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Three Essays on Intellectual Capital in Mexican SMEs

Thèse

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Résumé

Cette thèse s'intéresse à la mesure du capital intellectuel (CI) ainsi que son impact sur les avantages compétitifs de petites et moyennes entreprises (PME) au Mexique. La principale question de recherche est : *Comment le capital intellectuel devrait-il être mesuré et quel est son impact sur l'avantage compétitif des PME au Mexique ?*

Afin de répondre à la question de la recherche, le premier article offre une perspective méthodologique du CI. Dans cette revue, les limites des méthodes quantitatives utilisées lors de l'étude du CI sont soulevées. L'utilisation de la modélisation par équations structurelles est discutée et privilégiée.

Dans le deuxième article, un modèle de mesure adapté aux réalités des PME mexicaines est proposé. Les résultats suggèrent que, le capital humain et le capital organisationnel sont cohérents avec les études précédentes portant sur le CI dans les PME. Par contre, le capital externe présente des caractéristiques uniques au contexte du Mexique. De plus, malgré les disparités socio-économiques entre les différentes régions au Mexique, suite à une analyse comparative, il est démontré que la vision des gestionnaires ne semble pas différer en termes de CI. Finalement, malgré la multitude de programmes gouvernementaux à la fois aux niveaux national et local, très peu de PME semblent en récolter les bénéfices.

Le troisième article tient compte de la théorie basée sur les ressources et la théorie des capacités dynamiques afin d'examiner le CI dans les PME mexicaines ainsi que leur relation avec l'avantage compétitif. Une typologie est proposée et les PME examinées y sont catégorisées en conséquence. Les résultats suggèrent que les PME avec des capacités dynamiques ont institué des processus à l'interne afin de répondre plus rapidement au changement, leur permettant ainsi de gérer les opportunités et les menaces. De plus, elles prennent plus de risques que les PME moins dynamiques lorsqu'il s'agit de saisir des opportunités et de les transformer en avantages compétitifs. De tels processus sont intrinsèques aux PME dites dynamiques parce qu'ils deviennent partie de la culture organisationnelle.

Abstract

The objective of this thesis is to measure intellectual capital (IC) and its impact on the competitive advantage of small and medium enterprises (SMEs) in Mexico. The main research question is: *How should intellectual capital be measured and what is its impact on the competitive advantage of SMEs in Mexico?*

To answer the research question, the first essay offers a methodological perspective of IC. In this review, the limitations of quantitative methods used in the study of IC are noted. Subsequently, the use of structural equation modeling is discussed and promoted.

In the second essay, a measurement model adapted to the realities of Mexican SMEs is proposed. The results suggest that human capital and organizational capital are consistent with previous studies of IC in SMEs. As for external capital, it presents some characteristics unique to the Mexican context. Moreover, despite the socio-economic disparities across regions in Mexico, a comparative analysis shows that the vision of managers does not seem to differ in terms of IC. Finally, despite the multitude of governmental programs at both national and local levels, very few SMEs seem to be reaping their benefits.

The third essay takes into account the resource-based and the dynamic-capabilities views to examine IC in Mexican SMEs and its relation to competitive advantage. A typology is proposed and the examined SMEs are categorized accordingly. The results suggest that SMEs with dynamic capabilities have instituted processes within their organizations to respond more rapidly to change, allowing them to manage opportunities and threats. Moreover, they are willing to take more risks than their counterparts, who are characterized by less dynamism in seizing opportunities and transforming them into competitive advantages. Such processes are intrinsic to SMEs because they become part of the culture of organizations.

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List of abbreviations

AGFI: Adjusted Goodness of Fit Index

CFA: Confirmatory Factor Analysis

CFI: Comparative Fit Index

DCV: Dynamic Capabilities View

DIC: Direct Intellectual Capital method

EDP: Entrepreneurial Plan for Development

EFA: Exploratory Factor Analysis

GDP: Gross Domestic Product

GEM: Global Entrepreneurship Monitor

GFI: Goodness of Fit Index

IC: Intellectual Capital

ICT: Information and Communication Technologies

IFI: Incremental Fit Index

INEGI: Instituto Nacional de Estadística y Geografía

ITESM: Instituto Tecnológico y de Estudios Superiores de Monterrey

NFI: Normed Fit Index

NGO: Non-Governmental Organization

NNFI: Non-Normed Fit Index

NPD: National Plan for Development

OECD: Organisation for Economic Co-operation and Development

PCFI: Parsimony Comparative Fit Index

PGFI: Parsimony Goodness of Fit Index

PNFI: Parsimony Normed Fit Index

RBV: Resource Based View

R&D: Research and Development

RFI: Relative Fit Index

RMR: Root Mean Square Residual

RMSEA: Root Mean Square Error of Approximation

SC: Scorecard method

SEM: Structural Equation Modeling

SME: Small and Medium Enterprise

SRMR: Standardized Root Mean Square Residual

VRIN: Valuable, Rare, Inimitable, and Non-substituable

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Avant-propos

Cette thèse porte sur le capital intellectuel dans les PME mexicaines. Rédigée sous forme de thèse par articles, les chapitres 2, 3 et 4 présentent chacun un article publié ou soumis dans des actes de conférence avec arbitrage et des revues avec comité de lecture.

Le chapitre 1 introduit le contexte, la littérature, la méthodologie générale et fait le lien entre les différentes parties de la thèse.

Le chapitre 2 (article 1) présenté sous forme d'article est une revue méthodologique de la littérature sur le capital intellectuel. Il nous permet de faire un constat sur l'état des lieux des publications portant sur le capital intellectuel usant d'une méthodologie quantitative et plus précisément de modèles d'équations structurelles.

Le chapitre 3 (article 2) portant sur la mesure du capital intellectuel dans les PME au Mexique est le premier article du genre à notre connaissance. Il a été présenté et publié dans les actes de la conférence *Academy of Management Northeast* (AIB-NE, 2013). L'article 2 a été publié dans le *Journal of Intellectual Capital.*

Le chapitre 4 (article 3) traitant du lien entre le capital intellectuel et l'avantage compétitif des PME au Mexique a été présenté à *l'Association des Sciences de l'Administration du Canada* (ASAC, 2013). De plus, Il a été publié dans le *Journal of Applied Business Research.*

Le chapitre 5 présente une conclusion générale de la thèse, les contributions théoriques et pratiques, les limites ainsi que les recommandations futures.

Les références des articles sont :

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Chapter 1: Introduction

The "missing middle" is a term used to represent small and medium enterprises (SMEs) in developing and emerging economies. They have long been the forgotten businesses despite the key role they play. The objective of this thesis is to measure intellectual capital (IC) and its impact on the competitive advantage of SMEs in Mexico. Intellectual capital is defined as the sum of the assets that have no physical value but are valued by the organization (Edvinsson and Malone, 1997). This capital consists of three dimensions: human capital, the internal structure, and the external structure (Sveiby, 1997). As this field of study is still emerging and evolving, emphasis will be placed on the measurement of IC, particularly in SMEs in Mexico.

First, the general context is introduced. Then, a literature review in the form of an essay will be presented to demonstrate knowledge on the subject. This chapter will be followed by a measurement model adapted to the realities of Mexican SMEs making use of quantitative methods. The third essay presents a qualitative approach that will deepen our knowledge of the theoretical aspects of intellectual capital, taking into account the resource-based (RBV) and the dynamic-capabilities (DCV) views. The final chapter will discuss the practical and theoretical contributions as well as future research perspectives and the limitations of this thesis.

In this first chapter, the general context is discussed in section 1.1. Section 1.2 will present the specific context of SMEs in Mexico. In section 1.3, regional differences are highlighted and characteristics of the state of Queretaro are discussed. Section 1.4 presents a brief theoretical perspective of IC. Section 1.5 will summarize the research objectives, the main research question and sub-questions, the methodology, as well as the structure of the thesis.

1.1 Context

SMEs play a particularly important role in emerging countries. They provide employment and are a major source of income. SMEs promote efficient economic growth and development and are a source of wealth, dynamism, competitiveness, improved livelihood, and knowledge. Compared to multinational corporations, on a social level, SMEs allow for a more equitable diffusion of benefits and hence have a direct impact on poverty alleviation. In an economy where SMEs are successful and integrated into the formal economy, there is better use of human and material resources. This will lead to sustainable development and it will create a tax base with

which to tackle social challenges (Eggenberger, 2005). Moreover, higher numbers of SMEs in a given marketplace produce greater competition among firms, increased output, and improved consumer outcomes (Leo, 2011).

Despite the importance of SMEs in emerging economies, there is a lack of enabling environments for their development. The physical, legal, and institutional frameworks in which SMEs operate are often underdeveloped, since regulations have traditionally favored public enterprises and multinationals. Moreover, the informal sector weakens SMEs that respect business regulations since it creates unfair competition. According to Potter et al. (2013):

> *"In emerging economies where informality is widespread, entrepreneurs often quote informal enterprises as one of the main competitive threats to their business. Informality is not only a symptom of low productivity, but also a cause of it. Informal firms may be forced to camouflage part of their activity, thus restraining their growth. They invest less than formal enterprises in innovation and workforce training, both of which are drivers of business development. And they are less likely to draw on government support through public programmes or public procurement."* Furthermore, the informal sector does not contribute to tax collection and contribute to corruption.

Researchers and practitioners recognize the importance of SMEs in the development of emerging countries, whereby the old paradigm in international development is shifting to one where SMEs play a central role in economic development (Michel, 1995). However, decades of deficient policies in terms of small business development took their toll on SMEs in emerging economies. In order to overcome that trend, SMEs must have competitive advantages that allow them to survive and thrive in an ever-globalized economy. In order to achieve this, all major donor organizations have launched SME support programs in the past decades by focusing on the improvement of the business environment, addressing weak business management and operational capacity, and improving access to start-up, expansion, and development capital through direct and indirect financing facilities (Leo, 2011).

For instance, programs such as the SME linkage programs, whose objective is to support SMEs, focus on improving local technical and business skills, facilitating access to finance for local suppliers, and strengthening local supply and distribution networks. Hence, donor organizations

emphasize three interlocking challenges faced by SMEs: being in poor business environments, business skill capacity constraints, and limited access to capital (Leo, 2011). This new approach, advocated by international institutions, brings two novelties to the economic development of emerging economies: (1) focus is put on SME development instead of solely focusing on multinationals; (2) programs go beyond access to financial capital, to focus on human, organizational, and relational capitals (Potter et al., 2013).

In this thesis, IC is studied given its importance for developing and enhancing competitiveness and providing a competitive advantage for SMEs. In the knowledge economy, enterprises are characterized by good training, work force and know-how (Brooking, 1996, Edvinsson, 1997). Among other things, programs that develop human capital and strengthen organizational capital while providing an environment conducive to SME development must be created. To achieve this objective, such programs that encourage SMEs in emerging economies should not use the same measures as those used in developed countries or those related to multinationals. It is important to understand reality and develop tools and practices that meet the real needs of SMEs while taking into consideration the context.

1.2 SMEs in Mexico

In the past two decades, Mexico has shifted from a relatively closed economy to a very open one. High hopes were held by this liberalization, whereby it was expected to reduce inequality and boost development. However, compared to peer countries, its growth was deemed ordinary. Since 1993, the compounded annual growth rate of its gross domestic product (GDP) rose on average by 5%, versus 9% for Brazil, meaning that the latter has a growth rate almost twice as fast as Mexico's (Arregui, 2012, Maranto-Vargas and Gómez-Tagle Rangel, 2007). This market liberalization increased inequality between the different socioeconomic groups and across regions. As for businesses, market liberalization has posed important challenges to SMEs, which for the most part were not used to competing in a globalized open market. To tackle these challenges, public authorities in Mexico recognized the importance that SMEs played in the country's development and opted to put in place innovative solutions, whereby bottom-up innovation from its entrepreneurs and SMEs were encouraged (Arregui, 2012). Despite the assistance put in place, it is estimated that only 25% to 35% of SMEs survive two years from

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their inceptions. In order to subsist, SMEs have to pursue proactive strategies or perish (Maranto-Vargas and Gómez-Tagle Rangel, 2007).

In Mexico, SMEs represent 99% of all companies (over four million), generating more than half of the gross domestic product (52.5% of GDP) and nearly three-quarters of total employment (78.5%) (INEGI, 2009, Potter et al., 2013). As for their governance structures, most of these enterprises are family businesses. Mexico ranks fifth in the world for the number of family business (Reyes Avila, 2011). Despite their importance, the low productivity of SMEs is perceived as a main barrier to economic growth (Potter et al., 2013). Among the public policies put in place to encourage SME development, there are around 150 different programs aimed at promoting productivity and competitiveness of SMEs. These programs, created mostly between 1995 and 2000, are managed by different governmental agencies and can be grouped into two broad categories: assessment and consulting programs such as CIMO, COMPITE, CRECE, PAT and PMT; and knowledge sharing programs such as CONOCER, FAMPYME, FIDECAP, Mexico Exports, and PAIDEC (The World Bank, 2007).

In order to organize the different programs that were scattered, the first national Entrepreneurial Development Plan (EDP) was put place in 2001 by the Mexican government (OECD, 2013). In 2007, the National Plan of Development (NPD) succeeded the EDP and became the main governmental policy to assist SMEs. Moreover, in 2013, the Ministry of Economy created the National Entrepreneur Institute (INADEM), aimed at developing a competitive entrepreneurial environment. These plans strove to give financial assistance, but also develop entrepreneurs' and employees' capacities in terms of marketing, training, organizational structure, and technology to fortify SMEs and promote regional development (Reyes Avila, 2011). According to Lopez Acevedo and Tinajero (2010), participation in any SME program has positive and significant effects of 6% on value added, 5% on gross production, and 5% in total sales on average. However, the outreach of those programs is limited, given that a select number of SMEs benefit from them. A comprehensive impact evaluation measuring the net benefits of SME programs is yet to be made. As for biases, the positive results yielded by these programs are partly due to the elitist approach, since already flourishing SMEs are chosen to participate. Hence, despite those initiatives, Mexican SMEs suffer from a deficiency in skills, have low levels of technology, and limited access to finance:

"While SMEs dominate Mexico's business population, as in other OECD countries, their development remains hampered by fundamental weaknesses: unusually weak endowment of tangible and intangible capital and limited access to finance" (OECD, 2007).

According to the Global Competitiveness Report 2012–2013, Mexico ranks 53rd in the world in terms of competitiveness, behind other emerging countries such as China (29th place), Brazil (48th place), and South Africa (52nd place), but ahead of India (59th place). This report is based on 12 tangible and intangible references. Looking more closely, it is noted that Mexico ranks poorly in the role of institutions (92nd place), primary education (68th place), post-secondary and technical education (77th place), efficiency of labor (102nd place), technology (72nd place), and innovation (56th place). The report concludes that Mexico faces structural challenges that must be addressed in order to continue to improve the competitiveness of the economy. In particular, the functioning of public institutions is impacted by the lack of security and the business community's lack of confidence in politicians. Laws that are too rigid in terms of hiring and firing affect efficiency negatively. Moreover, innovation is hampered by the poor quality of education and small businesses' use of new technologies to foster productivity gains and innovation (Schwab, 2012). Other factors such as lack of information on markets and companies, lack of marketing and other skills needed to support SMEs, low funding, deficient workforce training, limited access to information and communication technologies (ICT), as well as the low levels of managerial skills are elements that limit the competitiveness of Mexican SMEs (Megchun et al., 2008). To summarize, in terms of IC, barriers faced by SMEs can be categorized into (1) the quality and competence of labor (human capital), (2) the strategic and operational management (organizational capital), and (3) the external environment of the SME (relational capital) (OECD, 2004a).

A major barrier to SME development in Mexico pertains to skilled human resources (human capital). There is a strong and positive correlation between labor productivity and level of education (Potter et al., 2013). The main challenge to SME development in Mexico is the lack of qualified staff and insufficient training. In terms of formal education, despite the 5% of public spending devoted to education, in the G20, Mexico ranks very low (15th place) in terms of tertiary education. Another major challenge is higher college retention rates, whereby only 8% of

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the population aged 18 and older in Mexico holds a bachelor's degree (Naranjo et al., 2012). Such low rates, combined with the poor quality of education, is responsible for the low productivity growth. Notwithstanding, major improvements were made to Mexico's education and training system both at the national and regional levels. Weaknesses were tackled with regard to the country's skill base and the lack of vocational education and continuing professional development (Potter et al., 2013). The results are positive and starting to pay off.

Another challenge in terms of human capital is the lack of entrepreneurial orientation in Mexico (Naranjo et al., 2012). This affects the creation of SMEs that operate and grow successfully. In order to address this gap, attention must be given to more business management training, such as for accounting and human resource management, but also to improving the ability to be innovative and creative. Managers must be able to change their business paradigms to ones of innovation and knowledge creation. Moreover, the ability to motivate and mobilize employees as a key leadership attribute contributes to the development of competitive advantages. It was found that development of internal capabilities has been more important than financial resources to develop competitive advantages. Thus, increasing the firm's competitive advantage must be done through highly skilled, committed employees and leadership (Maranto-Vargas and Gómez-Tagle Rangel, 2007).

A second barrier to SME development relates to organizational capital. Particularly, the lack of proper planning, the lack of professional administration, the use of obsolete business techniques and procedures, lack of resources, lack of effective marketing, and low and poor production. To be competitive, the owners of SMEs need to improve in each of these organizational capital areas to achieve a competitive advantage (Reyes Avila, 2011). Compared to other OECD countries, Mexico has one of the lowest levels of business expenditure on research and development (R&D) as a percentage of GDP. For instance, SMEs in Mexico represent over 99% of total enterprises but account only for 60% of R&D expenditure (OECD, 2013). Another reason for weak organizational capital in Mexican SMEs is due to knowledge management. Strong on family businesses, Mexican SMEs tend to retain knowledge with the founders. When the founder retires from the business without having a succession plan, it is likely the business will not survive (Reyes Avila, 2011).

Hence, increasing productivity is a great opportunity for Mexican SMEs by transforming obsolete management practices into optimal methods of production, adopting modern technologies, as well as improving marketing, administration, and other business functions (Potter et al., 2013). A positive business performance and a sustainable competitive advantage are positively related with the development of internal capabilities such as innovation, firm's knowledge accumulation, and the development of internal technical capabilities (Maranto-Vargas and Gómez-Tagle Rangel, 2007). According to the same study:

> *"Mexican SME availability of financial resources has not been a significant determinant element for the development of competitive advantages. A model for the development of competitive advantages could be proposed as one where soft and hard technology, continuous improvement, innovation and capacity to change foster the development of internal technical capabilities that differentiate firm's products or services from those of large multinational competitors. This led to higher business performance and created financial resources for investments and turns a vicious circle of no resources–no investment into a virtuous one where resources trigger investments and investments create resources"* (Maranto-Vargas and Gómez-Tagle Rangel, 2007)

Relational capital is the third barrier to SME development. Instability in the country affects directly investments and halts entrepreneurial drive. According to Transparency International, Mexico is perceived to have a corruption problem. The proportion of firms reporting the need to pay bribes is higher in Mexico than in Latin American and Caribbean and upper middle income countries in general. This is likely to hamper business start-up and SME development (OECD, 2013). Despite many advances and programs put in place, access to financing is still an obstacle to SMEs. For instance, just 18% of SMEs in Mexico received loans from commercial banks (Lopez-Acevedo and Tinajero-Bravo, 2010). Such constraints lead entrepreneurs to resort to personal savings, family assistance, and other informal channels to launch their businesses (Potter et al., 2013).

Villareal and Villareal (2006) assert that Mexican organizations face international pressure in an increasingly globalized world, which is characterized by the era of knowledge whereby IC is the

new paradigm of a firm's competitive advantage. Thus, the world is changing from a *ceteris paribus* mode (all other things remain constant) to a *mutatis mutandis* mode (all things change at the same time). Therefore, the old paradigm of competitive advantage based on cheap labor in developing countries and large-scale enterprises in industrialized countries no longer works in the age of knowledge. IC is one of the main assets of a company since it promotes competitive advantage and increases the knowledge base (Edvinsson, 1997, Jardón and Martos, 2009). The strategic factor of competitive advantage lies in intellectual capital, which is developed in smart-learning organizations that are innovative and have the ability to respond quickly to change (Brooking, 1996, Stewart, 1998).

