

# Impact of Structural Capital & Innovation Capability on Firm Performance, a Case of Pharma Industry in Karachi-Pakistan

Aisha Rauf, Weizhong Fu

**Abstract**— It has been argued that the speed in obligation and the ability for adjustment by firms is slower than the modifications & changes happening around. In the present technological competition and fast-paced developments, the firms are facing enormous challenges. Consequently, every invention and innovation may create possibility for employer. Hence, firms need to possess right structural capital & innovation capability. Organizations need to develop new products and share a clear vision so as to embellish the effectiveness of their product improvement & performance. The objective of this paper is to analyze the position of structural capital & innovation capability on company performance. The core areas where SC & IC is applicable has been taken into account including systems & programs, R&D, Culture, knowledge and environment. Similarly, the major areas relevant to IC are also selected including organizational and employees' innovation, product innovation & launching. The primary data has been collected from 100 employees of different pharmaceutical companies of Karachi using closed ended questionnaire using 5 Likert scale. The secondary data has been taken from the published reports, research articles & case studies. The data has been analyzed using SPSS and descriptive analysis, correlation and regression have been performed. The results indicate that all SC & IC practices were strongly correlated with the performance of the firms. The research suggests that companies need to exercise these practices efficiently on a broader level to achieve higher level of performance. It can be concluded that in order to endure and maintain the expectations, it is imperative for the pharmaceutical industry to adopt these factors (Structural Capital & Innovation Capability) as a practice to further improve their performances

**Index Terms**— Structural Capital, Innovation Capability, Firm Performance, Pharmaceutical Industry

## I. INTRODUCTION

The structural capital is of the major component of intellectual capital. This comprises of supportive infrastructure, processes, and databases of the organization, which support in deployment of human capital. The structural capital remain in the ownership of an organization even if employees leave the organization. In today's challenging business environment, dealing in expertise-based societies could be a huge problem of firms. During this competitive world with many changes, managers should understand the sources that empower the overall performance and seek worth in their organizations. Earlier, the shift towards know-how-based economy and the systems, the maximum

sources of value advent for firms had been tangible properties like assets, plant, equipment and materials (Carson et al., 2004). At present, however, tangible property, structural capital (SC) and innovation capability (IC) collectively has been recognized as pivotal because of the fact that these are driving elements in aggressive advantage and well worth creation (Delios and Thrilled, 2001; Conner and Prahalad, 1996; provide, 1996a; Quinn, 1992; Spender, 1996; Carmeli and Tishler, 2004). Structural Capital embrace all reserves of non-human records in addition to databases, organization & structure charts, and processes and operative procedures, strategies, action plans (Ross et al., 1997).

Chen and colleagues agree that the structural capital refers to this commercial enterprise structure and strategies of the business enterprise. In their study, they have deliberated the capital shape and sincerely classified as structure tradition, shape gaining knowledge of, operational strategies and data systems. It is argued that innovation talents and structural capital interacting with each other will facilitate organizations to shape capitals, use and broaden them harmoniously (Chen, 2004). Structural capital (henceforth) has been delineate due to the fact the infrastructure "that encourages the human useful resource to shape and leverage its expertise" (Edvinsson & Sullivan, 1996). In possibility phrases, the primary reason is to aid the conversion of human capital into intellectual capital.

Unlike human capital, structural capital is in the hands of company, which uses it and attain the results. The studies often refer thereto because it is still within the firm and remain on the tip of the operating and daily routine (Edvinsson, 1996). For the reason that it encompasses the strategies embedded in the businesses, the collective ability that is same to live inside and shape the procedures or guidelines (Nelson & Iciness, 1982). Structural capital is the conversion of information from non-public and silent information to public and written knowledge captured in databases, patents, manuals, structure systems, strategies, and statistics systems (Subramaniam & Youndt, 2005). One of the elements of structural capital is information gathered by means of the companies inside the form of code and databases (Stewart, 1997). The survival of any business enterprise, especially within an ever increasingly more globalized world, depends on its ability to innovate. Organizational intelligence represents through statistics and expert systems, the skills and competencies of employees, the finest production techniques and customer service, each have an outstanding impact on its ability to innovate. To reach this context, firms need to be revolutionary & innovative (Govindarajan and Trimble, 2005).

