



**Global Connectivity, Knowledge and Innovation for  
Sustainability and Growth: New Paradigms of Theory and  
Practice**

**Editors**

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## *Intellectual Capital in Public Universities: Comparative Analysis, University of Guadalajara and University of Guayaquil*

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### **Abstract**

*Higher Education Institutions (HEI) play a fundamental role in the economic and social progress of countries, but it is through the transfer of knowledge and the generation and application of knowledge, as it contributes to the formation of intellectual capital. Within universities, their intangible assets, enable institutional development and fulfilment of their mission, whose intellectual capital generates competitiveness and differentiation between universities, as in the case of two Latin-Americans universities where the study was applied. Among the main findings it is crucial that a university culture that fosters intellectual capital, leading to greater competitive development among its members and institutions.*

**Keywords:** Intellectual capital, Higher Education Institutions (HEI), Competitiveness.

### **Introduction**

Currently it is giving a strong emphasis on information and knowledge as essential resource to raise the competitiveness of an organization in the market (Osorio, 2003), where the intellectual capital is an issue that is growing interest in the institutions of higher education (IES), however, its main contribution and development has been in the business field, due this intangible resource can achieve greater competitiveness and success of organizations because of knowledge, skills and attitudes that personnel have in their work experience, problems and solutions that face daily, and the number of innovations that can be implemented to achieve competitive advantage, making it an intangible that creates high value for any organization.

HEIs are the most appropriate space where knowledge is transferred, it is in these academic organizations where the training of human resources, the generation and application of knowledge, where insertion in the labor field enables the institution to transcend socially, and the society benefits in that training contributing to solution of individual and collective problems.

The main intangible asset of HEIs is knowledge, and it is from this, where they organize, coordinate and manage the academic actions to achieve the institutional mission and vision, is within the institutions where it joins human, relational and structural capital, to manage intangibles to achieve competitive and comparative advantages, to get prominent positions around its institutional competitiveness.

Education field try to develop skills in students, understanding the concept as the range of knowledge, skills, abilities, motivation, values and interests that generate the vision of the future professionals.

Those characteristics develop during the learning process and through different teaching ways, and is currently the use of information Technology and Communication (ITC) a key for support the access to information, getting knowledge and the capacity to develop new innovations that are shared in cyberspace, whose value increases if the school has available technology, as a part of its academic and administrative actions, the use and application of this resource in the performance of students, teachers, researchers and managers, increasing their competitiveness, something that has already been purposing by Malhotra (2000), cited in Sanchez, Melian and Ant (2007), noting that knowledge refers to how the company, supported in technology and organizational processes, acquires, use or share knowledge.

The changes that have occurred in the world over the past decade and the development of ITC, have provided organizations greater competition and efficiency to manage their intellectual capital, generate new services, products, patents, technologies and project among others, knowledge management and, in particular, intellectual capital has become particularly important to the success of an organization (Osorio, 2003). Intellectual capital and knowledge management provide the tools to develop the institution, competent in all areas related to research and knowledge, being the highest value of a university.

This paper is the result of an applied research to Faculty in two Higher Education Institutions, University of Guadalajara, the main institution in western Mexico region, and University of Guayaquil, the second public university in Ecuador. In the study, the factors involved are intellectual capital in each university, and the relationship between technological factors with institutional competitiveness.

## **Theoretical Framework**

Within HEIs there is a need to quantify intellectual capital and intangible assets: knowledge, skills and attitudes. To study the approach presented takes into account professors of two public institutions of Latin American countries, trying to know the way it is being carried out the knowledge management process, and how to make best use of this intangible resource for the competitive development and educational institutions. Intellectual capital is highly important in terms of perception in organizations, it is highly important to conceptualize theoretically their role and why their intangible composition.

First studies of intellectual capital can be located in the 90's decade, most of them were made in United States of America and Sweden (Osorio, 2003); according to Díaz, (2012), intellectual capital consists in the explicit knowledge and tacit knowledge. Intellectual Capital is based in knowledge, this being the most important of intangibles and the main source of innovation in the process of creating value for organizations. Alarcon Alvarez, Goyes and Perez (2012) argue that knowledge has become the main source of wealth, and the affirmation of Prusak (1996) comes true, that the creation of competitive advantages of a company is based in its knowledge or more specifically on what you know, in how you use what you know and in their ability to learn new things relevant to the organization.