1.3 The case of Queretaro

At the regional level, Mexico is a country of contrasts, with great differences in terms of development given the diversity of its demographic structure and historical development opportunities. Within the *Organisation for Economic Co-operation and Development* (OECD) area, it is the second most unequal country with regard to the regional distribution of income. GDP per capita is five times greater in the Federal District than in Chiapas, the poorest state of the country (Potter et al., 2013). On a positive note and despite the disparities across Mexican states, convergence has been occurring (OECD, 2013). Since the '80s, Mexico, with a neoliberal perspective of social modernization, focused its economic policies to areas already developed while neglecting marginalized areas, mainly the southern States (Gravel, 2003). National plans such as the NPD established in 2007 for SME development account for those differences given the relatively high levels of spatial disparities in economic and social conditions and in the distribution of economic activities across the country (Potter et al., 2013). Despite its national scope, whereby all 31 states and the Federal District are included, this plan encouraged decentralization and a greater involvement of state-level governments and municipalities. But the efforts are not deemed sufficient.

A review of 151 programs put in place over the past 20 years with the objectives to develop the capacity of Mexican SMEs created by various government agencies was conducted. The results show that although their goals may vary, collectively, these support programs are designed to promote the productivity, quality, and competitiveness of small businesses, to encourage

technological modernization and training, and to improve the incomes and working conditions for workers in SMEs. The results show that these programs should take into account regional differences, since disparities between the different geographical areas persist. For instance, the percentage of SMEs is very high on the Pacific coast (Oaxaca, Guerrero, and Michoacan), while it is lower in the north, which is dominated by large companies (maquiladoras) (IBRD, 2010). More generally, the central and southern states seem more inclined to entrepreneurship and SME development (Aroca et al., 2005, OECD, 2013). Data on spatial variations in SME performance confirms this tendency, whereby the performance of SMEs tends to be better in the central and southern states and lower in the north.

It is agreed upon that the Mexican government puts considerable efforts into creating programs and incentives to support the creation and development of SMEs. Despite these efforts, the number of SMEs is diminishing in many states. In fact, 13 states in 2009 had less firms than they did in 2001. The most remarkable figures are for the state of Colima (2,540 firms in 2001 versus 597 in 2009), Durango (3,615 in 2001 versus 1,116 in 2009) and Sonora (13,528 in 2001 versus 6,531 in 2009). On the opposite side of the spectrum, Jalisco (79,788 in 2001 versus 110, 349) and Queretaro (5,981 in 2001 versus 34,901 in 2009) demonstrate the importance of incentives and initiatives made by local authorities in the promotion of SME development (Fong Reynoso, 2010). However, contrary to what strong economies aim for, there is a negative relationship between business density and income per capita in Mexico. The majority of SMEs in Mexico have low-productive activities, while the richer states are driven by large multinational and national enterprises. From this perspective:

> *"The challenge for Mexico is, therefore, to move in the coming years from a managed to an entrepreneurial economy, which is characterised by a stronger presence of innovative small businesses and is associated with the transition towards an upper-income economy"* (Potter et al., 2013)

SME policies must be adaptable at the regional levels. Given that economic structure, access to finance, and skill levels vary geographically, a balance needs to be found between the top-down, one-size-fits-all policies and the bottom-up, place-based regional programs (Potter et al., 2013). Therefore, local intermediaries play a big role in delivery of those services to SMEs. This

includes state institutions at national, regional, and local levels, but also private sector institutions such as universities, banks, and private training centers as well as civic associations such as non-governmental organizations (NGOs) and chambers of commerce:

> *"The spatial challenge for Mexico is, therefore, to promote not only self- employment but also opportunity-driven and higher productivity entrepreneurship in the poorer regions, and to nurture the diversification of the higher income regional economies beyond the mere attraction of FDI towards building complementary SME sectors"* (OECD, 2013)

According to the *Global Entrepreneurship Monitor* (GEM), it is not enough to assume policies and programs that have worked in developed countries will work in developing countries, but rather tailored programs that adapt to the local realities must be created (Bosma et al., 2012). The state of Queretaro understood this and acted accordingly. Queretaro is one of the smallest states situated in the central part of the country. Considered as the safest state in Mexico, it attracts migrants from all over the country. Despite its small contribution to the overall economy of the country, it is an interesting state to look at due to its successful economic performance. Traditionally known for its traditional manufacturing and heavy industries with a diversified economy that is balanced between the three sectors of activity, Queretaro began its shift towards a knowledge-based economy (Potter et al., 2013). In terms of human capital, the level of education in Queretaro is higher than the Mexican average, and there is a larger share of the population holding professional and graduate degrees. In terms of competitiveness, Queretaro excels in educational, scientific, and technological infrastructures. The state has 39 public and private research centers (Cardiel P. and Montejano G., 2009)..

 In order to ensure the transition of SMEs from informality to formality, several microcredit initiatives have been implemented. As stated earlier, attracting informal businesses into the formal sector is important since it reduces poverty, strengthens state control on the quality of the production, generates income to the state through taxes informal businesses, and improves overall SME performance. For instance, the program *Credito a la palavra* gives SMEs microloans up to MXN 10 000 ($850 Canadian) with competitive interest rates. Another program put in place is by one of the most prestigious higher education institutions. The *Instituto*

Tecnológico y de Estudios Superiores de Monterrey (ITESM) has an SME incubator and accelerator supported by the Ministry of Economy and promotes entrepreneurship education (Potter et al., 2013). Moreover, the ITESM, with its technology park, is the only university in Queretaro to assist high-tech SMEs. The rationale behind the vast network of business incubators is that there is an insufficient number of firms in Mexico and such incubators help the creation and development of mid-tech and high-tech SMEs. Such firms are sources of knowledge innovation leading to patents and copyrights. However, the program is criticized as it is lacking in networking opportunities, which are an essential part of intellectual capital building (Nativel, 2006). In terms of relational capital, there is a lack of coordination between the programs and the business support infrastructure is weak. Despite their shortcomings, Queretaro is considered as a model state in terms of development and support for its SMEs.

When asked why they decided to join the ITESM incubator, capacity building was the first reason put forward by entrepreneur (ITESM, 2011). The current level of learning ability and creativity of the Mexican worker requires a new orientation of the national system for developing skilled workers (Villareal and Villareal, 2006). If Queretaro is becoming the hub of development in Mexico, it is partly due to investment in SMEs and particularly in their intellectual capitals. As discussed earlier, SMEs are starting to reap the benefits of the programs put in place to foment human, organizational, and relational capitals.

1.4 Theoretical perspective

SMEs in Mexico have the potential to shift from being the "missing middle" to becoming a real force at the economic and development levels. In order to do so, they must develop competitive advantages through the development of their intellectual capital. According to Nahapiet and Ghoshal (1998), IC refers to the knowledge and knowing capability of a social collectivity. This knowledge is the stock unit of organizational learning flows (Bontis, 1998). In today's globalized economy, SMEs must rely on applied experience, organizational technology, customer relationships, professional skill, good training, its work force, and know-how (Brooking, 1996, Subramaniam and Youndt, 2005). From the managerial viewpoint, IC is a resource that creates value and ensures competitive advantage for the organization. Moreover, there is a growing consensus that IC consists of human, organizational, and external capital (Choong, 2008).

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Consequently, intellectual capital is the sum of all the assets and capabilities that contribute to the delivery of organizational strategy but are not recognized and disclosed in the balance sheet (Choong, 2008, Gallego and Rodriguez, 2005, Steenkamp and Kashyap, 2010).

From a theoretical point of view, the resource-based view is preferred when theory is applied to the management of intangibles (Kaufmann and Schneider, 2004). IC is closely imbricated into resource based view (RBV), whereby SMEs must look for valuable, rare, inimitable, and non-substitutable (VRIN) resources. Other authors argue that IC is a fundamental determinant of the competitive advantage since SMEs accumulate scarce intangible specific assets (Pal and Soriya, 2012). Moreover, the RBV suggests that SMEs have to develop their competitive advantage with distinctive intangible, hard-to-imitate resources and skills that counteract the shortcomings of their sizes and absences of economies of scale (St-Pierre and Audet, 2011).

However, the RBV has its shortcomings. For instance, it does not take into account the dynamics of the industry within which the organization competes, but rather focuses on the processes of resource accumulation and deployment that are inherent to that organization (Cheng et al., 2010). Moreover, the RBV considers the competitive environment as stable and transparent. Today's competitive environment however, is characterised by dynamic changing markets and fast changing customer demands (Stam, 2005). For these reasons, the RBV and the dynamic capabilities view (DCV) are combined in order to understand the dynamics of IC in Mexican SMEs. Additionally to possessing the skills, processes, and networks, SMEs must be able to integrate, build, and reconfigure internal and external competencies to respond rapidly to competitive environments (Teece et al., 1997).

1.5 Organization of the thesis

As this field of study is still emerging and evolving, several gaps were identified for this thesis. This work aims to highlight the most significant intellectual capital elements affecting the competitive advantage of Mexico SMEs. An in-depth look is taken at the elements in the internal and external environments of the organization that are or can become sources of competitive advantage. Moreover, methodological, theoretical, and practical contributions are discussed.

The main research question is:

- *How should intellectual capital be measured and what is its impact on the competitive advantage of SMEs in Mexico?*

To answer this research question, the primary question is divided into three sub-questions:

- *How do we measure intellectual capital?*
- *What are the components of intellectual capital in Mexican SMEs?*
- *What is the relationship between intellectual capital and competitive advantage of SMEs in Mexico?*

First, a literature review is presented to demonstrate the state of knowledge on the subject. This literature review will answer the first research sub-question: *How do we measure intellectual capital?* In this essay, ten literature reviews on IC are identified. It was found that none of these reviews tackled methodological issues pertaining to this field of study. Given the importance of using adequate methodological techniques and given the lack of literature on this topic within the field of IC, it is studied from a methodological perspective. Limitations of regressions and other types of quantitative methods used when studying IC are noted. Subsequently, the use of structural equation modeling (SEM) is promoted.

Building on the first paper, essay 2 presents a measurement model adapted to the realities of Mexican SMEs making use of quantitative methods. This paper aims at answering the second research sub-question: *What are the components of intellectual capital in Mexican SMEs?* The study aims to understand the characteristics of different components of IC in Mexican SMEs. More specifically, it takes an in-depth look at the three components of intellectual capital: human, organizational, and external capital. In order to do so, a quantitative study on 454 SMEs based on data collected through an online survey is conducted. Then, a structural equation model that fits with the reality of Mexican SMEs is proposed. Regional differences are highlighted by means of multigroup analysis.

Finally, a qualitative approach is used to deepen our knowledge of the theoretical aspects of intellectual capital, taking into account the resource-based and the dynamic-capabilities views. This third essay will answer the third research sub-question: *What is the relationship between*

intellectual capital and competitive advantage of SMEs in Mexico? This essay combines the resource-based and dynamic capabilities views to examine intellectual capital in the state of Queretaro and its relation to competitive advantage. Following an exploratory approach, this paper relies on semi-structured interviews with managers to take an in-depth look at the three components of intellectual capital: human, organizational, and external capital. Further, a typology is proposed and the examined SMEs are categorized accordingly.

The results of this thesis include important information that benefits SME leaders as well as authorities in decision-making and strategic planning. The study provides information about the competitive profile of Mexican SMEs from the perspectives of the executives of these SMEs and whether this competitive profile is adequate to attain and sustain a competitive advantage.

Figure 1 Thesis structure

Research question:

How should intellectual capital be measured and what is its impact on the competitive advantage of SMEs in Mexico?

Sub-question 1:	**Sub-question 2:**	**Sub-question 3:**
How do we measure intellectual capital?	What are the components of intellectual capital in Mexican SMEs?	What is the relationship between intellectual capital and competitive advantage of SMEs in Mexico?

Essay 1:	**Essay 2:**	**Essay 3:**
Structural equation modeling methods for studies on intellectual capital: A methodological review	Towards a better understanding of intellectual capital in Mexican SMEs	Intellectual capital in Mexican SMEs from the perspective of the resource-based and dynamic capabilities views

Conclusion:

Contributions, limitations, future research avenues

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Chapter 2:

Structural Equation Modeling Methods for Studies on Intellectual Capital: A Methodological Review

Article 1

Titre:

Structural Equation Modeling Methods for Studies on Intellectual Capital: A Methodological Review

Résumé:

La présente étude constitue une recension de la littérature des dix dernières années (2004-2013) sur le concept du capital intellectuel. L'analyse de cette littérature démontre qu'elle traite principalement les thèmes relatifs à la définition, aux objectifs, aux modèles, ainsi que à la catégorisation des composantes du capital intellectuel. Aucune de ces revues n'a abordé les questions méthodologiques relatives à ce domaine d'étude, d'où, l'objectif de cette recherche. Cette étude permettra de cibler les bonnes pratiques méthodologiques pour mieux comprendre le concept à l'étude. Étant donné la nature latente du capital intellectuel, cette recherche focalise sur les études quantitatives et plus particulièrement sur la modélisation par équation structurelle. Les questionnaires, l'échantillonnage, l'analyse des données, les méthodes d'estimation, et l'adéquation du modèle sont discutés. Après une critique des méthodes actuellement utilisées, nous proposons des lignes directrices pour les recherches futures.

Mots-clés : Capital intellectuel; Revue systématique; Modèles d'équations structurelles

Essay 1

Title:

Structural Equation Modeling Methods for Studies on Intellectual Capital: A Methodological Review

Abstract:

Intellectual capital (IC) is a maturing field of study. In this paper, we identified ten literature reviews from the past decade pertaining to the definition, purpose, and reporting models of IC, and the categorization of its components. We found that none of these literature reviews tackled methodological issues pertaining to this field of study. Given the importance of using adequate methodological techniques and the lack of literature on this topic within the field of IC, we studied IC from a methodological perspective. Given the latent nature of IC, we focused on quantitative studies and specifically structural equation modeling (SEM) techniques. Among other things, questionnaires, sampling, data analysis, estimation methods, and an overall model fit are discussed. Following a critique of the currently used methods, we propose guidelines for further research.

Keywords: intellectual capital, methodological review, structural equation modeling

2.1 Introduction

The literature on intellectual capital (IC) has been evolving. Specialized academic publications deal solely with this field, and various special issues in scholarly journals have been dedicated to IC. The debate on the purpose, definition, reporting models, and categorization of IC is maturing, as thousands of publications have tackled these issues over the past decade. Moreover, agreement over conflicting issues is starting to emerge, particularly concerning the definition and categorization of IC (Choong, 2008).

Ten years after Kaufmann and Schneider's (2004) review on existing literature on IC over a period ten years, and following several other reviews on IC, we have identified a gap in the research on IC reviews that we intend to tackle. This paper analyzes the field of IC from a new angle, that is, the methodological evolution of IC research, and is therefore considered a methodological review. Methodological issues have been discussed in many fields of study such as in comparative human resource management (Steinmetz et al., 2011), project management (Smyth and Morris, 2007), tourism research (Tribe et al., 2012), travel behavior research (Golob, 2003), international survey research (Harzing et al., 2013), and management information systems, whereby a methodological examination of MIS surveys research from 1992 to 2006 was made (Abareshi and Martin, 2009). However, this is the first methodological review tackling IC studies.

Since the publication of Kaufmann and Schneider's (Kaufmann and Schneider, 2004) review, several scholars published reviews relating to IC. We were able to identify nine other articles published in scholarly journals whose objective was to portray current knowledge of IC from different angles. These reviews can be classified in two broad categories: conceptual and domain-specific reviews.

We identified five conceptual reviews that examine IC literature, by focusing on conceptual issues such as definitions, categories, reporting, and theories, for proposing future research avenues. Bhartesh and Bandyopadhyay (2005) categorize the different measurement methods into indirect methods (rate of return method, market capitalization method), direct intellectual capital method (DIC), and the scorecard method (SC). The origins and history of IC are

presented by Pike et al. (2006). These authors claimed that the foundation of IC can be traced back to Schumpeter's work in 1912; they also found other links to the works of Chamberlin in the 1930s and of Penrose in 1959. From a theoretical perspective, IC was linked to the resource-based view, and particularly its determinants of resource allocation that lead to a competitive advantage. As for the measurement, the authors highlighted 18 different frameworks to measure IC and classified them into five categories. Basing his paper on the works of (Kaufmann and Schneider, 2004), Choong (2008) concluded that despite agreement on the non-monetary and non-physical nature of IC, definitions are still numerous and disparate. On the positive side, the categorization of IC seems to be converging towards three main focus groups: human, organizational (or structural), and relational capital. Tan et al. (2008) presented a chronological seminal literature review that followed the same avenue as in Choong (2008). Finally, El-Tawy and Tollington (2012) reviewed the literature published in the Journal of Intellectual Capital between 2000 and 2006. Conclusions were similar to the other general reviews, namely that the definition, measures, and components of IC need to be further researched.

As for the four domain-specific reviews of the literature on IC that we identified, they took different approaches to looking at IC, namely, focusing on: a regional level (Lerro and Carlucci, 2007); specific domains of application such as IC in libraries (Kostagiolas and Asonitis, 2009); and the impact of IC on capital market (Abhayawansa and Guthrie, 2010), intellectual assets, and specifically liabilities (De Santis and Giuliani, 2013). Based on these existing reviews of studies in the field of IC, we identified a clear research gap. So far, reviews have investigated concepts, definitions, measures, and specific domains. However, to our knowledge, there is no review looking into the methods used to study IC.

This review has three objectives. The first is to identify quantitative research in IC and analyze its evolution over the past decade. Secondly, an emphasis is placed on structural equation modeling, as methodological problems are identified and discussed. Thirdly, problem areas are highlighted, and recommendations are proposed. Subsequently, all structural equation modeling SEM studies on IC are identified, their content is analyzed, gaps are recognized, and future research avenues are proposed. To achieve the above-mentioned objectives, the following section of this paper presents the methodology. Subsequently, SEM publications are examined from a methodological perspective. The descriptive characteristics, level of analysis, as well as

methodological issues such as sampling, type of data, reliability, and model fit are discussed. The final section discusses future research avenues and concludes this paper.

2.2 Methodology

This paper reviews empirical studies on IC, and specifically quantitative research done on this topic. In order to do this, we look at research on IC published over the past decade. A broad search on the *ISI Web of Science, ProQuest (ABI/Inform)*, and *Business Source Complete* databases was conducted using the term "intellectual capital." Furthermore, the thesauruses of the selected databases were used to ensure the appropriateness of the selected term. This preliminary search yielded over 2200 peer-reviewed publications.

Several inclusion and exclusion criteria were set in order to filter publications. Pertaining to the inclusion criteria, all articles using SEM methods published in peer-reviewed scholarly journals as of 2003 were included. As for exclusion criteria, qualitative methods, conference papers, and unpublished work were excluded. The results from the three databases were grouped and duplications were removed. Our final sample contained 36 articles. Data extraction followed, whereby a thorough analysis of all articles was done. Information such as authors, affiliation, journal, objectives, IC definition, IC categorization, sampling, response rate, level of analysis, dependent versus independent variables, as well as methodological issues were extracted.

2.3 Structural equation modeling in intellectual capital studies

Regression, a relatively old statistical method, is a widely used technique in IC studies because it is a versatile tool that allows model specification, identification, and estimation (Field, 2009, Kothari, 2004). However, compared to SEM, it presents several shortcomings. It is not a robust enough model for error and model misspecification measurement (Bohrnstedt and Carter, 1971). It assumes perfect measurement of variables, which is not possible in management studies, particularly when using latent variables. Given the nature of IC, we deal with latent variables in management studies. Such variables cannot be measured directly, but are rather inferred from other observed variables. SEM, as a second-generation multivariate method, has a fundamental advantage over regressions. It is more appropriate to use to study latent constructs since it takes

into account latent variables while measuring estimation errors. It allows for better control and decreases biased estimates of the relationships between the latent constructs. Moreover, it allows for more flexible assumptions, tests entire models instead of individual coefficients, and can measure complex equations such as times series with auto-correlated errors and incomplete and non-normal data (Iacobucci et al., 2007). Finally, SEM allows to compare competing models within the same data set (Williams et al., 2004). With an increasing number of scholars using SEM in IC studies, it is important to analyze publications using such methodology, compare them to set standards, and evaluate their impact on the field.

2.4 Descriptive analysis

2.4.1 Publication by journal

We considered all peer-reviewed journals in our analysis, rendering a diverse range of articles in our sample. Out of the 36 articles, six were published in the *Journal of Global Business Management*, while two were published in the *African Journal of Business Management*, *Journal of Business Ethics, Management Decision, Service Industries Journal, International Journal of Human Resource Management*, and the *Interdisciplinary Journal of Contemporary Research in Business*. Eighteen articles were from other journals. Interestingly, journals specialized in IC published very few articles using SEM, for example, the *Journal of Intellectual capital* published only one such article while the *International Journal of Learning and Intellectual Capital* published none.

2.4.2 Publication by year

We studied IC publications as of 2003. Over this period, we noticed a steady pattern in the use of SEM between 2003 and 2010, where there were no publications in 2003, and either one or two publications per year between 2004 and 2010. Surprisingly, in 2011, 14 articles using SEM to study IC were published and in 2012, 11. This sudden increase could be explained by the increased attention given to SEM and its advantages in explaining latent variables.