**Manuscript received October 23, 2019**

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Innovation Capability(IC) implies the buildup, appearance or capability of a company's innovation regarding conceiving and implementing something new (Aramburu and Saenz 2011). As an intangible infrastructure, innovation capability may be said the ability to mobilize the understanding, possessed by employees combined to create new information, facilitating diverse improvements consisting of new products or services, new software designs & techniques, new manufacturing manner era, new shape, new administrative device, and new organizational forms and work style (Calantone et al. 2002). We conceptualize Innovation Capability as the potential of understanding introduction and accumulation to institutionalize something new in a firm, and value it from the components of product, method and control. The product innovation methods providing improved or new merchandise/services inside the marketplace and obtaining delight from customers. The process innovation is providing new manufacture or service operation apart from modern ones, which will attain better overall performance. The management innovation is a capability that improves a company's performance via enforcing new managerial guidelines, systems, and techniques (Çakar and Ertürk 2010; Damanpour 1991; Davenport 1993; Liao et al. 2007; Liao et al. 2010; Lin 2007).

The research on structural capital has been growing in last couple of years, because companies have been setting their goals to become more competitive in the marketplace. The management of the structural capital is pivotal to deal the adverse impacts of the external environment and thus have to design in a good way that facilitate growth of the business. The structural capital has to adapt the market's call hence it has flexibility; consequently it is difficult to give it a widespread definition. The type of structural capital technique, which is used by many researchers and corporations, can be divided into the internal and external capital (Schneider and Smakin, 2007).

The shape & structure of an organization depends on the degree of paperwork and complexity of the organization. Subramanian and Nilakanta (1996) argue that formalization is related to the characterization and outline of the duties of personnel, a truth that is negatively associated with innovation, according to Santos-Rodrigues et al. (2011). Several authors argue that firm size has an influence on its potential to innovate, and a favorable relationship between firm size and the potential to innovate exists (Damanpour, 1992). Similarly, Wan et al. (2005) found a high quality relationship between decentralized businesses and innovative ability. Pharmaceutical sector is performing essential role in the increase of the economy of Asian countries. After service and agriculture, it is the third largest factor. The manufacturing and pharmaceutical sector has 18.7% share in the GDP of Asia. Manufacturing & Pharmaceutical sector of Pakistan has growth rate of 3.56% with investments of approximately Rs. 1.5 trillion. The industrial policy of Pakistan aims at 8% annual growth of the sector.

The organizational researchers are of the view that adoption of innovation is a prime vehicle for improvement in company's performance under the situations like scarce resources, dynamic commercial enterprise environment,

intense opposition and changing customer demands for better quality products (Jansen et al, 2006; Roberts & Amit, 2003). The objective of the paper is to study whether structural capital & innovation capability significantly improves the association with organizational innovation in the short run. Therefore, does structural capital have better impact on organizational innovation through time is the research question for this study.

### II. LITERATURE REVIEW

Structural capital consists of all the non-human storehouses of expertise in companies, which encompass the databases, organizational charts, procedure manuals, techniques, physical manifest and something whose cost to the organization is higher than its material cost. Roos et al. (1997) describe structural capital as "what stays in the organization while employees go home for the night".

