically significant. The results of this study do not provide support for H1, suggesting that the HCE variable does not have an impact on ROA.The findings of

this study align with the research conducted by Danjuma and Ajike (2016) as well as Smriti and Das (2018), which similarly concluded that HCE had a little impact on performance.SCE has also positive and significant relationship with ROA at 1% level of significance. Due to these results, the H2 hypothesis is accepted, indicating that the SCE variable positively influences ROA. These results are consistent with Alipour (2012), Welly, Ikhsan and Situmeang (2021). Following the findings of this study, the RBV (Wernerfelt, 1984) explains that profits can be improved by the utilisation of critical strategic assets (tangible and intangible assets)

Similarly, the CCE coefficient β4 value is 0.531; this value exhibits a positive and statistically significant relationship at the 1% level. This shows that H3 is accepted, indicating that the CEE variable positively influences financial performance. The findings indicate that the use of capital within Pakistani enterprises is positively correlated with enhanced profitability.CE is the total worth of the firm's assets used to produce revenue. Therefore, if a firm invests much money into its operations, it may expect a sizable return. The results of this study align with the Resource-Based View (RBV), indicating that a company's resources have an impact on its performance, ultimately leading to a rise in its value (Forte et al; 2019; Kweh et al, 2019).

The industry concentration coefficient is 0.007, indicating a negative and statistically insignificant relationship. The findings are incongruent with the H4 hypothesis. Prior research has examined the negative correlation between a company's financial success and the level of industry concentration (Fosu et al., 2013; Wang et al., 2014; Liu, Qu & Haman, 2018). An industry with a low degree of concentration is one in which numerous enterprises of about equal size share the market. Concentrated industries are less profitable because firms are less likely to be innovative since they are protected from new competitors (Naseer et al., 2021).

The coefficient of CRI is -0.020 and statistically significant and H5 hypothesis, which demonstrates that the study has empirically shown the negative impact of Climate risk on a ROA.These findings are congruent with Huang, Kerstein, and Wang's (2018) research and Ozkan, Temiz and Yildiz (2022) research. Huang, Kerstein and Wang (2018) and Cavlak et al. (2021) analyse CRI data and conclude that climate risk significantly negatively affects firm performance. They show conclusively that increased climate risk decreases firms' financial performance. Policymakers worldwide have prioritised efforts to slow down climate change as they become more aware of the potentially catastrophic effects (Ozkan, Temiz and Yildiz, 2022).

Further it can be seen that two control variables positively affect performance measures: Firm size and GDP growth. While financial leverage negative influence firm performance. Experts in fields including industrial economics, business organisation, and finance agree that size has a pivotal role in determining business performance (Akinlo, 2012; Ozcan et al., 2017; Abeyrathna & Priyadarshana, 2019; Hirdinis, 2019).Results of financial leverage show that more highly leveraged corporation is vulnerable because it cannot borrow in the future if it fails to pay the interest on its loan. In addition to being a crucial metric, leverage increases a firm's wealth and allows it to take advantage of borrowing opportunities (Billett et al., 2007). GDP Growth rate (GDPGROW) is another control variable of this study. Findings suggests that the GDP growth rate has a positive impact on the financial performance of the company (Ismail et al. 2018; Aslam, Haron & Tahir, 2019;Soukhakian & Khodakarami,2019; Vieira, Neves & Dias,2019).

4.4 Additional Robustness Check

For additional robustness checks, IC components are substituted with a singular variable known as VAIC™, which collectively accesses the contribution of the Firm's IC by combining all the essential components; VAIC™ = HCE + SCE + CEE (Forte, Matonti, and NicolÃ, 2019). Similarly, for concentration ratio we use Herfindahl-Hirschman Index (HHI), another market concentration measure. It is computed as HHIjt = $\sum_{i=1}^{Nj}(Sales_{it}/\sum_{i=1}^{Nj} Sales_{ijt})^2$, here sales j and sales i used form industry and firm respectably in time (IsolaWakeel & AkanniLateef,2015). Increased values of the Herfindahl-Hirschman Index (HHI) indicate heightened market concentration and reduced competitiveness. It can be said that lower competition means the market is highly concentrated, thereby lowering the firm's financial performance (Funakoshi & Motohashi, 2009). The empirical evidence suggests that the VAIC substantially and positively impacts a company's performance. On the contrary, HHI shows no association with performance. The obtained results align with the main findings by showing the robustness of the previous

conclusions. Hence, the robustness check proves that after replacing the HCE, SCE and CEE with the VAIC™ model and CR4 concentration ratio with HHI, the results remain quantitatively unchanged.

5. Conclusion

A firm's internal and external factors' relationship with its performance has been of considerable interest to academic researchers and corporate executives for several decades in industrialised regions. However, in the context of developing nations, studies on firm's internal as well as external factors and its overall success is scarce. Therefore, academic researchers and corporate executives in these developing nations must recognise the significance of these internal and external factors. Findings of this study assist in determining the significance of internal (HCE, SCE, and CEE) and external factors (industry concentration and climate risk) impact on Pakistani firms. Although the relationship of HCE and performance remains insignificant but with literature support it can be said that when HCE, CEE, and SCE are high, a company often does well financially. Findings further suggests that market concentration do not affect Pakistanis 'firm financial performance while climate risk negatively influences it .Based on RBV, this study emphasises that CEE and SCE are critical to improving a firm's financial performance (Weqar and Haque, 2022).

5.1. Recommendations

This study provides a substantial academic contribution to the existing literature by investigating the direct impact of global climate risk on the financial performance of publicly traded firms. Furthermore, it considers multiple variables at both the firm and industry levels. The findings suggest to the policymakers and top management that investing in HCE, SCE, and CEE yields higher performance. According to the findings, a company's financial performance may be enhanced by enhancing CEE and SC, which in turn helps reduce costs and improve profits.Similarly, Pakistani firms can get also get benefits from the increased productivity from their investment in human capital.Firms should build financial cushions to provide "organisational resilience" in the face of climate risk. Governments may play a significant role in encouraging firms to continue taking measures to reduce the impact of climate risk.

5.2. Future Directions

The scope of this research is confined to the time spanning from 2009 to 2019, excluding the subprime financial crisis and the Covid-19 pandemic period. This study only includes publicly traded companies and has a small sample size. Future researchers can also include the period of financial crises (2007-2008) and the Covid-19 pandemic to assess the variations of that period. Future researchers can also replicate this study in other developing nations with different measures of financial performance to determine how HCE, SCE and CEE, industry competition and climate risk factors affect a firm's financial performance.

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