2.4.3 Publication by activity sector

Looking at the publications by activity sector, we noted that about a third of them used mixed samples coming from different industries, while 25% of the studies focused on manufacturing. The information and communications technology (ICT), hospitality management, and health care sectors each represents 8% of the studies. Finally, the rest of the articles focused on other types of sectors and industries such as design, construction, and logistics (see figure 2).
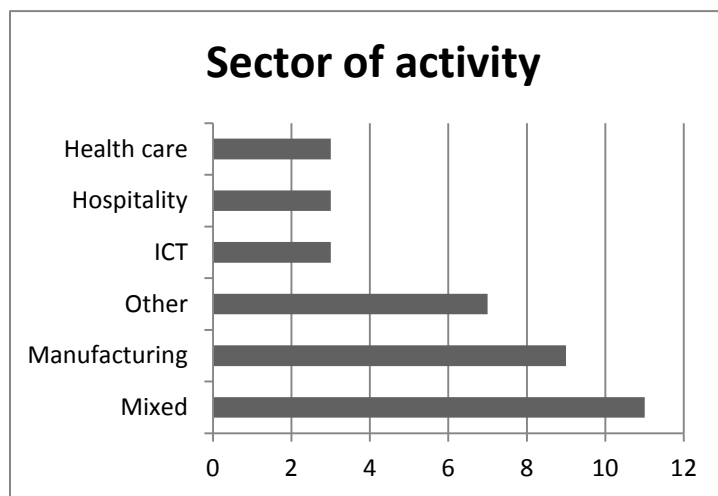
Figure 2 Studies on IC using SEM by sector of activity

2.4.4 Publication by country and degree of collaboration

In our sample, 18 out of the 36 articles using SEM for studies on IC were from Taiwan, representing 50% of our sample, followed by Iran with three studies (8%) and Spain and North America with two studies each. The remainder of the sample (31%) was divided across 11 different countries. Four studies have not specified the country where the study had been conducted, while another one used a multi-country perspective. Moreover, to the best of our knowledge, no studies using SEM have been conducted in Africa or South America.

Collaboration between researchers is critical to advance any field of study. In our sample, 25% of the articles have a single author, while 33% have two authors and 42% have three to five authors. Regarding the collaboration between authors, 26% of the articles (nine out of 27) were

between authors from the same university, while 74% (18 out of 27) were by authors from different universities. However, only four studies were part of international collaborations.

2.4.5 Recommendations on the descriptive analysis

Given the importance of the context and the culture-sensitive nature of IC subdomains (human, organizational, and relational capital), the activity sector and country covered in the studies need to be specified. Moreover, studies conducted in different countries and particularly North America, Europe, Africa, and South America are encouraged, as well as multi-country perspectives. We would like to point out the fact that half of the studies on IC using SEM techniques are from a single country (Taiwan). Furthermore, specialized IC journals should encourage the use of SEM techniques, as there was only one study in our sample using such a technique in only one of the two specialized journals.

2.5 Questionnaire and sampling

When using quantitative methods in general and SEM specifically, it is imperative to ensure that the questionnaire and sampling methods are sound. Table 1 presents a detailed analysis of questionnaire building and data generation to determine the soundness of these methods. In this section, we will discuss item generation, translation of the questionnaire, type of data and scales, validity of the questionnaire, survey administration, sample size, response rate, and non-response bias treatment.

2.5.1 Item generation

As explained earlier, the purpose of this review is not related to the definition of the IC constructs and its subdomains. However, it is important to explicate item generation. It is not sufficient to merely present a literature review of the topic at hand. Instead, authors must show transparency in questionnaire building and measurement. Six studies of our sample did not explicate the sources of their IC construct. As for the others, several relied on studies by (Bontis, 1998, Dzinkowski, 2000, Edvinsson and Malone, 1997, Roos and Roos, 1997, Tsen and Hu, 2010, Youndt et al., 2004). Some studies such as Cabello *et al.* (2011) replicated the work of one

author to build their IC measurement while Isaac *et al.* (2010) relied on over 20 sources for IC scale development.

2.5.2 Questionnaire translation and validation

Mistranslation or poor translation can have a negative impact on the quality of the data collected (Harkness et al., 2004). Authors should therefore mention how the questionnaire was translated and what measures were taken to ensure proper adaptation to the local language, culture, or even activity sector. Out of the 36 studies in the IC field using SEM, only three reported using the back-translation technique to ensure proper questionnaire validity, thus representing only 8%. The rest of the sample did not mention the language used to administer the questionnaire, nor if they had to take any measures to ensure proper adaptation of the questionnaire.

As for validity, 22% (eight studies) reported pre-testing the questionnaire with a sample of professionals; one study reported interviewing professionals to adapt and adjust the questionnaire, while 31% (11 studies) reported using several means to ensure questionnaire validity, such as: professional pretests, academic validation, and interviews. Lastly, 44% of the studies did not report any form of questionnaire pre-testing.

2.5.3 Data collection

In terms of the type of data used, we found that 14% (five out of 36) used secondary data, while 6% (two out of 36) used mixed data sources, and 81% used primary data. As for the scales used, a Likert scale was usually used. This scale allows for understanding the direction and intensity of a respondent's perception. We found that 38 used a 7-point scale, 31% a 5-point scale, while 31% did not report the scale used.

In terms of questionnaire administration, only 38% of the studies reported the means they used to do so. Hence, 22 studies did not explicitly state how they carried out data collection. As for the rest, eight reported mailing the questionnaires by post (22% of total studies), two electronically, one face-to-face, and three used mixed methods.

2.5.4 Sample size and response rate

There is no consensus on what constitutes an acceptable sample size in SEM studies (Raykov and Marcoulides, 2006). Given the nature of latent variables in IC studies, it is challenging to determine a simple sample size method. Various authors suggest that for a sample to be acceptable one needs a minimum of 200 observations; others suggest that the sample size must be 10 to 15 times the number of observed variables, or be at least five times the number of free parameters in the model (Bollen, 1998, Golob, 2003, Kline, 2011, Raykov and Marcoulides, 2006). By looking at the above requirements, studies on IC using SEM perform poorly. In our overall sample, only 53% (19) have over 200 observations, where the smallest sample size is 27 observations and the biggest one is 533.

As for response rates, six studies did not divulgate them. This is important since, depending on how the survey is administered, response rates diverge greatly. Moreover, low response rates could be a sign of sampling bias. In our findings, response rates were between 94.8% and as low as 11%. However, only four studies reported testing for non-response bias.

2.5.5 Recommendations on questionnaire and sampling

In terms of the questionnaire and sampling, key information should be clearly stated, allowing transparency and model replication. Clearly presenting item generation is also important, as a general literature review on IC is not sufficient for this. A table containing the sources of the IC construct can be a simple and efficient way to present how human, organizational and relational capitals are chosen. Knowing that most studies are published in English but data collection is done in a foreign language, it is essential for authors to validate the questionnaire by using adequate translation techniques such as back-translation (Harkness et al., 2004). Moreover, several other validation techniques can be used. Pre-testing the questionnaire on a small scale with professionals, obtaining feedback from academic experts in the field, as well as qualitative interviews in order to enrich the questionnaire, are all validation techniques to ensure questionnaire adequacy.

The sources of data collection must be explicated, especially when primary data is used. Scholars must present the scale used, specifying if a 5-point Likert scale, 7-point Likert scale, dichotomous variable, or if any other scale is used. When using secondary data, authors shall present the source used as well as the variables extracted from the database. In terms of data collection, key information including how the questionnaire was administered, sample size, and response rate must be discussed. Moreover, testing for non-response bias is important, as the quality of the collected data may be jeopardized.

Study	Item generation	Antecedent	Consequences	Scale	Validity	Data	Survey	Size	Rate
(Abadi and Tavakoli, 2011)			Brand value			Secondary		52	
(Ahmadi et al., 2011)	(Bontis, 1998)		Organizational performance		Pretest	Primary		236	94.8%
(Baxter and Matear, 2004)	(Roos & al, 1997; Bontis 1998,2002,)	Human & structural capital	Future financial performance	7 point	Interviews & pretest	Primary	Postal	318	23%
(Cabello-Medina et al., 2011)	(Lepak & Snell, 2002)		Innovative performance	7 point		Primary	Electronic & postal	85	13.73%
(Cater and Cater, 2009)	(Bontis, 1998)		Cost-leadership competitive advantage; Differentiation competitive advantage	5 point		Primary	Postal	500	36.4%
(Cegarra-Navarro and Rodrigo-Moya, 2005)	(Camison & al., 2000; Onge, 1996; Bueno, 1998)	Group capital		7 point	Pretest & academic validation	Primary	Postal	139	63.18%
(Chang and Chen, 2012)	(Chen, 2001)	BSC implementation	Financial performance	7 point	Pretest & academic validation	Primary	Postal	152	33.8%
(Chang, 2012)	(Chen, 2008)	CSR & environmental consciousness		5 point	Pretest & academic validation	Primary	Postal	122	30.5%
(Chao, 2011)	(Shu-Hsiao Tsen & Hsiang-ling Hu, 2010)	Human resource management	Organizational performance		Pretest & academic validation	Primary		212	84.8%
(Chen et al., 2008)	(Dzinkowski, 2000; Chen, 2000)	Innovative activities	Corporate development	5 point	Pretest	Primary		301	37.63%
(Chien, 2012)	(Chen,2001; Chen & Hu, 2010)	BSC & organizational commitment		7 point	Pretest	Primary		152	42.2%
(Chun-Yao and Yeong-Jia, 2005)	(Youndt, 1998; Bontis, 1998; Roos & al, 1998; King & Anderson, 1995)		Corporate value	7 point		Primary	Postal	81	28.03%
(Feng et al., 2012)	(Bontis, 1998; Edvinsson, 1997; Mouritsen & al., 2001; Roos & al., 1998)		Research outcomes & technology transfer			Secondary		86	
(Herremans et al., 2011)	Davenport & Prusak, 1998; Becker, 2001)	Level of decentralization & level of technology infrastructure	Internal uncertainty	5 point		Primary	Face-to-face	162	70%
(Hsu and Sabherwal, 2011)	(Youndt & al, 2004; Subramaniam & Youndt, 2005)		Knowledge enhancement capability & knowledge utilization capability	7 point	Pretest & academic validation	Primary & secondary		533	36.4%
(Hsu and Sabherwal, 2012)	(Youndt & al, 2004)	Learning culture	Knowledge management & dynamic capabilities	7 point	Pretest & academic validation	Primary & secondary	Postal	533	36.4%
(Huang and Kung, 2011)	(Bontis, 1999; Johnson, 1999; Chen, 2008)	Environmental consciousness	Competitive advantage		Pretest & academic validation	Primary	Postal & face-to-face	237	18.92%
(Isaac et al., 2010)	21 sources for IC scale development	Trust		5 point		Primary	Electronic & face-to-face	162	
(Khani et al.,			Performance			Primary		52	

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2011)

(Kim et al., 2012)	(Kim & al., 2011)		Performance	7 point		Primary		253	72.3%
(Kim et al., 2011)	17 sources for IC scale development	Human, organizational & customer capital		7 point	Pretest & academic validation	Primary		107 253	82.3% & 72.3%
(Lee et al., 2011a)	(Snell & Dean, 1992; Subramaniam & Youndt, 2005; Moenaert & Souder, 1996; Earley & Elaine, 2000; Edmondson, 1999)		Manufacturing process innovation	5 point	Pretest & academic validation	Primary	Electronic	179	11% to 48%
(Lee et al., 2011b)	(Peng, 2008)	Innovation strategy	Organizational performance		Pretest	Primary		312	89.14%
(Meng-Yuh et al., 2010)	(Chen & al, 2004; Hermans & Kauranen, 2005; Wu & al., 2006; Wang & Chang, 2005)		Performance			Secondary		224	
(Menor et al., 2007)			Process flexibility & product innovation	5 point		Secondary		264	
(Morris and Snell, 2011)	11 sources for IC scale development		Generation, sharing & implementation capabilities	5 point	Pretest, interviews, & academic validation	Primary	Electronic	187	65%
(Tai-Ning et al., 2011)		Knowledge creation				Primary		234	36%
(Ting, 2012)	(Chen, 2001; Tsen & Hu, 2010)		Organizational learning capability & organizational performance	7 point	Pretest	Primary		236	78.67%
(Wang, 2012)	(Tsen & Hu, 2010)	Organizational culture	Organizational performance	7 point	Pretest	Primary		182	75.8%
(Wu, 2012)	(Chen, 2001; Tsen & Hu, 2010)	BSC & corporate innovations		7 point	Pretest	Primary		151	43.1%
(Wu et al., 2012)	(Chen, 2001; Tsen & Hu, 2010)		Organizational performance	7 point	Pretest	Primary		238	79.3%
(Ling, 2012)			Global initiatives	5 point		Primary	Postal	168	
(Yang and Lin, 2009)	(Lado & Wilson, 1994; Nonaka, 1994; Nahapiet & Ghoshal, 1998; Pennings & al, 1998; Bontis, 1999; Argote & al, 2000; Hitt & al, 2001; Kang & al., 2007)		Organizational performance		Interviews	Primary		277	56%
(Yen-Chun and Chou, 2007)	Edvinsson & Malone, 1997; Roos & al., 1997; Stewart, 1997; Sveiby, 1997; van Buren, 1999; Dzinkowski, 2000; Ordonez de Pablos, 2003)	Human, structural & customer capital				Secondary		27	
(Yitmen, 2011)			Competitiveness & innovation drivers	5 point		Primary		205	33.2%
(Yun Ji and Hyo Gun, 2006)	Edvinsson & Malone, 1997; Brooking, 1996; Sveiby, 1997; Bontis & al., 2000)	Human, structural & relational capital		5 point		Primary		250	89%

Table 1 Issues related to questionnaire and sampling

2.6 Overall model fit

This section deals with SEM statistical methodology. In order to be able to replicate the proposed models and to ensure goodness of fit, several conditions must be met. We will present the key information in this regard, i.e., software estimation methods, construct validity and reliability, model comparison, chi-square and degree of freedom (df), and goodness of fit indices.

2.6.1 SEM software

Several software are marketed for SEM. Beyond graphics and ease of use, there are important differences that can occur depending on the software used. These differences can be due to rounding, the estimation approaches used, and command language. For instance, EQS checks for invariance by testing the validity of equality constraints multivariately, while LISREL tests it univariately (Byrne, 1994). For the purposes of reliability, it becomes important to specify the software as well as the version used. In total, 23 articles (64%) mentioned the software used. Out of this sample, 12 studies used AMOS, 10 used LISREL, and one used EQS.

2.6.2 Estimation methods

Estimation methods allow comparing the relationship between variables and the estimated covariance matrices of the model. Most software use frequentist methods, such as maximum likelihood, that are based on point estimates and a hypothesis test to measure the latent variable. A maximum likelihood estimator presupposes that variables are multivariate with normal distribution (Raykov and Marcoulides, 2006). Other methods also exist in the case of non-linear models. For instance, Bayesian methods can be used for complex cases, and has the advantage of functioning well with small samples. Given the specificities of each estimation method, authors should clearly state the estimation method used and justify their choice. In this study, only 16 studies out of the 36 specified the estimation method used, while 13 (36% of total studies) used maximum

likelihood estimation, and three (8%) used the Bayesian estimation. Over half of the studies (56%) did not mention the estimation method used.

2.6.3 Construct validity

Testing model validity must be done to ensure that the model holds, before testing the hypothesized relationships. To do so, researchers should test all measures at the same time, since testing each construct separately does not ensure that the relationships between the indicators are considered (Cheng, 2001). There are several ways to ensure construct validity; therefore, researchers must ensure the validity of different facets of measurement (Kline, 2011). Four components make up construct validity—nomological validity, face validity, convergent validity, or discriminant validity (Hair Jr et al., 2009).

Nomological validity observes the link between the proposed construct and theory, while face validity is determined prior to theory testing. To examine nomological validity, the matrix of construct correlation taken from the confirmatory factor analysis (CFA) is used. Face validity is ensured by comprehending items' content while linking it to the theory (Hair Jr et al., 2009). Most studies failed to report nomological validity and face validity, whereas only two and four studies in our sample, respectively, did so.

As for convergent and discriminant validity these methods compare measures against each other. Convergent validity can be tested by comparing two models. The traits of the first model traits are specified while that of the second one are not. The significant difference in X^2 between the two models is proof of convergent validity. As for discriminant validity, independent measures of traits must be examined and their correlation must be negligible (Byrne, 2013). However, most commonly, CFA is used for assessing convergent and discriminant validity. It allows us to determine whether there is empirical support for the proposed theoretical factor structure. In the case of the analyzed IC studies, only five used exploratory factor analysis (EFA) while 28 (78%) used CFA. In terms of other forms of convergent and discriminatory validity, 22 studies (61%) reported convergent validity, while 19 studies (53%) reported discriminant validity.

2.6.4 Construct reliability

In evaluating reliability, Cronbach's alpha is the most commonly reported. As a rule of thumb, a 0.7 or higher Cronbach's alpha is deemed good, and a Cronbach's alpha of higher than 0.6 is considered acceptable (Hair Jr et al., 2009). Other reliability indices are the composite reliability and average variance extracted (Bollen, 1998). Too many researchers failed to report construct reliability of their measures. Only 24 studies (67%) reported reliability in terms of Cronbach's alpha, while 10 (28%) presented composite reliability, and 20 (56%) average variance extracted (AVE).

2.6.5 Model comparison

In SEM modeling, authors can present a single model with one sample set, use a single model with multiple samples, or present multiple models to compare their proposed model with alternative nested models to test different theoretical propositions (Shah and Goldstein, 2006). Moreover, once they present a proposed model, they must provide theoretical support for the changes made to the original model and must acknowledge other models and compare them to their proposed model while discussing their results (Williams et al., 2004). In our sample, 27 studies (75%) used a single model with a single sample. In contrast, only nine studies (25%) compared alternative models or their hypothesized model with models from the literature. Finally, only three studies (8%) used multiple samples, by splitting the sample and testing their measures.

	Studies reported N=36	Proportion (%)
Software		
AMOS	12	33%
LISREL	10	28%
EQS	1	3%
Not mentioned	13	36%
Estimation method		
Maximum Likelihood	13	36%
Bayesian method	3	8%
Not mentioned	20	56%
Confirmatory factor analysis	28	78%
Exploratory factor analysis	5	14%
Validity		
Convergent validity	22	61%
Discriminant validity	19	53%
Nomological validity	2	6%
Face validity	4	12%
Reliability assessment		
Cronbach's alpha	24	67%
Composite reliability	10	28%
Average variance extracted	20	56%
Model comparison		
Single model (single sample)	27	75%
Alternative models	9	25%
Multiple samples	3	8%

Table 2 SEM data analysis

2.6.6 Chi-square and degree of freedom

Chi-square (X^2) is an inferential index representing the test statistics of the goodness of fit of the model. The degree of freedom (df) is the difference between the number of independent parameters and the number of non-redundant elements in a sample covariance matrix. Having a nonnegative degree of freedom is a necessary condition for model identification (Raykov and Marcoulides, 2006). The ratio X^2/df is an *ad hoc* fit measure. There is no consensus on what represents a good fit, but a X^2/df < 5 is deemed adequate and X^2/df < 2 is considered as a good fit (Bollen, 1998).

In our sample, 24 studies reported their X^2 while 23 reported their df, representing 67% and 64% of all the studies, respectively. As for the ratio X^2/df, 18 studies (50%) presented a ratio less than two, which is considered a good fit, and seven reported ratios (19%) less than five, which is acceptable. However, around a third of the total articles' ratios could not be calculated because of missing data.

2.6.7 Goodness of fit indices

In order to assess SEM model fit, three types of goodness of fit indices are used. Firstly, the absolute fit indices are derived from the fit of the covariance matrices. The most commonly used indices include the root mean square error of approximation (RMSEA), root mean square residual (RMR), standardized root mean square residual (SRMR), goodness of fit statistic (GFI), and adjusted goodness of fit statistic (AGFI).

The incremental fit indices compare the model to the baseline model and include comparative fit index (CFI), incremental fit index (IFI), normed fit index (NFI), non-normed fit index (NNFI), and the relative fit index (RFI). Finally, the parsimony adjusted measures include the parsimony goodness of fit index (PGFI), parsimony normed fit index (PNFI), and parsimony adjusted fit index (PCFI). There is no consensus on what measures should be presented by authors, but a combination of the three types should be presented. Moreover, authors should not present the indices that fit their model the best, while omitting to present and discuss the ones that are less applicable (Bollen, 1998, Byrne, 1994, Raykov and Marcoulides, 2006).

