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DISCOVERING THE ROLE OF INTELLECTUAL CAPITAL IN LATIN AMERICA: INSIGHTS FROM ECUADOR

Mariuxi Pardo-Cueva ¹, Guillermo Antonio Dávila ², Laura Magali Chamba-Rueda ³

^{1,3} *Department of Business Sciences, Universidad Técnica Particular de Loja, Loja, Ecuador*

² *Knowledge Engineering Department, Federal University of Santa Catarina, Florianopolis, Brazil*

E-mails: ¹ mcpardo@utpl.edu.ec; ² davila.guillermo@gmail.com; ³ lmchamba@utpl.edu.ec

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Abstract. This research aims to characterize the intellectual capital in Ecuadorian companies and to validate the applicability of a scale suitable for this context, considering each of its dimensions (human capital, structural capital, and relational capital), as well as innovation aspects of the Ecuadorian companies. The study uses a mixed approach, including factorial analysis and descriptive statistics, using a sample of 88 companies from different economic sectors, located in a single province of Ecuador. The results verified the applicability of the scale and its usefulness for future studies; and they showed that there are different kinds of configurations of intellectual capital, based on the sector and type of innovation usually implemented by companies. In order to be more innovative, construction firms in Ecuador need to focus more on the structural and relational dimensions of intellectual capital, and accommodation and food services industries should orient their efforts toward further developing their human capital. Future studies may explore the opportunities for enhancing innovation performance based on the management of intellectual capital in more detail, using larger sample sizes.

Keywords: intellectual capital; human capital; relational capital; structural capital; Latin America

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1. Introduction

Today, knowledge-based organizations are an important part of modern societies (Berezinets, et al. 2016), as companies compete by relying more on their intangible resources as key value factors (Sharabati, Jawad & Bontis, 2010). These intangible resources, which produce important benefits to overcome the weaknesses of small and medium enterprises (Verbano & Crema, 2016; Jordão & Novas, 2017) can be technologies, employee skills, process innovations, organizational structure, creativity, industrial networks, or relationships with customers and external suppliers (Starovic & Marr, 2004; Keong Choong, 2008).

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Given the characteristics of the market, being technological developments, changes in social conditions, and reduction of the products' life cycles, what will make companies more competitive in the current economic scenario will be the effective management of knowledge assets, including intellectual capital (Zhang & Lv, 2015; Agostini, et al. 2017).

Intellectual capital (IC) is recognized as one of the most important assets for business results and the basis for market leadership and differentiation, because it provides unique resources that cannot be easily imitated by competitors, and ultimately, it helps to deliver competitive advantage and value for organizations (Lev, 2001; Curado, 2008; Roos, 2017).

Considering the importance of intangible assets for companies, researchers have formulated some methodological frameworks and empirical studies in order to measure and evaluate each one of the components of IC and its economic impact (Goebel, 2015). However, much of this research has focused on assessing and analyzing IC in developed countries, or in knowledge-intensive industries such as technology, pharmaceuticals, banking, and telecommunications.

In emerging countries, empirical studies on innovation—and in the particular case of the role of IC for innovation—are still scarce, and often limited to specific regions and sectors (Jardon & Martos, 2012), or regional leaders with a large GDP like Brazil (Davila et al., 2019). In response, the present research aims to characterize IC and innovation and to validate the applicability of an instrument in more traditional and less explored industries, located in an emerging country like Ecuador. These sectors are manufacturing, commerce, information and communication technologies, construction, professional activities, housing, and food services.

The research will try to answer the following questions: How is IC and innovation managed in Ecuadorian companies? How can IC be quantified in emerging countries? How can Ecuadorian companies be characterized in relationship to their IC and the type of innovations they make?

Ecuador was chosen for two reasons. Firstly, Ecuador is one of the most economically stable countries with one of the highest GDP per capita in Latin America. According to the World Bank (2019), Ecuador has the 62nd highest GDP in the world, and it has a human development index of 0.762, above average for Latin American countries. Secondly, Ecuador has specific characteristics and at the same time, it has a lack of academic studies when compared with other emerging countries like Mexico or Brazil. Most Ecuadorian firms are SMEs (Superintendencia de Compañías, Valores y Seguros, 2018). Regarding innovation, Ecuador is ranked 99 worldwide according to the Global Innovation Index (GII, 2019), and this shows a need for the development of innovation capabilities. Private firms make huge investments in formal training for workers and this represents a strength that when combined with quality management and knowledge management, may enhance innovation capabilities. Consequently, Ecuador has good potential for academic analysis that will allow conclusions to be drawn, which will serve as inputs for new studies in the region.

This document is structured as follows: in Section 2, a theoretical review related to IC and innovation is provided. Section 3 describes the methodology, extensively developed in the study. Later, in Section 4, the results found in the research and their respective discussion are presented. Finally, Section 5 shows the conclusions.

