SOCIAL SCIENCE REVIEW ARCHIVES
ISSN Online: 3006-4708
ISSN Print: 3006-4694
https://policyjournalofms.com

The role of Intellectual Capital on firm performance a case of Telecom sector of Pakistan.

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DOI: https://doi.org/10.70670/sra.v3i3.876

Abstract:
This study investigates the impact of various dimensions of intellectual capital including Human Capital, Innovation Capital, Relational Capital, and Structural Capital on Firm Performance, with Dynamic Capability examined as a mediating variable. Using Structural Equation Modeling (SEM), the results reveal that Human Capital significantly influences both Dynamic Capability and Firm Performance directly and indirectly, highlighting its crucial role in organizational success. Relational Capital also shows a positive effect on Dynamic Capability but lacks a significant direct or indirect impact on performance. Conversely, Innovation Capital and Structural Capital do not demonstrate significant effects on either Dynamic Capability or Firm Performance, suggesting a more complex or context-dependent role. The mediation analysis confirms that Dynamic Capability serves as an effective conduit through which Human Capital enhances performance outcomes. Based on these findings, the study recommends prioritizing human capital development and external relationship management to foster adaptability and improve performance. Future research directions include exploring moderating factors, adopting longitudinal and industry-specific approaches, and examining broader performance metrics to deepen understanding of intellectual capital's strategic role.

Keywords: intellectual capital including Human Capital, Innovation Capital, Relational Capital, and Structural Capital, Structural Equation Modeling (SEM).

Introduction

The phenomenon of Intellectual Capital(IC) was presented by John Keneth in **1969** privately with Michael Kalecki but officially it was discussed in the article which was published in 1991 named as **"Brainpower"** by Tom Stewart(Muhammad Khalique 2013). Intellectual capital (IC) is measured a more important contributor to firms to a certain extent than tangible assets in firm competitiveness improvement and value generation in the knowledge economy. Therefore, it is vital for firms to understand, identify, develop and utilize IC efficiently, all of which can help firms gain competitive advantage(Xu 2020).Intellectual capital (I.C) has become an important issue in today's fast-growing, technology-driven and knowledge-based world. IC provides a long-term competitive advantage and adds value to the firm performance(A. Alrowwad 2020). The term IC is used to describe the efforts made by a company's employees, managers, and other stakeholders to improve business performance(Mahmood 2020).

There have been various researches conducted on the intellectual capital focusing on the study in the developing world, especially in the nations Sharabati(2010). Researches in the developing world has been conducted by the researchers to identify the intellectual capital role towards the innovation activities and performance of the firms in the, examples include'Mexico'Tovstiga(2007), 'Malaysia'Bontis N.W(2000),
'Egypt'Seleim(2004),'Sindh Pakistan.Shaari(2010); and 'Iran'MahmoodSalehi(2009).

Various numbers of scholars in theirs researchers have conducted the researches in various countries on topic of intellectual capital in different international settings, countries include, Australia, United Kingdom, Austria, Canada, USA, Malaysia, South Africa and Hong Kong.In the last two decades, world widely organizations have focused on the Intellectual Capital (IC). As it plays a basic role in the dynamic organizations within perspective of 21st century, it is the founding part of the businesses. The studies suggest that those organizations who have examined the role of IC in their organizations realized affective differences.(Martinez-Torres 2006). So the IC has been seen as the important driver for the performance of the firms.(Youndt, Subramaniam et al. 2004). Firm's intellectual capital is the combination of the experiences, knowledge, innovation, invention, communities, and the market share which may affect the performance of the firm.(Ali Talip Akpinar 2014). Pulic(2000)in his research said that the success in the economic development in the past used to depend on the firm's tangible assets, which include natural resources, land and equipment etc. which played the role of value creation for the well being, but now in the era of technology the success of economic development depends on the application of the knowledge. The Economics Institute of Washington analyzed that value of the production of the countries depends on the knowledge and skills of workforce, further the ability of the firm to solve the problems related to business will boost the market value of the firm.(Ali Talip Akpinar 2014). Previous researches have proved that the role of the intellectual capital positively affects the value of firms, calculated in terms of the share price(Ming Chin Chen 2012, Poraghajan 2013).

