

# **The relationship between intellectual capital and innovative performance on the Algerian services companies**

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## **Abstract :**

*It is rightly said by Drucker (1993) “ we are currently transitioning from industrial era to a knowledge era ,where the traditional factors of production of land ,labour and capital are being replaced by the creation of value through knowledge” .*

*As Peter Drucker has said , in the knowledge era,the company needs to serve and nurture “the knowledge worker” but at the same time the knowledge worker needs the value creative processes and infrastructures of the organization, as well as conversation with other knowledge workers to leverage their knowledge.*

*Intellectual capital can be defined as the ‘economic value’ of three categories of intangible assets of a company-that includes human capital, structural capital and social capital collectively. Intellectual capital is viewed as a sub-set of intangible capital, where the term intangible relates to assets without physical existence and capital refers to assets retained by the organisation to contribute to future profits. Intangible resources are more likely to produce a*

## **Introduction :**

The 21<sup>st</sup> century is the age of the information economy .What you know and how you protect that knowledge from your competitors is a critical aspect of a successful business. Management in the global economy is wide spread nowadays and it is the most important phenomenon that influences both business flows and business activities.To successful in the business the companies must obtain the competitive advantage, the traditional bases of competitive advantage have begun eroding .Over the last decades several driving forces have emerged.Among these forces we find the following : globalization of business and international competition ,sophisticated customers ,competitors and suppliers ,increased technological

*competitive advantage because they often are rare and socially complex there by making them difficult to imitate. A company’s intangible assets are increasingly crucial and positively related to innovative performance in today’s knowledge economy*

*This study examine the connection between the concepts of innovative performance and intellectual capital through an empirical study in the Algerian services companies. .*

*The results show that there are a weak influence of the IC on the innovative performance this due to the lack of awareness of manager the important of IC to produce a innovative product.*

**Key words:** intellectual capital, intangible resource ,knowledge economy , human capital, structural capital , social capital innovative performance ,Algerian services companies, empirical study.

**JEL code : M19**

capabilities ,shortening of product life cycle ,ect.(Volverda ,1996;Wiig,2000)<sup>(6)</sup>

The rise of the ‘innovative era’ made knowledge the most valuable economic resource (Drucker, 1993; Stewart, 1997; Sveiby, 1997; Bontis, 1999).

Today’s managers are more and more aware of the fact that a company’s advantage mainly depends on what does a company know ,how will that knowledge be used, and how quickly can a company learn something new.

Only knowledge provides the opportunity to improve the wealth of nations, the growth of

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<sup>6</sup> Patricia Ordonez de pablos ,**Evidence of intellectual capital measurement from Asia ,Europe and middle East**, journal of intellectual capital ,Vol 3,N 3,2002.p 287

organizations and the value of individuals (Bounfour and Edvinsson, 2005; O'Donnell et al., 2006)

Among the changes that have swept through the strategic management field during the last decades, knowledge management and intellectual capital measuring and reporting have probably made the most outstanding impact.

Intellectual capital is a relatively new term and is part of the knowledge Management (KM) trend that has impacted on the business during the last two decades. Evidence of this trend includes the vast number of newly published IC & KM related books, journals and electronic media, new advisory and consulting services.

Intellectual capital that provides structure, system, strategy and culture is an antecedent of innovation.

The aim of this study is to examine the relation between the innovative performance and intellectual capital.

## 1. Literature Review :

### 1.1. Intellectual capital :

As many authors point out, a major proportion of growth companies are valued beyond book value. The market value of a firm consists of its financial capital and something else. The first term is the firm's book value and is formed by organizational financial and physical assets. The something else term represents the firm's intellectual capital, defined as resource created from internal learning and development of valuable relationships.