Table 3 presents the goodness of fit indices figures for IC studies using SEM. The table shows that 25% of the studies did not report the RMSEA. A quarter of the studies have an RMSEA below the specified criteria of 0.06, as they range between 0.067 and 0.08. These results can be deemed acceptable when a more liberal cutoff of 0.08 is used. As for RMR (SRMR), about half of the studies did not report this, while the ones reporting it had values within acceptable norms. In terms of the incremental index, CFI and NFI were the most widely used indices, while RFI was the least reported. Parsimony indices were

very rarely reported by authors, with PCFI presented only once, PGFI discussed in four articles, and PNFI in six.

	Criteria	Within criteria	Below criteria	Not reported
Absolute index				
RMSEA	<0.06	18 (50%)	9 (25%)	9 (25%)
RMR (SRMR)	<0.06	17 (47%)		19 (53%)
AGFI	>0.9	14 (39%)	5 (14%)	17 (47%)
GFI	>0.9	17 (47%)	2 (6%)	17(47%)
Incremental index				
CFI	>0.9	29 (81%)	2 (6%)	5 (14%)
IFI	>0.9	9 (25%)		27 (75%)
RFI	>0.9	3 (8%)		33 (92%)
NFI	>0.9	20 (56%)	3 (8%)	13 (36%)
NNFI	>0.9	6 (17%)	1 (3%)	29 (81%)
Parsimony index				
PCFI	>0.5	1 (3%)		35 (97%)
PGFI	>0.5	4 (11%)		32 (89%)
PNFI	>0.5	6 (17%)		30 (83%)

Table 3 Goodness of fit indices

2.6.8 Recommendations on model fit

When looking at goodness of fit, it may be pertinent to present and discuss detailed information. Given the difference in result that may occur from the use of different software, as well as between the different versions of the same software, scholars should specify the version of the software used for SEM calculation. Estimation methods such as maximum likelihood should be justified, and the authors should explain why they chose to use it as well as stipulate its advantages and disadvantages. Construct validity and reliability should be ensured using validation techniques such as CFA. Moreover, different types of validity should be discussed such as convergent, discriminant, nomological, and face validity. The same applies to reliability, whereby Cronbach's alpha is the most used form of construct reliability. However, composite reliability and AVE could be presented and discussed when applicable. Other validation techniques are also suggested, such as cross-model validation using random or non-random sampling.

Finally, different models should be presented and tested in order to present the best possible fit model. Detailed results should be presented and authors must explicate items that were eliminated and those that were retained. It is plausible that many lessons will be drawn from the eliminated items as they can be an important source of information about the culture and sector contexts. As for the different indices, X^2, df, as well as a combination of indices comprising absolute, incremental, and parsimony indices must be analyzed. Scholars should keep in mind that when using the exact presented information, other scholars must be able to reproduce the same results. Out of the 36 articles reviewed, only one (Kim et al., 2011) took all the following precautions. First, the authors did an exploratory factor analysis, followed by a confirmatory factor analysis. Furthermore, the sample was split into two parts to purify the measurement scale and to refine it. In terms of construct validity, face, nomological, discriminant, and convergent validity were clearly discussed. Moreover, reliability was tested using Cronbach's alpha as well as composite reliability and average extracted variances. Finally, four competing models were compared and discussed.

2.7 Conclusion

Thousands of articles have been published over the past decade on intellectual capital, of which hundreds used quantitative methods. In this review, we noted the limitations of regressions and other types of quantitative methods used when studying IC, given its latent nature. Subsequently, we promote the use of SEM, which, we argue, presents the best solution for such latent variables (Bollen, 1998, Raykov and Marcoulides, 2006). We do not affirm that SEM should completely replace regressions, but for parsimonious models, structural equations offer better validation of the measurement instruments for the hypothesized relationships in the model (Cheng, 2001). Following our literature review, we found 36 IC publications using SEM. We undertook an in-depth analysis of these studies and showed that the majority of publications omitted to present important information regarding the methods used or did not take proper care to ensure transparency and replicability of the presented models. Following methodological models presented in other fields, we have recommended several aspects of SEM that must be presented by authors using SEM in the field of IC (Abareshi and Martin, 2009, Harzing et

al., 2013, Steinmetz et al., 2011, Tribe et al., 2012). In terms of descriptions, general tendencies in the field, such as types of journals, years of publication, activity sector, country of study, and collaboration amongst researchers, were presented. Questionnaires and sampling issues were discussed after that. In this section, item generation, questionnaire translation and validation, data collection, and sample size were discussed. Finally, model fit standards related to software, estimation methods, construct validity and reliability, model comparison, and overall goodness of fit indices were presented. Consequently, we encourage authors in the IC field to use this paper as a roadmap when using SEM as a methodology, as we presented practical recommendations for future research. However, we are well aware that we could not cover all methodological facets, given the complexity and variability of methods available.

IC is a maturing field of study, and its theory, terminology, comparability, and measurement are still a topic of debate among researchers (El Tawy and Tollington, 2012, Kaufmann and Schneider, 2004, Pike et al., 2006). We conclude that using SEM, based on the recommendations represented in this paper, can help advance this field of study.

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Chapter 3:

Towards a Better Understanding of Intellectual Capital in Mexican SMEs

Daou, A., Karuranga, E., Su, Z. (2014). Towards a better understanding of intellectual capital in Mexican SMEs. *Journal of Intellectual Capital,* 15 (2).

Article 2

Titre:

Towards a Better Understanding of Intellectual Capital in Mexican SMEs

Résumé:

Cette recherche vise à comprendre les caractéristiques du capital intellectuel dans les petites et moyennes entreprises (PME) Mexicaines. Elle focalise sur les trois composantes du capital intellectuel: humain, organisationnel et externe. Pour ce faire, une étude quantitative a été menée sur la base des données recueillies grâce à un sondage en ligne. L'échantillon final est composé de 445 PME. Un modèle d'équations structurelles adapté à la réalité des PME mexicaines est proposé. Les différences régionales sont mises en évidence par une analyse multi-groupe. Les résultats suggèrent que les caractéristiques du capital humain et organisationnel sont consistantes avec les études antérieures sur les PME dans les économies émergentes. Toutefois, le capital externe affiche certaines caractéristiques distinctives uniques au contexte mexicain.

Mots-clés: Capital intellectuel ; PME ; Économies émergentes; Mexique; Modèles d'équations structurelles

Essay 2

Title:

Towards a Better Understanding of Intellectual Capital in Mexican SMEs

Purpose: The study aims to understand the characteristics of intellectual capital (IC) in Mexican small and medium enterprises (SMEs). Due to the shift from traditional factors of production to knowledge-based economy, an understanding of the role of intellectual capital has become crucial for SMEs to develop a competitive advantage.

Design: This study takes an in depth look at the three components of intellectual capital: human, organizational, and external capital. In order to do so, a quantitative study on 445 SMEs was conducted based on data collected through an online survey. A structural equation model is proposed that is a fit with the reality of Mexican SMEs. Regional differences are highlighted by means of multigroup analysis.

Findings: The results suggest that the features of human and organizational capital are consistent with previous studies on SMEs in emerging economies. However, external capital shows some distinctive characteristics unique to Mexican context.

Practical Implications: Implications for managers and policymakers are discussed, whereby an adaptation of programs and policies are required to fit the Mexican context at the national and regional levels.

Originality/Value: To the best of the author's knowledge, this is the first study that observes the components of IC in Mexican SMEs.

Keywords: Intellectual capital, Small and medium enterprises, Emerging economies, Mexico, Structural equation modeling

3.1 Introduction

Small and Medium Enterprises (SMEs) are major players in today's economy. While, historically, researchers and practitioners have paid more attention to multinationals, there is a growing consensus on the need to understand SMEs. In emerging countries, such as Mexico, the public and private sectors recognize the importance of SMEs for their contribution to economic growth, employment, social cohesion, and local development. SMEs make up for 99.8% of formal economic activity and 78.5% of employment in Mexico (INEGI, 2009).

SMEs in Mexico, with the exception of some highly industrialized clusters in regions such as Mexico City (Federal district) and Monterrey (Nuevo Leon), most often are locally oriented and produce outmoded products of low quality, because of outdated tools of production and inadequate marketing. According to the OECD, Mexican SMEs suffer from shortage of human capital, inadequate use of technology (organizational capital), and lack of access to networks (external capital). Their development is further hampered by weak tangible and intangible capital and limited access to finance. Therefore, flexible, targeted and differentiated programs are necessary that take into account the overall conditions of framework in which firms operate, including inadequate infrastructure and low human capital (OECD, 2007).

Moreover, an understanding of the determinants that influence the growth of SMEs is also essential, because of the economic shift from traditional factors of production to knowledge (Piperopoulos, 2010). In an era where information takes on an economic life of its own (Stewart, 1998), intellectual capital (IC), defined in terms of human, organizational, and external capital, has become a key determinant of success for small businesses. In emerging economies where the role of SMEs is crucial in local development, the impact of intellectual capital is even stronger and access to financial capital is limited (Jardón and Martos, 2009, Piperopoulos, 2010). Authors agree that intellectual capital strongly influences the competitive advantage and performance of an SME (Cabello and Kekäle, 2008, Cohen and Kaimenakis, 2007, Jardón and Martos, 2009, Lopez, 2006). Thus, intellectual capital is one of the main assets of business that

helps promote competitive advantage, which is the basis for value creation (Edvinsson and Malone, 1997).

The purpose of this study is to understand the characteristics of the three components of intellectual capital in Mexican SMEs in general, and their variations across regions. This paper falls into the second stage of IC development, aiming to consolidate IC as a legitimate undertaking (Petty and Guthrie, 2000). In order to achieve the above-mentioned objective, the remainder of this paper is organized as follows: Section 2 reviews the literature and defines the major concepts discussed in this paper, *viz.* intellectual capital. It also presents and discusses the three sub-domains of IC: human, organizational, and external capital. Section 3 describes the methodology used in the sampling, data collection, and data analysis process. Section 4 presents the results, which include descriptive characteristics, reliability and validity, as well as the details of structural equation model and the multigroup test. Section 5 discusses the findings and interprets the results. Finally, section 6 concludes by presenting a summary of results, implications for researchers and practitioners, research limitations and future research avenues.

3.2 Literature review

IC falls into a new category of theories which portrays organizational theories in positive terms, grounded in knowledge as organizational advantage, instead of market failure theories (Nahapiet and Ghoshal, 1998). A number of studies have been published in the past decade that present a synthesis of intellectual capital research. Some focus primarily on the origins, theory, and definitions of IC (Dumay, 2009b, Dumay, 2012, Lerro and Carlucci, 2007, Pike et al., 2006); while others systematically present the current state of IC research (Bhartesh and Bandyopadhyay, 2005, El Tawy and Tollington, 2012, Kaufmann and Schneider, 2004, Tan et al., 2008). Existing reviews and published literature present various definitions for the concept of IC based on different schools of thoughts and disciplines. According to Kaufmann and Schneider (2004), several competing terminologies exist for intellectual capital, such as intangible assets, intangible resources, and intellectual property. As for definition, Nahapiet and Ghoshal (1998)

define IC as the knowledge and knowing capabilities of a social collectivity. This knowledge is the stock unit of organizational learning flows (Bontis, 1998). As for the capability, it is closely tied to the SMEs ability to utilize its knowledge resources in order to gain competitive advantage (Subramaniam and Youndt, 2005). According to Brooking (1996), the 'third millennium' enterprise characterized by its good training, work force and know how, lives or dies by its competitive advantage. From the Skandia perspective, IC is defined as the possession of knowledge, applied experience, organizational technology, customer relationships and professional skills (Edvinsson, 1997). However, with the maturity of the field being studied, the characteristics of IC are more commonly agreed upon by researchers. From an accounting perspective, it can be defined as the difference between the market and book value of the firm (Dumay, 2009b, Edvinsson and Malone, 1997). From the management viewpoint, IC is seen as a resource that creates value and ensures competitive advantage for the organization. Moreover, there is a growing consensus that IC consists of following categories: human capital, organizational capital, and external capital (Choong, 2008). Consequently, intellectual capital is the sum of all the assets and capabilities that contribute to the delivery of organizational strategy, but are not recognized and disclosed in the balance sheet. These assets can be divided into human, organizational, and external capital (Choong, 2008, Gallego and Rodriguez, 2005, Steenkamp and Kashyap, 2010).

Furthermore, it is crucial to scrutinize the IC literature from the perspective of SMEs, given the differences between small and large firms. Even if the sub-domains of IC apply to both small and large firms in general, key differences arise in the interaction of these components (Cohen and Kaimenakis, 2007, St-Pierre and Audet, 2011). For instance, smaller firms tend to be less bureaucratic, have simpler organizational processes, and are more long-term oriented given the higher risk and pressure (Huggins and Weir, 2007a). Another key distinction that needs to be considered is the difference between SMEs in developed and emerging economies. It is noted that SME competitiveness in developing countries is based more on production and operation costs (Phusavat et al., 2011). In the following sections, the three dimensions of IC are presented and defined.

3.2.1 Human capital

Human capital can be defined as the knowledge, skills, and abilities of employees (Edvinsson and Malone, 1997, Bhartesh and Bandyopadhyay, 2005). It can be seen as the set of values, attitudes, and aptitude of employees that result in competitive advantage and value creation for the organization (Jardón and Martos, 2009). In other terms, it is the know-how, experience, and talent of employees and managers in the organization (St-Pierre and Audet, 2011). The importance of human capital cannot be emphasized more, since it has been proven time and again that it is the most important aspect of IC (Boekestein, 2006, Choudhury, 2010, Cohen and Kaimenakis, 2007, Durst, 2008, Jardón and Martos, 2009), whereby the economic value of human capital does not need to be proved anymore (Stewart, 1998). However, mere accumulation of individual knowledge does not impact IC, unless it is considered along with organizational capital (Cabello and Kekäle, 2008).

Human capital is also more valuable for SMEs compared to other forms of capital as it directly affects productivity. Compared to larger firms, SMEs also are at an advantage in terms of human capital as they can foster more interaction in a friendly atmosphere, thereby fomenting creativity and cooperation among employees (Ngah, 2009).

3.2.2 Organizational capital

Organizational capital, also referred to as structural capital (Jardón and Martos, 2009, Kamukama et al., 2010), is what remains in the SME when we take out employees. It comprises the core values of SME, which when translated into strategies and structure of organization lead to the diffusion of knowledge, and eventually, an increase in efficiency and performance (Cohen and Kaimenakis, 2007).

Organizational capital can be defined based on the internal structure of the organization. It includes patents, structure, policies, culture, processes, as well as the technology used in the SME (El Tawy and Tollington, 2012, Montequin et al., 2006). This infrastructure is established to support the human capital (Clarke et al., 2011, Yi and Davey, 2010).

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According to a Malaysian study on IC (Ngah, 2009), SMEs tend to keep a record of practices employed. Moreover, SME culture facilitates cooperation among employees and supports creativity, which, along with the use of technology, encourages innovation. The four components of organizational capital that are crucial for the success of SME are: management processes, technological processes, intellectual property, and organizational culture.

3.2.3 External capital

External capital (also referred to as network capital, relational capital, or customer capital) represents the external environment of the SME. In other terms, it is the sum of relationships that SMEs establish with third parties, such as customers, suppliers, government, competitors, and community, as well as the image of organization, reputation of products, and satisfaction of clients (Cohen and Kaimenakis, 2007, Jardón and Martos, 2009), whereby such network ties provide the SME access to resources (Nahapiet and Ghoshal, 1998).

In their study on the impact of external capital on Scottish SMEs, Huggins and Weir (2007) found that government intervention is necessary in order to improve IC. Hence, public policies play a crucial role in the development of SMEs, particularly, in terms of external capital and IC in general. The study concludes that: "It has also been recognized by policymakers in Scotland, resulting in the establishment of the IA Centre as a means of countering perceived economic market failure, and to lead not only in economic development policy terms in this area, but also in terms of business practice both for suppliers of services and for businesses" (Huggins and Weir, 2007a).

Given the importance of client satisfaction, various scholars use the terms customer capital and external capital interchangeably, thereby considering the customer component as the sole representation of the external environment (Adekunle Suraj and Bontis, 2012, Ngah, 2009, Stewart, 1998). In other instances, the image (brand) is used to represent the external capital, since it is a reflection of the ties of the organization with its different stakeholders. In the case of SMEs, the owner/manager often represents this brand, and

thus, a change in ownership can lead to a change in the image of the organization. Such change can have a positive or a negative impact on the performance of the SME depending on the personality of the owner and the extent of his network (Durst, 2008). In order to reflect the importance of the discussed elements in SMEs, focus is put on six key elements: SME image, product reputation, customer satisfaction, relationship with suppliers, relationship with investors, and relationship with other stakeholders.

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┌─────────────────────────────────────────────┐
│              Intellectual capital             │
└─────────────────────────────────────────────┘

