

Intellectual capital Effect on the Project's Performance in the United Arab Emirates

Efecto del capital intelectual sobre el desempeño de proyectos en los Emiratos Árabes Unidos

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ABSTRACT

Infrastructure projects have been developed rapidly within the United Arab Emirates over the last decade; this development meets the government trends toward setting the United Arab Emirates as one of the commercial, preferable, and tourism destinations. The main objective of the current research is to find out the impact of the human capital (HC), structural capital (SC), relational capital (RC), and social capital (SC) on the project performance. The quantitative approach was followed in this study to test the structured hypotheses. The data source of this study is retrieved from two sources, as the infrastructure projects providers within the country list into two exchange security markets that Abu Dhabi exchange security market, and Dubai exchange security market. This study focuses on the time period 2014 to 2018, to explore the optimal adoption of the intellectual capital components by the infrastructure projects providers, to overcome the slowdown economy challenges. This research has found out that there are positive and significant relationships between the human capital, structural capital, relational capital, and social capital, with the return of asset, return of equity, and earning per share (that represent the project performance).

Keywords: intellectual capital, human capital, structural capital, relational capital, social capital, project performance.

RESUMEN

Los proyectos de infraestructura se han desarrollado rápidamente en los Emiratos Árabes Unidos durante la última década; Este desarrollo cumple con las tendencias del gobierno para establecer a los Emiratos Árabes Unidos como uno de los destinos comerciales, preferibles y turísticos. El objetivo principal de la investigación actual es descubrir el impacto del capital humano (HC), el capital estructural (SC), el capital relacional (RC) y el capital social (SC) en el desempeño del proyecto. El enfoque cuantitativo se siguió en este estudio para probar las hipótesis estructuradas. La fuente de datos de este estudio se obtiene de dos fuentes, ya que los proveedores de proyectos de infraestructura dentro del país se clasifican en dos mercados de seguridad de cambio que el mercado de seguridad de cambio de Abu Dhabi y el mercado de seguridad de cambio de Dubai. Este estudio se centra en el período de tiempo 2014 a 2018, para explorar la adopción óptima de los componentes de capital intelectual por parte de los proveedores de proyectos de infraestructura, para superar los desafíos de la desaceleración de la economía. Esta investigación ha descubierto que existen relaciones positivas y significativas entre el capital humano, el capital estructural, el capital relacional y el capital social, con el retorno del activo, el retorno del capital y las ganancias por acción (que representan el desempeño del proyecto).

Palabras clave: capital intelectual, capital humano, capital estructural, capital relacional, capital social, desempeño del proyecto.

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I. INTRODUCTION

The recent economic change from an industrial society to a knowledge-based society has implications to organizations. Drucker (1993) asserts that organizations have passed through two phases of applying knowledge to wealth creation. In the first of these, knowledge was applied to tools, processes and products and created the industrial revolution. In the second phase, with the application of scientific management theories to production, knowledge was applied to human work, which ushered in the productivity revolution. Drucker (1993) argues that the emergent knowledge economy that is creating an economic revolution signifies the third phase, in which knowledge is being applied to knowledge itself and where economic value depends on the activities of knowledge workers. Knowledge work is characterized by variety and exception rather than the routine. Therefore, organizations require a new focus on the role that knowledge and meaning connected knowledge (understanding) play in the organizations' and individuals' ability to deliver quality work (Inkinen, Ritala, Vanhala, & Kianto, 2016).

The project management field is witnessing a change in the way of understanding what is expected from the labor market. Apparently, the tendency is to enter a new reality in which human potential is the cause of economic growth. Training people, developing them and keeping them update with the latest technologies is the challenge facing today's employers and the immediate future. The industrial era moves away to make way for the era of people and talent, so it's called "Human Age". Competitive advantages stop nesting in capital to focus on talent, on people, on the skills they possess. In the future, thanks to technology, borders will disappear; geographic barriers to finding a job will be able to perform any task from any place provided that the key to knowledge, capacity and ability is possessed. Human capital is a source of competitive advantage and is the key factor in the competitiveness of projects, regions and even countries.

