Intellectual Capital, Impact Factor in Competitiveness: SMEs Manufacturing Industry in Mexico.

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Structured Abstract

Purpose – *The main purpose of this paper is to analyse the impact of the intellectual capital (IC) on the competitiveness in the SMEs manufacturing in Mexico.*

Design/methodology/approach – *The approach of this investigation is developing a theoretical construct to determine the correlation between intellectual capital and competitiveness, and find the most relevant factors that impacts it, where IC is independent variable, and the competitiveness as dependant variable. Using the Likert scale in order to determine the degree of agreement or disagreement, and the survey was applied to 420 SMEs. The results were analysed using confirmatory factor analysis (CFA), Cronbach's alpha and subsequently structural equation models (SEM).*

Findings -- *The results show that the IC dimension:s the information obtained, intellectual capital developed and learning and feedback; have effect on the competitiveness of SMEs. The paper presents the theoretical validation of the factors that*

impact on intellectual capital and competitiveness, and hence the key elements that impact mostly on each analysed variable.

Originality/value – *This study shows the effects of the IC that are directly impacting the competitiveness of SMEs, so that each factor of the dependent and independent variables should be analysed separately to propose improvements in implementing CI to seek higher level of competitiveness.*

Practical implications – *The results obtained measure the level of correlation between the variables in study, hence to design the strategies and key factors needed to integrate the intellectual capital and develop competitive synergies in the SMEs manufacturing.*

Keywords – Intellectual Capital, Competitiveness, Manufacturing Industry

Article Classification – Research Paper

1 Introduction

The information will be significant for manufacturing SMEs, as the investigation will serve as an incentive to carry out the purposes of Intellectual Capital development and its impact on competitiveness.

Generating and maintaining companies, and small and medium, is an important part of the national economy, generating 52% of GDP and 72% of employment in the country (Banamex. 2013), figures we should not let pass unnoticed, it is important to take actions that optimize and support SMEs.

Through this study we intend to make an approach analyzing the situation of intellectual capital from internal and external technical activities of manufacturing companies, and the tools used identifying difficulties and benefits to develop it.

1.1 Objectives

Analyze the relationship of Intellectual Capital and Competitiveness in SMEs in the Manufacturing Industry of Guadalajara Mexico.

1.2 Research Questions

How intellectual capital influences the competitiveness in SMEs of Guadalajara?

2   Literature Review

Intellectual capital has always been present in business but it was not until the 1990s when it began to have more relevance in the organizations. According to Brooking (1997) intellectual capital is not new, but has been present from the time the first seller established a good relationship with a client.

IC is difficult to define because of its invisible nature and dynamics. The term intellectual capital is often a term synonymous with intellectual property assets, intangible assets or knowledge assets (Roos, Pike, and Fernström   2001). IC could be considered as intellectual material that has been formalized, captured and leveraged to produce a good of greater value (Klein and Prusak, 1994), and IC assets created through activities ranging from the acquisition of new knowledge (learning) and inventions to create valuable relationships (Wiig, 1997).

Several models have emerged looking for manage, measure and control IC of a company. Among them are the Skandia Intellectual Capital Model (Edvinsson, 1997); Intangible Asset Monitor (Sveiby, 1997); Balanced Scorecard (Kaplan and Norton, 1996). Although each takes a somewhat different approach, the concept underlying the design incorporated is quite similar, Steward (1997) defines IC as intellectual material, knowledge, information, intellectual property; experience that can be used to create value, wealth is the product of knowledge. Bradley (2003) states that intellectual capital is the ability to transform knowledge and other intangible assets in wealth producing resources for business and nations, and IC is defined as knowledge that can be converted into a value for organizations(Bogdam, Balint and Farcas,2011; Lopez-Gamero *et al* 2011).

Some definitions of intellectual capital is routed to the elements of the "intellectual capital", for example, so, the focus on people, intellectual property, infrastructure and market (Brooking, 1997), the knowledge, experience, organizational technology and relationships with customers by the organization (Edvinsson, 1997), the sum of the knowledge of the members of the organization and its conversion into brands, products and processes (Roos, Pike, and Fernström, 2005), patents, processes, management skills, technologies, information about former customers and suppliers experience. (Stewart, 1997).