**Structural Capital:** Is the hardware, software, databases, organizational form, patents, emblems and the whole thing that helps personnel' productivity. Structural capital is the supportive infrastructure that enables human capital to feature (Bontis et al., 2000). It describes the internal form of an organization, together with its techniques, middle talents and lifestyle this is typically context precise. Structural capital is owned by using a corporation, remains with company even though the human beings leave. Edvinsson and Malone (1997), in addition divide structural capital into organizational capital, method and innovation capital. From the individual character & point of view, Collis and Bernard Law Montgomery (1995) point out that the significance of structural capital relies upon on the degree to which it contributes to the creation of a competitive advantage. From of view a financial factor, transaction-expenses suggest that firm profits a competitive advantage once they delicate the company-unique assets that cannot be copied by their opponents & rivals in the market place. Consequently, as the distinctiveness of structural capital will increase, firm have incentives to make investments into its controls and the purpose to lessen dangers and capitalize on productive potentials. Hence, individuals need to enhance their competency skills in order to be elevate in their companies. The Structural capital concept has gone through a fast improvement. Within its improvement, more interest has been paid to R&D, Organizational charts and related components of SC and IC.

Innovation Capability relates to an organization's know-how and codified experience; those are part of its organizational culture, its knowledge management gadget, efficient methods and pinnacle management aid (Yang and Lin, 2009). Subculture is described as a hard and fast of norms and expectations, values, ideals and attitudes, which are commonplace to a set (Jacobs et al., 2013). Organizational structure is described as how authorities and work roles are distributed so that one can organize and manage selection-making sports (Huang et al 2011). Top management guide is defined as the extent of pinnacle control given to innovation through presenting IC Capital, human resources and a suitable work environment to inspire creativity and innovation (Carbonell and Rodríguez-Escudero, 2009). Know-how control (knowledge management) refers to the

process of making, sharing and making use of expertise Sources (Lavie and Drori, 2012). Expertise & knowledge acquisition is a mechanism which enables acquiring know-how or it's far a procedure associated with soaking up essential knowledge from its sources. A company obtains expertise from the marketplace and its personnel. These resources provide many opportunities for organizations to recycle their current expertise for you to create extra treasured knowledge (Antonio et al, 2012). Innovation plays an essential role in assisting the efficiency of the economic system in which pharma industry is thriving for bring new thoughts and supports to the enterprise quarter and allowing the commercialization of latest concept (OECD, 2010). Due to fierce competition and the opposition within the market, globalism and a detonation of advanced technologies in current years, innovation and differentiation are taken into consideration as a necessity for every enterprise. To reap marketplace success and preserve a competitive benefit, businesses want to make the maximum new opportunities, enlarge new merchandise, service offerings and markets (Tajeddini, 2010: 221).

Innovation may be termed as "implementing new ideas that create value". This regular description refers back to the extraordinary styles of innovation along with product development, the deployment of new method technologies and controls. This means the adoption of recent products and techniques to grow and increase competitiveness and profitability, primarily based on customer demands & necessities (Leskovar, 2007: 535). The Oslo guide (2005: 51) has given many definitions of innovation and the kinds of innovation. In those definitions, four forms of innovation are discussed especially; product innovation, process innovation, marketing & advertising innovation and organizational innovation. Enzing et al. (2011) observe that organizational practices have an effect on the extent of innovation within the organization. Furthermore, the researchers explored that enterprise's unique practices consequences in product and manner innovation through dealing with the assets. Walker (2004) concluded that innovation varieties have an effect on each individual and they want to be executed in conjunction. Staropoli (1998) emphasized that technical innovation may be more advantageous by means of the use of cooperative organizational re-arrangements and adjustments techniques. Similarly, Germain (1996) decided the organizational restructuring as a predictor for technique innovation that offers the means of relationship amongst organizational innovation and gadget innovation. Walker over again in 2008 introduced that advertising and marketing & advertising, product, organizational improvements are inter-associated, and that the extra studies are recommended. Moreover, technology also affects the needs & wishes of the businesses, as the clients output as services or products. Consumer is the primary protagonist who has whole authority and desire whether or not to take the firms goods or services. Organizational innovation is not possible if the firm does not have appropriate working techniques and structures to harmonize its activities (Widener, 2006).