The infrastructure projects providers were integrated into the national economy in the United Arab Emirate (UAE), providing sources of work, offering technology and creating infrastructure for the region. Take advantage of their business resources, their appropriate and timely application allows positioning in the daily business world. That is, if companies capitalize on the opportunities offered by the environment, they position themselves in the international market, improve their growth prospects and face the globally competitive economic scenario. Past global economic crisis (recession, 2008-2012) that have not ended send signals and a financial instability is perceived.

This economic turbulence indicates that organizations must make changes in their organizational structure, adopting more flexible and advanced systems, such as acquisition of current technology, development and research, competitiveness, and constant revision of applied strategies. It is suggested that one of the actions and attitudes that companies can perform is to innovate, thus they will face structural elements to the global market supported by their intangible assets. The main internal strength that can count organizations to take these challenges, is the cultural heritage and the appropriate use of knowledge, considered an intangible asset. It should be integrated as the fifth factor or production resource, the group of four proposed by Marshall (1927) that land, labor, capital, and organization, and the knowledge as the fifth element. Thus, knowledge as a fundamental resource is essential in the productive activity, and is the main differentiating source before a competitive market.

II. LITRATURE REVIEW

According to the theories of economic growth, specifically according to Solow's neoclassical theory of Solow (1956), the increase of capital and labor mean an increase in productivity and economic growth; for Denison (1957) the capital increase and the increase of work revert to progress and investment in intangibles; (Barro, 1991; Lucas Jr, 1988; Romer, 1994) with the theory of human capital, Becker, Murphy, and Tamura (1990) treat intellectual capital (IC) in their theories. It is concluded how the research trend of IC has been dominated by accounting and management perspectives with a little influence of psychology and sociology. That is why they see the need to highlight a theory of IC that emphasizes the human attributes of individuals and working groups. They have developed a double conception of human capital and at the same time they have identified a new component of structural capital labeled with fluid structural capital against what is crystallized structural capital. For Allee (1999) the manager must have a broader vision of the company when it comes to modeling IC. That is, the dynamics must take into account that the company is in a social and environmental environment with the influence of external agents. The models do not include these dynamic changes with society or with the land and its resources. However, it is beginning to appreciate that there are companies with multiple coincidences creating so-called "communities of practice" in which the union between companies comes hand in hand with a common sense of purpose. In turn, the companies are also located in between other communities where they act as collective nodes in a broad social system. This would imply interdependence between organizations and society that is ignored in the management and business models. Companies and organizations are, in addition to the fabric of this broad society, dependent on this social system at the level of employees, customers and other stakeholders. For example, the quality of the knowledge of the workers of a company in a certain locality will be determined to a certain extent by the quality of

the education that public and private organizations offer in that locality.

Testing the role of IC on the firms' performance has received attention from several previous studies. These studies such as (Dženopoljac, Janošević, & Bontis, 2016; Gogan, Artene, Sarca, & Draghici, 2016; Kamath, 2015; Lin, Yu, Wu, & Cheng, 2018; Maria Morariu, 2014) have focused in examining the financial effect indicators of the IC components, while the impact of each component drivers has neglected, which forms a gap that need to be closed. Cabrilo, Grubic Nesic, and Mitrovic (2014) suggest that investigating the gap among human and structural capital drivers leads to improve the role of IC on the overall performance. Cabrilo, Uzelac, and Cosic (2009) have clarified that each component of IC composites several drivers, these drivers interact together toward the target performance, the lag of performance is resulted from the lack of one or more drivers of the component. In this regard, the Human capital can be divided into Efficiency, Motivation, Experience, Education and knowledge-sharing, Leadership and management skills, and Expertise, while the structural capital Employees' communication and interaction, Information communication technology (ICT), and Process management, and the relational capital can be divided into Customer relationship, Image, and Supplier relationship.

III. METHODOLOGY

In UAE, the infrastructure projects represent a guiding axis of growth and development since it uses raw materials, energy, capital, and labor, generating jobs, strengthening productive chains, increasing productivity and promoting the construction sector, thus configuring new scenarios of economic development. The population of this study contains all the infrastructure companies' providers within the UAE. To obtain the data required for the secondary data preparation, the sample size is picked up from the exchange security markets, which represent all the infrastructure companies' providers listed in Dubai and Abu Dhabi security market as shown in Table 1.