Other to this, various researches on the IC suggest that it has the positive effect on the financial performance of the firms measured in terms of the revenue growth, profitability, return on the assets, and return on the equity(Rubina 2011, Baroroh 2013, Poraghajan 2013, Narwal. 2014).The shift toward knowledge-based economies has reshaped the traditional view of resources that drive performance and value in organizations. Historically, tangible assets such as property, plant, equipment, and raw materials were considered the primary sources of value creation(Carson 2004). However, as the global economy transitioned into a knowledge-based era, intangible assets, particularly intellectual capital (IC), have emerged as the critical drivers of competitive advantage and organizational success (Delios 2001) .Intellectual capital (IC) refers to the knowledge, skills, and intangible assets that organizations leverage to create value (Stewart 1997) . It is composed of three main elements: human capital, structural capital, and relational capital(Edvinsson 1997).Human capital encompasses the knowledge, skills, and competencies of an organization's employees, which are critical to innovation and organizational performance(Bontis 2003). Structural capital refers to the organizational processes, systems, and intellectual property that support and enhance business activities(Teece 1997).Relational capital, on the other hand, includes the relationships and networks that organizations build with customers, suppliers, and other stakeholders(Nahapiet 1998). In today's competitive business environment, intellectual capital has become increasingly important as organizations seek to differentiate themselves and achieve sustainable growth. Numerous studies have demonstrated the positive impact of intellectual capital on firm performance. Intellectual capital significantly contributes to business performance in Malaysian industries, showing that firms with well-developed intellectual capital are better positioned to achieve superior results(Bontis 2000). Similarly, a study indicated that intellectual capital positively affects firms' market value and financial performance, further confirming the critical role of IC in value creation(Chen 2005).

Previous research's scope was of the unique as the concept of the intellectual capital was new to the most of the managers in the pharmaceutical industry in Sindh Pakistan. Few studies have been conducted in the role of the IC on the financial performance of the firms in Sindh Pakistan(Khalique 2011). In this era environment is altering very fast day by day , anywhere globalization is making their space now it is hardest task or dare for the industries to be ultimate aggressive in competition. . Intellectual capital is the intangible value of a business, covering its

people, the value inherent in its relationships, and everything that is left when the employees go home, of which Intellectual property is but one component(Ibrahim, Sharabati et al. 2013).

Telecom sector is selected due to flexibility of skills and knowledge it shows. In this innovative century, rapidly growing industry the telecommunication industry is the on the most top developing industry, the development of this industry is based mainly on innovation, which is a most important part of IC(Vafaei and Karami 2012). In Sindh Pakistan telecom industry is the fast growing industry in the country and one of the key support services needed for the transformation of various sectors of the economy. Empirical studies have explored the relationship between intellectual capital and firm performance in various industries, including the telecom sector. For instance, (Muhammad 2009)conducted a study on the telecom sector in Pakistan and found that human capital and structural capital have a significant positive impact on organizational performance. Their findings suggest that telecom companies in Pakistan that invest in intellectual capital, such as employee training and process improvement, are better equipped to achieve superior performance outcomes.

Therefore, the following are objectives have been set:

- To find the impact of Human Capital on the firm's performance.
- To find the impact of Structural Capital on the firm's performance.
- To find the impact of Relational Capital on the firm's performance.
- To find the impact of Innovation Capital on the firm's performance.
- To find Dynamic capabilities mediating the relation between Human Capital , Relational Capital, structural capital and innovation capital on firm's performance.
- Learn whether Intellectual capital affects the improvement of Telecom sector's performance in Sindh Pakistan.

Therefore, the current study aims at measuring the effect of IC elements on the telecommunication industry in Sindh, Pakistan. The aim of this study is to explore and comprehend the components of intellectual capital. To dig more information about the impact of intellectual capital on the firm's performance this study investigates a case of telecom sector in Sindh (Pakistan). In order comprehend concept and applications of intellectual capital in-depth. Subsequently, to fulfill the objective this study a comprehensive related literature review was performed. The related literature showed that there are four components of intellectual capital namely human capital, structural capital, relational capital and innovation capital will be identify. Despite the recognized importance of intellectual capital and dynamic capabilities, there is a paucity of research focusing specifically on the telecom sector in Sindh, Pakistan. Most existing studies have examined the broader Pakistani context or other industries, leaving a gap in understanding the unique challenges and opportunities within Sindh's telecom industry.

Literature Review:

The corporate environment of today is turbulent, unstable, and constantly changing. An organization must develop and acquire innate resources and knowledge in order to increase its absorptive capacity and competitiveness(Mahmood 2020) while keeping in mind that the shift to industry is causing resources to become more intangible rather than tangible (Ashton 2005).