2. Literature review

2.1 Innovation in emerging countries

In the current context, characterized by globalization and dynamism resulting from technological disruptions and political and economic turbulence, innovation becomes an intrinsic characteristic for companies wishing to survive in the market (Teece, 2010). Innovation is defined by Schumpeter (1927) as the superior condition achieved due to the improvement or development of a new product or production method, or due to the opening of a new market. The interest of managers and academics in innovation is to try to understand how the innovation phenomenon has been growing in recent decades (Baregheh et al. 2009). Baregheh et al. (2009) state that innovation is being analyzed from different disciplines such as management, economics, technology, and engineering. In management, specifically in studies related to knowledge management, innovation has been conceptualized as a product of factors; one of which is the IC of organizations (Edvinsson, Sullivan, 1996; Sullivan, 1998; Bontis & Fitz-Enz, 2002; Subramaniam & Youndt, 2005).

Despite the growing interest in the subject, the number of studies has evolved very unevenly when developed and emerging countries are compared. In developed countries, there are empirical studies that have characterized IC, have developed measurement techniques for that variable, and have analyzed the relationship between IC and innovation (Bontis, 2001; Cabrita & Bontis, 2008; Marques et al. 2006; Maurer et al. 2011; Cabello-Medina et al. 2011; Dumay & Garanina, 2013; Kianto et al. 2017). Looking at studies on IC and innovation in emerging countries, it is evident that those are scarce and limited in scope to some sectors and regions, and therefore there are greater gaps in knowledge (Jardon & Martos, 2012). This lack of studies about the influence of IC on the innovative performance of companies in emerging countries is critical. This is due to the pressure on companies to innovate in a context where customer's demands are often more complex, and companies frequently face global competitors with better institutional support, access to technology, qualified personnel, and other resources (Dávila et al. 2019).

In the following section, IC and its dimensions will be discussed, as well as the theoretical relationship between IC and innovation. Subsequently, this construction will be characterized in the Ecuadorian context, and based on the results, proposals will be developed that will serve for future empirical studies on the relationship between IC and innovative performance.

2.2 Intellectual capital

The academic literature has provided several definitions related to IC. One of the most influential was established by the authors Stewart & Losee (1994) who considered IC as "the knowledge a company has in order to create a competitive advantage". It also constitutes the knowledge that is generated within the organization and that can be converted into tangible benefits (Edvinsson & Sullivan, 1996; Sullivan, 2000).

For Lev (2001), IC is also an intangible source of value, transmitted by innovations in specific projects or human resource management practices of an organization. Marr, Schiuma, & Neely (2004) further consider that IC is represented by the combination of resources and intangible activities that allows an organization to obtain a competitive advantage through the transformation of material, and financial and human resources into a system capable of creating stakeholder value and organizational innovation.

Jordão & Novas (2017) consider that IC is composed of the relationship between the material and immaterial resources in the possession of an organization. The same interpretation is made by Kujansivu & Lönnqvist (2007),

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who mention that IC is made up of all the intangible and non-physical goods that are important in a knowledge-intensive industry.

For Stewart (1997) and Bontis (2001), IC is intellectual material, represented in knowledge, experience, intellectual property, and information that can be used to create wealth; however, Dumay (2016) makes a clarification to this definition considering that it does not take into account the totality of the nature of IC to create wealth, affirming furthermore that the basis of the value creation process (monetary, social, and sustainable) is key to deduct the value and characterization of the IC. Dženopoljac, et al. (2016) further consider that the potential of IC in corporate performance will be evident in terms of the management of this intangible resource.

Current researchers of IC such as Bontis et al. (2015), Dumay & Garanina (2013), and Kianto, et al. (2010) recognize this intangible asset as a term under construction and with multiple facets, since IC constitutes a multidimensional concept of knowledge assets, experience, and practical capabilities to create value of products and services Dumay (2016), using the intelligence rather than just the financial aspect (Allameh, 2018).

At the same time, it is important to highlight that due to the lack of direction related to the classification of intangible assets, there are several arguments related to this issue which have resulted in IC being categorized between two to four dimensions (Dženopoljac et al., 2016). However, to address this weakness, Bontis (1998); Roos, et al. (1997); Sullivan (2000); Roos (2017), Matricano (2016), Wee & Chua (2016); and Buenechea-Elberdin (2017) identified three main components to categorize IC: human capital, structural capital, and relational capital.

Human capital constitutes the combined knowledge, skill, and innovation capacity that employees have in order to accomplish a task (Edvinsson & Malone, 1997). It also contains a series of characteristics such as education, knowledge, cultural value, and corporate identity that can influence creativity and the willingness to create new ideas within the company (McGregor, et al. 2004; Martín-de-Castro, et al. 2011). This gives satisfaction to the employee and the improvement of personal and organizational performance (Martínez-Torres, 2006).

Sayyed (2018) determines that human capital is one of the largest and most important dimensions of IC in an organization. Bontis (1998) also points out that human capital constitutes a source of innovation and a strategic element for an organization. FitzPatrick, et al. (2013) agrees with this argument, and, further considers that human capital is one of the key resources of strategic renewal and therefore cannot be replaced by machines; since human capital is "the intelligence of the member of the organization" (Bontis, 1998, 65).

Structural capital constitutes the knowledge incorporated in the structures and processes of the organization, and it includes databases, patents, trademarks, research and development, technology, information systems, strategies, organizational charts, manuals and programs, and all the capabilities of the organization that support employee productivity (Edvinsson & Malone 1997; Bontis, 2001; Petty & Cuganesan, 2005 and Nazari & Herremans, 2007). Casas Nova, et al. (2017) also pointed out that the procedures, rules, systems, and routines are elements that together define the organizational system (structure and processes). Through structural capital, the company can turn the innovation and energy of its human resources into the property of the organization (Seleim, et al. 2004; Casas Novas et al. 2017). Furthermore, it is considered internal capital since the accumulated knowledge within the company's structures, processes, and capacities remain in the company when the employee goes home (FitzPatrick, et al., 2013).