The studies suggest that adequate assets in companies' operation and dedication have a great impact on performance (De Brentani & Kleinschmidt, 2004). Santos-Rodrigues et al. (2011) contend that it is essential to highlight the variations

between concepts, i.e. Invention is an authentic creation of an concept, and creativity is the creation of latest thoughts, at the same time as innovation is not just about creativity it has to translate into cost. Innovation may be taken into consideration as the economic exploitation of creativity. Firms today are integrating new technology to benefit a facet over others in terms of productiveness and services. With the assistance of technology, there are adjustments in the strategies like advertising, manufacturing, human improvement. Technology is useful in accurate choice making, money, time saving, and lots of others. Innovation is a major source of competitive benefit and appeared to be a prerequisite for organizational fulfillment and survival. The potential to innovate relies upon largely on the way in which a business enterprise makes use of and exploits the assets it had. (Charles O., 2004).

Innovation may be seen as benefit of shareholders, workforce, and customers as a brand new device in making a wealth (Ketchen et al., 2007). Innovation plays a critical role in reinforcing a company's performance. In wake of excessive opposition and environmental uncertainty, the potential to innovate has turned out to be more critical as a method which is no longer simplest to encourage growth but for survival (Dinopoulos and Syropoulos, 2007). Companies must be able to adapt and evolve if they desire to survive as their competitors undertake new merchandise or techniques with a purpose to enhance their aggressive strength. Innovation is the important component influencing competition for organization and one of the most vital factors of sustainable advantage. Innovation causes product enhancements, increases the delivered fee, measures technological functionality and performance, R&D management and generate higher revenues (Coombs & Bierly, 2006; Coombs, J., & Bierly, P. 2006).

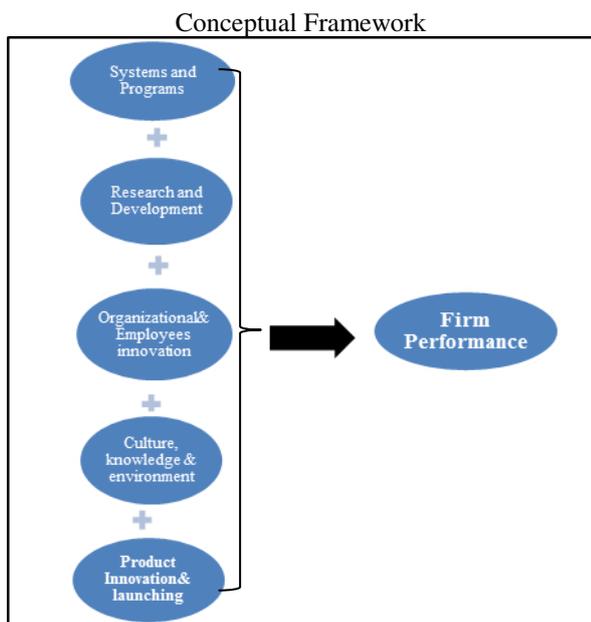
Firm performance may be measured in variety of methods, including overall performance (e.g, profitability, ROI), product performance (e.g, product reliability & duty, form of splendid product competencies), and market performance (e.g., market share value, customer pleasure) (Jones, Lanctot and Teegen, 2000: 263). From commercial corporations' perspective, business monitoring and control may also feature a foundation for standard performance evaluation, they are growth measures such as income increase, and profit measures together with ROA or and return on sales (ROS). The former is indicative of the manner efficaciously a company can open up new markets or increase in current markets. The latter suggests the performance of its operation (Li and Ye, 1999). Few empirical evidences indicate that, in certain instances, internal and external technology acquisition result in overall performance of enterprise. Zahra (1996) studied the relationship amongst firm financial performance and generation strategy and determined that while external generation sourcing is regularly beneficial, its effect on corporation financial performance was moderated by means of the company's operating surroundings and became negatively related to financial performance in sturdy and homogeneous environments (Jones, Lanctot and Teegen, 2000: 263).