There are many definitions of the intellectual capital. They are summarized as follows: Stewart (1997) defines intellectual capital as intellectual material-knowledge, information, intellectual property and experience that can be put to use to create wealth.<sup>(7)</sup>

Roos et al. (1997) Intellectual capital includes all the processes and the assets which are not normally shown on the balance sheet and all the intangible assets (trademarks, patents and brands) which modern accounting methods consider ... it includes the sum of the knowledge of its members and the practical translation of his/her knowledge. Bontis (1998) defines IC as the pursuit of effective use of knowledge (the finished product) as opposed to information (the raw

material). Olve et al. (1999) regarded IC as an element of the company's market value as well as a market premium. Brooking (1996) defines IC as the term given to the combined intangible assets of – market, intellectual property, human-centred and infrastructure – which enable the company to function<sup>(8)</sup>. Union Fenosa (1999), a top Spanish firm, defines intellectual capital as the set of intangible values that promote the organizational capability for generating profits now and in the future.<sup>(9)</sup>

### *Component of intellectual capital :*

There are different views about determining the component of intellectual capital in the article concerned. Edvinsson (1997) explains that intellectual capital consists of human, structural and customer capitals. However, Bontis (1999) investigates it as three different components: such as human, structural, and relational capitals. Edvinsson (1997)'s categorization of capital is seen in Figure 1.

Generally intellectual capital consists of three types of capital; human capital, structural capital and relational capital. Intellectual capital can be located in its people, its structures and its relation with its stakeholders.

#### ▪ *Human capital :*

Human capital refers to the value of knowledge, skills and experience held by individual employees in a firm. (Edvinsson & Malone, 1997).<sup>(10)</sup>

It is the intangibles that rest within the minds of individuals, such as knowledge, competencies, know how, etc.

Bontis (1999) argues that human capital is important because it is a source of innovation and strategic renewal, whether it is from brainstorming in a research lab, daydreaming at the office, throwing out old files, reengineering new processes, improving personal skills

<sup>8</sup> Bontis, N., William Chua Chong & Stanley Richardson, **Intellectual Capital and Business Performance In Malaysian Industries**, Bontis, N., William Chua Chong & Stanley Richardson, Journal of Intellectual Capital, 2000.

<sup>9</sup> Patricia Ordonez de pablos, **Evidence of intellectual capital measurement from Asia, Europe and middle East**, journal of intellectual capital, Vol 3, N 3, 2002, p 288

<sup>10</sup> Ngah, R. & Abdul Razak, I., **The relationship of Intellectual Capital, Innovation and Organizational Performance : a Preliminary Study in Malaysian SMEs**; International Journal of Management Innovation Systems, Vol 1, N 1, 2009, p 3

<sup>7</sup> Bontis, N., **Assessing knowledge assets: a review of the models used to measure intellectual capital**; International Journal of Management Reviews, Vol 3, Issue 1, 2001, p 42

or developing new leads in a sales rep's little black book.

The essence of human capital is the sheer intelligence of the organisational member.

▪ **Structural Capital:**

Structural capital includes all the non-human storehouses of knowledge in organisations which include the databases, organisational charts, process manuals, strategies, routines and anything whose value to the company is higher than its material value.

Roos et al. (1998) describe structural capital as "what remains in the company when employees go home for the night".

Structural capital arises from processes and organizational value, reflecting the external and internal foci of the company, plus renewal and development value for the future.

According to Bontis (1998), if an organisation has poor systems and procedures by which to track its actions, the overall intellectual capital will not reach its fullest potential. Organisations with strong structural capital will have a supportive culture that allows individual to try new things, to learn, and to fail. Structural capital is the critical link that allows IC to be measured at the organisational level of analysis.

This component of intellectual capital is the infrastructure firms develop to commercialize their intellectual capital (Edvinsson and Sullivan, 1996). It provides a platform for people to be creative (Stewart, 2000).

While firms do not own human capital that which remains in the organization after employees go home at the end of the working such as the organization's process, information systems, databases ect (Cohen and Kaimenakis 2007), structural capital belongs to the organization as a whole. It can be reproduced and shared. A good structural capital will provide a good environment for rapid knowledge sharing, collective knowledge growth, shortened lead times and more productive people (Stewart, 2000)

▪ **Customer or relational capital :**

The relationships the organization has established with resource providers, customers and other key stakeholders, relational capital represents the potential an organization has due to ex-firm intangibles. These intangibles include the knowledge embedded in