Relational capital constitutes a network of relations between people and groups of people, through which information and knowledge is transferred in a shared way (Roberts, 2003). Relational capital symbolizes the best

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attitude of an organization to incorporate the knowledge that comes from the interaction with the external community, such as suppliers, customers, government, and industry and that it develops throughout its existence (Bontis, 1998; Inkinen, 2015). It is embedded in marketing channels, brand names, reputation, customer satisfaction, franchisees, suppliers, and partners (Bontis, et al. 2000; Davey et al. 2009). Casas Novas et al. (2017) also emphasizes that this capital is not owned by the organization, but it can establish corrective measures with a view to its development and determine connectivity between the elements (internal and external) essential for its formation.

Despite fundamental differences in each of the components of IC, they are not always found separately in organizations. Individual knowledge, for example, is related to human capital, and is often codified and institutionalized through structural capital, which is transferred and used in social networks by social capital. Therefore, the different dimensions of IC influence organizational outcomes, including innovation (Machado et al. 2017).

2.3 Intellectual capital and innovation

Innovation is defined as the openness and willingness to create and test new ideas given by a cultural aspect of the company to seek new ways of doing things, being creative in their methods of operation and product introduction (Schumpeter, 1927; Calantone et al. 2002). Several empirical studies (Fernández, et al. 2000; Subramaniam & Youndt; 2005) concluded that intangible factors have a significant influence on innovation outcomes. For that reason, organizations have realized that they can achieve sustainable innovation through IC and that their success depends largely on their ability to manage this valuable intangible asset (Tootifar, et al. 2014; Buenechea-Elberdin, 2017), since knowledge assets, including IC, are essential to maintaining an appropriate innovation environment and developing sustainable innovative capabilities in a competitive environment (Allameh, 2018). Therefore, IC is seen as an antecedent for innovation (Chahal & Bakshi, 2015).

Some empirical studies have explored the role of IC and its dimensions (relational, structural, and human capital) for enhancing innovation performance. Most studies suggest that relational capital has a positive influence on innovation performance (Capello & Faggian, 2005; Zerenler, et al. 2008; Dorrego, et al. 2013; of Cabrilo & Dahms, 2018). The study by Dorrego et al. (2013) using data from SMEs from different industries shows that relational capital is an antecedent of product innovations. More evidence about the positive influence of relational capital on innovation performance was shown in the study by Zerenler, et al. (2008) in a Turkish automotive parts firm, and in studies using data from medium and large-sized manufacturing and service firms from Serbia (Cabrilo & Dahms, 2018) and Italy (Capello & Faggian, 2005). In addition, Capello & Faggian (2005) evidenced that in firms from high technology sectors, the contributions of relational capital to innovation are higher. In SMEs, the situation is not different: using data from high tech Italian manufacturing firms, the study of Agostini, et al. (2017) shows that firms with more relational capital tend to have better firm outcomes.

Regarding structural capital, its importance for leveraging innovation performance was highlighted by several studies around the world (Cabrilo & Dahms, 2018). Using data from Turkish manufacturing firms, Bayraktaroglu, et. al (2019) demonstrated that structural capital is positively related to innovation performance. Similar results were obtained by Agostini & Nosella (2017) using data from Italian manufacturing SMEs. The study of Buenechea-Elberdin, et al. (2018) classified 180 medium and large-sized firms into two groups: high tech and low tech firms. Their results evidenced that in high tech firms, structural capital influences innovation performance, with capital renewal as a moderating factor. In low tech firms, Buenechea-Elberdin, et al. (2018) show that structural capital has a direct and positive effect on innovation performance.

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Human capital is highlighted by academics as a critical dimension of IC. Some studies show a direct relationship between human capital and innovation performance (Bayraktaroglu, et al. 2019), and some others posit that this relationship is moderated for organizational capabilities, for instance absorptive capacity (Engelman et al., 2017). The study by Engelman et al. (2019) uses data from Brazilian manufacturing firms and highlights the positive influence of human capital on absorptive capacity, and of absorptive capacity on innovation performance. Similar results were obtained in the study by Xu & Li (2019), which analyzes high tech and low tech manufacturing SMEs from China, and provides evidence that the impact of human capital in high-tech SMEs is greater than that in non-high-tech SMEs. Despite few studies (Cabrilo & Dahms, 2018) providing evidence of a significant influence of human capital on innovation performance, there seems to be a consensus in academia about the significance of this relationship.

3. Methodology

For this paper's purpose, a mixed approach was used. First, a survey was applied in order to collect information about levels of IC and innovation in firms from Loja, Ecuador. In the second step, the scale used for measuring IC was statistically assessed. In the final step, the study presents a descriptive analysis for explaining relevant aspects related to the dimensions of IC and innovation.

