

The survey of relationship between Intellectual capital(IC) and Organizational performance (OP) within the National Iranian South Oil Company

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Abstract

The world is fast changing from industrial to knowledge economy. One of the important and essential elements in this economy is intellectual capital (IC). The purpose of this study is to test the relationship between IC (i.e. human capital, structural capital, relational capital) and organizational performance (OP) within the National Iranian South Oil Company (Staff sector - Ahvaz). This research is description – correlation and its purpose is Implication. The data collecting instrument is questionnaire (Cronbach α of IC, OP =.92, .85, Split-Half M of IC, OP =.80, .80). The hypothesis testing was conducted using SPSS18 (Pearson correlation coefficient, one factor ANOVA, t-test) and model development was Conducted using AG⁸ on 236 respondents from a sample of 249 from a statistical society of 3800 members. Statistical support are founded for the hypothesized relationships and results confirm a positive relationship between intellectual capital and organizational performance ($r = .595$, $p = .000$) and also dimensions of IC impact on each other and on organization performance within the company. It shows a confirmation of previous studies but the difference in psychometric item evaluation given the unique geographical and sect oral context. Some recommendations are then made for researchers.

Keyword: Intellectual capital, human capital, structural capital, relational capital, organizational performance; Structural Equation Modeling, AG

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1. Introduction

The world is moving quickly from a production-based economy to a knowledge-based economy (Hung et al , 2010) and knowledge storage and application are the basis of economic growth and accumulated capital (Hsu & Fang , 2010) . Intangible assets to be key factors for company success and important levers for value creation (Marco Montemari,

2010). One of the essential blocks of this assets Intellectual capital is becoming a crucial factor for a firm's long-term profit and performance that identify their core competence as invisible assets rather than visible assets (Hsu & Fang , 2010) . Traditionally, those resources were physical, such as land and machines, or financial capital. More recently the concept of intellectual capital has been identified as a key resource and driver of organizational performance and value creation (marr,needly, Schiuma,2004) . A profound change has occurred in the way corporate value is generated over the past decade (Young, Tsai & Lee, 2007).

The purpose of this paper is to investigate the relationship between intellectual capital (IC) and organizational performance (OP) in the oil industry. After a brief literature review on IC, this paper explores the categories of IC; and examines the categories of IC and its flows and impacts on organizational performance in the National Iranian South Oil Company. It answers managerial questions such as: how efficiently does the Oil industry convert the different categories of IC into organizational performance?; which of these IC categories has a stronger and more direct impact on a organizational performance results?; and which flows within the IC categories should be developed more in order to increase a oil industry organizational value and consequently boost organizational performance?

2. Literature review

2.1. Intellectual capital

Intellectual capital issues have undergone extraordinary development since the beginning of the 1990s (Viedma Marti, 2007). So far, there doesn't exist a thoroughly accepted definition for intellectual capital. (Yi-cheng&Chuan-ru, 2009). The concept of IC will be used in reference to the resource-based view of the firm, as a resource that distinguishes one organization from another (Bornemann & Alwert, 2007). Stewart (1997) defines intellectual capital as the intellectual material that has been formalized, captured, and leveraged to create wealth by producing a higher-valued asset (Bontis et al., 2010). Lu et al. Defines IC as anything an enterprise can use to increase its competitive advantage in the market place, including knowledge, information, intellectual property rights and experience (Lu , Wang& Tung,2010). Following the work of Edvinsson and Malone (1997), Sveiby (1997), Roos et al.(1997), Bontis (1999), Agendal and Nilsson (2006), Sa'llebrant et al. (2007), Cabrita and Bontis (2008) among others, intellectual capital is defined as encompassing:

1. . human capital;
2. . structural capital; and
3. . Relational capital.

2.2. Human capital

Human capital is considered the primary element of intellectual capital and the most important source of sustainable competitive advantage (Nonaka and Takeuchi, 1995; Edvinsson and Malone 1997 ;Ashour and bontis 2004).human capital refers to human capital the source of innovation and strategic renewal (Cabrita & Bontis,2008) and the major source of economic growth (Schultz,1961). Increased training of employees may lead to higher productivity and enhanced creativity (Bontis, 2002). Human capital must be combined with relational and structural elements in the organization, to create value (Cabrita & Bontis, 2008). Our discussion on human capital includes competence, intellectual agility, innovation and creativity, skills, values and experiences and individual's education.