TABLE 1: Infrastructure projects providers

No	Company name	Listed in
1	AL DAR PROPERTIES	Abu Dhabi exchange market
2	ESHRAQ PROPERTIES COMPANY	Abu Dhabi exchange market
3	RAK PROPERTIES	Abu Dhabi exchange market
4	SHARJAH GROUP	Abu Dhabi exchange market
5	ARABTEC HOLDING	Dubai Exchange market
6	DEYAAR DEVELOPMENT	Dubai Exchange market
7	DRAKE & SCULL INTERNATIONAL	Dubai Exchange market
8	EMAAR PROPERTIES	Dubai Exchange market
9	AL MAZAYA HOLDING COMPANY	Dubai Exchange market
10	UNION PROPERTIES	Dubai Exchange market
11	EMAAR MALLS	Dubai Exchange market
12	DAMAC PROPERTIES DUBAI CO	Dubai Exchange market
13	EMAAR DEVELOPMENT	Dubai Exchange market

For the secondary data measurements, the type of data is time series, the independent variable represents the IC measures as follows:

- HC: represents the cost of human resource (Pulic, 2000)
- RC: represents the based cost for improving the customer relationship (Pulic, 2000)
- SC: measures by deducting the cost of human capital from the net output of the firm (Pulic, 2000)
- Social capital: measures by three dimensions that network ties, trust, and shared vision (Saha & Banerjee, 2015)

Meanwhile, the dependent variable of this study represents the firm performance measures as follows:

- ROA: measures by dividing net income by the total assets (Needles, Powers, & Crosson, 2013)

- ROE: measures by dividing net income by the total equity (Needles et al., 2013)
- EPS: measures by dividing net income over the outstanding shares (Needles et al., 2013)

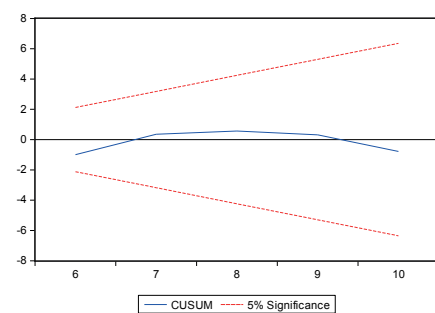
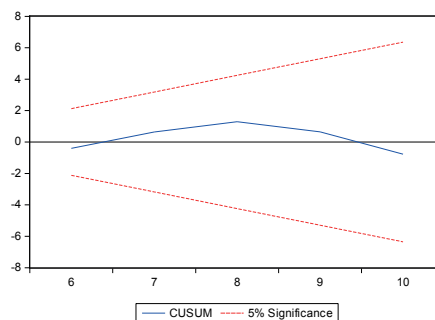
The data source of this study will be retrieved from two sources, as the infrastructure projects providers within the country list into two exchange security markets that Abu Dhabi exchange security market and Dubai exchange security market. Hence, both markets database forms the data hub of this study. The required data are a raw data that will be retrieved and calculated to figure out the appropriate data for analysis. The measurements of the selected data will be calculated from the approved and audited financial statements of the selected companies from Abu Dhabi security market and Dubai security market in the annual base. Deciding the optimal period of analyzing the effect of the IC on the infrastructure projects performance was a critical decision to the researcher. In regards to the related economic and financial events over the last decade, the period from 2014 to 2018 within the UAE market is considered a vital to be investigated, as the country is one of the OPEC members, and one of the oil and gas providers globally. This period has witnessed a sharp declining of the oil price globally, which reflects on the overall market performance negatively. Hence, this study focuses on the time period 2014 to 2018, to explore the optimal adoption of the IC components by the infrastructure projects providers, to overcome the slowdown economy challenges.

IV. FINDINGS

Cusum square (CUSUMSQ), an alternative measure, although not equivalent to using CUSUM, is to use the squares of the recursive residuals. Again, the cumulative time sum of these residuals squared, known as CUSUM squared, allows us to verify non-random deviations from their mean value line. The series of CUSUMSQ, duly standardized, has an expected value that goes from zero at $t = 1$ to one at the end of the sample, $t = T$.

Applying the Cusum test to the current study to measure the stability of the research variables, it helps to find out if the coefficients of regression are changing systematically or not, while the CUSUMSQ is used to find out if the coefficients of regression are changing suddenly. Finally, to sum it up, the satiability test is used to show if the parameters are stable or not. The results show that if the blue line between the redlines, then the null hypotheses are accepted, but if the blue line is crossing the redlines then the null hypotheses are rejected.