3.1 Sample

The selected sample was of 88 companies from the city of Loja, from the main economic sectors of the Province of Loja—according to the results of the National Economic Census (INEC, 2011)—such as manufacturing, commerce, information and communication, construction, professional activities, lodging, and food services, as described in Table 1. Companies with active status, and registered with the “Superintendencia de Compañías Valores y Seguros of Ecuador” were considered as the basis for the study. The obtained sample represents 21% of the total of 424 companies from these sectors in Loja Province. The information was collected through face-to-face surveys with managers of tactical or strategic levels of the target companies, between March and August 2018.

Table 1. Distribution of companies in this study.

Economic Section	Amount	Percentage
Information and communication	17	13.79%
Manufacturing	27	31.03%
Trade	2	2.30%
Construction	20	22.99%
Professional activities	10	11.49%
Accommodation and services	11	12.64%
Total	87	100%

Source: Results of the study

The survey contained 40 questions distributed in five blocks. The first block collected general information of the population (to know, among other things, the sector, size, whether the company is family owned or not, and the percentage of women in it); in the second block, data related to human capital was collected; the third block contained questions focused on structural capital; the fourth block was to collect information related with

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relational capital; and finally, in the fifth block, data related to innovation was collected. The first and fifth blocks of the survey were developed on the basis of open and closed questions; while, from the second to the fourth block, the design was elaborated with a Likert scale, using a scale of 5 options: (1) strongly disagree, (2) disagree, (3) neither agree nor disagree, (4) agree, and (5) strongly agree.

The scale for IC was developed based on several relevant studies from around the world. The human capital dimension was measured using 11 items based on Ganesan et al. (1996), Babin & Boles (1996), Bontis (2013), Edvinsson & Malone (1997), Sharabati et al. (2010), Hartline & Ferrell (1996), Youndt et al. (2004), and Carmeli, 2004 among others. For measuring the structural capital dimension, 10 items from IRSE (2007), Berry (1991), Ulrich et al. (1999), Song and Parry (1993), Tippins & Sohi (2003), and Youndt et al. (2004) among others were used. Finally, for measuring relational capital, eight items based on Chen et al. (2004), Gallego & Rodríguez (2005), Warn (2005), Youndt et al. (2004), Bontis (1998), Peña (2002), Bueno et al. (2004), and Yli-Renko et al. (2001) among others were used. The authors that support each item of the IC scale are detailed in the appendix.

The instrument was selected as it was considered appropriate for the Ecuadorian context, after conceptual and applicability validations with two academic specialists from the authors' institution, and two external academics. According to Creswell, & Creswell (2017), some questions were added and others were modified to guarantee applicability to the Ecuadorian context. Finally, the new IC instrument was validated by a group of five Ecuadorian entrepreneurs to ensure its functionality before data collection. This instrument is shown in Table 2. Finally, based on Calantone, Cavusgil, & Zhao (2002); and Weerawardena (2003), each company was consulted about its predominant type of innovation: product or process.

3.2 Analysis Method

In line with the objective of the present work, which was to characterize the IC and innovation in the companies of Loja, this work had two parts. First, statistical validations of the reliability and validity of the used scale were made to verify if it was applicable and could correctly represent the variables of IC in the Ecuadorian context. Next, the collected data went through a descriptive analysis, following suggestions from Creswell, & Creswell, (2017). The results were presented and discussed with Ecuadorian and international specialists regarding IC and innovation.

4. Results analysis and discussion

After data collection, the suitability of the instrument to measure the components of IC and innovation in the Ecuadorian context was verified (Chart 2). The reliability of each category was confirmed by verifying values greater than 0.6 for indicator loadings (Hair et. al 2010) and values higher than 0.7 (threshold suggested by Nunnally & Bernstein, 1994) for each construct, following the tests of Dijkstra-Henseler, Jöreskog, and Cronbach's alpha. Convergent validity was confirmed by verifying that the average variance extracted from each construct (AVE) was above 0.5, following the suggestions of Fornell & Larcker (1981). Then, divergent validity was confirmed by verifying that the cross-loadings and the HTMT coefficient (Heterotrait-Monotrait Ratio) were lower than 0.9 for each category, as suggested by Fornell & Larcker (1981). Finally, it was verified that all the indicators or questions had a VIF (variance inflation factor) index lower than 3.3 to guarantee the absence of multicollinearity. After the first assessment of the above-mentioned indicators (first iteration), indicator H1 (VIF > 3.3) was eliminated to avoid multicollinearity; indicators H11, E10, and R5 (loadings less than 0.6) to guarantee reliability; and indicators H8, H9, E3, E4, R3, and R4 (for cross loadings) to guarantee discriminant validity (see details in the Appendix). The second interaction yielded values showing correct reliability and validity, as can be seen in Table 2.

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Table 2. Instrument to measure IC in companies in Ecuador.