2.3. Structural capital

Structural capital in organizational perspective stands for various non – human sources of knowledge, for example, data bases, organizational charts, operating processes and information systems, strategies, organizational culture, so in other words, the content of such issues is much higher than its material value (Dubra, 2010). Unlike human capital, structural capital is an intangible asset that can be traded, reproduced and shared within the firm (Zambon, 2002). In fact, certain structural capital elements can be legally protected in the form of patents and trademarks as a result of investment in research and development.

2.4. Relational capital

The dimension of relational capital is based on the idea that firms are considered not to be isolated systems but as systems that are, to a great extent, dependent on their relations with their environment. Thus, this type of capital includes the value generated by relationships not only with customers, suppliers or shareholders, but with all stakeholders, both internal and external (Hormiga & Batista-Canino, 2010). The relationships of this type that contribute value to the firm are considered to be relational capital the knowledge embedded in the relationships established with the outside environment and inter organization (Bontis, 1997, Edvinsson, and Sullivan, 1996). Our discussion on relationships distinguishes between social relationships (between individual, which can be professional or non-professional) and inter organizational relationships.

3. Research design

Adopting Bontis's (1999) perspective on higher-order organizing principles, a proposed conceptualization of intellectual capital is put forth (see Figure 1). Intellectual capital is a second order multi-dimensional construct. Its three sub-domains include:

- 1) HUMAN CAPITAL – the tacit knowledge embedded in the minds of the employees;
- 2) STRUCTURAL CAPITAL – the organizational routines of the business, and
- 3) RELATIONAL CAPITAL – the knowledge embedded in the relationships established with the outside environment (Bontis, 1996 and Edvinsson, and Sullivan, 1996) and inter organization (Agndal & Nilsson, 2006).

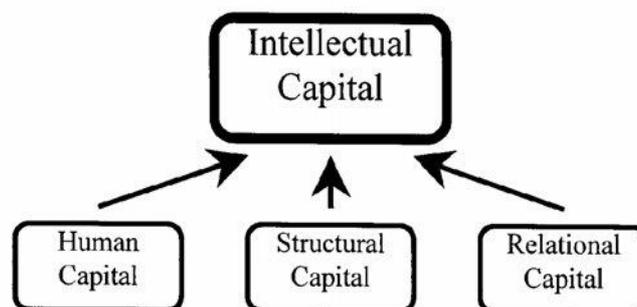


Figure 1 Discriminating intellectual capital sub-domains

Human capital presents the individual tacit knowledge embedded in the mind of the employees. First, the organization's members possess individual tacit knowledge (i.e., unarticulable skills necessary to perform their functions) (Nelsson & Winter, 1982). In order to illustrate the degree to which tacit knowledge characterizes the human capital of an organization, it is useful to conceive of the organization as a productive process that receives tangible and informational inputs from the environment, produces tangible and informational outputs that enter the environment, and is characterized internally by a series of flows among a network of nodes and ties or links (Bontis, 1999). A node represents the work performed – either pure decision-making, innovative creativity, improvisation or

some combination of the three – by a single member of the organization or by parallel, functionally equivalent members who do not interact with one another as part of the

productive process (see Figure 2). Thus, individual tacit knowledge, when present, exists at the nodes themselves. A tie or link is directional in nature and represents a flow of intermediate product or information from a given node. Every node has at least one tie or link originating from it, while multiple ties originating from a single node imply that the task performed at the node includes a decision about where to direct the subsequent flow. Structural tacit knowledge, when present, implies that no member of the organization has an explicit overview of these ties and consequently of the corresponding arrangement of nodes (see subsequent discussion on STRUCTURAL CAPITAL). Accordingly a productive process characterized by a substantial degree of tacit knowledge is arranged as a hodgepodge of nodes lacking any discernible organizational logic. In certain circumstances sustained competitive advantage can accrue from ‘a pool of human capital’ which is larger than those groups, such as senior managers and other elites, who are traditionally identified as determining organizational success or failure. This is achieved through the human capital adding value, being unique or rare, imperfectly imitable and not substitutable with another resource by competing firms (Wright et al., 1994).