By looking at the three models shown in figure 1, its obvious that in the three figures shown as Figure 1 for the Stability diagnostic – CUSUM test, the null hypotheses for the current research are accepted because in the three models the blue line is in between the redlines.



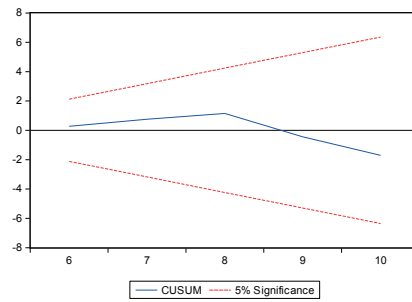


Figure 1: Stability diagnostic – CUSUM test

Correlation Analysis is the set of statistical techniques used to measure the intensity of the association between two variables. The main objective of the correlation analysis is to determine how intense the relationship between two variables is. Normally, the first step is to show the data in a scatter diagram. Correlation Coefficient describes the intensity of the relationship between two sets of interval level variables. It is the measure of the intensity of the linear relationship between two variables.

The value of the correlation coefficient can take values from minus one to one, indicating that the closer to one the value of the correlation coefficient is, in any direction, the stronger the linear association between the two variables. The closer to zero the correlation coefficient is, the weaker the association between the two variables. If it is equal to zero, it will be concluded that there is no linear relationship between both variables. There are 4 independent variables and 3 dependent variables, each independent variable will be tested with each dependent variable. The following points are the conclusions of the correlation test:

- It was found out that the HC has a positive and significant relationship with the ROA, ROE, and EPS with ($r=0.420$, $r=0.221$, and $r=0.826$) respectively.
- It was found out that the SC has a positive and significant relationship with the ROA, ROE, and EPS with ($r=0.512$, $r=0.107$, and $r=0.887$) respectively.
- It was found out that the RC has a positive and significant relationship with the ROA and ROE with ($r=0.902$ and $r=0.771$) respectively. But there was no relationship between relational capital and EPS.
- It was found out that the SC has a positive and significant relationship with the ROA, ROE, and EPS with ($r=0.794$, $r=0.288$, and $r=0.944$) respectively.

The following Table 2 shows the results of the correlation test.

TABLE 2: Correlations test

		HC	SC	RC	SOC
HC	Pearson Correlation	1			
	Sig. (2-tailed)				
SC	Pearson Correlation	.979 ^{**}	1		
	Sig. (2-tailed)	.000			
RC	Pearson Correlation	.266	.370	1	
	Sig. (2-tailed)	.458	.292		
SOC	Pearson Correlation	.815 ^{**}	.844 ^{**}	.684 ^{**}	1
	Sig. (2-tailed)	.004	.002	.029	

ROA	Pearson Correlation	.420**	.512**	.902**	.796**
	Sig. (2-tailed)	.027	.030	.000	.006
ROE	Pearson Correlation	.221**	.107**	.771**	.288**
	Sig. (2-tailed)	.009	.008	.009	.019
EPS	Pearson Correlation	.826**	.887**	.703*	.944**
	Sig. (2-tailed)	.005	.001	.023	.000

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

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

The objective of the regression tests is to eliminate the wave effect, that is, to verify that the changes on a component of an information system do not introduce undesired behavior or additional errors in other unmodified components.

The regression tests must be carried out each time a change is made in the system, both to correct an error and to make an improvement. It is not enough to test only the modified or added components, or the functions performed in them, but it is also necessary to control that the modifications do not produce negative effects on the same or other components.

Normally, this type of tests implies the repetition of the tests that have already been done previously, in order to ensure that no errors are introduced that could compromise the operation of other components that have not been modified and confirm that the system works correctly. Once the changes have been made.

Regression equation is an equation that defines the linear relationship between two variables. Linear regression equation: $Y' = a + Bx$.