┌──────────────┐   ┌──────────────┐   ┌──────────────┐
│    Human     │   │Organizational│   │   External   │
│   capital    │   │   capital    │   │   capital    │
└──────────────┘   └──────────────┘   └──────────────┘
 Leadership          Organizational process   Satisfaction of clients
 Employees' competencies  Technological process   SME image
 Loyalty/commitment  Intellectual property   Product reputation
                     Culture                 Suppliers
                                             Investors
                                             Other stakeholders
```
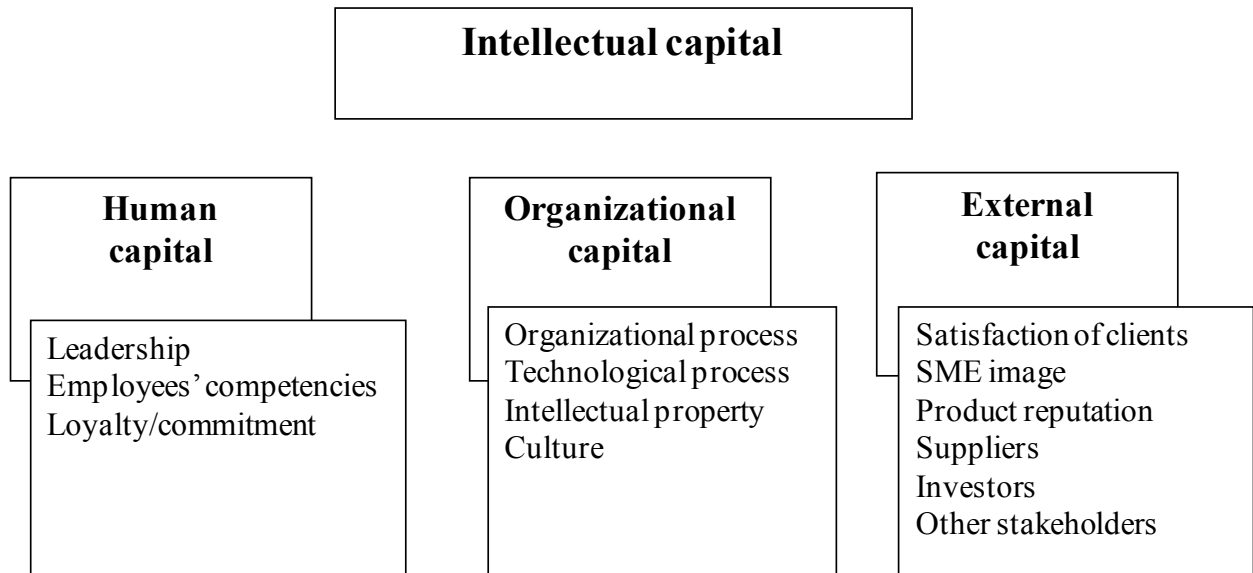
Figure 3 Intellectual capital in SMEs

3.3 Methodology

3.3.1 Sampling

The objective of this study is to measure the components that constitute IC in SMEs in Mexico and highlight regional differences between states. The perspective of owners/managers of SMEs is obtained to analyze their views on the importance of IC in their organizations. After an update in 2009, the definition of SMEs in Mexico has become more comprehensive (Fong Reynoso, 2010). In fact, Mexico adopted one of the most detailed and inclusive definitions, which allows for accurate analysis. The definition combines the three main characteristics of SMEs—sector type, the number of employees,

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and sales volume—and introduces an equation to categorize SMEs according to their overall size.

Size	Sector	Employees	Volume of sales	Maximum combined*
Micro	All	10 or less	$ 4 or less	4.06
Small	Commerce	11 to 30	$ 4.01 to 100	93
	Industry & services	11 to 50	$ 4.01 to 100	95
Medium	Commerce	31 to 100	$ 100.01 to 250	235
	Services	51 to 100		
	Industry	51 to 250	$ 100.01 to 250	250
*Maximum combined= (workers) X 10% + (annual sales) X 90%				

Table 4 Definition of SME

3.3.2 Data collection

An online questionnaire was designed to collect primary data. The survey was based on the IC literature and previous questionnaires validated by theoretical and empirical works. The questionnaire was adopted from the works of Bontis et al. (2000), Cohen and Kaimenakis (2007), O'sullivan and Schulte (2007), and Montequin et al. (2006). The first part of the questionnaire pertains to respondent's information (education, position, ownership, etc.). The second section enquires information related to the organization (size, number of employees, location, industry, etc.), and the third section is based on the IC components (human, organizational, and external capital). All the items related to IC use a five-point Likert scale (where 1 means "not important at all" and 5 means "very important"). In order to ensure validity and reliability, the questionnaire was pre-tested by two means. At first, the questionnaire was modified based on the scholars' reviews. Then, it was further enriched based on the qualitative interviews with SME managers. Back-translation technique was used to translate the questionnaire from English to Spanish (Harkness et al., 2004).

The online questionnaire was administered between January and May 2012. The questionnaire, along with an email including information on the project and an invitation to participate, was sent to 3200 SMEs in Mexico. This email was followed by a reminder email three weeks later. Authors received 445 valid questionnaires at the end of the process that corresponds to a response rate of 14%. In general, a sample size of at least 200 observations, that represents more than 10 times the number of free model parameters, is deemed acceptable (Raykov and Marcoulides, 2006). In this study, the number of observations per parameter is 12.97. Hence, the sample selected for the study is a fit as it fulfills both these conditions. For testing the multigroup equivalence, Mexican states were divided by clusters. Following studies made on the patterns of regional growth according to income clusters (Aroca et al., 2005, Weiss and Resonblatt, 2010), Mexico can be divided into three clusters. Cluster one made up of the Federal district, State of Mexico, Nuevo Leon and Quintana Roo. Cluster two is made up mainly of Northern and Central states (Aguacalientes, Baja California, Baja California Sur, Chihuahua, Coahuila, Colima, Guanajuato, Jalisco, Querétaro, Sonora, Tamaulipas), while the third cluster includes all other states, mostly in the center and south of the country. In this study, we compared cluster 1 (n-191) made up of especially richer states with the rest of the country (n=254), hereafter cluster 2 (Aroca et al., 2005).

3.3.3 Data analysis

A principal component factor analysis with varimax rotation using SPSS was performed to assess the factor structure. Subsequently, structural equation modeling (SEM) was used in order to examine the patterns of interrelationships among the latent constructs (Raykov and Marcoulides, 2006). According to Byrne (2006), SEM as a statistical methodology allows a confirmatory approach to data analysis, while providing explicit estimates of the parameters. Additionally, SEM takes into account error measurement on the variables, which is not the case with standard regression analysis.

EQS 6.1 software was used for analysis to test the relationship between IC and the rest of the factors in the confirmatory factor analysis. Among the various methods of estimation, the use of the maximum likelihood method was privileged, as the data set is normally

distributed. Also skewness (lack of symmetry) and kurtosis (shape of distribution) were considered. In addition, a number of indices to estimate the goodness of fit of the model were calculated. First, the SBX^2/df ratio is presented, wherein a ratio inferior to 5 is deemed acceptable (Bollen, 1998). Moreover, a range of absolute and incremental fit indices are presented. In terms of absolute fit indices, authors presented the Root Mean Square Error of Approximation (RMSEA). The RMSEA value should not exceed 0.08; a value of less than 0.06 implies a good model. Incremental indices discussed are the Non-Normed Fit Index (NNFI), which is a descriptive index that compares the proposed model to a model without interrelationships (null model) and the comparative-fit index (CFI), which also compares the model at hand with the null model. NNFI and CFI values above 0.9 imply that a model is an acceptable fit (Byrne, 2006, Raykov and Marcoulides, 2006).

3.3.4 Multigroup equivalence

Following recommendations by Byrne (2008) and Bentler (2006), the model was tested on a regional level, according to the clusters. The steps followed consisted in a nested sequence of configural (simultaneous model with no constraints), measurement (factor loadings equal) and structural invariance (factor relationships equal) tests.

3.4 Results

The results are presented in four sections. The first section details the descriptive statistics (respondents' characteristics). The second section presents the validity and reliability of the model. The third section emphasizes on the proposed baseline model. Finally, cross group equivalence is tested.

3.4.1 Descriptive statistics

Out of the sample of 445 respondents, 89% are owners/managers of SMEs and 13% belong to administrative staff. In terms of gender distribution, 80% respondents are men. As for sector of activity, 56% SMEs offer services, while 19% are in commerce and 25%

are manufacturing firms (Figure 4). In order to assess the area of SME activity, authors asked about the geographic markets of operation in the administered questionnaire. Based on responses, 23% SMEs operate only locally, 22% operate on regional level, 38% sell their products/services nationally, while 17% have access to international markets (Figure 5).
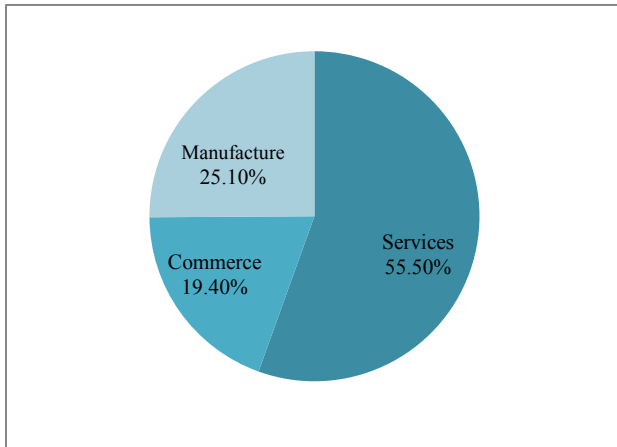
Figure 4 Percentage of respondents by sector of activity
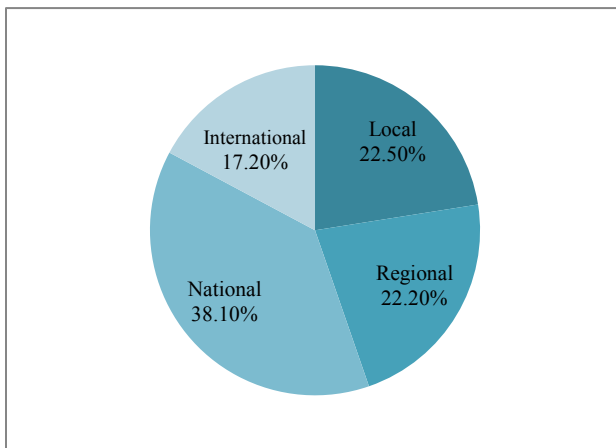
Figure 5 Percentage of respondents by geographic activity

Regarding the geographic distribution of SMEs, received responses came from 28 out of the 32 federal entities (31 states and 1 federal district). Unsurprisingly, the Federal district had the highest response rate (23%), followed by the State of Querétaro (17%) and the State of Mexico (10%). Table 5 presents the geographical distribution by major states.

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Region	Number of SMEs	Percentage of SMEs
Federal district	102	22.9%
Querétaro	75	16.9%
State of Mexico	46	10.3%
Nuevo Léon	39	8.8%
San Lui Potosi	21	4.7%
Jalisco	21	4.7%
Guanajuato	17	3.8%
Coahuila	16	3.6%
Chihuahua	13	2.9%
Others	95	21.4%

Table 5 Geographic distribution of SMEs

3.4.2 Reliability and validity

Reliability and validity of measures must be ensured when using SEM. Reliability ensures accuracy and precision of the measurement procedure. Factor analysis is driven by theoretical relationships among the observed and unobserved variables. It is a commonly used method to ensure reliability, as it determines the number of latent constructs and explains variations among variables. The exploratory factor analysis revealed four factors that explain 66.69% of the variance. Factor loadings ranged from 0.546 to 0.875 (see Table 6). As for scale reliability, Cronbach's alpha is the most common measure used, wherein the recommended threshold is above 0.7 (Field, 2009, Raykov and Marcoulides, 2006).

Intellectual capital consists of three sub-domains: human, organizational, and external capital. According to the factor analysis, human capital is further explained by three components: employee competencies, leadership, and loyalty/commitment of employees. In a similar fashion, organizational capital can be explained by intellectual property, the organizational processes in place, as well as the technological processes and the organizational culture of the SME. Finally, the external environment influencing the SME is divided into two sub-factors. The first one is composed of client satisfaction,

SME image, and product reputation. The second factor is composed of different relationships of the SME with suppliers, investors, and other stakeholders.

Items	Factor 1	Factor 2	Factor 3	Factor 4
Employees competencies	0.785			
Leadership	0.791			
Loyalty/commitment	0.526			
Intellectual property		0.758		
Organizational process		0.763		
Technological process		0.772		
Organizational culture		0.546		
Satisfaction of clients			0.730	
SME image			0.788	
Product reputation			0.875	
Relationship with suppliers				0.748
Relationship with investors				0.802
Relationship with other stakeholders				0.812

Table 6 Factor analysis

Table 7 shows the response rates for each of the IC components on a five-point scale. The mean response rate is high, as most of the respondents considered all components as important or very important. The mean of the different components lies between 3.74 for employees' competencies and 4.82 for satisfaction of clients. Ten of the thirteen components had a mean above 4.

IC components	1	2	3	4	5	Mean
Employees' competencies (EC)	0.7	7.4	32.4	36.5	23.0	3.74
Leadership (LEAD)	0.2	11.3	26.1	32.2	30.2	3.81
Loyalty/commitment (COM)	0	1.3	11.0	31.6	56.1	4.42
Intellectual property (IP)	1.1	6.1	20.2	30.6	42.0	4.06
Organizational process (OP)	1.1	5.6	22.7	36.0	34.6	3.97
Technological process (TP)	0.5	5.2	20.7	32.9	40.8	4.08
Organizational culture OC)	0	2.7	11.3	34.9	51.1	4.34
Satisfaction of clients (SC)	0	0	2.0	14.2	83.8	4.82
SME image (IM)	0.2	1.6	8.3	21.3	68.6	4.57
Product reputation (PR)	0	0.7	4.9	19.1	75.3	4.69
Relationship with suppliers (SUP)	0.2	1.6	14.7	29.8	53.7	4.35
Relationship with investors (INV)	0.5	1.6	24.8	21.8	51.4	4.22
Relationship with other stakeholders (STK)	0.5	1.1	14.7	29.0	54.8	4.36

1=Not important at all; 2= Not important; 3= Neutral; 4= Important; 5= Very important

Table 7 Percentage and mean of IC components

In order to ensure model validity, authors followed a cross validation model. Following propositions by Byrne (2006) and Bentler (2006), the data set was split into two random

samples—sample A and B. Afterwards, SBX^2, df, NNFI, CFI, and RMSEA values for each subset were calculated and compared.

The final part of the model reliability and validity test involves model comparison. Authors tested two models from the literature on IC (Chen et al., 2004, Chien, 2012, Kim et al., 2011, Yen-Chun and Chou, 2007, Yun Ji and Hyo Gun, 2006), be it one-factor or two-factor model. This comparison provides further evidence that the proposed model is the best fit for IC measures in the Mexican context. Table 8 presents the results that show a good fit and acceptable values, thus confirming the reliability and validity of data set.

	SBX^2	Df	NNFI	CFI	RMSEA
Sample A	101.3315	59	0.911	0.933	0.058
Sample B	76.3070	59	0.972	0.979	0.037
One factor model	305.3914	62	0.783	0.828	0.096
Two factor model	151.2090	59	0.914	0.935	0.06
Proposed model	135.3156	60	0.931	0.947	0.053
Cluster analysis					
Cluster 1	86.78	60	0.945	0.958	0.048
Cluster 2	97.3597	60	0.935	0.950	0.050
Invariance					
Configural	183.9389	120	0.939	0.953	0.049
Measurement	189.7492	129	0.946	0.956	0.046
Structural	191.2792	132	0.949	0.957	0.045

Table 8 Fit indices and invariance tests

3.4.3 Structural model

This study presents a confirmatory factor model for intellectual capital in Mexican SMEs. Following the factor analysis, factor models were identified to explain the latent variables. The results of the SME model using EQS 6.1 show a good model fit (figure 6). Given that the Mardia coefficient was greater than 5, the robust method was used. The goodness-of-fit indices met the recommended threshold values and were as follows: SBX^2= 135.3156; df= 60; X^2/df= 2.24; NNFI= 0.931; CFI= 0.947; RMSEA= 0.053. The model needed eight iterations, and all variables were statistically significant at a level of 5%.
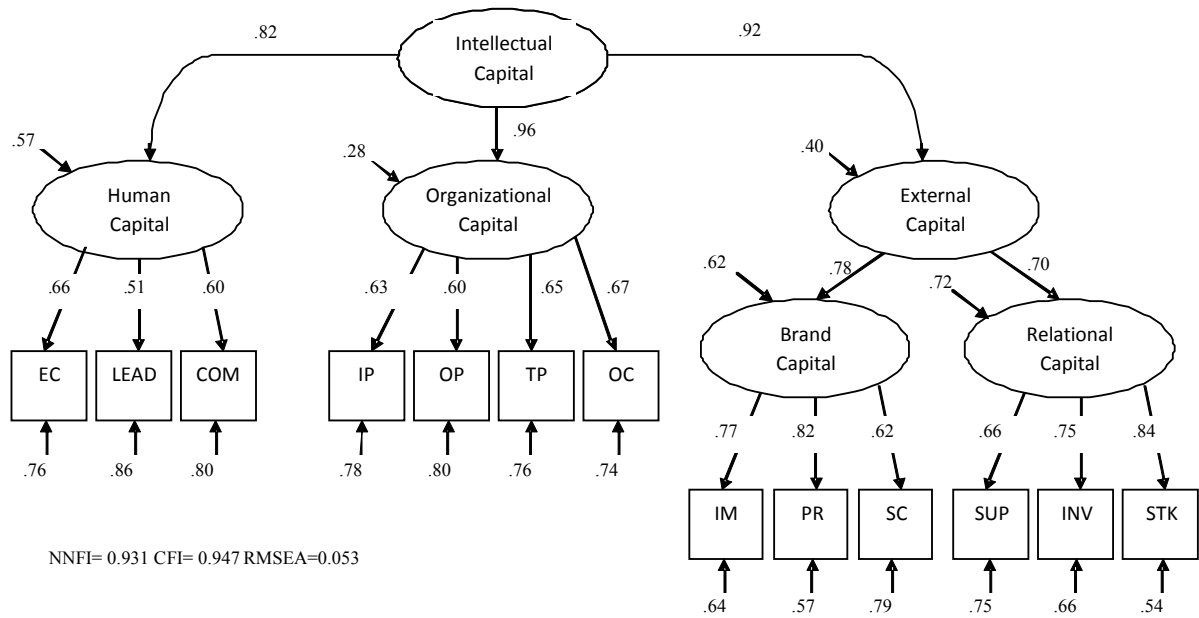
Figure 6 Structural equation model for Mexican SMEs

3.4.4 Cross group equivalence

Table 8 presents the results of the invariance tests and cluster analysis. The proposed model was tested individually for each cluster (see figure 7). The fit was acceptable for both cluster 1 (SBX^2=86.78; NNFI=0.945; CFI=0.958; RMSEA=0.048) and cluster 2 (SBX^2=97.36; NNFI=0.935; CFI=0.95; RMSEA=0.05).

Following a nested sequence of tests as recommended by Byrne (2008) and Bentler (2006), configural analysis showed adequate fit to the data (SBX^2=183.94; NNFI=0.939; CFI=0.953; RMSEA=0.049), which means that the respondents of both clusters shared a common frame of reference (Vandenberg and Lance, 2000) in defining IC. Because there was no decrement in model fit, measurement invariance (SBX^2=189.75; NNFI=0.946; CFI=0.956; RMSEA=0.04) and structural invariance (SBX^2=191.28; NNFI=0.949; CFI=0.957; RMSEA=0.045) were also validated, suggesting that the conceptual and operational interpretation of the IC construct was similar, on average, between the two clusters.

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Cluster 1

Intellectual Capital

.75 — Human Capital
.92 — Organizational Capital
.88 — External Capital

.66 (Human Capital)

Human Capital: .76 EC, .48 LEAD, .67 COM
.65, .88, .74

.12 (Organizational Capital)

Organizational Capital: .63 IP, .65 OP, .63 TP, .73 OC
.77, .76, .78, .69

.48 (External Capital)

External Capital: .87 Brand Capital, .76 Relational Capital
.50 Brand Capital, .66 Relational Capital

Brand Capital: .80 IM, .85 PR, .60 SC
.61, .53, .80

Relational Capital: .67 SUP, .79 INV, .88 STK
.75, .61, .46

NNFI= 0.945 CFI= 0.958 RMSEA=0.048

Cluster 2

Intellectual Capital

.88 — Human Capital
.94 — Organizational Capital
.95 — External Capital

.48 (Human Capital)

Human Capital: ..58 EC, .55 LEAD, .53 COM
.81, .84, .85

.33 (Organizational Capital)

Organizational Capital: .62 IP, .55 OP, .68 TP, .64 OC
.78, .83, .73, .77

.33 (External Capital)

External Capital: .71 Brand Capital, .66 Relational Capital
.70 Brand Capital, .75 Relational Capital

Brand Capital: .76 IM, .81 PR, .63 SC
.65, .60, .77

Relational Capital: .65 SUP, .72 INV, .82 STK
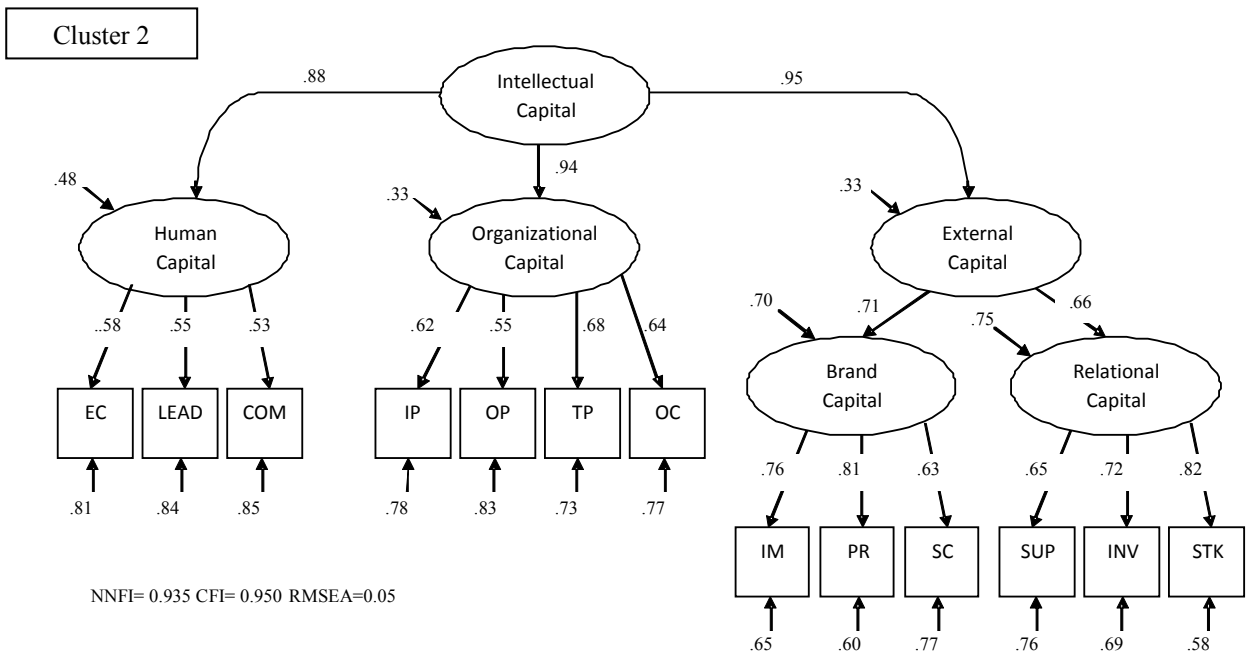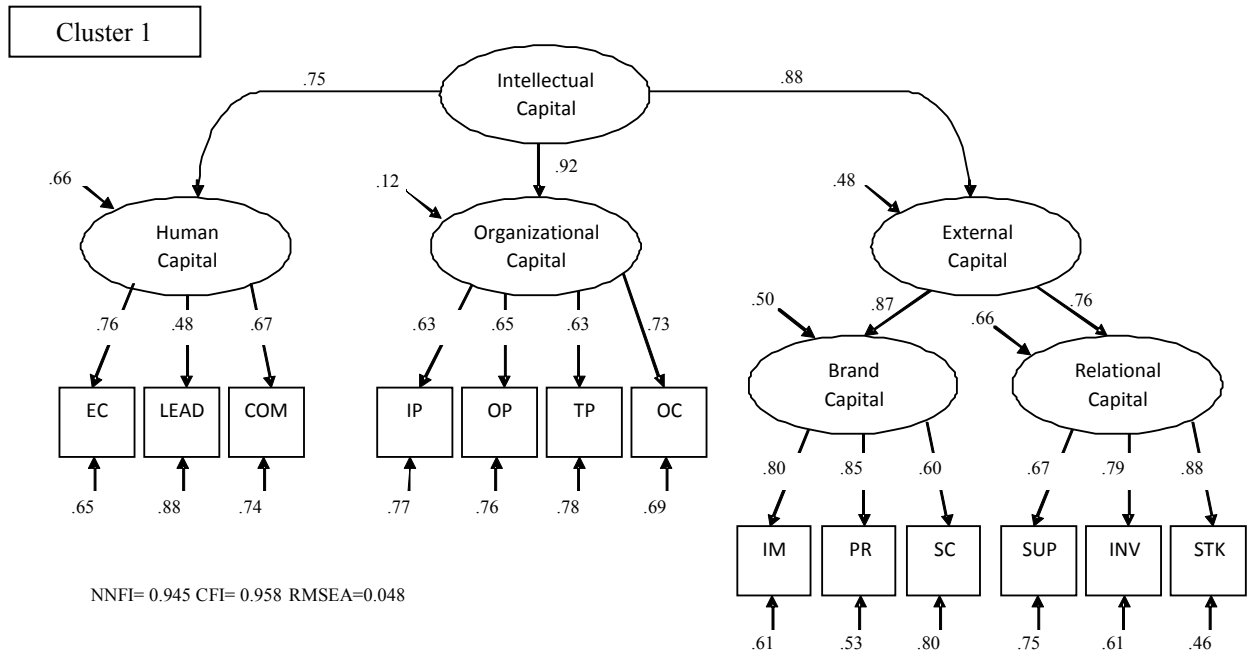.76, .69, .58

NNFI= 0.935 CFI= 0.950 RMSEA=0.05

Figure 7 IC structure for clusters 1 and 2

3.5 Discussion

The aim of this study was to understand the characteristics of intellectual capital in Mexican SMEs. This research is significant in respect that it specifically takes Mexican context into account, as the application of an IC model without the specificity of context would be irrelevant (Axtel Ortiz, 2009). The use of SEM allowed us to examine the relationships between IC and its sub-domains, that is, human capital, organizational capital, and external capital. Multigroup analysis was used to compare Mexican states, relatively to their development (Aroca et al., 2005). Although the proposed model resembles others in similar IC studies on SMEs in emerging and developing economies (Cohen and Kaimenakis, 2007, Durst, 2008, Hamdam and Damirchi, 2011, Huggins and Weir, 2007a, Khalique, 2011, Steenkamp and Kashyap, 2010), some key differences of this model are worth contemplation. Hence, the main contribution of this work is to present a model that is applicable to Mexican SMEs, given their cultural and economic context.

The first finding of this study reveals that the characteristics of human capital in Mexican SMEs seem to be similar to that in other SMEs in emerging economies. Many authors agree that human capital is the main source of intellectual capital in SMEs (Cohen and Kaimenakis, 2007, Durst, 2008, Ngah, 2009). Hence, human capital affects employees' competencies, leadership, and commitment to the organization. Accordingly, competencies that include all the tacit knowledge of employees from education or previous experience are important to the SME's performance. Managers should establish policies to attract and promote competent employees and encourage training to foment their capabilities. In addition, employee training is intrinsically linked to the retention of employees in the organization, since it is a source of motivation and leads to an increased commitment to the SME. This study also shows that leadership has a positive impact on the IC in SMEs. This can be explained by the importance of managers in SMEs, as the management style affects all the aspects of the organization, both internally—including the employees or structures and processes in the organization—and externally, as the managers are often the ones responsible for maintaining the relationships with different

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stakeholders. Thus, given that human capital is an important asset for competitiveness, SMEs in Mexico should encourage its development both at the level of employees and management.

The second finding of this study is that the importance of organizational capital in SMEs is consistent with previous studies. This suggests that managers in Mexican SMEs valorize the importance of intellectual property, organizational culture, as well as organizational and technological processes. However, most respondents accepted the failure to apply for patents, trademarks or other forms of intellectual property, because of the lack of knowledge regarding the application process or lack of time and financial resources. Given the volatile nature of human capital (Bontis et al., 2000), it is imperative to implement procedures and processes to reinforce the organizational structure in order to improve efficiency. Such systems will support human capital and assure the infrastructure necessary to run operations smoothly. Managers in Mexican SMEs are aware of the importance of human capital and acknowledge that further efforts must be made to put systems in place that allow the transformation of tacit knowledge owned by employees' into explicit knowledge owned by the organization. This transformation from tacit know-how to explicit systems allows the organization to move from short-term, individual dependent vision toward long-term vision of sustainable competitive advantage.

The third finding of this study is of great significance, since it shows that external capital in Mexico has some particularities that were not seen in other studies on IC in SMEs in general, particularly in emerging economies. This study highlights a main difference in case of external capital in Mexican SMEs that was first identified during factor analysis and afterwards validated through structural equation modeling. In previous studies, external capital was always portrayed as a single factor, inclusive of its components. However, this study shows that external capital is divided into two sub-domains—brand capital (brand equity) and relational capital. Many models (Cohen and Kaimenakis, 2007, Ji Moon and Gun Kym, 2006, Montequin et al., 2006, Nazari et al., 2009, Steenkamp and Kashyap, 2010, Yi and Davey, 2010) depict that external capital is same as the relational capital. Moreover, they include the components of brand capital (image, reputation, and

client satisfaction) under relational capital. This goes beyond the existing marketing plan or strategy, since brand equity capitalizes on the value of brand knowledge and customer response. In the Mexican context, customer loyalty is of key importance for SMEs (Axtle-Ortiz, 2013). While employees are the most vital internal component of a SME, brand image is its most important external asset and brand equity is a *sine qua non* condition for customer satisfaction. In contrast, relational capital represents the relationship that the SME has with the different stakeholders. Majority of the respondents agreed to the importance of this relationship. However, they also concurred to the lack of access to external support, such as governmental programs, or financial assistance from the private sector. Despite the multitude of governmental programs at both national and local levels, very few SMEs seem to be reaping their benefits. The situation regarding the access to finance from commercial banks and the private sector is even more flagrant, as most surveyed managers suggested a big gap between their needs and the assistance offered. However, assistance received from the family and personal network of the SME owners seem to be a compensating force. This observation is consistent with previous studies that elucidate the limited access of SMEs to financial support in emerging economies and the crucial role played by personal contacts, which also explains the prevalence of family-owned SMEs.