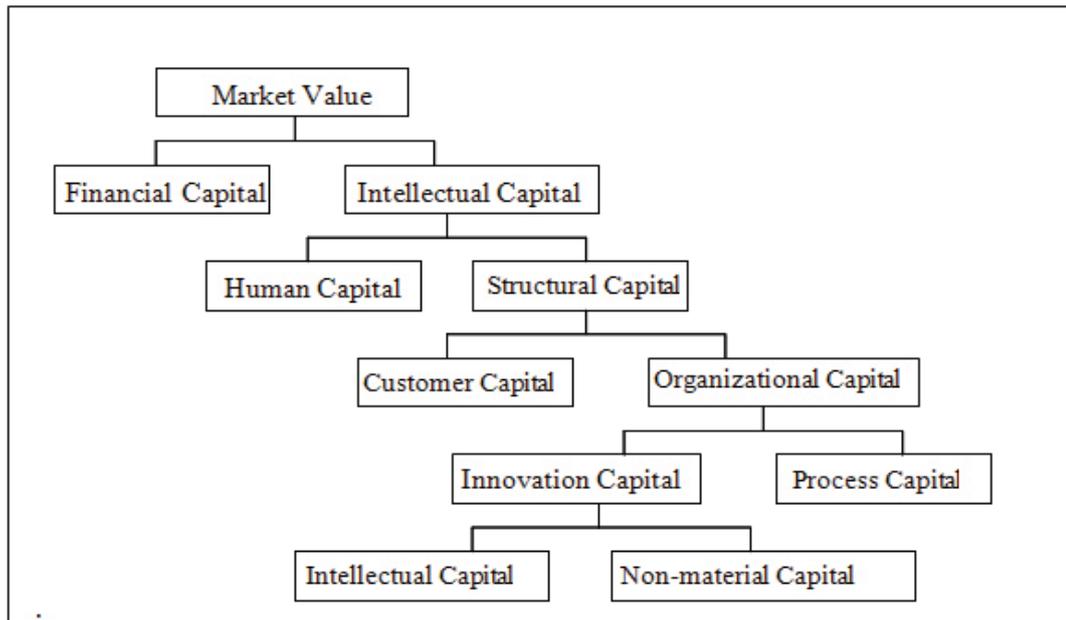
customers, suppliers, the government or related industry associations (Bontis, 1998).<sup>(11)</sup>

It is the ensemble of intangible values matured in the relations of the firm with its external environment (clients, distributors, suppliers, investors).

▪ It also can be contain **Social capital** that defines as the network of relationships that individuals have throughout the organization; such relationships are critical in sharing and leveraging knowledge and in acquiring resources. Social capital also can extend beyond the organizational boundaries to include relationships between the firm and its suppliers, customers, and alliance partners<sup>12</sup>.

<sup>11</sup> Bonitis.N, **Intellectual capital : an exploratory study that develops measures and models**, Management decision, 1998 vol 2 n 36.p67

<sup>12</sup> Lumpkin Eisner.D, **Strategic Management :Text and Cases**, McGRAW-Hill International Edition, 2008, p 118



**Figure 1. Edvinsson's Categorization of Capital<sup>13</sup>**

### ***1.2. Innovation Performance:***

Over the last two decades the relationship between innovation and geography has become an important theme for research into economic growth. While the links between innovation and growth have long been discussed (Nelson and Winter, 1982), more recently the work of Porter (1990), Scott (1988), Acs(2002) has focused attention on the ways in which localized knowledge and technology spillovers may promote innovation. In particular, it is argued that face-to-face contact between local firms and organizations promotes knowledge exchanges, which in turn are assumed to facilitate innovation (Storper and Venables, 2004). However, knowledge can also be transferred by the movement of human capital embodied in labor mobility. Yet, the type of knowledge transfers associated with labor mobility are largely absent from the innovation literature within urban economics. Little is therefore known about the importance for innovation of human capital mobility. <sup>(14)</sup>

Innovation also is the process of creating a commercial product from an invention (Hitt et al,2005). Innovation can deliver four types of benefits besides cash: knowledge, brand, ecosystem and culture. But the most important reason for innovation in an organization is to make profit. A firm makes profit by offering products or services at a lower cost than its competitors or by offering differentiated products at premium prices that more than compensate for the extra cost of differentiation (Afuah,2003), as shown in the figure below

<sup>13</sup> Resource: Leif Edvinsson and M. S. Malone, “**Intellectual Capital: Realizing Your Company’s True Value** by Finding Its Hidden Brainpower”, Harper Business, New York, 1997.