Subramaniam and Youndt (2005) observed that SC had a massive impact on each incremental and radical progressive competency. Molina, and Martinez, (2010) sates that, in

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Spanish Production & manufacturing firms; there has been a positive connection between SC and system and product Innovation. Syed et al (2014), in their study on impact of SC and corporations' progressive functionality on sustainable growth of ladies owned establishments in Malaysia discovered that significant direct relationship of SC and revolutionary functionality with corporations' sustainable growth was found. Trust in the relationships mediated positively at the performance of innovation and the release level for product innovation. Social networks has a capability to reinforce ability for improvements (Baba and Walsh 2010). A research by Xiaobo and Sivalogathanan (2013), on innovation capability for higher overall performance on IC and enterprise performance of the clothing enterprise in Sri Lanka, concludes that SC and organizational capital have magnificent link with innovation.

Organizational performance has been generally associated to monetary perspective and the organizational mind-set & attitude. The economic mindset emphasizes the significance of marketplace elements, which include the corporations' competitive characteristics and something associated with monetary elements. The organizational or non-monetary angle builds on behavioral and sociological paradigms and their suit with the surroundings, which includes quality of services (together with worker satisfaction and client pride) pleasant of product and competitiveness.



### III. RESEARCH METHODOLOGY AND DATA ANALYSIS

Research design and framework has been created to understand answers of research questions. There are three styles of research studies: exploratory, descriptive and explanatory research according to (Kothari, 2004) research on 2004. Considering the focus of this study to test the impact of structural capital & innovation capability on overall performance of the firm, a quantitative approach has been adopted. The quantitative research focuses on calculating and making capabilities and building statistical models and figures to give a clear reason for what is being perceived. In order to answer the research question, primary data is

collected through questionnaires from a number of employees working in different organizations of pharmaceutical industry in Karachi. The questionnaire is designed in the perspectives for employees and it has thirty questions from different aspects such as SC, IC & firm performances. Convenient sampling method has been used to collect the responses from employees, at different positions, in pharmaceutical companies of Karachi. In order to test the reliability, the data has been analyzed in two different parts 1- Reliability of (Structural capital with firm performance) and 2- Reliability of (Innovation capability with firm performance).

#### Case Processing Summary

		N	%
Cases	Valid	98	98.0
	Excluded <sup>a</sup>	2	2.0
	Total	100	100.0

a. List wise deletion based on all variables in the procedure.

#### Reliability Statistics

Cronbach's Alpha	N of Items
.849	20

Cronbach's Alpha is greater than 0.7, which indicates the accuracy of the respondents' responses. In the above table Cronbach's Alpha value of 0.849 is acceptable and reliable for further analysis.

Test two: Innovation Capability & firm performance

#### Case Processing Summary

		N	%
Cases	Valid	98	98.0
	Excluded <sup>a</sup>	2	2.0
	Total	100	100.0

List wise deletion based on all variables in the procedure.

#### Reliability Statistics

Cronbach's Alpha	N of Items
.853	20

Cronbach's Alpha is greater than 0.7, which indicates the accuracy of the respondents' responses. In the above table, Cronbach's Alpha value of 0.853 is acceptable and reliable for further analysis.

#### Demographics of the Respondents - Statistics

		SC1	IC1	FP1
N	Valid	100	100	100
	Missing	0	0	0
Mean		2.18	2.24	1.94
Std. Deviation		.881	.933	.802
Minimum		1	1	1
Maximum		5	4	4

Responses of respondent's show that independent variable innovation capability (IC) is with the highest mean 2.24. The structural capital (SC) mean of 2.18 and firm performance (FP) with mean of 1.94 are at second and third position respectively. Standard deviation of the IC (.933) is the highest, in this model, which indicates that role, and impact of the innovation capability in firm performance in pharmaceutical industry of Karachi is low as compared to the other variable.