In the business, the concept encompasses the relationships that organizations have with customers and partners, as well as the innovation efforts given, the infrastructure and the knowledge and expertise of the members of the organization (Edvinsson and Malone, 1999; Edvinsson and Stenfelt, 1999; Pasher 1999), cited in Sánchez et al. (2007). Organizations require a number of elements to develop the cognitive process, such as staff knowledge, ability to learn and adapt, relationships with customers and suppliers, brands, product names, internal processes and the ability of R & D , etc., that generate value and sustained competitive advantage. It is important to note that intellectual capital is managed as a process and space for knowledge creation in a set of systems, which seeks increase the organizational intellectual capital, by managing their capabilities to solve problems efficiently (in the shortest possible time), with an ultimate goal: to generate sustainable competitive advantages in time (Osorio , 2003).

There is a significant amount of views that provide definitions of what intellectual capital means, however it is important to those whose contribution to analyze the evolutionary process of concept and not only their meanings (Abreu and Garcia, 2007), cited in Alarcon Alvarez, Goyes and Perez (2012):

**Table 1.1.- Concepts and Evolution of Intellectual Capital Concept**

Author	Definition
Kenneth, 1969	Intellectual action means more than mere knowledge or pure intellect.
Funk y Wagnal, 1977	Synonymous with intellectual property, intellectual assets and knowledge assets. It is part of the total capital stock or share capital based on knowledge that the company holds.
Dierickx y Cool ,1989	Company knowledge stock
Stewart, 1991	Anything that can be touched but that can make money for the company.
Edvinsson y Sullivan, 1996	Knowledge that can be converted into profit in the future, consisting of resources, such as ideas, inventions, technologies, software, designs and processes.
Jhonson, 1996	Looking even less tangible assets, such as a company's ability to learn and adapt.
Bradley, 1997	Ability to transform knowledge and other intangible assets in wealth-producing resources, both for companies and countries.
Edvinsson y Malone, 1997	It is like an iceberg: "above the surface financial and physical, visible and impressive resources under the sun rise, below there is something invisible, much bigger, the importance of which no one knows but know all their environments."
Stewart, 1997	"It is intellectual material, knowledge, information, intellectual property, experience, which can be used to create value. It is collective brainpower. It is difficult to identify and distribute even more efficiently. But who finds and exploits, triumphs "
Euroforum, 1998	Grouping of assets of a company that, despite not being reflected in traditional financial statements, generate or generate value in the future for it.
Stewart, 1998	Sum of all knowledge possessed by employees and give the company a competitive advantage.
Bueno, 1999	Measurement value generated in a moment of time, background variable that explains the effectiveness of organizational learning and evaluates efficiency in knowledge management.
Petty y Guthrie, 2000	Formed by a structural part, consisting of software, distribution networks, and a human side, including human resources of the organization and external, within which suppliers and customers are.
Lev, 2001	Those who can create value in the future, but do not have a physical or financial body.
Nevado Peña y López Ruiz, 2002	Set of company assets that, although they are not reflected in the financial statements, generate or generate value in the future as a result of aspects related to human and structural capital, innovation capacity, customer relations, quality processes, products and services, cultural and communicational capital resulting in the generation of future profits.
Viedma, 2003	It is equivalent to core competencies or essential skills.

Among the most recent concepts are the Moon (2006) who claims that intellectual capital consists of: innate intelligence, knowledge, technology, emotional intelligence, memory, values, ethics, innovation, invention, learning and decision. Youndt et al., Cited in (Kwantes, 2007), report that are "knowledge resources that organizations use for competitive advantage," Pribac (2010) explains that intellectual capital represents the totality of what each employee develops in as for their competitive capabilities. Ramirez (2011) citing Arboniés says it is a concept stock that is in relation to the standardization of intangible assets (accounting concept), generates capabilities that distinguish or core competencies in the long term and for that knowledge management aims the intellectual capital of an organization grow significantly, taking into account management capacities for conflict resolution effectively with a single purpose: to create advantages over the competition sustained over time, manage

knowledge to cause management of all the assets that support the organization to obtain skills or competencies that distinguish it.