INDICATORS	Loadings	Dijkstra-Henseler's rho (ρ_A)	Jöreskog's rho (ρ_C)	Cronbach's alpha(α)	AVE
HUMAN CAPITAL (HC)		0.898	0.918	0.896	0.617
H1. Employee commitment					
H2. Tasks within deadlines	0.833				
H3. Recognition of efforts and improvements	0.757				
H4. Positive attitude to change	0.792				
H5. Continuing education	0.745				
H6. Degree of initiative for improvement	0.816				
H7. Satisfaction towards subordinates	0.778				
H8. Adaptation to changes					
H9. Competition for the position					
H10. Development of creativity	0.771				
H11. Staff rotation					
STRUCTURAL CAPITAL (SC)		0.896	0.903	0.879	0.539
E1. Periodic review of the strategic plan	0.708				
E2. Coordination of departments	0.807				
E3. Knowledge of activities at all levels					
E4. Incentive to create something new					
E5. Working environment	0.725				
E6. Description of procedures	0.774				
E7. Database	0.774				
E8. Information storage and processing	0.737				
E9. Computer systems	0.614				
E10. Use of patents and/or licenses					
RELATIONAL CAPITAL (RC)		0.866	0.887	0.847	0.569
R1. Customer retainment	0.763				
R2. Relationship with customers	0.815				
R3. Relationship with suppliers					
R4. Assessment of competitors					
R5. Cooperation agreements with the sector					
R6. Relationship with universities, institutes, or innovation centers	0.704				
R7. Knowledge of community needs	0.739				
R8. Socially responsible company	0.853				

Source: Results of the study.

After ensuring that the scale adequately measured IC and its dimensions, the existence of a high correlation between them can be observed, according to the numbers shown in Table 3. This result is similar to previous studies (Bozburu, 2004) and may show that companies develop their IC as a result of generic actions aimed

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toward improving their competencies, rather than as a result of a strategy focused on a certain dimension or set of dimensions of IC.

Table 3 - Correlation between the dimensions of IC in companies in Loja

	1	2	3
1 Human capital	1		
2 Structural capital	0.6271	1	
3 Relational capital	0.7209	0.7355	1

Source: Results of the study.

After verifying the scale, IC characteristics and innovation of the studied companies were analyzed using descriptive analysis.

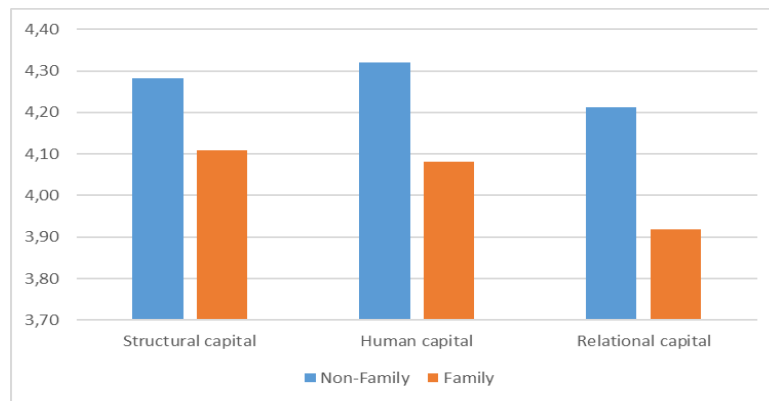


Fig 1. Average IC by type of business

Source: Results of the study

Figure 1 identifies, on average, greater efficiency of the three components of IC (human, structural, and relational) in companies where family ties are not predominant. These results are due to the fact that in family businesses there are greater restrictions or a tendency to increase the dispersion of ownership and even more of their intangible assets. At the same time, a lower average (3.92) was observed in family businesses for relational capital, as most family businesses avoid maintaining entries of external people for fear that they may take control of the organization (Goyzueta, 2013). However, Rodríguez-Suárez, et al. (2013) emphasize the external relations that family businesses must maintain, because of their decision-making processes and, above all, because they are dynamic companies.

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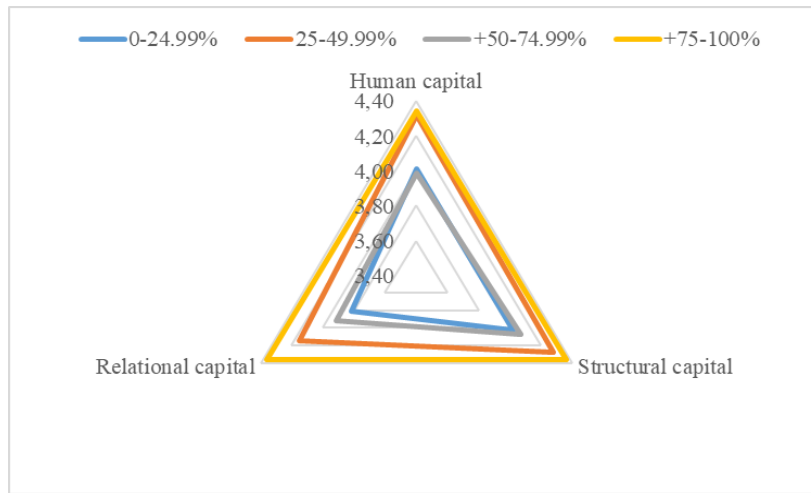
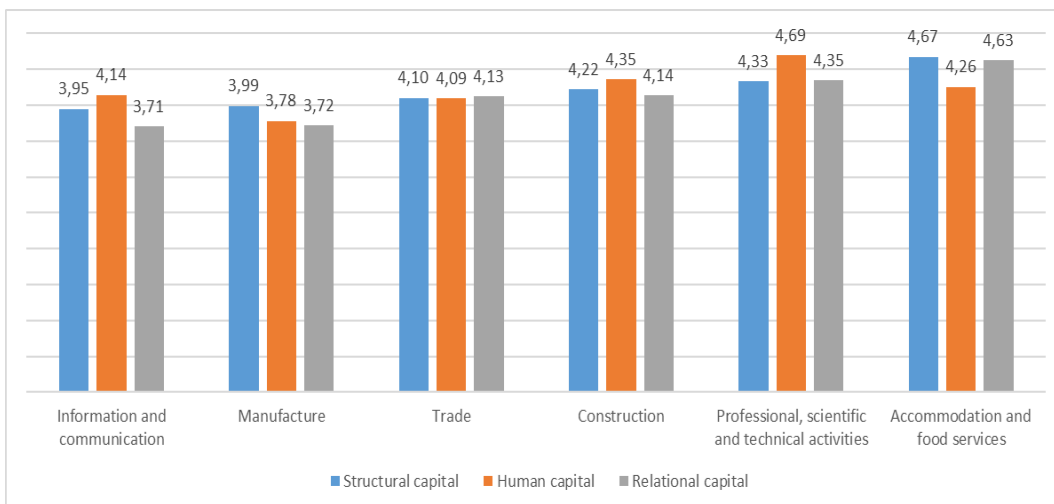