<sup>14</sup> Zerenler.M , Burak Hasiloglu.S & Sezgin.M, **Intellectual Capital and Innovation Performance: Empirical Evidence in the Turkish Automotive Supplier**, Journal of Technology Management & Innovation; 2008, Volume 3, Issue 4.p33

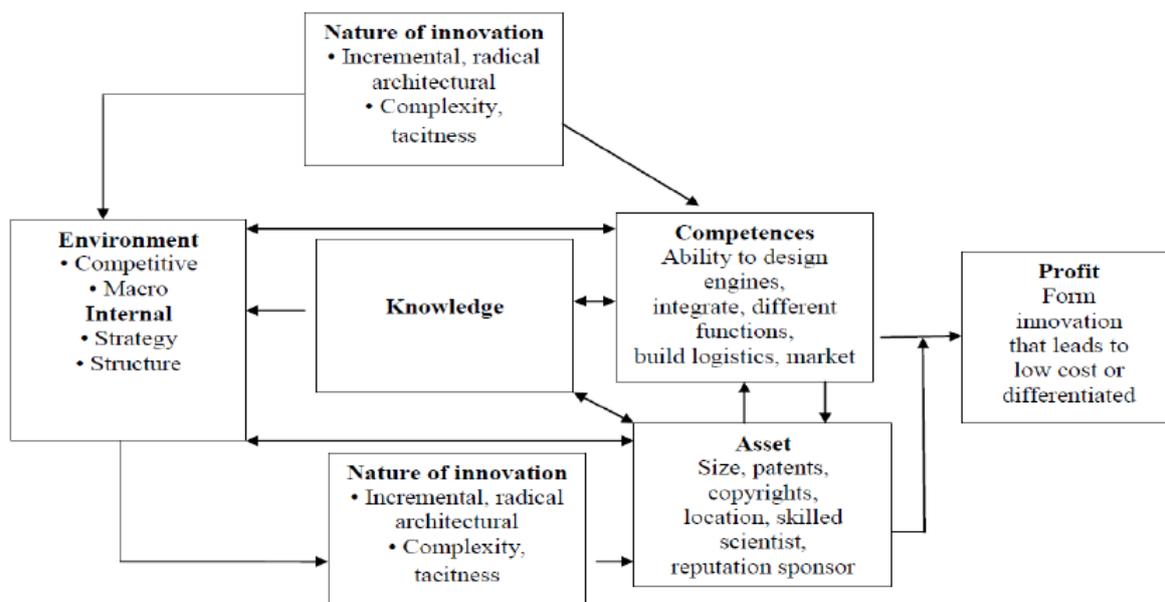


Figure 2: The innovation model (Afuah, 2003)

Source : Ngah.R& Abdul Razak.I, **The relationship of Intellectual Capital,Innovation and Organizational Performance : a Preliminary Study in Malaysian SMEs** ;International Journal of Management Innovation Systems. Vol 1,N 1 ,2009,p 6

Internally, firms should be supported by their strategy, structure, system and people (Afuah,2003). Competences and assets are the function of technological and market knowledge as innovation is the use of new technological and market knowledge to offer a new product or service that customers will want (Afuah, 2003). Motwani et al. (1999) found that the structure of an organization is important to innovation as it supports innovation , for both the product and process of innovation. Product innovation occurs when a new or improved product is introduced to the market while process innovation is an adoption of new ways of making products or services (Maravekalis et al., 2006).<sup>(15)</sup>

### 1.1. Intellectual Capital & Innovation Performance Integration:

The distinctive competence of a company can generate better managerial effectiveness, operation efficiency, and innovation than its competitors, and can

further provide more value and benefit for its customers . On the other hand, the more intellectual capital of a company is, the more distinctive is the unique competence of the company, the better (Edvinsson and Malone, 1997). Moreover, the more the unique competence of the company is, the better innovation performance can be achieved .The distinctive competence of the company can be regarded as the result of intellectual capital within the firm. Hence, when a company has more intellectual capital, it would create better innovation performance. In other words, when a company has more intellectual capital, it would have more innovative competence to further increase its new product development performance. Namely, there is obviously positive correlation between the existing intellectual capital within the organization and its innovation performance.