The IC comprises structural human and capital. Human capital represents the collective capabilities of the workforce of a company to meet and address of customer, market issues and operational concerns (quality, productivity, technical support, etc.) Structural capital consists of customer or market and organizational capital, customer capital represents the value of relationships with customers, suppliers, industry associations and markets (Punniyamoorthy and Raj, 2007), and organizational Capital philosophy and systems for maintaining organizational capacity focuses, therefore, organizational capital consists of capital and process innovation, reflecting the long-term ability of a company to create intellectual properties (Schiuma and Lerro, 2008) and deals with capital process.

According to Fasil and Osada (2011), the IC has been recognized as a strategic area for strengthening practices total quality management and promote the value of a company's brand and image. Despite recent difficulties in the definition and evaluation of IC, efforts to identify key performance indicators for IC have been ongoing in the organizational and national levels (Lonnqvist, Kianto and Sillanpa, 2009).

2.1. Information Search

Disclosure of human capital can be considered as the business information disclosed about the knowledge of its workforce, skills and motivation. It is voluntarily disclosed by relevant communication channels. However, external reports focus primarily on financial data. Consequently, like other intangible resources, human capital is not considered properly outside the financial implications (Canibano, Garcia and Sanchez, 2000). Moreover, human capital cannot be activated as an asset. As a result, a large part of the resources of the company does not appear in the balance sheet (Hand and Lev, 2003). Thus, several scholars have called for greater disclosure of information on human capital and other intangible resources.

Innovation is a multifaceted expression used in the strategic and operational levels of the company, covering business processes, products and services, competitive intelligence, trade policy, policy formulation and understanding of customers. As innovation is the power and added value, but also covers a variety of research perspectives informed by theories of economics, sociology and psychology. In particular, this review identifies the theory of strong linkage with the IC innovation, implying that the relationship is very

positive. From the early stages of development of IC technology and management, innovation has been identified as the main determinant of competitiveness (Petty and Guthrie, 2000).

2.2 Knowledge Development

A particular feature of the basic concept of Drucker (1993) is that value creation based on knowledge is almost exclusively due to a particular type of people he calls knowledge workers, denoting persons shapely and skilled. Based on this division, which is reproduced hereafter work in IC, Drucker recommends creating organizational structures focused on the management of the first group, always aligning their possible contributions to the desired organizational results in the complexity and intellectual capital considered a condition to knowledge productive.

Knowledge is the basis of intellectual capital is the most important component of intangibles and the main source of resources innovation systems in the process of creating value for organizations and obtaining competitive advantage." (Sarmiento , et al, 2011), Knowledge is handled as analyzed and organized information (Nieves and Leon, 2001; Ortiz, 2003), being the idea that, since knowledge exchanges occur under a network structure, connections or links should be assumed to be other actions that make IC (Nahapiet and Ghoshal, 1998).

Different IC researchers agree that knowledge is the aspect that generates current sustainable competitive advantage, however, there is no such clarity between the theoretical and practical implementation (Kaufmann and Schneider, 2004).

2.3 Learning and Feedback

Knowledge management is focused on the acquisition, analysis, implementation and reuse of knowledge in the organization, with the aim of improving the quality in business processes, lower cost and generating competitive advantages. The competency management systems focus the scope of the employee life cycle in the organization, from the beginning of the relationship in recruitment processes until final disengagement thereof (Urquiza, 2009).

The relationship between IC and KM is vital for an organization, because of the similarities and complementarity, ICM and KM should be linked to provide added value and should be made to work together by aligning the processes of KM with individual elements of CI. The reason for this linkage is competitive IC if used correctly and exploited, becomes the central resource for sustainable competitiveness, success and viability (Wiig, 1999).

Holland (2003) identifies the role of the central structural capital of human and value creation of the company, but recognizes the problems of retention and ownership of human capital. The views of Drucker (1994), Porter (1990) and Prahalad and Hamel (1990) also suggest that in a competitive environment, structural capital of a company is the key to increasing its value.

2.4 Competitiveness

There are various definitions of what is competitive, but most of them you can see that there is mention that competitiveness should basically be a relationship between government, society and business to generate economic growth.

Competitiveness is the product of a society of complex and dynamic interaction between government, companies, intermediary institutions and society organizational capacity. The competitiveness of the economy relies on goal-directed actions, articulated in four level system, and is based on a multidimensional conductor concept (Esser, Hillebrand, Messner and Meyer, 1995), moreover, considering the competitiveness as the ability to achieve rapid and sustained economic growth (Garelli 2000), and the capabilities of the economy of a country to create added value continuously (Fouquin, 1986) as the share of exports of a nation in foreign markets.