Based on the definitions above, it can be concluded that intellectual capital is the basic raw material for knowledge management and begins with the recognition of intangible assets that make an organization efficient and competitive (Osorio, 2003). It is an intangible resource; It refers to the skills that humans play within the organization or institutions and is a tool when making decisions, covers the skills and knowledge of employees, and training activities with the aim of growing competitiveness and productivity of employees, (Martinez-Lorente, 2015). Knowledge management and intellectual capital, no doubt, they are changing the way the economy is today managed organizations in a globalized world, (Osorio, 2003).

Intellectual capital in educational institutions that process is all that is done in order to generate knowledge and at the university level is considered the most valuable is an institution. According to Alarcon et al. (2012) the concept helps to university to:

Develop a teaching-learning process faster and more effective; vision to focus on the development of training programs; promote creativity, scientific research, and the generation of ideas and knowledge, sharing and documenting; make better decisions for the future, building through the identification, measurement and development of intellectual capital, sustainable and sustainable competitive advantage with other institutions of higher education; It facilitates the development of knowledge and value creation in all functional areas to ensure the teaching and research university processes and to stimulate the search for new knowledge for the development of science in the different races that are promoted in the institution, in order to make them available to society.

The variables involved in intellectual capital according to Roos, Bainbridge and Jacobsen (2001) cited in Sánchez et al. (2007), it is the sum of the knowledge of its members and practical interpretation. Meanwhile Alarcon et al. (2012) consider that are related to workers: interpersonal relationships, attitude and behavior of staff satisfaction and loyalty, as well as the creation, practice and dissemination of knowledge in the use of new technologies. The powers of a worker on what knowledge is, what skills developed and what attitudes reflected in job performance for the benefit of the organization (Sarur, 2013), also knowledge of the key people in the company are included, satisfaction employees and customers, the knowhow of the institution, are assets that account for much of the value that the market gives an organization, (Osorio, 2003).

Intellectual capital includes a number of components and in this regard there is a consensus to be three: Human capital, structural capital and relational capital (Bontis, 2002; Petty and Guthrie, 2000; Ordóñez de Pablos, 2002, 2003; Roos et al, 2001; Viedma Martí, 2001). Within the human capital, due to technological advances in telecommunications and information technology is transforming the knowledge, skills and talent of individuals. Given this, companies require a different type of worker with skills, attitudes and intellectual agility that allow a critical and systemic thinking within a technological environment (Bontis, 2002), quoted in Sánchez et al. (2007); This component includes not only the skills generated by the formal education and training but also those developed with practice, experience, and the activities and legacy capabilities, which help the technological development (Simoneen, 2012), quoted in Solleiro and Castanon (2012); within this component a subdivision according to ( Roos et al, 2001) are given: (a) skills in the form of knowledge, skills, talent and know-how; (B) attitude, which results in behavior, motivation, performance and ethics of the people; and (c) intellectual agility, which creates value for the organization to the extent that new knowledge or discoveries that can transform ideas into products and services apply (Sanchez et al., 2007).

Structural capital, incorporates knowledge that the company has been able to internalize and remains in the organization, either in their structure, processes or their culture, even when employees leave this (Bontis, Chua and Richardson, 2000; Camisón Zornosa et al, 2000;. Petrash, 1996, 2001) and, for this reason, is owned by the company

(Edvinsson, 1997). It can therefore be included in this dimension all non-human intangibles of the organization: (Bontis, et al, 2000) culture, internal processes, information systems or databases, cited in Sánchez et al. (2007).

Finally, relational capital, considering that companies are not isolated systems, but, on the contrary, they relate to the outside, (Sanchez et al., 2007).  
Competitiveness and technology factor.

According to Solleiro and Castanon (2012) suggest that the factors that promoted productivity and competitiveness in organizations primarily focused on factors associated with specialization and division of labor, then the classical economists emphasized investment in physical capital and infrastructure, and more recently they have been considered elements such as education and training, technological progress, macroeconomic stability, governance, company performance and market efficiency, among others.