Fig 2. Average of IC components according to % of women in each company.
Source: Results of the study.

In Figure 2, the contribution of the female gender in determining intellectual capital is shown, denoting that when there is greater involvement of women (between 75% and 100% and between 25% and 50%), the structure of IC in each of its components (human, structural, and relational) has a greater contribution to the results of the organization. It is considered that women have the ability to create a favorable environment for companies (Granelli & Robotti, 2016). On the other hand, studies such as that of López (2013) consider that in organizations there should be an equal presence of men and women, constituting a source of creativity and inclusion for entities. Other research supports this statement by ensuring that to assess the IC and management of organizations, the distinction between men and women does not matter because the most relevant factors are the competencies of workers and not their gender (Trequattrini, et al, 2018).



FFig 3. Average IC by economic sector
Source: Results of the study.

Figure 3 shows the distribution of the components of IC by each economic sector of study. It can be seen that in the service sectors, especially knowledge-intensive ones—those related to professional, scientific, and technical activities—there is greater efficiency of human capital. For instance, previous studies in Tunisian ICT firms showed that incremental innovations are positively linked to human capital (Berraies, 2019). Other studies highlighted the importance of human capital and relational capital for innovation in knowledge-intensive firms (Capiello et al., 2020). Regarding accommodation and food services, results from the present study evidenced that these firms need to focus on the development of human capital (the IC dimension with the lowest mean), in line with previous studies that highlighted the relevance of human capital with information technology (Rudež & Mihalič, 2007) and structural capital (Kim et al., 2012).

In manufacturing companies, there is a greater predominance of structural capital. Surprisingly, the present study showed a predominance of human capital in firms from the construction sector. Even though Lin et al. (2018) posit that business performance in the construction industry relies highly on IC, a recent study by Duodu & Rowlinson (2019) with firms from the construction sector in Hong Kong evidenced that both the structural and relational dimensions have a positive influence on innovation performance, while the effect of human capital on innovation is through the other dimensions. It may be proposed that firms from the construction sector in Loja may be able to increase their innovation performance if they focus on improving their structural and relational capital.

In this regard, it is important to note that Machado, et al. (2017) highlighted the differences in the IC configurations that companies of various types have, and in turn, stated that there is always a synergy between the components of the IC, which act together to achieve competitiveness.

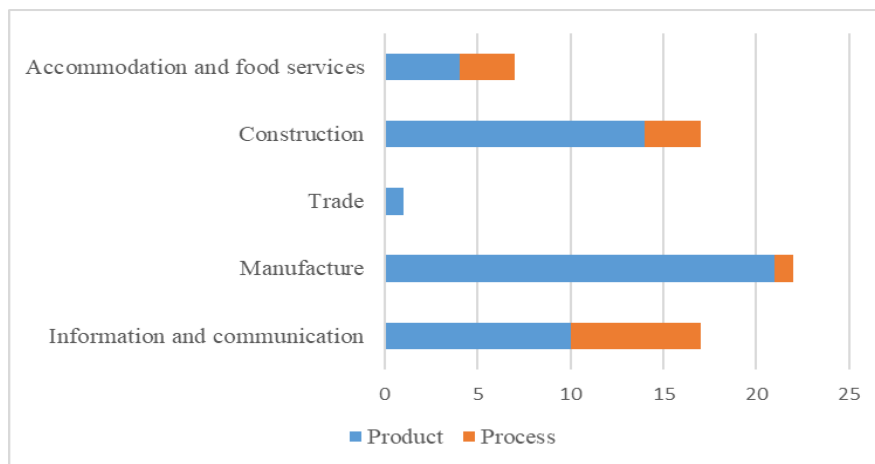


Fig 4. Predominant type of innovation by economic sector

Source: Results of the study.

Due to the characteristics of the sample and the context of the study, there is more product innovation (in goods and services) in the economic sectors analyzed represented in Chart 4. Recent research has shown that companies in Latin America tend to develop incremental product innovations, as they are constantly looking for foreign product designs and adapting them to local environments (Davila, et al. 2018). In line with Hipp & Grupp (2005), in non-knowledge-intensive services (e.g. ICT, construction, housing, and food services) where cost and time

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efficiency are important, the present study found that innovation has been carried out on products. Studies by Kianto et. al. (2010), Schilling (2011), and Buenechea-Elberdin (2017) also state that the intensity with which the IC influences innovative performance will also depend on the location of the company, the industry to which it belongs, its level of technology, and its size.