The fourth finding of this study relates to differences between states. The division of Mexican states according to the World Bank relative to regional growth in the form of income clusters was used (Aroca et al., 2005, Weiss and Resonblatt, 2010). Cluster 1 made of the richer regions of the Federal District, State of Mexico, Nuevo Leon and Quintana Roo was compared with the rest of the country. Given the regional inequalities and income disparities in Mexico, one would assume that richer states (cluster 1) would offer a better business environment for SME development. In terms of IC, that would translate in differences in how managers view human and organizational capital, but also the relationship they have with different stakeholders, such as the government. Following comparative analysis, it was found that SMEs in the two regional clusters do not exhibit any significant difference, on average, in terms of IC. This can be explained partially by institutional isomorphism, (Powell and DiMaggio, 1983) whereby coercive (policy and regulatory requirements), mimetic (standard responses to uncertainty), and

normative (growing professionalization of management) pressures exerted on SMEs in Mexico, lead to increasingly homogeneous structures.

However, this does not mean that idiosyncratic differences do not exist between SMEs from different regions of Mexico. It mainly shows that a common pattern of IC is seen to be relevant to (the success of) SMEs, regardless of their geographical location and/or socio-economic environment.

3.6 Conclusion

The findings of this study have several implications. Evidently, the results of this study can be used to study the link between IC sub-domains and their impact on the competitive advantage of SMEs in the Mexican context. Moreover, the above-mentioned findings show that managers consider intellectual capital extremely important for the growth of SMEs. Given the limited access to financing, IC plays an ever important role in gaining competitive edge for organizations. Accordingly, it is imperative to understand IC, since managers can influence its different components to impact overall organizational competitiveness. This managerial implication, along with the findings on the importance of brand capital, must guide future research to understand the specificities of Mexican SMEs. These findings are also of importance to policymakers trying to introduce programs that encourage the development of SMEs by training employees and raising managerial awareness on the importance of relationships and constant improvement in the image and quality of products of SMEs. Another implication of the study is that it signifies the use of tools that allow authorities and managers to measure IC in organizations. Most SMEs responded that though they have different tools to measure financial performance, only few tools are available to measure non-financial performance.

To the best of the author's knowledge, this is the first study that observes the components of IC in Mexican SMEs. However, it is not free from limitations. First, only the perception of managers is considered for analysis, who are often the founders/owners of the SME, and thus, might have response bias. Hence, future studies that explore IC in the

Mexican context, should collect the opinions of multiple stakeholders, such as managers, employees, and authorities, to minimize such bias. Second, this study is more cross-sectional in nature. A longitudinal study would help understand the progression of SMEs in relation to the application of IC measurement tools. Lastly, although results showed that there is no significant difference between clusters, an in depth case study would allow to raise more subtle changes in IC between the different Mexican states. Future studies should use a triangulation of sources, such as an analysis of annual reports and in-depth qualitative interviews. Concurrent with Kaufmann and Schneider (2004), authors believe that future studies should not only try to understand IC but also propose models and tools to manage its different sub-domains. Additionally, future studies should look at the link between IC, as well as financial and non-financial SME performance.

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Chapter 4:

Intellectual Capital in Mexican SMEs from the Perspective of the Resource-Based and Dynamic Capabilities Views

Daou, A., Karuranga, E., Su, Z. (2013). Intellectual capital in Mexican SMEs from the perspective of the resource-based and dynamic capabilities views. *Journal of Applied Business Research,* 29 (6), 1673-1688.

Article 3

Titre:

Intellectual Capital in Mexican SMEs from the Perspective of the Resource-Based and Dynamic Capabilities Views

Résumé:

Cette étude combine la théorie basée sur les ressources et la théorie des capacités dynamiques pour examiner le concept du capital intellectuel dans les PME au Mexique et déterminer son lien à l'avantage concurrentiel de l'entreprise. C'est une recherche exploratoire qui s'appuie sur des entrevues semi-structurées avec les gestionnaires. Elle vise à étudier en profondeur les trois composantes du capital intellectuel: capital humain, organisationnel et externe. En outre, une typologie des PME est proposée et les entreprises examinées y sont classées. Les résultats démontrent que les PME dynamiques ont mis en place des processus internes et externes pour répondre rapidement aux changements. Ceci leur a permis de prévoir les opportunités et les menaces et par conséquent de bénéficier d'avantages concurrentiels.

Mots-clés : Capital intellectuel; PME; Capacités dynamiques; Théorie basée sur les ressources; Mexique

Essay 3

Title:

Intellectual Capital in Mexican SMEs from the Perspective of the Resource-Based and Dynamic Capabilities Views

Abstract:

This paper combines the resource-based and dynamic capabilities views to examine intellectual capital in Mexican small and medium enterprises (SMEs) and its relation to competitive advantage. Following an exploratory approach, this paper relies on face-to-face interviews with managers to take an in-depth look at the three components of intellectual capital: human, organizational, and relational capital. Further, a SME typology is proposed and the examined companies are categorized accordingly. Dynamic SMEs have instituted internal and external processes to respond rapidly to change, allowing them to sense opportunities and threats and subsequently benefiting from competitive advantages. This analysis can help both managers and policymakers put appropriate programs in place to encourage SME development and growth by identifying the impact of intellectual capital. The generalizability of the results is limited by the small sample size and the focus on one geographic region in Mexico. This study contributes to the limited literature on intellectual capital in SMEs in emerging markets. Moreover, very few papers have analyzed intellectual capital from the perspective of the dynamic capabilities view.

4.1 Introduction

Intellectual capital (IC), often defined in terms of human, organizational, and relational capital, has become a key determinant of the success of small businesses, especially during transitions from traditional factors of production to a knowledge-based economy (Piperopoulos, 2010). According to some authors, the competitive advantages and performance of small and medium enterprises (SMEs) are largely influenced by their intellectual capital (Cabello and Kekäle, 2008, Cohen and Kaimenakis, 2007, Jardón and Martos, 2009, Lopez, 2006). In fact, intellectual capital is one of the main assets of businesses that support competitive advantages and are also the basis for value creation (Edvinsson and Malone, 1997).

It has been demonstrated that IC generally has a positive impact on firm performance. However, its impact on SME performance in emerging economies is even stronger because for these companies, access to financial capital is limited. In addition, the role of these types of companies is crucial for local development (Jardón and Martos, 2009, Piperopoulos, 2010). For instance, in Mexico, one of the major emerging countries, the last census conducted by the National Institute of Statistics and Geography (INEGI) in 2009 stipulated that SMEs represent 98.4% of all firms and support 78.5% of employment at the national level. Due to the small size and client proximity of SMEs, they have the ability to respond quickly to changes and adapt by managing the different opportunities or challenges they may encounter. With regard to innovation, it has been proven that SMEs generate more innovations per unit of financial capital than larger firms (OECD, 2010). Flexibility also allows these firms to adapt to niche markets and outperform large firms in terms of research and development (R&D) (Bhagavatula et al., 2010, Çakar and Ertürk, 2010).

However, although SMEs play a critical role, they also face major challenges, especially in emerging economies. They can hardly compete with large enterprises in attracting the highly skilled personnel necessary for innovation. It is difficult for them to engage in sufficient communication with other companies, foreign markets, and government agencies. They lack the capital to meet increasing demand and face challenges in registering patents. Furthermore, SMEs in emerging economies have a limited ability to make their voices heard when negotiating about and devising government policies (OECD, 2004b). Above all, SMEs in emerging and developing

countries are facing problems related to poor quality of human capital and the lack of required institutional capacities; they are therefore experiencing a deficiency in intellectual capital.

Given that there is a lack of understanding of the impact of intellectual capital on SMEs in emerging countries (Khalique, 2011, Phusavat et al., 2011), this research attempts to fill the existing literature gap on this evolving matter. More specifically, this research has two objectives: (1) to study the impact of intellectual capital on SMEs in an emerging country, i.e., Mexico, where resources and dynamic capabilities are either scarce or used differently from what is observed in most developed countries; and (2) to develop a new theoretical framework on intellectual capital that combines the resource-based view (RBV) and the dynamic capabilities view (DCV) by examining SMEs in the region of Queretaro, Mexico. To date, intellectual capital has been studied mostly from the perspective of the resource-based view, in which firms seek to take advantage of valuable, rare, inimitable, and non-substitutable resources. However, obtaining such resources is not sufficient. SMEs must also have the ability and structure to process their resources and transform them in a way that will allow them to attain a sustainable competitive advantage. This is especially true in highly dynamic environments and sectors (Wang and Ahmed, 2007). Hence, we believe that the dynamic capabilities view is appropriate for the analysis of the intellectual capital of SMEs.

To achieve the objectives mentioned above, this paper is organized as follows. Section 2 is devoted to a literature review on the relationship between intellectual capital, the resource-based view, the dynamic capabilities view, and competitive advantage. Section 3 describes the research design and section 4 discusses the findings. Finally, we present the conclusion, contributions, and limitations of this study in section 5.

4.2 Literature review

4.2.1 Intellectual capital

Although there are many definitions of intellectual capital (Kaufmann and Schneider, 2004), there is a consensus that IC creates value and supports the creation of competitive advantages in organizations. According to Edvinsson and Malone (1997), IC is defined as the possession of

knowledge, organizational competence, technology, experience, customer relations, and professional skills that confer a competitive edge to their owner. Hence, IC is the combination of knowledge-bearing intellect, which, if well-managed by the firm, provides a sustainable competitive advantage (Cohen and Kaimenakis, 2007). Consequently, intellectual capital is the sum of all the assets and capabilities that are not recognized and disclosed on the balance sheet but significantly contribute to the delivery of the organizational strategy.

Despite the lack of unanimity on the components of IC, consensus is growing as the field matures (Bontis et al., 2000). One of the concepts upon which scholars do not agree relates to taxonomies and categorization of resources such as customer capital versus relational capital and organizational versus structural capital (Pike et al., 2006). For instance, Cohen and Kaimenakis (2007) classified IC into human, organizational, and customer capital, whereby customer capital constitutes the most important component of relationships with stakeholders. Other authors have chosen to use five sub-domains (human, organizational, technological, business relations, and context) to classify firm intellectual capital (Rodriguez A. et al., 2005). In a recent review of the literature on intangibles by El-Tawy and Tollington (2012), the authors provided different classifications and distinctions between internal and external structures and between business and social capital. In this study, we employed a broad definition of IC that is widely used by researchers and includes human, organizational, and relational capital (Choong, 2008, Gallego and Rodriguez, 2005, Steenkamp and Kashyap, 2010).

Human capital can be defined as the knowledge, skills, and abilities of employees (Edvinsson and Malone, 1997, Bhartesh and Bandyopadhyay, 2005). It can be seen as the set of values, attitudes, and aptitudes of employees that leads to a competitive advantage and creates value for the organization (Jardón and Martos, 2009). The importance of human capital cannot be overemphasized because it has been proven to be the most important aspect of IC (Boekestein, 2006, Choudhury, 2010, Cohen and Kaimenakis, 2007, Durst, 2008, Jardón and Martos, 2009). SMEs rely heavily on this resource and value human capital over other types of capital because it has a direct impact on SME productivity. Compared to large firms, the size of SMEs can be advantageous in terms of human capital because it allows for more interactions, promotes a friendly atmosphere, and encourages creativity and cooperation among employees (Ngah, 2009).

Organizational capital, also referred to as structural capital (Jardón and Martos, 2009, Kamukama et al., 2010), is what remains in the SME when employees are not considered. It includes the core values of an SME, which are translated into the strategies and structure of the organization and lead to the diffusion of knowledge that can eventually be perceived as enhanced efficiency and performance (Cohen and Kaimenakis, 2007). Organizational capital can be regarded as the internal structure of the organization. It includes patents, structures, policies, organizational culture, processes, and technology. This internal structure is built to support the firm's human capital (Clarke et al., 2011, Yi and Davey, 2010). According to a study on IC in Malaysia (Ngah, 2009), SMEs tend to keep good records of the practices they employ. Moreover, the culture of an SME facilitates cooperation among employees, supports creativity, and, along with the use of technology, encourages innovative practices.

Relational capital represents the external environment of the firm. It is the set of relationships (Jardón and Martos, 2009) established with customers, suppliers, governments, and other stakeholders (Cohen and Kaimenakis, 2007). Some researchers emphasize the role of customers and the SME-client relationship by including elements such as reputation and brand image in this dimension (Cohen and Kaimenakis, 2007, Evans et al., 2007, Jardón and Martos, 2009, Kiong T. and Hooi H., 2009), while others focus on the role of the authorities and the policies that encourage or hinder SME development (Hamdam and Damirchi, 2011, Huggins and Weir, 2007a).

Even if the general characteristics and sub-domains of IC are generic (Cohen and Kaimenakis, 2007) and applicable to all types of firms, SMEs, especially in developing economies, have particularities that are worth contemplating. As previously mentioned, given their small size, SMEs are flexible, have flat management structures, can respond quickly, and have a close relationship with their clients and suppliers. However, they also suffer from poor human capital, limited budgets, limited access to credit, and limited influence on governmental policies compared to bigger firms. Another key difference is their tendency to focus on human capital in their early stages instead of reinforcing organizational capital. This is due to the lack of financial resources and the time-consuming nature of implementing such processes and procedures (Durst, 2008, Huggins and Weir, 2007b).

4.2.2 Resource-based view

At the core of IC, the resource-based view has been a dominant theory. When developing competitive advantages from the perspective of the resource-based view, SMEs look for valuable, rare, inimitable, and non-substitutable (VRIN) resources. These resources can be regarded as the invisible assets that form IC (Kamukama et al., 2011). In order to comprehend the competitive advantages of SMEs, it is essential to understand resources. Barney (1991) concludes that "the resource-based view suggests that firms obtain sustained competitive advantages by implementing strategies that exploit their internal strengths, through responding to environmental opportunities, while neutralizing external threats and avoiding internal weaknesses". By resources, the author is referring to assets, capabilities, organizational processes, firm attributes, information, and knowledge, among others. Hence, resources can be categorized into three groups: physical, human, and organizational capital (Barney, 1991). While considering the implementation of the RBV in transitional and emerging economies, several studies have shown that human capital (education and training), organizational resources, and relational capital, such as reputation, influence firm growth and positively impact firm performance (Inmyxai and Takahashi, 2009, Rangone, 1999).

Nevertheless, the RBV has its limitations. Some studies have demonstrated that in light of the resource-based theory, intangibles could lock firms into a persistent disadvantage (Pal and Soriya, 2012). To further ascertain this point of view, the example of R&D is used to depict causal ambiguity, whereas investing in IC is seen as gambling with organizational resources (Dumay, 2009a). Such a top-down approach has been criticized because there is no framework depicting the IC phenomenon; thus, other organizational theories offer explanations for IC in SMEs (Dumay, 2009a, Kaufmann and Schneider, 2004). According to Delery (1998), "while the resource-based view provides a nice backdrop explaining the importance of human resources to firms' competiveness, it does not deal with how [an] organization can develop and support the human resources it needs for achieving [a] competitive advantage". Therefore, the shift from the traditional competitive environment into today's fast-changing markets requires a more dynamic strategic alternative to the competitive advantage point of view (Stam, 2005).

4.2.3 Integrating the dynamic capabilities view

According to Teece *et al.* (1997), in a dynamic environment, a firm's competitive advantage depends on its ability to integrate, build, and reconfigure internal and external competencies to respond rapidly to competitive environments. In line with this, the dynamic capabilities view can better explain how and why some firms have a competitive advantage in this situation. Eisenhardt and Martin (2000) stressed that "dynamic capabilities are the organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and die."

Both the resource-based and dynamic capabilities views come from the field of economics (Mahoney, 2005), and we believe that the incorporation of latter can improve our understanding of the factors that affect SMEs. Thus, by combining the RBV and DCV in the context of our study, we can obtain a better grasp of IC and its impact on Mexican SMEs. The RBV is static in nature, making it insensitive to environmental changes (Zaidi and Siti Norezam, 2011, Teece, 2007, Teece et al., 1997). In contrast, the DCV is dynamic, and can better respond to environmental changes stemming from external volatility. This perspective is more comprehensive in explaining IC because external capital is one of its key components.

4.2.4 Competitive advantage through IC