Competitiveness variable, involves the ability to produce quality goods and services at the right price, at the right time, the globalization process remain key to successfully compete with commercial competitors and meet the needs and desires of customers. It relates to the ability to increase the standard of living of the population, generating sustained increases in productivity, successfully inserted into international markets, among others (Padilla, 2006). Like reflects the extent to which a country within a system of free trade and fair market conditions, produce goods and services that exceed international markets, and increase the real income of the population in the long term (OECD, 1996 ), coupled with including the productivity of a country determined by their income levels and investment returns, which are key to a growing economy (World economic Forum, 2009) factors.

The incorporation and technological infrastructure in organizations and institutions is a competitive advantage, particularly for those who demand constant improvements in its products and / or processes. ICTs are generating scientific opportunities in academia, but organizational stability that is oriented to the dissemination of knowledge and the competitive dynamic where continuous learning, innovation and implementation of technologies for greater access privileges required to world of information for knowledge generation. It is envisaged that the importance of technology does not depend on its scientific value or its prominence in the physical product; technology is important if much affect the competitive advantage or industry structure (Porter, 2004), cited in Solleiro and Castanon (2012), since the technological factor plays a critical role in the competitiveness of the company and is one of the resources that raises more difficulty in managing (Demuner & Mercado, 2011). ICT provide benefits that support the development of human capital, improve the economic conditions of the countries that acquire capacity for technological development and offer significant advantages in industrial and service sectors. There is a tendency in competitive companies to integrate continuous innovation, product development and redesign their processes in order to achieve a better market position, improved competitiveness and efficiency, so that universities are not immune to this dynamic to a globalized society, demanding to be increasingly competitive.

## **Research Methodology**

The research was supported in a quantitative study conducted academic staff, based on an approach of descriptive, correlational and explanatory, which allowed to find the differences and the correlations between two university institutions with respect to intellectual capital and competitiveness. The research instrument was based on 73 reagents under Likert scale, whose reliability according to Cronbach's alpha was .858.

Statistical information was performed using frequencies and sphericity test for the characterization of teachers and ANOVA for correlating variables. The methodology based on a quantitative study applied to the academic staff of higher education institutions that participated in the study, enabled through ANOVAS identify the variables that influence intellectual capital and competitiveness.

## Results

The application of a theoretical and methodological tool based on information found in the theory of intellectual capital and competitiveness which was described particularly in the construct presented in the previous section was performed. The instrument consists of 75 reagents based on the so-called Likert scale, which can be defined as the measurement instrument preference of respondents through a non-comparative dimensional technique, ie that only the respondent has a unique opportunity to answer in each of the reagents (Bertram, 2008).

To determine the confidence of applied instruments run data was performed with the responses of scale that make up the questionnaire, to be of two different institutions was necessary to analyze separately with the technique called Cronbach's alpha which refers to extent that is possible to determine the level of correlation between the elements of the independent and dependent variables of the construct and the way in which these correlations (Welch & Comer, 1988)

**Table 2.- Cronbach's Alpha University of Guadalajara**

Cronbach's Alpha	No of Items
0.853	23

**Source:** Own with questionnaire data.

**Table 3.- Cronbach's Alpha University of Guayaquil**

Cronbach's Alpha	No of Items
0.822	23

**Source:** Self Elaboration with questionnaire data.

In tables 2 and 3 both cases the application of the survey shows levels of highly acceptable confidence, since they are in a range > 0.8 indicating that the correlation of the answers given by the measuring instrument is medium high; at the same time it indicates that there is a completely random application of questionnaires and bias is located within the normal range so it is possible to proceed with the thorough analysis of the variables.