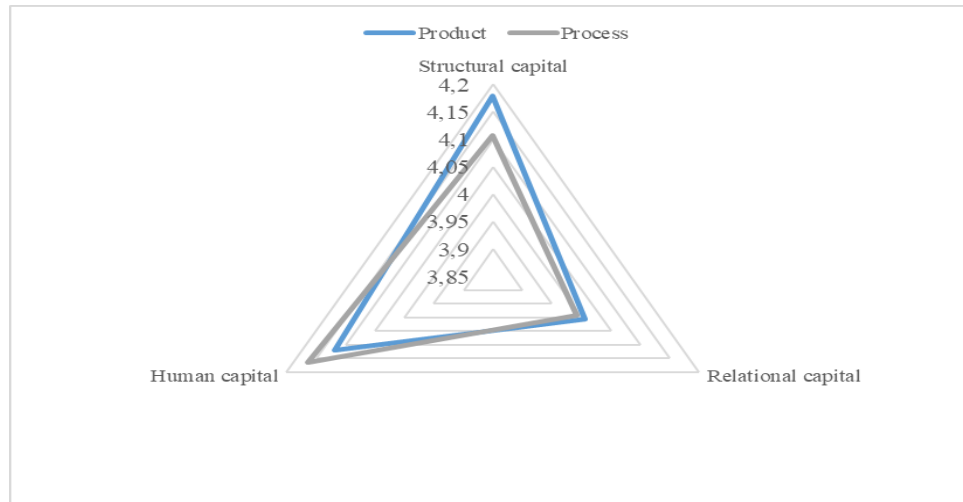


Fig 5. IC dimension averages by type of innovation

Source: Results of the study.

Figure 5 shows that companies which innovate in processes have different IC structures to companies that innovate in goods or services. The first ones have a greater focus on their human capital, because the knowledge, experience, skills, and creativity of the employees are fundamental for the creation of new processes (Mariz Perez et al. 2012). Companies that innovate in products also develop a higher structural capital, as this type of innovation is more complex (mainly in emerging countries), because it requires an adequate integration of specialized knowledge in people, towards final goods and services, supported by organizational processes and technology (Davila, et al. 2018). The support of organizational processes and technology in the launching of products contributes to the reduction of production costs, the faster completion of development projects, to the creation of spaces for innovation, to improving decision-making and results coordination, and to increasing the sales or revenue from new products and services (Huang, et al. 2010; Chen, et al.,2017).

At the same time, the present study showed that all companies, regardless of the type of innovation they present, pay attention to relational capital as external knowledge is a critical input for the innovative performance of organizations (Fosfuri & Tribó, 2008). On this point, Subramaniam & Youndt (2005) state that organizations generate innovations when their individual experts communicate, network, and share knowledge with each other. Dost, et al. (2016) concluded that IC is significantly associated with innovation, whether in products or processes, which is consistent with the results of the present research.

5. Conclusions

The main academic contribution of this study was the adaptation and verification of a scale to analyze IC in emerging countries. This scale can be used in future research, which seeks to identify relationships between IC and organizational outcomes, such as innovation and financial performance, in companies located in Ecuador or other emerging countries.

In addition, the main empirical contribution of this study is the description of the components of IC in Ecuadorian companies. The results show that the configurations of IC may vary in companies according to their sector and the type of innovation usually practiced by each company. This study identified some opportunities related to IC, for improving their innovation performance in firms from Loja. Accommodation and food services may focus on the development of human capital, and construction firms may improve their innovativeness if they increase their efforts to enhance both structural and relational capital. A dynamic view of IC covers the integration of all its components, which means considering the effects and relationships with each other, in order to understand in a broad and organized way the strengths of each organization, and to promote successful innovation.

IC appears to be an important potential engine of innovation for Ecuadorian companies, especially those located in the city of Loja. However, a proposition of this study is that not all companies need a high level of development of all IC dimensions. The level of development required for each dimension depends on its own characteristics, such as economic sector, size, or location. However, it is important to emphasize that all IC dimensions should work together to ensure that the IC contributes to creating value (Casas Novas et al. 2017). Further studies may help to explain which levels of IC and its dimensions are needed in order to achieve superior innovation performance, taking into consideration their sector and size. This will allow the development of guidelines for decision makers improving the efficiency in the allocation of its resources, by prioritizing the dimensions of IC that are most relevant to each organization.

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Appendix. Statistical assessment of the instrument to measure IC in companies in Ecuador.