The organization itself embodies structural tacit knowledge. This construct deals with the mechanisms and structures of the organization that can help support employees in their quest for optimum intellectual performance and therefore overall organizational performance. An individual can have a high level of intellect, but if the organization has poor systems and procedures by which to track his or her actions, the overall intellectual capital will not reach its fullest potential. An organization with strong structural capital will have a supportive culture that allows individuals to try things, to fail, to learn, and to try again. If the culture unduly penalizes failure, its success will be minimal. Structuring intellectual assets with information systems can turn individual know-how into group property. It is the concept of structural capital that allows intellectual capital to be measured and developed in an organization. In effect, without structural capital, intellectual capital would just be human capital. It also supports elements of cost minimization and profit maximization per employee. Structural capital is the critical link that allows intellectual capital to be measured at an organizational level. Point B in Figure 2 illustrates the structural ties or links of human capital nodes that are required to transform human capital into structural capital. The arrows within structural capital represent the focus of intellectual capital development from the nodes into the organization’s core. The essence of structural capital is the knowledge embedded within the routines of an organization. Its scope lies internal to the firm but external to the human capital nodes. It can be measured (although it is difficult) as a function of efficiency (i.e., an output function per some temporal unit) Organizational processes (such as those found in structural capital) can eventually be codified. Infrastructure assets are those technologies, methodologies and processes that enable the organization to function (Bontis, 1998).

Relational capital, an essential part of IC, represents the value of a company’s ongoing relationships with the people or organizations (Bontis, 1998), clientele relationships, as well as a sound understanding of governmental or industry association impacts, is the main theme of relational capital (Stewart, 1997). Companies often have difficulty in retaining employees because they have not put enough time and energy in ensuring that the mission and values are truly shared (Senge, 1990) Relational capital represents the potential an organization has due to ex firm intangibles and an enterprise develops by conducting business (ramazan,2010). What firms do better than markets is the sharing and transfer of

knowledge embedded in the organizing principles of an organization. They have suggested that a firm's innovative capabilities "rest in the organizing principles by which relationships among individuals, within and between groups, and among organizations are structured" (Kogut and Zander, 1992). Point C in Figure 2 illustrates that relational capital is the most difficult of the three sub-domains to develop since it is the most external to the organization's core. The arrows represent the knowledge that must flow from external to the organization (i.e., its environment) into the organization's core by way of linked nodes. The essence of relational capital is knowledge embedded in relationships external to the firm. Its scope lies external to the firm and external to the human capital nodes. It can be measured (although it is difficult) as a function of longevity (i.e., relational capital becomes more valuable as time goes on). Due to its external nature, knowledge embedded in relational capital is the most difficult to codify (Bontis, 1998).