In order to determine whether the variables are indictable each other's Bartlett's Test of Sphericity and Statistical KMO, which indicate the level of particular correlation maximum between each will be obtained, however the process generalizes groups variable therefore be taken as a proportional factor and which enables correlation analysis of variance (ANOVA), however not particularly determines whether each of variables is representative or not

**Table 4.- KMO and Bartlett's Test of Sphericity University of Guadalajara**

<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy</b>		<b>0.801</b>
<b>Bartlett's Test of Sphericity</b>	Approx Chi-Square	4.322
	df	658
	Sig.	0

**Source:** Self Elaboration with questionnaire data.

**Table 5.- KMO and Bartlett's Test of Sphericity University of Guayaquil**

<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy</b>		<b>0.854</b>
<b>Bartlett's Test of Sphericity</b>	Approx. Chi-Square	3.998
	Df	658
	Sig.	0

**Source:** Self Elaboration with questionnaire data.

Table 4 corresponding to the data obtained from the University of Guadalajara, it is observed that the extent of sampling adequacy KMO the level of correlation of the variables is 80.1%, while in Table 5 is 85.4% as It is indicating that even when the surveys were applied following the same methodology the level of correlation between variables is relative to the particular situations that occur in each of the revised universities, while the Square Chi Aprox. they are in normal range, is say between 1.5 and 12.0 indicating that the variables are capable of providing information related to various combination of variables, while both the degrees of freedom as the significance level found in normal levels with what is possible crossing variables of each of the hypotheses.

#### **Analysis of Variance (ANOVA) of Hypothesis 1**

It is a comparative study it was decided to analyze the behavior of the variables that make each of the factors in the process of knowledge management and intellectual capital, for it mentions the hypothesis raised:

*"The factors of knowledge management and intellectual capital process promotes a competitive advantage in higher education institutions"*

To this end the 8 variables that make up the group of knowledge management and intellectual capital as well as the calculation that forms the factor called competitiveness and was taken from the arithmetic mean of each of the factors shaping the competitiveness group were taken. In order to observe the behavior two separate tables, one for each university they were made.

**Table 6.- University of Guadalajara Hypothesis 1 One Way ANOVA**

		Sum of Squares	f	Mean Square		F	Sig
<b>Planning</b>	Between Groups	15.663	4	2.453		7.324	0
	Within Groups	21.324	2	1.22			
	Total	36.987	06				
		Sum of Squares	f	Mean Square		F	Sig
<b>Decisions</b>	Between Groups	15.663	4	3.457		10.214	0
	Within Groups	21.324	2	1.998			
	Total	36.987	06				
		Sum of Squares	f	Mean Square		F	Sig
<b>Leadership</b>	Between Groups	15.663	4	4.112		3.563	0.01
	Within Groups	21.324	2	2.854			
	Total	36.987	06				
		Sum of Squares	f	Mean Square		F	Sig
<b>Culture</b>	Between Groups	15.663	4	1.101		0.882	0.244
	Within Groups	21.324	2	0.998			
	Total	36.987	06				
		Sum of Squares	f	Mean Square		F	Sig
<b>Technology</b>	Between Groups	15.663	4	4.324		6.312	0
	Within Groups	21.324	2	3.092			
	Total	36.987	06				
		Sum of Squares	f	Mean Square		F	Sig
<b>Measure</b>	Between Groups	15.663	4	2.345		7.324	0
	Within Groups	21.324	2	1.973			
	Total	36.987	06				
		Sum of Squares	f	Mean Square		F	Sig
<b>Strategic Vision</b>	Between Groups	15.663	4	1.233		4.304	0.005
	Within Groups	21.324	2	0.873			
	Total	36.987	06				
		Sum of Squares	f	Mean Square		F	Sig
<b>Knowledge and Growth</b>	Between Groups	15.663	4	3.021		3.242	0
	Within Groups	21.324	2	2.783			
	Total	36.987	06				

Can be observed in the analysis of variance of the University of Guadalajara that leadership is without doubt the value of more relevance has to scholars of this institution and thus it can be inferred that they feel is one of the elements to assess direct way to increase competitive advantage, however observed that in the case of the strategic vision was not considered as an important part, however all variables have high levels of significance, except in the case of culture, which represents 1/8 the total data available, so it appears that there is truly representative correlation level.