Competitiveness is a multidimensional concept that involves different aspects, comparative advantages, competitive advantages, business strategies, results, among others (Waheeduzzaman, 2011), showing Porter (1990) that prosperity is not inherited, but is created and is dependent on the ability to innovate and improve having the industry.

Schilling and Martinez (2008), suggest that the issue of competitiveness becomes more relevant in terms of determining what those factors on which it is necessary to articulate

the business success is to achieve competitively positioned in a given market and what to do to maintain or improve that position which is a central theme in the direction of the company, while the Competitiveness Mexican Institute (2015), known by its acronym in Spanish IMCO, defines competitiveness as the ability to attract and retain investment.

According to Aragon and Rubio (2006), the competitive success of a company has resources and capabilities, enabling it to achieve a favorable competitive position to maintain and enhance its position in the market, and get superior performance. The lack of competitiveness can have negative consequences, which may affect the financial condition of SMEs and lead to bankruptcy (Madrid, Garcia and Van Auken, 2009).

Vermeulen (2004) comments that innovation generates sustainable competitive advantage over time and one determinant of economic growth. For his part, Freel and Robson (2004), distinguishes innovative companies with reference to the intensity of product innovation, which measured as the proportion which the number of new products introduced to the total of goods, and it is necessary to implement and monitor cost accounting systems, analyzes of financial economic situation and attempt, as far as possible, using their own sources of financing (Birley and Westhead, 1994).

The technological advancement is a guarantee of competitiveness in business, Huerta et al. (2003) notes that SMEs should develop rapid, simple, transparent and practical Innovation Technology, commenting Tseng and James Goo, (2005) that competitive success of an organization relates to the way in which tangible and intangible resources are managed. The intangible assets or intellectual capital includes structural human capital and clients. It plays an important role in competitiveness of a company and can increase profits (Hazlina, Zubaidah, 2008).

The innovate constantly is because they know the market needs are changing and they look forward to penetrate it, innovation is an essential factor for competitiveness, but it is also important to include internal factors such as technology and management, and external factors such as market structure and product position in the market.

3   Methodology

The surveys were applied in 420 SMEs of manufacturing industry in Guadalajara, Mexico, during March to June 2014.

The questionnaire was designed considering the competitiveness as dependent variable, and as independent variable the intellectual capital, and the results were analyzed using confirmatory factor Analysis (CFA), Cronbach's alpha and subsequently structural equation models (SEM).

Similarly, to measure the level of competitiveness were considered the three factors proposed by Buckley *et al.* (1988): *1) financial performance*, *2) costs reduction*, and *3) technology use*, all of these, measured by a scale of 6 items. All the items of the three factors are built by a level Likert type of 5 positions, with 1 = completely in disagreement to 5 = completely agree as limits.

To assess the reliability and validity of scales measuring of the level of intellectual capital and business competitiveness, a Confirmatory Factorial Analysis (CFA) with the method of maximum likelihood and EQS 6.1 software (Bentler, 2005; Brown, 2006; Byrne, 2006).

Rates of statistical adjustment that were considered were the NFI, NNFI, IFC and RMSEA (Bentler & Bonnet, 1980; Byrne, 1989; Bentler, 1990; Hair et al., 1995; Chau, 1997; Heck, 1998).

There are seven hypotheses that will contribute to this research:
H1: Higher level of new information, higher level of intellectual capital.
H2: Higher level of knowledge development, higher level of intellectual capital.
H3: Higher level of learning and feedback, higher level of intellectual capital.
H4: Higher level of financial performance, higher level of business competitiveness.
H5: Higher level of cost reduction, greater level of business competitiveness.
H6: Higher level of technology use, greater level of business competitiveness.
H7: Higher level of intellectual capital development, higher level of business competitiveness.

According Hernandez, Fernandez & Baptista (2015), correlational research variables associated with a predictable pattern for a group or population. Correlated studies

measure two or more variables to verify whether they are related to the same subject and then the correlation (Campos and Sosa, 2011) is analyzed.

The surveys were applied in 420 SMEs manufacturers in Guadalajara, Mexico, from March to July 2013, and the number of employees was from 11 to 250, simple random sampling was used, and the universe was 2847 SMEs, the construct is shown in the figure 1.