INDICATORS	HC	SC	RC	Variance Inflation Factors (VIF)	AUTHORS
HUMAN CAPITAL (HC)					
H1. Employee commitment	0.864	0.587	0.556	4.266	Ganesan et al. (1996); Babin & Boles (1996)
H2. Tasks within deadlines	0.809	0.511	0.512	3.532	Kianto, A. (2008)
H3. Recognition of efforts and improvements	0.720	0.499	0.461	2.178	Mention & Bontis (2013), Edvinsson & Malone (1997)

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H4. Positive attitude to change	0.761	0.539	0.597	3.080	Mention and Bontis (2013), Edvinsson and Malone (1997)
H5. Continuing education	0.770	0.566	0.535	3.418	Sharabati et al. (2010)
H6. Degree of initiative for improvement	0.785	0.518	0.566	2.720	Sharabati et al. (2010)
H7. Satisfaction towards subordinates	0.767	0.562	0.505	2.574	Carmeli (2004)
H8. Adaptation to changes	0.719	0.694	0.628	2.400	Hartline & Ferrell (1996)
H9. Competition for the position	0.734	0.723	0.613	2.267	Bontis (1998), Carmeli & Tishler (2004)
H10. Development of creativity	0.762	0.574	0.613	2.748	Bontis (1998), Youndt et al. (2004)
H11. Staff rotation	0.351	0.177	0.158	1.235	Carmeli & Tishler (2004)
STRUCTURAL CAPITAL (SC)					
E1. Periodic review of the strategic plan	0.385	0.646	0.450	2.492	IRSE (2007)
E2. Coordination of departments	0.583	0.784	0.660	2.980	Berry (1991)
E3. Knowledge of activities at all levels	0.626	0.786	0.673	2.276	Ulrich et al. (1999)
E4. Incentive to create something new	0.701	0.734	0.560	2.065	Song and Parry (1993)
E5. Working environment	0.695	0.746	0.589	2.254	Kianto (2018)
E6. Description of procedures	0.446	0.717	0.618	2.233	Tippins & Sohi (2003), Youndt, Subramanian & Snell (2004)
E7. Database	0.495	0.759	0.581	2.677	IRSE (2007)
E8. Information storage and processing	0.450	0.712	0.533	2.413	Tippins & Sohi (2003)
E9. Computer systems	0.392	0.606	0.433	1.885	Tippins & Sohi (2003)
E10. Use of patents and/or licenses	0.240	0.411	0.479	1.434	Youndt, Subramanian & Snell (2004)
RELATIONAL CAPITAL (RC)					
R1. Customer retainment	0.604	0.670	0.796	2.565	Chen et al. (2004), Gallego & Rodríguez (2005)
R2. Relationship with customers	0.627	0.701	0.815	2.372	Yli-Renko et al. (2001)
R3. Relationship with suppliers	0.420	0.603	0.680	1.978	Gallego & Rodríguez (2005), Warn (2005)
R4. Assessment of competitors	0.327	0.541	0.595	1.609	Youndt, Subramanian & Snell (2004)
R5. Cooperation agreements with the sector	0.380	0.326	0.571	1.448	Bontis (1998), Peña (2002), Bueno et al. (2004)
R6. Relationship with universities, institutes or innovation centers	0.443	0.370	0.646	1.916	CIC (2003)
R7. Knowledge of community needs	0.490	0.463	0.685	2.100	IRSE (2007)
R8. Socially responsible company	0.703	0.757	0.836	2.352	Carmeli & Tishler (2004), Gallego & Rodríguez (2005)

Source: Results of the study.

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Mariuxi PARDO-CUEVA, PhD candidate in Administration - National University of Rosario (Argentina). Master in Integral Audit - UTPL. Engineer in "Accounting and Audit" - UTPL. Diploma in Quality Management Audit - UTPL. Diploma in Taxation - UTPL. Work experience: 3 years as an accounting assistant and accountant, also responsible for the purchasing and human resources areas of Ediloja Cía. Ltda. Undergraduate and postgraduate university professor for 11 years in the areas of General Accounting, Audit, Management Accounting, Productive Management, Practicums. Coordinator of the Accounting and Audit degree 2014-2016. Member of the research group Knowledge Management in Organizations (GCO). Teacher: full-time researcher of the Department of Business Sciences, Accounting and Audit Section of the UTPL.

ORCID ID: orcid.org/0000-0003-3769-2242

Guillermo Antonio DAVILA, PhD. is Senior Researcher in the Knowledge Engineering Department (www.ngs.ufsc.br) at Federal University of Santa Catarina, UFSC, Florianópolis, Brasil; and Visiting Professor at Universidad Técnica Particular de Loja - UTPL, Ecuador. He has more than 10 years of experience in consultancy, insurance, banking, and public sectors, working in different areas (e.g. FDI attraction, operations management, technology management, technology transfer, KM maturity assessment, innovation management). His research focus is on knowledge management, innovation, and technology transfer between SMEs, KM practices for innovation, and knowledge absorptive capacity. He works as a reviewer for International Journal of Innovation Management, and Brazilian Business Review. His work has been published in Brazilian and international peer-reviewed journals, and he has been awarded at the IFKAD 2017 and 2019 conferences.

ORCID ID: orcid.org/0000-0002-1479-2585

Laura Magali CHAMBA-RUEDA, PhD student in Administration at the University of Rosario-Argentina. Master in Business Management, Business Administration Engineer at the Universidad Técnica Particular de Loja - Ecuador. University teacher (undergraduate components: Quality Management, Financial Mathematics, Business Case Analysis, Entrepreneurship and Administration. Postgraduate components: Implementation of a Quality Management System, Implementation of the ISO 26000 standard). Responsible credit experience at Banco Centro Mundo, Financial Assistant at ECOLAC, Research Manager at a call center, Master's Degree Coordinator in Quality Management and Business Management.

ORCID ID: orcid.org/0000-0002-4882-0070

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