For the regression test in this research, there are three models, each model was tested for each dependent variable. The first model explains the relationship between human capital, structural capital, relational capital, and social capital with the ROA, the first model's R^2 is 0.835, which confirms that this model explains the relationship with 83.5%. while for the second model that identifies the relationship between human capital, structural capital, relational capital, and social capital with the ROE, this model's R^2 is 0.616, which confirms that this model explains the relationship with 61.6%. For the last model that identifies the relationship between human capital, structural capital, relational capital, and social capital with the EPS, this model's R^2 is 0.933, which confirms that this model explains the relationship with 93.3%.

Applying the regression test for the current study aims to find out the future contribution for the variables in units. For the first model, it's found that all the independent variables (human capital, structural capital, relational capital, and social capital) have future contribution to the ROA with Beta = 0.447, 0.265, 0.502, and 0.117 respectively. Secondly, for the Model 2, it was found out that the only independent variables that have future contribution to the ROE are human capital and social capital with Beta = 0.108 and 0.448 respectively. Finally, for the last Model, it's found that all the independent variables (human capital, structural capital, relational capital, and social capital) have future contribution to the EPS with Beta = 0.880, 0.162, 0.070, and 0.382 respectively.

TABLE 3: Regression test result

Construct	Model (1)	Model (2)	Model (3)
	ROA	ROE	EPS
C	-0.036**	-0.030**	-2.106**
HC	0.447**	0.108**	0.880**
SC	0.265**	0.351	0.162**
RC	0.502**	1.077	0.070**
SOC	0.117**	0.448**	0.382**

F-statistics	23.85	18.22	32.10
Adjusted R ²	0.835	0.616	0.933

V. Discussion

Obviously, all the research results are coping with the previous studies' results, where this research has found out that all the hypotheses are accepted. These results are similar to the study of Kamath [21], where this study aimed to investigate the impact of IC on firm performance and market valuation in Indian firms. The finding of this study revealed a significant impact from the IC on the both market valuation and firm performance.

According to the theories of economic growth, specifically according to Solow's neoclassical theory of Solow [22], the increase of capital and labor mean an increase in productivity and economic growth; for Denison [23] the capital increase and the increase of work revert to progress and investment in intangibles with the theory of human capital, Becker, Murphy, and Tamura treat IC in their theories. They conclude that they have observed how the research trend of IC has been dominated by accounting and management perspectives with a little influence of psychology and sociology. The need to highlight a theory of IC that emphasizes the human attributes of individuals and working groups. They have developed a double conception of human capital and at the same time they have identified a new component of structural capital labeled with fluid structural capital against what is crystallized structural capital. For Allee [24] the manager must have a broader vision of the company when it comes to modeling IC.

In the last two decades, numerous studies have been developed focused on the research for methodologies and models that contribute to improving the management capacity of IC. Despite this, it has not been possible to reach a consensus in which one of these models can be chosen as the guiding model, this is due to the intangible nature of these assets, and that each business has its own combination of knowledge keys, depending on the objectives and position of the firm in the market. The philosophy of the measurement of IC is focused on the determination of judgments that offer an estimate of the effectiveness of organizations. Therefore, the measurement of IC will be the link between research and organizational practice, since it allows identifying the current state of performance and organizational development based on the achievement of relevant results that meet the needs of the elements of the environment Khalique [25]. Since the last decade of the twentieth century with the beginning of the studies related to the IC, the first models of measurement and management of intangible assets in organizations have emerged. For authors such as Mačerinskienė and Aleknavičiūtė [26] the models are classified as basic and related.

To sum it up, this research has found out that there are positive and significant relationships between the human capital, structural capital, relational capital (that represent the IC as independent variables), and social capital with the return of asset, return of equity, and earning per share (that represent the project performance and a dependent variable).

VI. Conclusion

In line to vision 2021, the UAE government relates two objectives that must be achieved that; "Improving the Networked Readiness Index and improving the online services index". For this goal, the government harnesses its efforts to improve the country infrastructure, taking into consideration a roadmap strategy that relies on three pillars financial capital, human capital, and technological capital Byat & Sultan [27]. The lack of adoption the full prescriptive of IC by this strategy, it would affect the acceleration of improvement. Following these affects, the current research problem can be summarized on type of influence that IC might have on infrastructure projects' performance in the UAE.

In that regard, the researcher has created the objectives and questions of this paper to find out the relationship of IC on the project performance. This paper has shown that there is a positive and significant influence of the IC on the project performance of the infrastructure project in GCC region.

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