Source: own
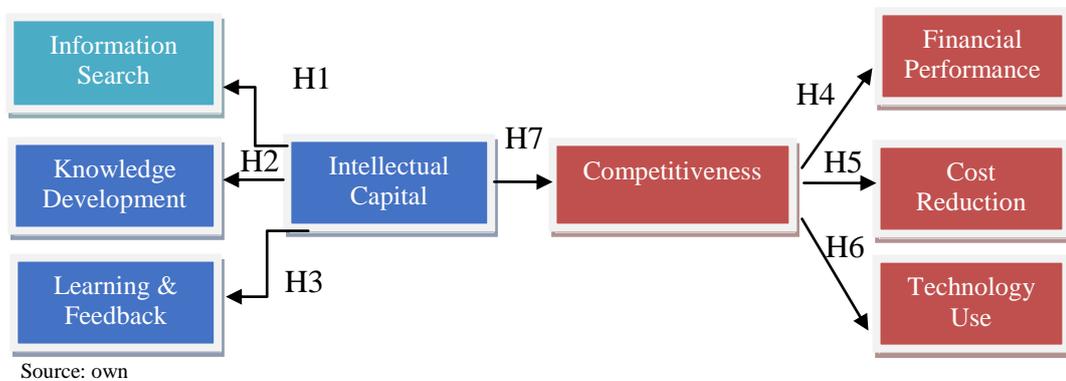
Fig. 1 theoretical model relating Intellectual Capital and Competitiveness

4   Analysis and Discussion

According to the table 1 shows the Cronbach's alpha and the Composite Reliability Index (CRI) exceed the value 0.70 recommended by Nunally and Bernstein (1994), Schumaker and Lomax (2011), and the variance extracted index (VEI) was calculated for the variables of the model, resulting in a higher value of 0.50 (Fornell & Larcker, 1981; Kline, 2011; Albright y Winston, 2015).

And for evidence of convergent validity, the results with the CFA, indicated that all items related factors are significant (p <0.001) and the size of all standardized factor loadings are greater than 0.60 (Bagozzi & Yi, 1988).

Variable	Indicator	Factor Loading	Robust T- Value	Cronbach's Alpha	CRI
Information Search	CIB1	0.603	1.000*	0.646	**0.695**
	CIB2	0.607	10.938		
	CIB3	0.595	11.829		
	CIB4	0.606	10.779		
Knowledge Development	CIC1	0.601	1.000*	0.740	**0.872**
	CIC2	0.598	11.402		
	CIC3	0.694	12.694		
	CIC4	0.608	9.825		
	CIC5	0.647	11.943		
Learning & Feedback	CIA4	0.610	1.000*	0.654	**0.703**
	CIA5	0.617	12.382		
	CIA6	0.610	12.548		
	CIA8	0.603	12.131		
Financial Performance	FP1	0.611	1.000*	0.682	**0.702**
	FP2	0.615	9.191		
	FP3	0.602	8.222		
	FP4	0.608	8.398		
Cost Reduction	PC3	0.757	1.000*	0.571	**0.628**
	PC4	0.592	5.016		
Technology Use	TE1	0.682	1.000*	0.795	**0.798**
	TE2	0.673	17.606		
	TE3	0.651	16.289		
	TE4	0.589	14.807		
	TE5	0.593	14.547		
	TE6	0.59	13.165		

S-BX^2 (df = 260) =393.0910 (p < 0.0000);   NFI = .864 ;   NNFI = .941 CFI = .948 ; RMSEA = .032

*** = p < 0.001

Table 1 Consistency internal and convergent validity of the theoretical model

Variables	Information Search	Knowledge Development	Learning & Feedback	Financial Performance	Cost Reduction	Technology Use
Information Search	**0.505**	0.389	0.487	0.239	0.125	0.435
Knowledge Development	0.281 , 0.497	**0.498**	0.404	0.235	0.213	0.321
Learning & Feedback	0.359 , 0.615	0.296 , 0.512	**0.492**	0.248	0.195	0.429
Financial Performance	0.149 , 0.329	0.155 , 0.315	0.160 , 0.336	**0.501**	0.087	0.261
Cost Reduction	0.029 , 0.221	0.123 , 0.303	0.099 , 0.291	0.099 , 0.183	**0.502**	0.232
Technology Use	0.315 , 0.555	0.225 , 0.417	0.313 , 0.545	0.169 , 0.353	0.124 , 0.340	**0.602**

Table 2 Discriminant Validity of the Theoretical Model Measurement

Related to the evidence of the discriminant validity, measurement of the scale of the business competitiveness level was through two ways which you can see in more detail in table 2. First, the range of 95% of confidentiality, none of the individual elements of the correlation factors matrix contains the value 1.0 (Anderson & Gerbing, 1988).