**Gender**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	66	66.0	66.0	66.0
Female	34	34.0	34.0	100.0
Total	100	100.0	100.0	

This study shows that Pharmaceutical organizations of Karachi are more male-oriented.

**Correlations**

		Structural capital	Innovation Capability	Firm performance
Structural capital	Pearson Correlation	1	.566**	.455**
	Sig. (2-tailed)		.000	.000
Innovation Capability	Pearson Correlation	.566**	1	.226*
	Sig. (2-tailed)	.000		.024
Firm performance	Pearson Correlation	.455**	.226*	1
	Sig. (2-tailed)	.000	.024	

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

\* . Correlation is significant at the 0.05 level (2-tailed).

c. List wise N=100

The correlation matrix shows the relationship between Structural Capital, Innovation Capability with Firm Performance. From the value of correlation coefficient, we can say that these variables are correlated with each other & the strength of correlation is around 45% and 26% respectively, which is a positive correlation; however, the correlation is significant showing the p-value of 0.000, which is much less than 0.05.

**Regression**

**Variables Entered/ Removed<sup>a</sup>**

Model	Variables Entered	Variables Removed	Method
1	Structural capital, Innovation capability <sup>b</sup>		Enter

a. Dependent Variable: Firm Performance

b. All requested variables entered.

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.499 <sup>a</sup>	.249	.234	.702

1	.499 <sup>a</sup>	.249	.234	.702
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a. Predictors: (Constant), Structural capital, Innovation capability

R shows the coefficient of correlation, which means relationship of the two variables. R value (.499a) shows that there is a positive relationship between SC & IC (independent variables) with FP (Dependent variable). The R Square show Coefficient of Determination defines the square Coefficient of Correlation. In this analysis, R square is .249, which indicates 24% reliable to be used for estimation of population.

**ANOVA<sup>a</sup>**

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	15.864	2	7.932	16.104	.000 <sup>b</sup>
Residual	47.776	97	.493		
Total	63.640	99			

a. Dependent Variable: Firm performance

b. Predictors: (Constant), Structural capital, Innovation capability

The ANOVA shows the fitness of model, as F statistics is .000, which is less than the value of 0.05 and the total Sum of squares shows the complete variability near to mean. The sum of residual mean the sum of squared error in prediction, Sum of square Regression indicates the improvement in prediction by using the predicted value of (Y) and the degree of freedom (df) which is linked to the variance. Degree of freedom is the total number of respondents minus 1. F value indicates the total model fit. It shows that the independent variable has predicted dependent variable accurately or not. A value of more than seven indicates model is good and independent variable has predicted on dependent variable well. In this model, F is 16.104, which are acceptable.

**Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	.661	.250		2.640	.004
Structural capital,	.443	.090	.437	4.953	.001
Innovation capability	.163	.068	.213	2.412	.018

a. Dependent Variable: FPI

The coefficient table above shows the individual significance of the variables included in the model, the independent variable of structural capital has a positive significant and impact on firm performance as the value of beta coefficient is .433 which is a positive whereas the value of T statistics is greater than 2 meaning a positive and significant impact.

**CONCLUSION**

Structural capital & Innovation capability enactment play an important role in the development and growth of every firm. These arrangements and practices are vital for companies in following the right path and support employees with the

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structures and innovation functionality they need in order to perform well for achieving the company's strategic aim. It is obvious, from the evidence given in this study that structural capital & innovation capability, offer organizations with treasured possibilities and tools for achieving sustainable competitiveness and extended first mover benefit in today's dynamic and competitive market. The efficient implementation & control of these factors (SC & IC) is very crucial, because it guarantees that an enterprise's effective and efficient processes and methodologies are appropriately leveraged to expand the marketplace and customer base system, which increases firm profitability and growth. The study also accentuates that there is a positive relationship between the independent & dependent variables, indicating that structural capital & innovation capability have significant effect on firm performance.

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