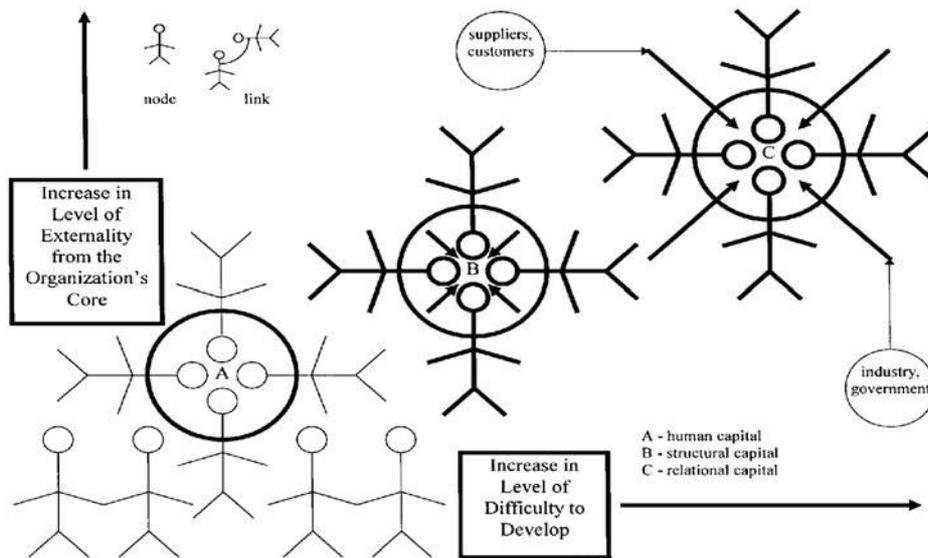


Figure 2: Discriminating intellectual capital sub-domains (Bontis, 1998)

4. Data collection: context and sample

This paper uses a sample of 249 of 3800 managers, experts and supervisors of the National Iranian South Oil Company. Of the 249 managers, experts and supervisors who received the questionnaire, 236 took part in the study. So this response rate is 94.8%.

We inspected the reliability of measures using Cronbach's alpha. The reliabilities for each of the four constructs were greater than 0.82, exceeding the minimum threshold level of 0.7, considered good for research (Nunnally, 1978).

In order to increase the content validity of the research instrument, the questionnaire was "pilot examined". For this purpose, 20 personal interviews were conducted with managers and experts who agreed not only to fill in the questionnaire, but also to comment on the scales employed. Then, their suggestions were collected and some reformations were made to improve validity of questionnaire (see Table 1). Table 1 presents the descriptive statistics for our data set.

5. Data analysis

The relationships between intellectual capital (human capital, structural capital and relational capital) and organizational performance and also inspecting the reliability of measure was performed with using SPSS18 (see Table 1). For considering the links between the constructs in the model (i.e. path coefficients), we use AG (Amos graphic18). Statistical support are founded for the hypothesized relationships and results confirm a

positive relationship between intellectual capital and organizational performance ($r = 0.595$, $p = 0.000$). The Pearson correlation coefficient for each of the three constructs proved to be significant at p -values <0.001 level (p -values >0.01). (see Table 2)

Table 1 Pearson correlation coefficient, Cronbach's alpha and the explanatory power (R^2) results ³⁷³

	Number of Item	Mean	Cronbach's alpha	Correlation of constructs				R^2
				HC	SC	RC	OP	
Human capital	15	3.75	0/82	1				
Structural capital	14	3.03	0/89	0.693	1			0.48
Relational capital	12	3.43	0/80	0.507	0.690	1		0.47
Organizational Performance	8	3.22	0/85	0.394	0.584	0.567	1	0.39

Table 2 Pearson correlation coefficient results

Dependent Variable	Independent Variable	Pearson correlation coefficient	Sig.	Result
Human capital	Organizational Performance	0.394**	0.000	Confirmed
Structural capital		0.584**	0.000	Confirmed
Relational capital		0.567**	0.000	Confirmed

** . Correlation is significant at the 0.01 level

6. Amos overview

The hypotheses were tested using Amos graphic18 (AG). AG is a structural equation modeling technique sometimes described as an example of 'second generation multivariate analyses. Structural equation modeling techniques allow researchers to model and examine a series of relationships simultaneously, which has advantages over first-generation techniques where relationships are examined one at a time (Bontis, 2008). For this reason, AG is considered a powerful tool in social and behavioral sciences where theories are formulated in terms of hypothetical constructs. AG considers the links between the constructs in the model (i.e. path coefficients) simultaneously (i.e. allowing analysis of direct, indirect and spurious relationships).

7. Research models

To assess the statistical significance of the path coefficients (i.e. standardized betas), a path analysis was performed that the four paths proved to be significant at p -values <0.001 level and two path (HC \rightarrow RC & HC \rightarrow OP) aren't significant (p -values >0.05). As a result, we must omit them.