## 2. Empirical study

### 2.1. Objective and methodology :

The model of this study is translate from the study of J. Choudhury (2010) that examine the interrelation between the intellectual capital and organizational performance.

<sup>15</sup>: Ngah.R& Abdul Razak.I, **The relationship of Intellectual Capital,Innovation and Organizational Performance : a Preliminary Study in Malaysian SMEs** ;International Journal of Management Innovation Systems. Vol 1,N 1,2009,p 6

Intellectual capital in this study was defined as the total stocks of all kinds of intangible assets, knowledge, capabilities, and relationships, etc, at employee level and organization level, within a company.

We referred to literatures of the past and classified intellectual capital into human capital, social capital, and structural capital.

“Human capital” in this study was defined as the summation of employees’ knowledge, skills, capabilities, experience, attitude, wisdom, creativities, and commitment, etc and was embedded in employees, not organizations. A company can increase its innovation performance through its human capital.

Social capital refers to those stocks of social trust, norms and networks that people can draw upon to solve common problems

In this research, “structural capital” was defined as the stocks of organizational capabilities, organizational commitment, knowledge management systems, reward systems, information technology systems, databases, managerial institution, operation processes,

managerial philosophies, organizational culture, company images, patents, copyrights, and trademarks, etc, within a company; it is embedded in organizations, and thereby cannot be taken away by employees.

The purpose of this study was to investigate the relationship of intellectual capital in the Algerian companies upon their innovation performance.

The hypotheses are described as follows :

**H<sub>1</sub>**: Intellectual capital is positively associated with innovation performance in Algerian companies .

**H<sub>2</sub>** :Human capital is positively associated with innovation performance in Algerian companies.

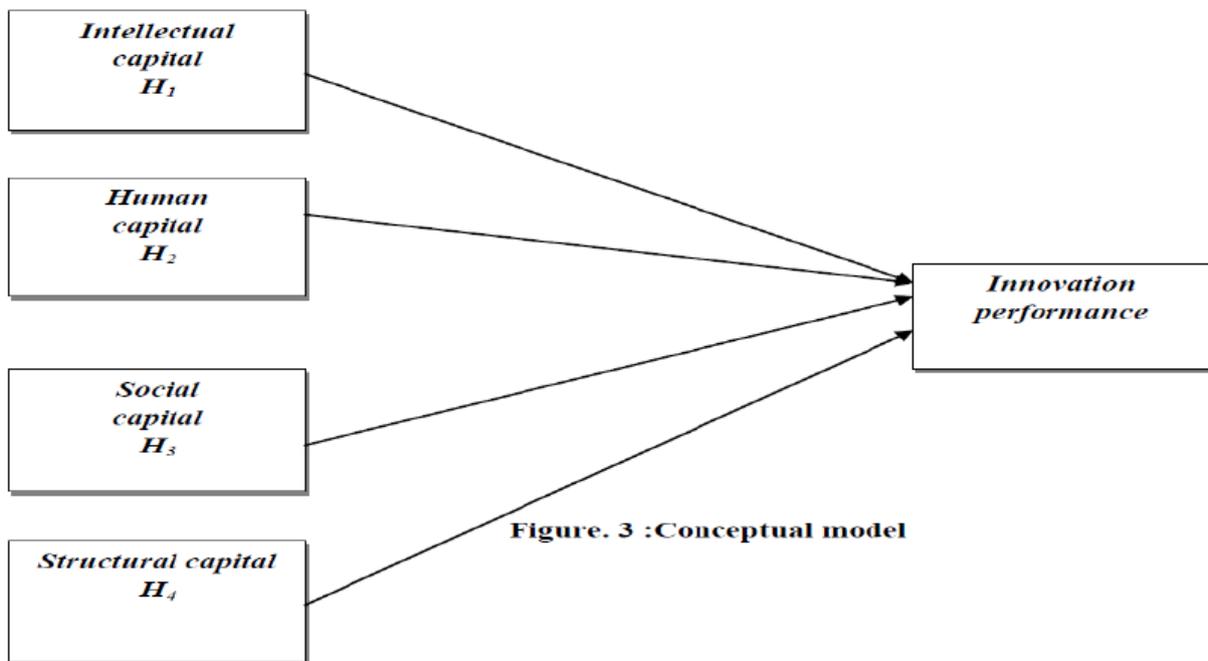
**H<sub>3</sub>**:Social capital is positively associated with innovation performance in Algerian companies.