One of the main objectives of SMEs is to gain a sustainable competitive advantage that can be translated into growth and superior financial performance (Cheng et al., 2010). In order to accomplish this, there are four possible generic strategies that SMEs can choose from: gaining a sustainable cost advantage, differentiation from competitors, using a focus strategy, or using a differentiation focus strategy. By not having a clear strategy, firms tend to get stuck in the middle and possess no competitive advantages (Porter, 2008). From the RBV perspective, a competitive advantage is generated when a firm implements strategies that cannot be imitated by competitors or new entrants and hence becomes irreplaceable. Some potential approaches for SMEs would be to create value for their customers, use innovation as a strategy to outperform competitors, and implement an operational strategy to constantly improve internal activities. However, from the

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DCV perspective, in a dynamic marketplace, an SME's competitive advantage diminishes if it is not constantly renewed (Huang and Kung, 2011).

Several authors link one or several components of IC to gaining a sustainable competitive advantage (Bogner et al., 1999, Cheng et al., 2010, Evans et al., 2007, Jardón and Martos, 2009, Huang and Kung, 2011, Kamukama et al., 2010, Kamukama et al., 2011). In today's globalized and constantly changing environment, IC is increasingly replacing tangible resources as the main source of the competitive advantages of firms (Cheng et al., 2010, Kamukama et al., 2011). However, depending on several internal and external factors, the different sub-domains of IC are not equally important as a source of competitive advantage (Kamukama et al., 2010). Some studies confirm that human capital is at the heart of sustainable competitive advantages, whereby investing in the development of talent is the key to achieving a firm's strategic goals (Choudhury, 2010). Moreover, in a dynamic environment, it is by improving the competencies of employees and management that firms can improve management efficiency, subsequently leading to the acquisition and maintenance of a competitive position (Bogner et al., 1999). Others find that internal practices, such as innovative capacity, and relational capital, such as customer base, are sources of sustainable competitive advantages for firms (Cheng et al., 2010). Therefore, we posit that all aspects of IC are, to some extent, important factors for SMEs in Mexico to establish sustainable competitive advantages.

	Intellectual capital through	Sustainable competitive advantage through
Dynamic environment	• Accumulation of experience and organizational learning • Development of dynamic capabilities and routines • Innovative strategies • Dynamic responses to environmental changes	• Changing routines and resource bases • Ability to sense, react to, and manage threats • Ability to transform and adapt to threats and opportunities • Collective activity systematically generating improved effectiveness
Static environment	• Employee motivation and competencies • Resources such as patents and technology • Established relationships with customers, suppliers, governments, and other stakeholders	• Valuable, rare, inimitable, and non-substitutable resources • Strategies making the firm irreplaceable • Creating routines and acquiring resources

Table 9 Comparing intellectual capital through the resource-based and dynamic capabilities views

4.3 Research design

4.3.1 Research propositions

In terms of human capital, the dynamic capabilities and resource-based views are complementary to each other. Two aspects are considered when discussing human capital: the perspectives of the manager/owner and employees. From the managerial point of view, education and experience are taken into consideration (McKelvie and Davidsson, 2009). This approach goes hand-in-hand with the definition of human capital from the IC perspective (Edvinsson and Malone, 1997, Jardón and Martos, 2009). The human capital of employees is regarded as comprising their skills and capabilities. It includes elements such as training, knowledge, and motivation (Edvinsson and Malone, 1997, McKelvie and Davidsson, 2009). Consequently, we propose that:

P1: *Human capital has a significant influence on the competitive advantages of SMEs.*

Firms with strong dynamic capabilities are highly entrepreneurial. This characteristic is imperative for the survival of SMEs in developing economies given their limited access to financing and support from the authorities (Ruiz, 2001). Capabilities can be perceived as the capacity to determine opportunities and threats, seize opportunities, and continually maintain, protect, and enhance competitiveness in order to sustain a competitive advantage. In today's globalized markets, SME managers in developing economies must detect new opportunities by either accessing external information or creating new knowledge (Teece et al., 1997). This type of detection can be driven internally (by building commitment, training employees, and implementing organizational processes that encourage innovation) or externally (by knowing customer needs and building strong relationships with suppliers and other stakeholders). Once an opportunity is recognized, its exploitation involves investing in development and commercialization. Such a decision demands skills and judgment on the part of managers, whereby taking such an action can be risky for an SME. Finally, transformation is related to adapting and reconfiguring when changes occur.

P2: *Organizational capital has a significant influence on the competitive advantages of SMEs.*

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Truijens (2003) compares the RBV to a strengths, weaknesses, opportunities, and threats (SWOT) framework that did not take opportunities and threats stemming from the external environment into account. To fill this gap, the DCV looks at the influence of the external environment on the firm. From the IC perspective, external capital is one of the three key components. It reflects established relationships with third parties such as customers, suppliers, governments, and competitors (Cohen and Kaimenakis, 2007, Jardón and Martos, 2009). SME managers must constantly consider external changes, including government legislation, new competitors, and customer needs (Bowman and Collier, 2009), which are constantly evolving. Moreover, the dynamic interactions among the different factors influencing managers allows for the better adaptability of the DCV in different cultural settings, such as our research on SMEs in Mexico.

P3: *Relational capital has a significant influence on the competitive advantages of SMEs.*

By emphasizing the importance of non-traditional sources of competitive advantage (Barreto, 2009, Mahoney, 2005) such as managerial capabilities, human resources, intellectual capabilities, and network of relationships, among others, the DCV reflects the importance of intellectual capital in SMEs while also providing the tools to observe such resources (Truijens, 2003). The intellectual resources from a dynamic capabilities perspective are unattainable with money alone; time-consuming to develop; can have multiple, simultaneous uses; and are able to yield multiple, simultaneous benefits (Mahoney, 2005).

P4: *Dynamic capabilities have a significant influence on the competitive advantages of SMEs.*

By combining our hypotheses, we generate a typology of SMEs (see figure 8). Our first category, called *sclerotic*, includes SMEs that have low intellectual capital and low dynamic capabilities. These are most likely to disappear in the short term if corrective measures are not taken. The second group includes *wannabes*. A wannabe SME has low intellectual capital and high dynamic capabilities. Such firms are likely to have a short-term focus and are able to respond dynamically to environmental changes but have not instituted routines and do not have a long-term strategy. *Reactive* SMEs are characterized by high intellectual capital but low dynamic capabilities. Such firms are likely to have strong routines and procedures. However, they are self-centered and

therefore do not evaluate opportunities and threats in a timely manner. Finally, *chameleon* SMEs score high on intellectual capital and dynamic capabilities. These firms have competent human capital, routines and procedures, and score high on relational capital. Moreover, such firms can adapt their routines because they have the ability to sense and react to opportunities and threats in order to improve effectiveness.
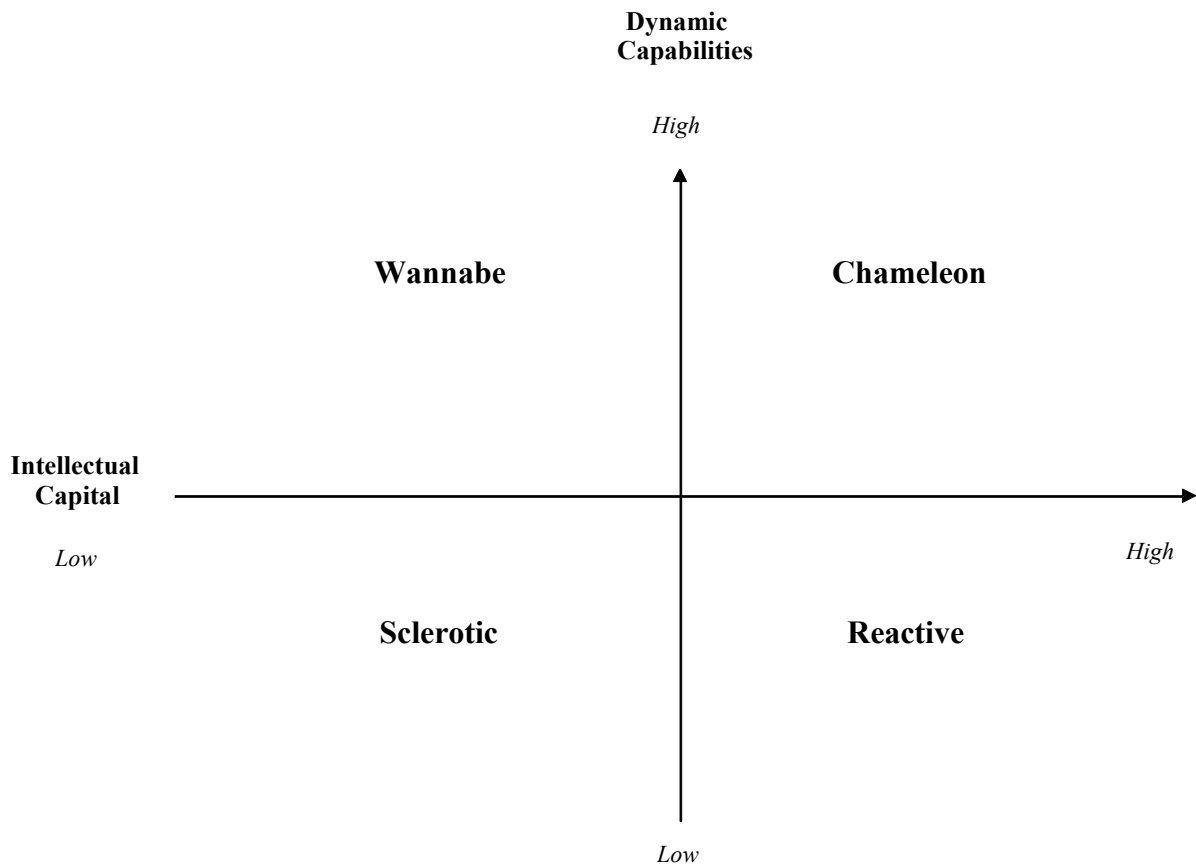
Figure 8 SME typology

4.3.2 Methodology

The objective of this study is to combine the RBV and DCV to understand the impact of IC of SMEs in Mexico. In our research, we used the definition of SMEs used in Mexico, which was updated in 2009 (INEGI, 2009) and incorporates sector type, number of employees, and sales volume.

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Size	Sector	Employees	Sales volume	Maximum combined *
Micro	All	10 or less	$ 4 or less	4.06
Small	Commerce	11 to 30	$ 4.01 to 100	93
	Industry & services	11 to 50	$ 4.01 to 100	95
Medium	Commerce	31 to 100	$ 100.01 to 250	235
	Services	51 to 100		
	Industry	51 to 250	$ 100.01 to 250	250
*Maximum combined= (workers) X 10% + (annual sales) X 90%				

Table 10: Definition of SMEs in Mexico as of 2009

Following a qualitative approach, which facilitates the comprehension of the context and permits an in-depth analysis, we interviewed managers and owners of Mexican SMEs from different economic sectors (Maxwell, 2005). The perspectives of the owners and managers of SMEs were collected to analyze their views with respect to the challenges they face in developing intellectual capital in their organizations. A total of 24 face-to-face interviews were conducted to collect opinions. This strategy was adopted because interviews are best performed in the form of an in-person conversation rather than over the telephone (Kvale, 1996, Maxwell, 2005).

This study is based on semi-structured interviews conducted in the area of Queretaro in Mexico between January and May of 2012. Interviews lasted an average of one hour and were completely transcribed (Palys and Atchison, 2008). Respondent confidentiality was guaranteed. Table 11 presents the relevant information on the sample of interviewees. The main topics that were addressed included general information about the interviewee, general information about the SME, and information on the human, organizational, and relational capital components of IC. In addition, the views of managers were surveyed to understand the financial and non-financial impacts of IC on organizational performance.

Data analysis was conducted by combining and comparing information from different sources including interviews, documents, and websites. This method allows for data triangulation (Maxwell, 2005). Systematic interview analysis was conducted by examining the common

themes from our sample. After transcribing the interviews, QDA Miner (V4.0.4) software was used to codify and analyze the results. Finally, we conducted a content analysis of the results.

Case	Sector	Established	Position	Market
1	IT/consulting	2010	Owner/director	Regional
2	HR management	2010	Owner/director	Regional
3	IT/software development	2010	Director	International
4	IT/software development	2008	Owner/director	National
5	Construction	2008	Owner/director	National
6	IT/software development	2006	Owner/director	International
7	Furniture/design	2009	Owner/director	National
8	Industrial engineering	2006	Director	Regional
9	Renewable energy	2010	Owner/director	National
10	Manufacturing	2009	Owner/director	National
11	Furniture/design	2011	Owner/director	Regional
12	IT/business consulting	2011	Owner/director	National
13	IT/software development	2010	Owner/director	National
14	IT/software development	2005	Owner/director	Regional
15	IT/software development	2011	Administrator	National
16	IT/consulting	2006	Director	Local
17	Construction	2010	Owner/director	Regional
18	IT/software development	1997	Owner/director	International
19	Construction	2004	Owner/director	National
20	IT/software development	2006	Area director	National
21	Communication	2008	Owner/director	National
22	Mechanical engineering	1990	Owner/director	International
23	Mechanical engineering	1999	HR manager	International
24	Training/education	2010	Owner/trainer	Regional

Table 11: SME interviewee information

4.3 Results and discussion

The results from the analysis of the interviews and documents allowed us to make some important observations regarding the development of intellectual capital among Mexican SMEs. The results are presented according to our research framework.

4.3.1 Human capital

The findings show that human capital is often regarded as one of the main challenges facing SMEs in Mexico as they develop and grow. The managers we met revealed several challenges during the interviews and agreed that most of the human resources they hire lack skills.

However, many stressed the importance of training and investing in the acquisition of skills. That being said, and given the scarce resources of SMEs, most training is informal and on the job.

> *Mainly it (training) is done externally; there is also some internal training, but it relies mostly on the sharing of experience. The training given internally is somewhat informal.* (Case 14)

When considering the motivation of employees, the interviewed managers focus on three key points leading to employee satisfaction and retention within the organization: training and the possibility of gaining experience, salary and benefits, and the relationship between management and employees.

> *It's very important to motivate them (employees); there are several ways, but the most obvious is economic. We try to keep a healthy coexistence and avoid things that harm the relationship we have with employees. We try to keep them motivated, but it is a difficult process. HR is always a complex issue, but at least the ultimate goal is attained.* (Case 13)

In terms of human resource management and accounting, several SMEs opted for outsourcing because they lack the capabilities to do it internally. However, this tendency to rely on outsourcing is mainly found among SMEs that are in the information and communication technologies (ICT) sector. SMEs in other sectors have the tendency to rely mostly on the owner/manager to perform multiple tasks. Moreover, two opposing views regarding human capital are expressed in the interviews. On the one hand, dynamic SMEs recognize the importance of investing, developing, and creating a work place that is conducive to the development of human capital and innovation.

> *Since we are in ICT, what we are building is not manpower but rather minds, and information technologies industry generally offers good wages. (Case 21)*

On the other hand, SMEs with low dynamic capabilities tend to have less awareness of the importance of investing in employees because some feel that employees are in need of jobs and will not leave due to their economic situation.

No, we do not do any of that (retention plan) and I've never really evaluated it as something that might have some benefit or might be motivating for employees. I have no idea how or what to do and what impact it may have. (Case 19)

4.3.2 Organizational capital

Dynamic capabilities can be regarded as the organizational and strategic routines that help firms achieve new resource configurations (Eisenhardt and Martin, 2000). The routines implemented by SMEs are related to the organizational processes that help firms adapt to a changing environment.

The interviewed Mexican SMEs are aware of the importance of implementing procedures and systems within their organizations. Most SMEs said that they follow the national rules and regulations in terms of wages and benefits; however, they do not have any internal documents in relation to this. This lack of documentation is seen in all types of SMEs with low or high dynamic capabilities. While most SMEs recognize the importance of establishing internal procedures, they agree in saying that they lack the skills, resources, and time to do it, as well as that it is not a priority for them at this stage. Detailed job descriptions seem to be common to most SMEs because each position in the organization has a detailed profile. With regard to other administrative and financial aspects, guidelines, manuals, and databases are clearly lacking.

> *Yes, right now all the positions are well defined; employees already have a job profile and know that this profile matches the duties that must be performed to accomplish their tasks. All documentation is written, so that your employee knows how you evaluate him.* (Case 13)

Planning is a key aspect of management routines. Only four interviewed SMEs (cases 3, 6, 18, and 22) confirmed engaging in annual planning involving all key staff. These SMEs have an international reach and are keen to have a positive image. Moreover, in order to increase their credibility for their international clients, they have established procedures and processes as a result of their ISO certifications.

> *Yes, the company has been ISO 9001 certified for over ten years now and part of the certification is to have an organizational chart with job descriptions, designated responsibilities, and all those issues; that is where we have everything scheduled.* (Case 22)

On the other hand, SMEs that think and act locally tend to have informal management systems in place, whereby the internal structures are less defined. Hence, the policies and decision-making processes are centralized among high-level management.

> *We do plan, but it is not very formal, we have general objectives, some steps to follow, but it is not highly institutionalized, what we do is we establish overall objectives.* (Case 14)

We also noted that access to information and hierarchies are highly knotted. It is well known that power distance is high in the Mexican context because it is a highly centralized, hierarchical society with clear inequalities between management and employees (Hofstede, 1984). However, our findings suggest that SMEs that operate in highly dynamic environments tend to have flatter structures, provide access to information at all levels of the organization, and encourage employees to participate in decision-making processes.

> *As a young company, we have an open space policy. We have different positions here, but our platform is very horizontal, the scheme of work is multidisciplinary; we encourage teamwork, working between departments, trying to motivate teams to work together, so we can say that in the end the job is done together.* (Case 20)

In contrast to this point of view, low-dynamic-capacity SMEs (cases 5, 7, 9, 10, 11, 17, 19, and 23) tend to restrict access to information among lower-level employees and operate with a more defined hierarchy in which top management plans and makes decisions without consulting other employees. Hence, we recognize the presence of a large power distance in such organizations.

In addition to managerial processes, another fundamental issue is the management of intellectual property in general and patents in particular. All interviewed SMEs were aware of the importance of protecting their processes and products. However, very few have done so, or even begun to attempt it, for a number of stated reasons. Among these, the most commonly mentioned

include lack of resources, lack of know-how, lack of required financial resources, lack of trust in the patenting process in Mexico, and fear that others will steal their idea. On the other hand, SMEs seem to be keen on buying international licenses and are proud to mention this because it presents a positive image of their organizations.

In terms of technological processes, the interviewed SMEs acknowledge their importance and invest heavily in information technologies. This observation can be generalized to SMEs in all sectors and is not restricted to one area in particular. Furthermore, SMEs regard technologies as representing an opportunity to reduce the gap between them and larger firms that have highly skilled human capital and access to financial resources. Technological processes are closely linked to innovation as a key to enabling organizations to develop a sustained competitive advantage. The interviewed managers agreed that information and communication technologies were the main factors allowing them to implement process innovations that contribute to improved internal communications, create management systems, and establish better monitoring systems for markets and competitors.

> *We have a monitoring system for technologies and for the market where we see what is happening in our environment, new trends in products or services, and what world leaders are doing. We have access to databases that give us a good picture of what's going on and on that basis, we plan the entry or exit of products to our market. (...) We have continuous improvement objectives in all business processes, be it operation, administrative, marketing, technological, etc. In our operation, we can improve how we manage our HR, accounting, and procurement systems, which were all manual and are now computerized and directly connected to our wireless network.* (Case 18)

4.3.3 Relational capital

Relational capital refers to the external environment and its impact on SME performance. The image of the organization, customer satisfaction, and the relationship with stakeholders were cited as being important for SME development. During the interviews with managers, the role played by the government was prominent in the discussion; therefore, its role cannot be underestimated. In Mexico, there are 131 different programs aimed at promoting the productivity

and competitiveness of SMEs. These programs, created mostly between 1995 and 2000, are managed by different governmental agencies (The World Bank, 2007). Most interviewed SMEs had a favorable view of such initiatives, and a considerable number had received assistance from those entities.