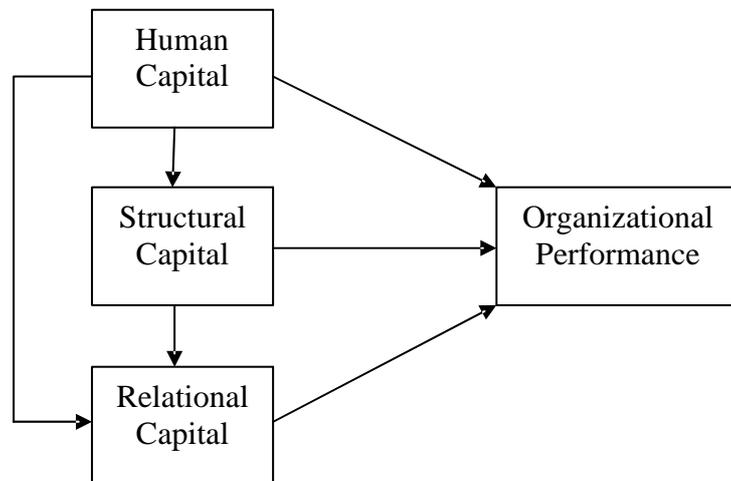


Figure 3 Discriminating intellectual capital sub-domains

Table 3 Amose path analysis results(standardized beta coefficient and *t*-values)

	coefficient β	<i>t</i> -values	Sig.
HC→SC	0.693	14.73	0.000
HC→RC	0.056	0.863	0.388
SC→RC	0.651	9.95	0.000
RC→OP	0.316	6.49	0.000
SC→OP	0.393	4.67	0.000
HC→OP	0.039-	-0.551	0.582

The result indicates that the three constructs that make up intellectual capital really affect one another and organizational capital indirectly or directly. That explanatory power of the models were relatively, plus all of the remaining main effects' paths were substantive, significant and in the expected direction. Next, we ran our model with interaction constructs (i.e. H×S×R, H×S, S×R), in addition to the main effects. Figure 4 depicts the results for our overall structural model, comprising of main and interaction effects.