**H<sub>4</sub>**: Structural capital is positively associated with innovation performance in Algerian companies.

## 2.2. Data Collection and Samples:

This study tested hypotheses with a questionnaire survey that was conducted in Algerian companies .

The data for this study was collected throughout a field survey.



**Figure. 3 :Conceptual model**

## Results:

In order to test for the normal distribution of response data, Cronbach’s alpha was used to test the reliability of the measures. The Cronbach’s alpha

results for the actual study ranged between 0.10 and 0.44 which is some what acceptable ; as shown in the table -1

**Table -1:** The test of the reliability

<i>Items</i>	<i>Cronbach's alpha</i>
<i>Human capital</i>	0.4483
<i>Social capital</i>	0.1064
<i>Structural capital</i>	0.1116
<i>Innovation performance</i>	0.1889

Pearson's bi-variate correlation coefficient was used to test the relationship between independent and dependent variables. The result showed that the intellectual capital variables and sub-variables had a weak and significant relationship with innovation performance. An ANOVA test was then used to analyze respondents' characteristics related to gender, age, education, role and experience.

The data for the study were collected from 37 respondents from various different services companies .

As per the table-2 demographic profiles of the respondents where male participants in the study was 24 where female participants consisted 13 of the total population. The almost of the respondent have the licence diploma ,it consists73%. Age wise distribution depicts 31-40 age group dominates in the study consisting of more than 40% of the total sample. The respondents having more than 5 years of experience at current organization is very well present in the study consisting of 53.8% of the total sample.

**Table2 :** Respondents profile

<i>Parameter</i>	<i>Group</i>	<i>#</i>	<i>%</i>
<i>Sex</i>	Male	24	64.9
	Female	13	35.1
<i>Age</i>	20-30	11	29.7
	31-40	18	48.6
	41-50	4	10.8
	> 50	4	10.8
<i>Study level</i>	Secondary	10	27
	License	27	73
<i>Role</i>	General manager	1	2.7
	Account	10	27
	Branch manager	12	32.4
	Others	14	37.8
<i>Experience</i>	> 5years	16	43.2
	<5 years	21	56.8
<i>Total</i>		37	100

Table 3 depicts the mean scores of each variable and its corresponding construct. Generally speaking, all items scored in the affirmative (1 strongly disagree, 5 strongly agree, with 3 the mid-point) with mean

values greater than 3.0. The only item below the mid-point was the use of **question 6** and **question7** at 2.78 and 2.94.