> *I benefited from México Emprende; it is an incubation process that is subsidized by the government, the Secretaria de Economia and PYME Fund. Such assistance had some benefits such as the creation of my website, and my brand was created with the help of México Emprende. Such benefits are good, and I do not undervaluethem, but the real benefits are financial, in cases when access is impossible.* (Case 1)

As previously mentioned, despite many advances and implemented programs, access to financing is still an obstacle for Mexican SMEs. For instance, just 18% of SMEs in Mexico received loans from commercial banks (Lopez-Acevedo and Tinajero-Bravo, 2010). Access to capital continues to be the main concern of the interviewed SMEs. This is why most start-ups and smaller SMEs rely heavily on personal financing or assistance from family. This is particularly true for firms operating in highly dynamic sectors such as ICT, a sector with greater risks and fewer assets than traditional sectors.

> *For businesses related to information technologies, access to credit is nearly impossible because banks and lending institutions focus on our assets to grant loans. The activity in this industry involves the person's mind, in contrast to other sectors. In the case of companies in information technologies, we have only computers and furniture; everything else is related to our minds, so there have been hardly any credit programs targeting us.* (Case 16)

When considering the relationships of organizations with their external environment, customer satisfaction and the building of close relationships are viewed as the main competitive advantages by a large number of the interviewed SMEs. This is intrinsically linked with the image of the SME as well as competitiveness in the targeted markets. Managers view these relationships over the long-term, by building customer loyalty and thus improving their market positions. A particularity of the Mexican context is the relationship of SMEs with the community at large.

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I think we have a positive image, because of the quality of the services that we have delivered. We have been recommended to other clients. This is something that we value; it is crucial. Alliances are borne from good relations, where we had new opportunities to sell new products and services that would not have been there without these relationships. It is crucial and essential since our customers are recommending us. (Case 4)

In IC, relational capital is often viewed in terms of clients, the local authorities, and suppliers. However, our findings are distinct due to the magnitude of the impact of SMEs in the community. Managers agree that the image of their organizations in the communities where they operate is important because they value making a positive impact and having close ties with different stakeholders.

4.3.4 Dynamic capabilities

Managers of Mexican SMEs need to integrate and coordinate capabilities to gain a sustainable competitive advantage. This task would need to be conducted both internally and externally, by dynamically integrating the three components of IC to ensure the creation of synergies and involving all stakeholders in the process. The interviewed managers agree on the importance of anticipating changes and responding to them; however, once again, the pace and priority given to this type of adaptation process differs between dynamic and less dynamic SMEs. Dynamic firms see internal knowledge accumulation as the sum of interactions with different stakeholders, which in turn, if exploited, can provide SMEs with a competitive advantage.

I believe that everyone creates their own opportunity. We do not sell systems; we see ourselves as a company that partners with its clients to achieve objectives through the development of software. We want it to be seen differently, to have a long-term relation where in addition to providing the service, we become an ally that enables our clients to be more competitive, having a lead pair. So I believe that competition has a little more to do with helping our partner to be competitive and to compete with each other to be better. (Case 14)

Moreover, this dynamic process must be ongoing, allowing the SME to respond to changes in its internal and external environments and constantly reinvent itself. For this to happen, firms need to implement a plan setting short- and long-term objectives to integrate new capabilities.

> *In planning for SMEs, you need to set a goal now knowing that over time it can be modified; that does not mean you let go of a goal but over time, objectives and priorities change. It can be changing in the sense that you reached the goal that you set, or that your priorities have changed.* (Case 1)

Overall, our theoretical model and its propositions are confirmed. The interviews demonstrate that the combined RBV and DCV analysis leads to a greater competitive advantage. To further analyze the results, we plotted the interviewed SMEs according to our typology (figure 9). On the horizontal axis, we considered the subcomponents of intellectual capital as being either low or high. As previously discussed, human, organizational, and relational capital form the intangible resources of the SMEs (Cohen and Kaimenakis, 2007, Edvinsson and Malone, 1997). In our sample, nine SMEs were identified as having low intellectual capital, while 16 were identified as high. In Mexico, most high-IC SMEs are characterized by a having top management that have high levels of education and/or experience on as well as appropriate organizational procedures such as certifications and intellectual property. It was found that organizations serving or planning to enter international markets tend to nurture local and international relationships while trying to implement formal processes and procedures.
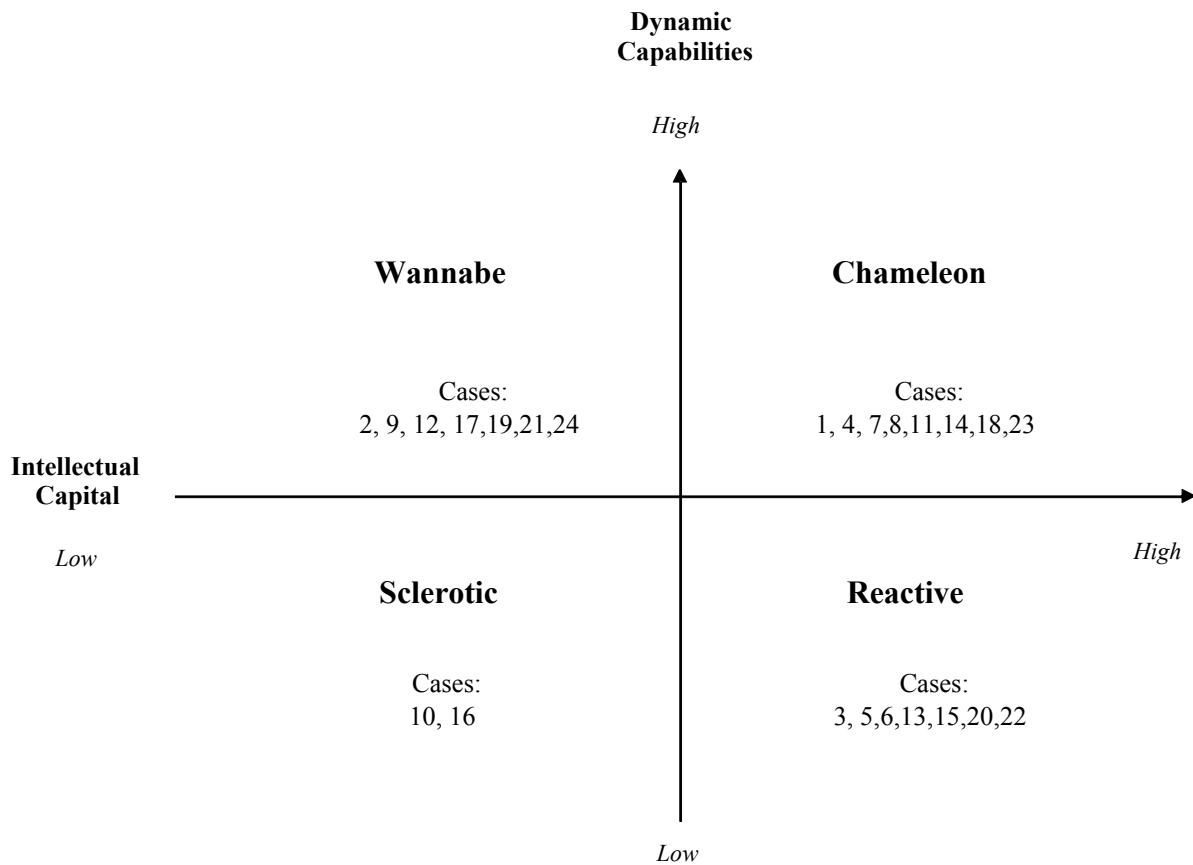
**Dynamic
Capabilities**

High

Wannabe

Cases:
2, 9, 12, 17,19,21,24

Chameleon

Cases:
1, 4, 7,8,11,14,18,23

**Intellectual
Capital**

Low

High

Sclerotic

Cases:
10, 16

Reactive

Cases:
3, 5,6,13,15,20,22

Low

Figure 9 Examined SMEs according to proposed typology

On the vertical axis, SMEs are plotted according to their dynamic capabilities. Going beyond the RBV, firms need to implement internal and external strategic processes to manipulate their resources and create value (Eisenhardt and Martin, 2000). Out of the 24 interviewed SMEs, we identified nine with high dynamic capabilities and 16 with low dynamic capabilities. Highly dynamic SMEs are found have established routines, high adaptability, a high capacity for learning, and the ability to create new knowledge for specific situations (Teece, 2007). Highly dynamic SMEs are aware that they operate in high-velocity markets, whereby SMEs in rapidly changing environments need to develop the capacity to constantly transform and adapt (Teece and Pisano, 1994).

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4.4 Conclusion

The objective of this study was to present intellectual capital through a new perspective combining the RBV and DCV. Within the context of SMEs in Mexico, IC is analyzed from the perspective of both the RBV and DCV. It was found that SMEs need to adapt in order to obtain and safeguard sustainable competitive advantages in an ever-changing environment. Following a qualitative approach, which facilitates the comprehension of the context and permits an in-depth analysis, we interviewed 24 managers and owners of Mexican SMEs from different economic sectors (Maxwell, 2005). This study contributes to the limited literature on IC in SMEs in emerging markets (Cohen and Kaimenakis, 2007, Hamdam and Damirchi, 2011, Khalique, 2011, Ngah, 2009, Phusavat et al., 2011, Steenkamp and Kashyap, 2010). Moreover, very few papers have analyzed IC from the DCV perspective (Hsu and Wang, 2012).

The results suggest that SMEs with dynamic capabilities have instituted processes within their organizations to respond more rapidly to change, allowing them to manage opportunities and threats. Moreover, they are willing to take more risks than their counterparts, who are characterized by less dynamism in seizing opportunities and transforming them into competitive advantages.

It is necessary for firms to have dynamic capabilities for long-term performance because SMEs need to respond to changes in the external environment, which can be culture- and industry-specific (Wang and Ahmed, 2007). Such adaptation impacts the relational capital of firms because regulations put in place by the Mexican authorities, access to financing, customer capital, and relationships with different stakeholders have to be taken into consideration by managers in order to apprehend and respond to market opportunities by adapting and transforming. This impact, although it comes primarily from the external environment, affects human and organizational capital. Internal capital (human and organizational) allows SMEs to manage knowledge within the organization and plays a role in the potential exploitation of identified opportunities. As previously mentioned, in highly dynamic environments, SMEs need to have the adequate processes in place to be able to adapt and seize opportunities. Such processes are intrinsic to SMEs because they become part of the culture of organizations. Moreover, in such dynamic markets, the ability to respond quickly to threats and opportunities

often determines the chances that small firms will survive. Accordingly, a horizontal organizational structure allows for better dissemination of information and quicker responses to changes.

Both scholars and practitioners can benefit from this research. The main contribution of this study is to open the door to a new theoretical perspective on intellectual capital and analyze it in combination with dynamic capabilities. At a practical level, this study is important to both managers and policymakers. SMEs should capitalize on IC by devoting appropriate resources to its development at the human, organizational, and relational levels. Given limited access to financial resources, the impact of IC is even greater in SMEs, giving them a clear competitive advantage. Policymakers should adapt their programs to the realities and needs of SMEs with regard to IC. The results provide the basis for further research on the subject, while questioning the current IC model and its limitations, as previously discussed.

Given the exploratory nature of this study, the results have some limitations. The small sample size, as well as the focus on one region (Queretaro) in Mexico does not allow us to generalize the results. However, beyond the local foci, there are some useful lessons for understanding the phenomenon as a whole. Further research could be conducted, for instance, to examine the link between IC and DCV in other markets by testing the proposed typology. Moreover, given the evolutionary process of the dynamic capabilities through which SMEs sense, seize, and transform opportunities, a longitudinal study could help deepen our understanding of the relationship between DCV and the elements of intellectual capital. Finally, quantitative surveys in Mexico could provide further knowledge on IC in emerging economies because these countries have received little research attention. Such an approach would validate our exploratory study on the relationship between intellectual capital, the resource-based view, and dynamic capabilities.

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Chapter 5: General Conclusion

5.1 Conclusion

In today's globalized world, the competitive advantage of SMEs depends more on the innovation than the abundance of cheap labor and natural resources. This shows the transition to an era of knowledge where intellectual capital, supported by skilled workers, is the strategic factor of sustainable competitive advantage. This research deals with intellectual capital in Mexico with a main research question: H*ow should intellectual capital be measured and what is its impact on the competitive advantage of SMEs in Mexico?*

In order to answer this research question, three research sub-questions were raised:

- *How do we measure intellectual capital?*

- *What are the components of intellectual capital in Mexican SMEs?*

- *What is the relationship between intellectual capital and competitive advantage of SMEs in Mexico?*

The research question and its sub-questions are tackled through three essays. In the first essay, a methodological review portrays the current knowledge on the quantitative methods used in IC studies. Looking at the past decade and taking Kaufmann and Schneider's (2004) literature review as a baseline, previous quantitative research in IC is analyzed with an emphasis on SEM whereby challenges are highlighted and recommendations are proposed. Among the recommendations, studies conducted in different countries are encouraged as well as multi-country perspectives; future research should consider using SEM techniques to study the relationship of IC sub-components; key information must be clearly stated, allowing transparency and model replication; item generation, sources of data and pre-testing must be clearly presented; estimation methods should be justified; construct validity and reliability must be ensured; and different models must be presented and tested in order to present the best possible fit model.

Following the recommendations of essay 1, the second essay uses SEM to scrutinize the characteristics of IC in Mexican SMEs. An online questionnaire is administered to survey SME managers on their perspectives of IC and its subcomponents. With a sample size of 445

respondents, the results demonstrate the importance of adapting the models to the context under study. Findings of this essay demonstrate that characteristics of human and organizational capital in Mexican SMEs seem to be similar to those found by other studies. However, external capital shows some particularities unique to Mexican SMEs. Following a comparative analysis of Mexican states (Aroca et al., 2005, Weiss and Resonblatt, 2010), despite the regional inequalities and income disparities in Mexico, it was found that managers surveyed do not exhibit any significant difference, on average, in terms of IC.

In the third essay, the RBV and DCV are mobilized to present the relationship between IC and the competitive advantage of Mexican SMEs from a new perspective. In order to achieve this objective, an in-depth qualitative analysis of SMEs in the state of Queretaro is provided. Following face-to-face interviews (Maxwell, 2005) with 24 managers, it was found that SMEs with dynamic capabilities institute processes to respond to change, are risk-takers, and have the ability to adapt in an ever-changing environment. In dynamic markets, the ability to respond quickly to threats and opportunities often determines the survival chances of SMEs. Internal processes play an important role in this adaptation, whereby such processes must become part of the culture of organizations.

5.2 Theoretical contributions

The contributions of this thesis are towards many levels, such as the review of the literature, theory, methods, and measures. These contributions are discussed in each of the essays and are linked to the research sub-questions. In essay 1, the objective is to identify the state of knowledge in terms of measuring intellectual capital, and a methodological review of the literature is presented. This first article helps us to address the gaps in the literature. The results show that despite the advances in research, the use of SEM as a tool to measure the latent variable is still under-used or misused in publications on IC. A categorization of quantitative literature is presented, as well as guidelines for future researchers wishing to use structural equations in the study of IC.

Essay 2 uses a confirmatory factor analysis to measure intangibles in SMEs in Mexico. The results show the importance of adapting the models to the context under study. This article addresses IC measures in the context of Mexico. It highlights similarities and differences with

the models presented in the literature as well as points out the characteristics of the Mexican context. This study is the first of its kind, to the best of our knowledge, whereby it adapts an IC model to the Mexican context. Moreover, it responds to several gaps in the literature in terms of IC when studying SMEs (Cohen and Kaimenakis, 2007, St-Pierre and Audet, 2011), emerging economies (Cohen and Kaimenakis, 2007, Durst, 2008, Hamdam and Damirchi, 2011, Huggins and Weir, 2007a, Khalique, 2011, Steenkamp and Kashyap, 2010), and the usage of SEM techniques (Herremans et al., 2011, Huang and Kung, 2011, Isaac et al., 2010).

The third essay integrates the RBV and the DCV in a new framework that is tested. This essay opens the door to a new theoretical perspective on IC. Very few articles have integrated these two theories in IC studies (Hsu and Wang, 2012). The limitations of the RBV in IC studies are highlighted and a demonstration is done of how the incorporation of DCV can improve our understanding of the factors that affect Mexican SMEs. Research propositions in terms of the relationship of human, organizational, and relational capitals' influence on the competitive advantage of SMEs and the proposed typology are tested.

5.3 Practical contributions

By emphasizing IC in SMEs in Mexico, this study presents practical contributions that are of interest to both SMEs and regulators. According to Cohen & Kaimenakis (2007), SMEs account for over 99% of companies but remain understudied. In addition, given the differences in terms of capacity and structure, the components of IC differ between MNCs and SMEs. This study shows that the broad perception that, contrary to large firms, SMEs do not accord importance to IC is untrue. This thesis deepens our understanding of the realities, challenges, and opportunities as perceived by Mexican SME managers.

The results confirm several reports and recommendations by institutions such as INEGI (2009) and the OECD (OECD, 2004a, OECD, 2007, OECD, 2013), which evoke the barriers to accessing financial assistance faced by Mexican SMEs, the lack of skills in human resources, and inadequate government support programs in place. Despite the multitude of government programs implemented both nationally and locally by the Mexican regulators, very few SMEs reap their benefits. This study follows the same path as international and national

recommendations (Villareal and Villareal, 2006), whereby the importance of assistance programs put forward by the different levels of government is shown. However, it goes beyond these propositions to demonstrate that although it is of great importance to offer financial assistance to SMEs, it is imperative to implement programs to reinforce the human capital through adequate training, leadership, and professionalization of SMEs. Hence, managers should be able to put procedures and processes in place and have access to adequate technology to transform Mexican SMEs from quasi-informal into organizations where knowledge is embedded in the personnel, organizational routines, and network relationships of the organization.

Surveyed managers consider IC extremely important for the growth of their organizations. In fact, given the limited access to financing, IC plays an ever-important role in gaining competitiveness. Despite the importance of financial and external capitals to SMEs, managers cannot control these elements directly. Thus, enhancing human and organizational capitals is an action that has a direct impact on the competitive advantage and is within reach of the managers. Another implication of the study is that it presents a framework with which to measure IC. Instituting processes to respond more rapidly to change and having flatter organizational structures allows SMEs to take advantage of opportunities and foresee threats. Such dynamic capabilities will help SMEs adapt and transform in order to respond to market opportunities. These findings go beyond the organizations themselves and are of importance to policymakers trying to encourage the development of SMEs. In order to have competitive SMEs, policymakers should adapt programs in place according to their realities with regard to IC.

5.4 Limits and future research avenues

Given the nature of the thesis, the limitations of each essay are discussed within the document. However, overall, this thesis has some limitations worth mentioning. Only the perceptions of managers are considered for analysis and thus the study might have response bias. The qualitative study's focus on the state of Queretaro does not allow generalization of the results. The focus of this thesis is at the SME level, whereby it does not look at the interrelation between firms or at the impact of IC in SMEs on the Mexican economy as a whole.

These limitations are an inducement and will guide future research. As explicated in this thesis, and given the importance of the ''missing middle'' in emerging economies, future research shall

look at the link between IC in SMEs as a way to achieve economic development. Emphasis shall be at the firm level but also at a macro level in order to conceive support programs that will live up to the challenges faced by SMEs. In this thesis, the interrelationship of the SME with its external environment is noted by the external capital. However, future research shall deepen this point by taking multiple stakeholders' perspectives. The local intermediaries such as national, regional, and local authorities, competition, the private sector, banks, and civic organizations should be surveyed to include their perspectives on IC in SMEs.

5.5 References

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