Interesting viewpoints on how companies strike a balance between discovery and exploitation can be found in the IC literature. Likewise, HC, SC, and RC represent different knowledge repositories at different organizational levels (Mubarik 2018). Each of the IC traits covered here will interact with the others at different organizational levels, contributing in a different way to skill development and, eventually, the success of the company (Wang 2021). The relationship between firm-specific political risks and intellectual capital investment is a relatively neglected topic, despite the fact that there is a large body of literature on the factors that influence intellectual capital investment, which is crucial to the long-term success of businesses. Considering the special qualities of intellectual capital, namely its high risks, lengthy payback period, and difficulty in

quantifying (D'Amato 2021). The findings indicate a more substantial decline in intellectual capital investment among companies with more financial difficulties and reliance on outside funding. Since it is less significant for enterprises with larger institutional ownership, the magnitude of this detrimental effect also depends on firm-level governance. Third, using the scores for managing skill created by (Demerjian 2012). As such, intellectual capital – not tangible assets or even financial capital is crucial tactical property as it is valuable, unique, and challenging to reproduce and thus a basis of competitive advantage (Joshi 2013) and the concept of long-term value creation(Lerro 2014). Previous research has validated the crucial connection between intellectual capital and business performance as intangible assets (Maditinos 2011) .

IC is typically categorized into three components: **Human Capital (HC)**, **Structural Capital (SC)**, and **Relational Capital (RC)**. These components collectively enable organizations to generate innovation, enhance customer relationships, and optimize operational processes, ultimately contributing to firm performance(Stewart 1997). Very first time Jon Kenneth Galbraith found the word intellectual capital in 1969(Khalique 2011).In literature there is no unique description of IC exit, mostly debated by many scholars and experts .Researcher argued that still thought of intellectual capital is unestablished, so in literature "there is no standard definition of intellectual capital is available that will identify its subcomponents" .Researcher concluded from previous researches that every investigators explain the similar thought of IC however in dissimilar methods(Khalique 2011)."The current studies highlight the multidimensional perspective of intellectual capital by integrating four elements including human, structural, relational, and social capital. Such a multiple-feature approach to intellectual capital suggests that there are distinctive knowledge assets that could enable organizations to take advantage of their potential human resources, structural assets, cultures, and networks with external parties". Researchers have a tendency to give more response to human and structural more than social and relational capital(Subramaniam 2005). One and only of the fundamental calculated resources is Human capital , in fluctuating and competitive environment human capital is more helpful and compulsory used for achievement meanwhile employees' awareness and ability remain important in today's fast-paced.(Subramaniam 2005).Firm generated the methods and procedures which is commonly used to discuss by Structural capital , in the whole organization flow of knowledge is speedup by these methods and procedures which are put in storage in a firm's technology system(Carson 2004, Youndt, Subramaniam et al. 2004).On the other hand, if organization have strong structural capital it will give backbone of culture which will inspires to the employees to do effort and acquire new information(Florin 2002). "Recent research suggests that organizations' operation processes and the organizational commitment of sufficient resources have an important impact on firm's performance"(De Brentani 2004).In Previous research argued by scholar that in organization's the worth of their members and the wealth of the knowledge substituted between partners enriched by Relational capital. Significant knowledge and support may improve by its external partners, members and suppliers in an organization. "In an exchange relationship, this process establishes the perception of fairness and mitigates the influence of power. The parties seem to gain enough trust in one another through frequent meetings that they might not need to rely on official contracts to guarantee the firm's performance "(Wang 2010).

Research Methodology

The aim of this study is to identify the impact of intellectual capital on firms performance and which elements is impacting more on Performance. To dig deep information a Telecom sector of Sindh Pakistan is chosen. The philosophy of this research pertains to the adoption of positivism philosophy. It made it possible for the researcher to communicate with study participants as little as possible, ensuring that the data collected is reliable and truthful. For this study, a deductive approach is used to supplement the use of quantitative methods and positivist philosophy (Zahid, 2020).

The Primary data from the respondents is started to collected with the help of closed ended five point Likert scale survey Questionnaire by conducting quantitative research, being of a structured Survey Questionnaire, to go for creation of realities.