Second, the variance extracted between each pair of factors is higher than its corresponding VEI (Fornell and Larcker, 1981). Therefore, based on these criteria one can conclude that the different measurements made on the scale show enough evidence of reliability and convergent and discriminant validity. See table 2.

The hypotheses were tested in the theoretical model of innovation and business competitiveness, using the Structural Equations Model (SEM) software EQS 6.1 (Bentler, 2005; Byrne, 2006; Brown, 2006).

The nomological validity of the theoretical model was analyzed through the performance of the chi-square test, in which the theoretical model was compared with the measurement model, not finding significant differences (Anderson & Gerbing, 1988; Hatcher, 1994).

The results of this analysis are presented in table 3.

Hypothesis	Structural Relationship	Standardized Coefficient	Robust T-Value
H1: Higher level of new information, increase the level of intellectual capital.	Information search → Intellectual Capital	0.341***	11.182
H2: Higher level of knowledge development, increase the level of intellectual capital.	Knowledge development → Intellectual Capital	0.308***	11.466
H3: Higher level of learning and feedback, increase the level of intellectual capital.	Learning & feedback → Intellectual Capital	0.326***	12.354
H4: Higher level of financial performance, greater level of business competitiveness.	Financial Performance → Competitiveness	0.335***	8.31
H5: Higher level of cost reduction, greater level of business competitiveness.	Cost Reduction → Competitiveness	0.424***	5.016
H6: Higher level of technology use, greater level of business competitiveness.	Technology use → Competitiveness	0.447***	15.283
H7: Greater level of intellectual capital development, greater level of business competitiveness.	Intellectual Capital → Competitiveness	0.601***	18.773
S-BX2 (df = 243) = 367.3889; p = 0.000; NFI = 0.873; NNFI = 0.941; CFI = 0.952; RMSEA = 0.032			

*** = p < 0.001

Table 3 Results of the Theoretical Model of Business Competitiveness

The table 3 shown the results obtained of the Structural Equations Model, with regard to the **H1** the results obtained, $\beta = 0.341$, $p < 0.001$, indicate that searching information has significant effects with the intellectual capital in manufacturing firms. As for the hypothesis **H2**, the results obtained, $\beta = 0.308$, $p < 0.001$, suggest that knowledge development also have significant effects in the intellectual capital. The hypothesis **H3** the results obtained, $\beta = 0.326$, $p < 0.001$, suggest that the learning and feedback also have significant effects in the manufacturing firms.

Related to competitiveness, in hypothesis **H4** the results obtained, $\beta = 0.335$, $p < 0.001$, indicate that the financial performance has significant effects on the competitiveness level. In the hypothesis **H5** the results obtained, $\beta = 0.424$, $p < 0.001$,), suggest that cost reduction also have significant effects on business competitiveness. The results obtained in the hypothesis **H6**, $\beta = 0.447$, $p < 0.001$, suggest that the technology use also has significant effects on business competitiveness.

Finally, the results obtained in the hypothesis **H7**, $\beta = 0.601$, $p < 0.001$, presented that the intellectual capital has significant effects on business competitiveness.

This research had shown that SME's manufacturing in Guadalajara, have a good correlation between the dependent variable competitiveness with the independent variable intellectual capital, and the results expressed in this study appear to be consistent with the relation of factors technology use, costs and financial performance with the variable competitiveness, and also the factors information search, knowledge development, and learning and feedback are related with the variable intellectual capital.

These SME's are in a transformation process of administrative schemes, with a more cognitive and sustainable system, being conscious to create and generate new information, increasing knowledge development and learning and feedback knowledge in all the organization.

5   Limitations

The first limitation, the sample considered companies from 20 to 250 workers, excluding the companies from 1 to 10 workers, witch representing an important quantity of the total manufacturing SME's, then, for future studies should be important to consider this companies to analyze the effects of intellectual capital in business competitiveness.

A second limitation is that the questionnaire was applied to directors or CEO's level, and the results could differ in functional managers. Therefore, in future studies, it could be important to consider the opinion of customers and suppliers to analyze the results obtained.

Finally, it is important to go beyond the technical results and discuss in greater depth: what effects should in SME manufacturing if a more quantitative scale is used to measure the business competitiveness? What results would be in SME manufacturing if applies a more sophisticated model for the measurement of business competitiveness? What specific activities of the financial performance, the reduction of costs and the use of technology are those that most affect business competitiveness? These and other questions that may arise can be answered in future research.

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