**Table 7.- University of Guayaquil Hypothesis 1 One Way ANOVA**

		<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sig</b>
<b>Planning</b>	Between Groups	13.222	32	6.212	7.324	0
	Within Groups	18.762	112	3.872		
	Total	31.984	144			
<b>Decisions</b>	Between Groups	13.222	32	4.811	10.214	0
	Within Groups	18.762	112	3.211		
	Total	31.984	144			
<b>Leadership</b>	Between Groups	13.222	32	2.213	3.563	0.01
	Within Groups	18.762	112	1.321		
	Total	31.984	144			
<b>Culture</b>	Between Groups	13.222	32	0.998	0.882	0
	Within Groups	18.762	112	0.11		
	Total	31.984	144			
<b>Technology</b>	Between Groups	13.222	32	3.217	6.312	0
	Within Groups	18.762	112	2.763		
	Total	31.984	144			
<b>Measure</b>	Between Groups	13.222	32	6.542	7.324	0
	Within Groups	18.762	112	4.312		
	Total	31.984	144			
<b>Strategic Vision</b>	Between Groups	13.222	32	3.212	4.304	0.005
	Within Groups	18.762	112	3.089		
	Total	31.984	144			
<b>Knowledge and Growth</b>	Between Groups	13.222	32	1.23	3.242	0
	Within Groups	18.762	112	0.923		
	Total	31.984	144			

In the specific case of the University of Guayaquil, the behavior is primarily focused on planning for what scholars of the Ecuadorian university mention that yes there is that element in your institution, while in a general

view is important to note that like in the above table, we can see that the trend occurs naturally, indicating that for academics there is a direct relationship between the variables of knowledge management and the generation of competitiveness.

Given the above cases presented in the respective analysis of variance it is possible to state categorically that the No. 1 hypothesis is fully confirmed.

### Analysis of Variance (ANOVA) of Hypothesis 2

He looked analyze the direct relationship between knowledge management as a general variable and the factor which affects particularly on competitiveness, this based on the hypothesis that states: "The performance is the most favored by knowledge management competitive factor and intellectual capital".

**Table 8.- University of Guadalajara Hypothesis 2 One Way ANOVA**

		Sum of Squares	f	Mean Square	F	Sig
<b>Costs</b>	Between Groups	16.431	6	2.452	6.892	0
	Within Groups	21.655	0	1.273		
	Total	38.086	6			
<b>Performance</b>	Between Groups	16.431	6	3.101	4.324	0
	Within Groups	21.655	0	2.267		
	Total	38.086	6			
<b>Technology</b>	Between Groups	16.431	6	3.631	3.957	0
	Within Groups	21.655	0	2.452		
	Total	38.086	6			

Is possible to see at Table 8 of the University of Guadalajara that according to academics surveyed the factor that most affects the intellectual capital and knowledge management is technology, followed by performance and ultimately operating costs, however as mentioned in the hypothesis it does not correspond directly to what is intended to observe.

**Table 9.- University of Guayaquil Hypothesis 2 One Way ANOVA**

		Sum of Squares	f	Mean Square	F	Sig
<b>Costs</b>	Between Groups	10.21	2	1.874	6.892	0
	Within Groups	19.844	5	1.201		
	Total	30.054	7			
<b>Performance</b>	Between Groups	10.21	2	2.749	4.324	0
	Within Groups	19.844	5	1.773		
	Total	30.054	7			
<b>Technology</b>	Between Groups	10.21	2	2.983	3.957	0
	Within Groups	19.844	5	1.652		
	Total	30.054	7			

The University of Guayaquil and academics interviewed mentioned equally that the technological process is the one that directly benefited seen from the processes of knowledge management and intellectual capital, which is why hypothesis 2 is rejected because in no case performance is benefited.

## Conclusions

Knowledge management and intellectual capital is undoubtedly one of the topics most topical in both public and private organizations, the real rationale is that since it is possible to increase substantially the collection of knowledge and capitalize on to achieve improve all internal processes while improving the competitiveness of each of the organizations who join these efforts.

However in institutions of higher education in Latin America the process is still far from functioning as a whole, however, in the cases used with the University of Guadalajara and the University of Guayaquil it is possible to observe that increasingly perceived efforts to stand out from the intangible resource called knowledge is highly important, it is therefore required to handle much more assertively how capitalized institutions which students can generate and exploit it in a better way.

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