Data on the constructs of this study is obtained from two sources: questionnaire survey and online data from published articles. The questionnaire survey will used to measure the four elements of IC , (HC,SC,RC and IC) and will also measure the mediating variable and dependent variable. For this study, an adopted questionnaire was applied. This tool has been taken from the study of (Bundi) , (Maria do Rosário Cabrita, 2008) (Vatne, 2015) , (Snell, 2004) (Robert G. Isaac, 2010) (Su, 2014) . The tool carried close-ended questions on respondents' demographics and other variables. The data is collected with the help of questionnaire to analyze and interpret the results using various processes. 300 employees from the selected companies form the sample size who worked as top level manager and two senior employees were selected on the basis of non-probability sampling along with convenience sampling (Altaf Hussain, 2020) (Zahid, 2020). The sample size is calculated through the following formula(Jaffar, 2020).

Results and Discussion

CORRELATION

Correlations

		Relational_CAPITAL	Human_CAPITAL	Structural_CAPITAL	Firm_Performance	Innovation_capital
Relational_CAPITAL	Pearson Correlation	1	.530**	-.299**	.327**	.525**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	398	398	398	398	398
Human_CAPITAL	Pearson Correlation	.530**	1	-.237**	.463**	.448**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	398	398	398	398	398
Structural_CAPITAL	Pearson Correlation	-.299**	-.237**	1	-.202**	-.306**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	398	398	398	398	398
Firm_Performance	Pearson Correlation	.327**	.463**	-.202**	1	.362**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	398	398	398	398	398
Innovation_capital	Pearson Correlation	.525**	.448**	-.306**	.362**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	398	398	398	398	398

**. Correlation is significant at the 0.01 level (2-tailed).

The above table shows that the correlation is significant at 0.01 level and resulted Sig. value is .000 so we can conclude that there is positive significant relationship among variables.

MULTICOLINEARITY

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	4.742	1.171		4.049	.000		
	Human_CAPITAL	.325	.078	.253	4.169	.000	.506	1.976
	Relational_CAPITAL	.011	.078	.008	.135	.893	.593	1.685
	Structural_CAPITAL	-.043	.036	-.056	-1.218	.224	.877	1.140
	Innovation_capital	.214	.075	.152	2.853	.005	.660	1.515
	Dynamic_Capability	.244	.072	.195	3.411	.001	.569	1.757

a. Dependent Variable: Firm_Performance

In above table we can see that the VIF values for HC, RC, SC,IC, and DC are 1.976, 1.685, 1.140 ,1.515 and 1.757 respectively which are less than 10 so we can conclude that there is no correlation among the independent

- **Construct Reliability and Validity**

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Dynamic Capability	0.834	0.836	0.883	0.603
Firm Performance	0.864	0.881	0.901	0.645
Human Capital	0.843	0.857	0.889	0.616
Innovation Capital	0.859	0.866	0.899	0.641
Relational Capital	0.816	0.819	0.871	0.575
Structural Capital	0.915	0.941	0.935	0.743

The reliability and validity assessment of the measurement model indicates that all constructs meet the necessary thresholds for internal consistency and convergent validity. Cronbach's Alpha values for all constructs range from 0.816 to 0.915, which are well above the commonly accepted threshold of 0.70, confirming that the items within each construct consistently measure the same underlying concept. Similarly, rho_A values, which provide a more accurate estimation of construct reliability in PLS-SEM, also exceed the 0.70 benchmark for all constructs, further supporting the reliability of the scales used.

Composite Reliability (CR) values, ranging between 0.871 and 0.935, indicate a strong overall reliability for each latent construct. These values suggest that the measurement items are adequately capturing their respective constructs with minimal measurement error. Furthermore, the Average Variance Extracted (AVE) for each construct is greater than 0.50, with values ranging from 0.575 (Relational Capital) to 0.743 (Structural Capital), demonstrating acceptable levels of convergent validity. This implies that each construct explains more than half of the variance of its indicators, affirming that the indicators are truly representative of the latent variables they intend to measure.

In conclusion, the measurement model demonstrates strong psychometric properties. All constructs exhibit high reliability and satisfactory convergent validity, indicating that the model is suitable for further structural analysis.