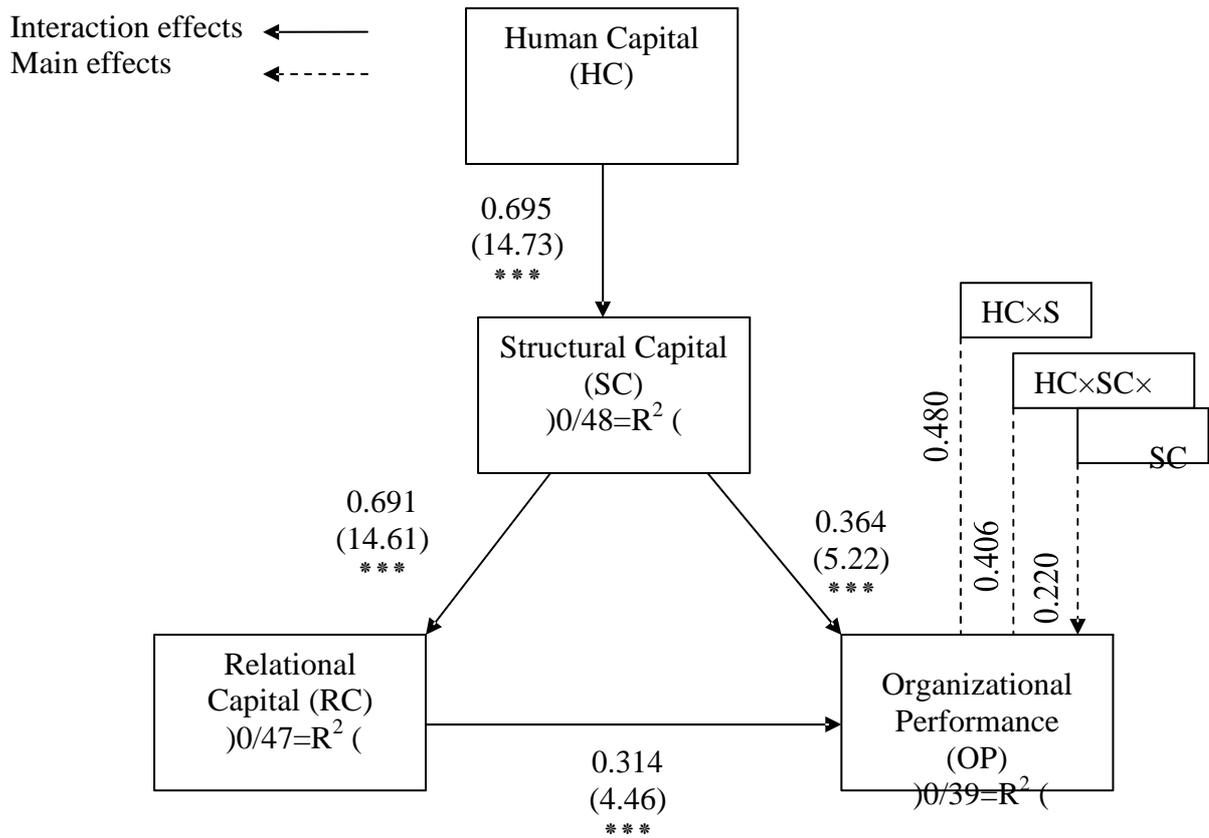


Figure 4 Discriminating intellectual capital sub-domains
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An important benefit of the AG methodology is that it makes it possible to disentangle direct and total effect of the variables included in the model. As can be seen in figure, the total effects of variable include various indirect ‘chain’ effects among the variables included in model. Decomposition of effects reveals that human capital (HC) has important effect on structural capital (0.695) and relational capital indirectly through the structural capital (0.695×0.691). Human capital influences organizational performance (OP) indirectly HC→SC→RC→OP (0.695×0.691×0.314) and HC→SC→OP (0.695×0.364). Structural capital influences organizational performance not only directly (0.364) but also indirectly through the relational capital (0.691×0.314=0.220), giving a total effect of 0.584. Relational capital has effect on organizational performance directly (0.314). The explanatory power (R²) for our model is 39%.

Table 4 Amose path analysis results of the research final model
 (Indirect effect& Direct effect)

Path	Direct effect	Indirect effect	Total effect	Sig.
HC→SC	0.695	-	0.695	0.000
HC→RC	-	0.480		0.000
SC→RC	0.691	-	0.691	0.000
HC→OP	-	0.402	0.402	0.000
SC→OP	0.364	0.220	0.584	0.000
RC→OP	0.314	-	0.314	0.000

According to the fit measures results, the research final model can be regarded as infallible or correct, because the values of the fit measures indicate a goodness and acceptable fit of the model. (see Table 4)

Table 5 fit measure results

RMSEA	CFI	TLI	CMIN/DF	P	square- Chi	DF	NPAR	indicator
0.000	1.000	1.000	0.523	0.59	1.047	2	8	
$1.00 \leq TLI \leq 0.95$ $1.00 \leq CFI \leq 0.95$ $0.05 \leq RMSEA \leq 0$ $2 < CMIN/DF < 0.50$: goodness fit $1.00 \leq TLI \leq 0$ $1.00 \leq CFI \leq 0$ $0.08 \leq RMSEA \leq 0$ $2 < CMIN/DF < 1$: acceptable fit								

8. Conclusions

Intellectual capital is increasingly recognized as an important strategic asset for sustainable corporate competitive advantages and that firm with better intellectual capital efficiency yield greater profitability and revenue growth in both the current and the following years. Our results underline the importance of capitals of human, structural and relational in improving intellectual capital and enhancing firm profitability and finally organizational performance. Our discussion here suggests that intellectual capital leads to new capabilities for the firm and has improved the organizational performance by enhancing teamwork, reinforcing competence of employment, making comprehensive recruitment and remuneration systems.

This study provides the managers' company with a better understanding of how intellectual resources develop and drive performance. We recommend that managers' and senior's National Iranian South Oil Company utilize an intellectual capital framework when evaluating the assets of a potential target.

The results show that human capital influences relational capital and organizational performance indirectly through the structural capital.

There are different between the Research conceptual model and the Research's exploratory model. We think it's reasons is the current bureaucracy into the National Iranian South Oil Company. Because In the bureaucracies of firms objectives are set by rational, systematic, standardized techniques (structural capital), thereby eliminating the effects of interpersonal relationships.

Further research is needed to investigate how bureaucratic impacts on intellectual capital and organizational performance.

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