**Table- 3 :** Statistical results of summary variables

	<b>Mean</b>	<b>Std .d</b>	<b>t-value</b>
<b>Intellectual capital</b>	<b>3.53</b>	<b>0.77</b>	<b>29.287</b>
<b>Human capital</b>	<b>3.32</b>	<b>0.85</b>	<b>23.324</b>
<i>1-Our employees are highly skilled and talented</i>	3.21	0.67	29.100
<i>2-Our employees are widely considered one of the best in our industry</i>	3.02	0.89	20.524
<i>3-Our employees are very creative and innovative</i>	3.72	0.73	30.987
<i>4-Our employees have enough knowledge and skill to finish their own job Employees generally use new idea and knowledge to develop a solution</i>	3.51	0.86	24.568
<i>5-Our employees are skilled at collaborating with each other to diagnose and solve problem and issues</i>	3.16	1.14	16.829
<b>Social capital</b>	<b>3.42</b>	<b>0.84</b>	<b>27.219</b>
<i>6-Our employees are skilled at collaborating with each other to diagnose and solve problem and issues</i>	2.78	1.25	13.544
<i>7-Our employees share information with other and learn from other within their own team and department</i>	2.94	0.99	17.940
<i>8-Our employees interact and exchange ideas with cross functional department and division</i>	3.91	0.64	37.233
<i>9-Our employees partner with customers, vendors and other alliance partners to develop solutions</i>	4.05	0.70	34.979
<i>10-Our employees apply knowledge from one area of the organisation to problem and opportunities that arises in another part of the organisation</i>	3.45	0.64	32.390
<b>Structural capital</b>	<b>3.87</b>	<b>0.63</b>	<b>37.324</b>
<i>11-Our organisation uses white paper, case studies, patents as a way to store knowledge</i>	3.45	0.60	34.760
<i>12-Much of our organisation's knowledge is contained in manuals, and databases</i>	4.13	0.63	39.875
<i>13-Our organisation has an enterprise information portal having easy access to various information source</i>	3.64	0.78	28.110
<i>14-Our organisation's culture (stories, rituals) contains variable ideas and ways of doing certain businesses</i>	3.91	0.54	43.609
<i>15-Our organisation embeds much of its knowledge and information in structures, systems and processes</i>	4.24	0.64	40.240
<b>Innovation performance</b>	<b>3.50</b>	<b>0.63</b>	<b>33.360</b>
<i>16-Usage of reusable components increases the productivity drastically</i>	3.02	0.55	33.351
<i>17-Reusable components increase the product stability and reduce defect injection rates</i>	3.13	0.48	39.658
<i>18-We use white papers, case studies, project artefacts in our solutions</i>	4.13	0.71	35.250
<i>19-Our solution design is very robust</i>	3.72	0.80	28.202

As defined in table-4, the regression equation of the innovation performance with human capital, social capital and structural capital.

The regression equation of innovative performance component with human capital, social capital and structural capital clearly depict the model is poorly fit with R less than 0.5. Social capital is weak in explaining the relationship with R value 0.114.

The effect of human capital, social capital and structural capital on innovative performance are not significant with R value 0.150, 0.114 and 0.123 in this arrangement and intellectual capital as a whole has a little influence on innovative performance with R value 0.086.

**Table 4 : Innovation performance Vs intellectual capital**

<i>performance</i>	<i>Intellectual capital</i>	<i>Multiple R</i>	<i>R<sup>2</sup></i>	<i>Adjusted R<sup>2</sup></i>	<i>Std .Error</i>
<b><i>Innovation</i></b>	<i>Human capital</i>	0.150	0.023	-0.005	1.40780
	<i>Social capital</i>	0.114	0.013	-0.015	1.41479
	<i>Structural capital</i>	0.123	0.015	-0.013	1.41326
	<i>Intellectual capital</i>	0.086	0.007	-0.021	1.41879

The results related to path analysis showed that the three sub-constructs of intellectual capital together have a positive and weak relationship with innovation performance .The relationship between the dependent variable of innovation performance and sub-constructs of intellectual capital derived by this model can be expressed with the following equation:

$$\text{Innovation performance} = 0.587 + 0.150\text{Human capital} + 0.179\text{ social capital} + 0.203\text{ structural capital}$$

Table 5 represents a correlation matrix across all variables with only the component of intellectual capital and intellectual capital values being statistically significant (  $p < 0.01$  )

**Table 5 :Correlation matrix**

<i>Variable</i>	<i>Human capital</i>	<i>Social capital</i>	<i>Structural capital</i>	<i>Intellectual capital</i>
<b><i>Human capital</i></b>				
<i>Social capital</i>	-0,109			
<i>Structural capital</i>	0,286	0,076		
<i>Intellectual capital</i>	0.709**	0.509**	0.633**	
<i>Innovation performance</i>	-0,150	0.114	-0.123	-0.086**

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

All the results are summarized as follow:

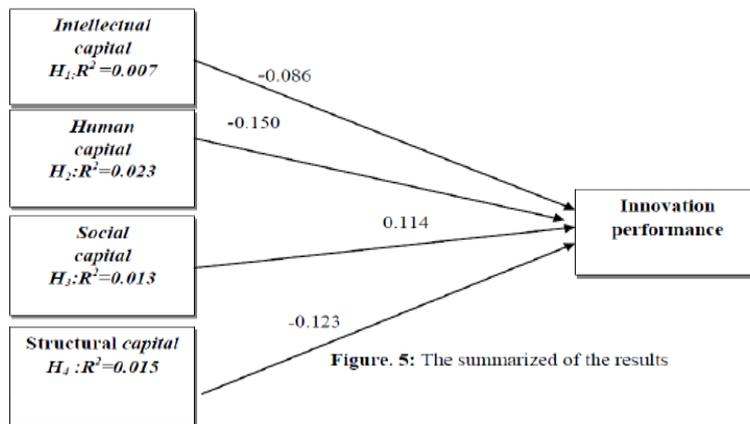


Figure. 5: The summarized of the results

### 1.3. Discussion

The present study found that each of the three types of intellectual capital to be associated with increased innovation performance . Human capital, social capital and structural capital exhibited weak relationship with innovative performance .

Human capital exhibited strong relationship with performance lending support to the widespread anecdotal evidence suggesting that talented people are critical ingredient in developing and delivering superior products and services that generate high consumer demand. Scholars and practitioners have argued for quite some time that many of the fastest growing companies over the past several decades ( Southwest Airlines, Tyson Foods, Wal-Mart) achieved their phenomenal growth and competitive advantage through their talented people. Hence the elements of human capital management are central to the successful implementation of most other management initiatives and achieving the firm's strategic goal. Social capital is regarded as the strongest predictor of performance. Such a strong linkage between social capital supports that knowledge tied up relationship among employees, customers, suppliers, alliance partners, and the like tends to lead to process and product innovations, better problem solving which tends to increase production and service delivery efficiencies as well as customer satisfaction. Social capital also enable organisations to utilise their knowledge base by leveraging it across the entire organisation and thereby reduce redundancies, effort duplication and ultimately organisational costs but the study found social capital is poorly related with all the components of intellectual capital. So collaborative management and consensual decision making is in preaching only. It is yet to be recognised and practiced ( J. Choudhury ,2010).

The relationship between structural capital and performance become statistically significant in the study with weakness relationship .

Since individuals form the basis of organisational level of learning and knowledge accumulation (Structural Capital) and institutionalisation of knowledge and knowledge sharing is lowly encouraged in Algerian industries , there is weak co-relation between structural capitals with its bottom line

This results refer the necessary to increase the awareness of the manager, the important of the component of the intellectual capital in result to increase the innovative performance . The results are in line with J. Choudhury (2010).

### Conclusion :

In this paper, we have examined the question of whether the form of intellectual capital within firms influence innovative performance.

We have offered findings based on a sample of Algerians firms.

Findings suggest that there is a weak influence of intellectual capital on the innovative performance .

Intellectual capital is considered as the number one business driver in the organisation since the currency of the knowledge economy is intellectual capital. So there is a growing need for reporting on intangibles by intellectual capital reports, which complement traditional financial statements.

The Algerian industries must understand the relationship between intellectual capital and innovation .they must understand their own capabilities especially their internal strengths. Their people ,their practices and there external support are important in assisting Algerians industries to be innovative in order of them

to be competitive .Most innovation is related to products and services.

It is important for the Algerian government to harvest the full potential of its people by investing in appropriate technological infrastructure so that human capital can be converted (or processed) into increased wealth and a higher standard of living. This can be achieved for organizations regardless of size .

Social capital is the capacity of a nation to create and develop entrepreneurs, inventors, innovators and leaders. Social capital improves the capabilities of individuals and organizations for future benefits. It emphasizes high co-operation among society members, government, academic institutions, and organizations.

The concept of intellectual capital is a newly emerging concept, and until now, it is not fully understood by most organizations in Jordan or the Arab world. This study represents a necessary to elevating this concept within the Algerian business community.

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