- **Table 4.8**
- **Bootstrapping (Total Effects)**

	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values
Dynamic Capability -> Firm Performance	0.187	0.189	0.054	3.447	0.001
Human Capital -> Dynamic Capability	0.532	0.526	0.048	11.125	0.000
Human Capital -> Firm Performance	0.271	0.275	0.061	4.446	0.000
Innovation Capital -> Dynamic Capability	0.082	0.090	0.051	1.620	0.106
Innovation Capital -> Firm Performance	0.153	0.139	0.094	1.632	0.103
Relational Capital -> Dynamic Capability	0.129	0.131	0.058	2.216	0.027
Relational Capital -> Firm Performance	0.007	0.019	0.082	0.085	0.932
Structural Capital -> Dynamic Capability	-0.011	-0.009	0.037	0.300	0.764
Structural Capital -> Firm Performance	-0.059	-0.061	0.060	0.982	0.327

The structural model analysis reveals several important relationships among the constructs. Human Capital emerges as a key driver in the model, exerting a strong and statistically significant influence on Dynamic Capability ($\beta = 0.532$, $p < 0.001$), and also having a direct positive effect on Firm Performance ($\beta = 0.271$, $p < 0.001$). This suggests that organizations with a more skilled and knowledgeable workforce are better positioned to adapt to changing environments and perform effectively.

Dynamic Capability, in turn, shows a significant positive impact on Firm Performance ($\beta = 0.187$, $p = 0.001$), underscoring its mediating role in translating internal competencies into better organizational outcomes. Additionally, Relational Capital—which includes networks, partnerships, and stakeholder relationships—demonstrates a modest but statistically significant effect on Dynamic Capability ($\beta = 0.129$, $p = 0.027$), implying that external relationships can support an organization's adaptability and responsiveness.

In contrast, the results indicate that Innovation Capital and Structural Capital do not have significant direct effects on either Dynamic Capability or Firm Performance. Despite showing positive coefficients, Innovation Capital's effects are not statistically significant, suggesting its influence may be indirect or context-dependent. Similarly, Structural Capital—which includes systems, databases, and organizational routines—shows negative and non-significant coefficients, implying it may not directly contribute to dynamic capabilities or firm outcomes in this context.

Overall, the model highlights the central role of Human Capital in enhancing both adaptive capacity and performance, while pointing to the supportive role of Relational Capital. It also suggests that further exploration may be needed to clarify the roles of Innovation and Structural Capital, possibly by examining mediating or moderating effects not captured in the current model.

Conclusion and Future Directions

The findings of this study underscore the critical role of **Human Capital** in driving firm performance both directly and indirectly through the development of **Dynamic Capabilities**. Human Capital emerges as the most influential resource, significantly enhancing an organization's ability to adapt to changing environments, which in turn leads to improved performance outcomes. This highlights the importance of investing in skilled and knowledgeable employees as a strategic priority.

Additionally, **Dynamic Capability** itself is confirmed as a key mediator that translates internal resources into tangible performance gains, reinforcing its central position in the resource-based view of competitive advantage. **Relational Capital** also contributes positively to dynamic capabilities, albeit to a lesser extent, indicating that external relationships and networks support organizational adaptability but do not directly influence firm performance.

Conversely, **Innovation Capital** and **Structural Capital** do not show significant direct or indirect effects on dynamic capability or firm performance in this model. This suggests that their impact may be more complex, potentially requiring alternative theoretical frameworks or additional mediators/moderators to fully capture their influence.

Overall, the results highlight the necessity for organizations to prioritize human resource development and nurture external relationships to build dynamic capabilities that ultimately enhance performance. Future research should further investigate the roles of innovation and structural resources to provide a more comprehensive understanding of their contributions within the organizational capability-performance nexus.

Future Directions

Based on the findings of this study, future research could benefit from exploring additional factors that might influence the relationships between intellectual capital components and firm performance. For instance, examining potential moderators such as organizational culture,

leadership styles, or external environmental conditions could provide deeper insights into how Innovation and Structural Capital contribute under different circumstances. Longitudinal studies would also be valuable to track how these relationships evolve over time, offering a clearer picture of causality and the long-term effects of intellectual capital investments.

Moreover, conducting research across different industries or cultural contexts could help determine the generalizability of the results and reveal sector-specific dynamics. Since Innovation and Structural Capital did not show significant effects in this study, future work might focus on understanding the conditions under which these resources become more impactful, possibly through qualitative or mixed-method approaches. Additionally, investigating how emerging technologies influence the development and utilization of intellectual capital could open new avenues for understanding organizational adaptability. Lastly, expanding performance measures to include non-financial outcomes like innovation success or sustainability could provide a more holistic view of firm performance and the role intellectual capital plays in achieving it.

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