Social Capital and the Integration of Processes in the Supply Chain Management in the Real Sector in Colombia

By

Juan Carlos Aldana Bernal

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Supervisor

PhD. Cesar A. Bernal

CENTRUM CATÓLICA GRADUATE BUSINESS SCHOOL
PONTIFICIA UNIVERSIDAD CATÓLICA DEL PERÚ
MAASTRICHT SCHOOL OF MANAGEMENT

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Dedication

To my parents who have been support and motivation, and a permanent company to carry out this research.

To my family that has been my pillar and to "Pachito", that no longer accompanies us.

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To Dr. Cesar Augusto Bernal for his unconditional and permanent guidance and support for the development of the research.

To my friends and related, who helped make this study a reality.

Abstract

This research evaluates the relationship of social capital with the integration of processes in the supply chain management in companies of the real sector in Colombia, mediated by their organizational size and the uncertainty of the environment. For this purpose, 232 companies associated to the real sector in Colombia were surveyed and with the information obtained, multivariate analysis of structural equations was made with the SPSS and AMOS tools. As a result, there is a significant direct relationship between social capital and the integration of processes in the supply chain management, thus social capital was identified as a fundamental determinant in efforts to integrate the supply chain, unlike the mediating variables analyzed (size and uncertainty of the environment).

Resumen Ejecutivo

Esta investigación evalúa la relación del capital social (CS) con la integración de los procesos en la gestión de cadenas de abastecimiento (SCI) en empresas del sector real en Colombia, mediada por las variables del tamaño organizacional (S) y la incertidumbre del entorno (UE). Para esto, se encuestaron 232 directivos de empresas asociadas al sector real en Colombia y con la información obtenida se realizó análisis multivariante de ecuaciones estructurales (SEM) con la herramienta SPSS y AMOS. Como resultado, se evidencia una relación directa significativa del CS sobre la SCI. Las variables mediadoras no registran significancia en el análisis.

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Chapter 1: Introduction

The purpose of this research is to analyze the relationship between social capital and the levels of integration of processes in companies belonging to supply chains of some industrial sub-sectors in Colombia. This research is based on the Theory of Interorganizational Relationships (IOR) according to which the integration comprises flows and long-term links that are established between an organization and one or more organizations in its environment (Oliver, 1990). The importance of integration as a process of coordination and control of the parts of a system is evident from the studies of Mintzberg (1991) and Parsons (1951), who consider integration as one of the imperative priorities of any kind of system to survive.

Supply Chain Management (SCM) has been identified as one of the most important forms of business integration, and is understood as the integration of fundamental business processes of the companies, which are related to provision of products and services, from the final customer to the primary suppliers (Flynn, Huo, & Zhao, 2010; Romano, 2003). Therefore, a high level of inter-company integration has proven to be one of the factors that have a high impact on organizational performance and sustainability (Aryee, Naim, & Lalwani, 2008; Boon-itt & Paul, 2006; Boon-itt & Wong, 2010; Carter & Rogers, 2008; Fabbe & Roussat, 2011; Hosseini, Azizi, & Sheikhi, 2012; Lee, Kwon, & Severance, 2007; Naslund & Hulthen, 2012).

According to the Theory of Social Networks Analysis (SNA), the need to study new forms and relational media of different social actors arises in the current information society (Cardozo, 2011; Emirbayer & Goodwin, 1994; Scott, 2000; Wasserman & Faust, 1996). Additionally, the network concept has also been used to explain the integration in the supply chain management. Therefore, the notion of a supply network has been used to explain how a company is linked simultaneously with its business partners, suppliers, distributors and customers (Harland, 1999).

The theory of SNA has identified a trend in social networks, that is, the development of Social Capital (CS), according to which behaviors and expectations of actors of a social network are affected by the structure of the network that influences their level of integration. Therefore, an extensive network of relationships increases social capital, making it easier to access knowledge, information and even financial resources (Leenders & Gabbay, 1999). In this sense, variables that can mediate Process Integration in Supply Chain Management (SCI) have been recognized.

On the one hand, the size of the company with respect to the others with whom it establishes an integration process (Gélinas & Bigras, 2004; Mohr, Fisher, & Nevin, 1996) is a variable associated with inter-organizational integration. On the other hand, the uncertainty of the environment (UE) is a variable in which companies operate in an industrial sector, as it is a factor that could facilitate or restrict the SCI to develop appropriately (Boon-itt & Wong, 2010; Giménez, Van der Vaart, & Van Donk, 2012).

Thus, in the following chapters, according to the IOR theory, the importance of SCM as a process integration mechanism is identified, constituting the dependent variable. The SNA theory will identify the need for relational (soft) determinants represented in Social Capital (CS), to explain this integration of processes in the supply chain management (SCI), as the independent variable. This chapter presents the background that identifies the determinants of inter-company integration, definition of the problem, purpose pursued by this research and its justification. Likewise, the methodological structure used in the present study is established with nature of the research, research questions and hypotheses, theoretical framework, delimitations and limitations of it.

Background of the Problem

This research will be based on the concepts provided by the theory of

Interorganizational Relationships (IOR), according to which integration is a strategic action planned by companies in same sector, which voluntarily associate to generate competitive advantages that impact the end customer (Babiak & Thibault, 2008). In this sense, the term SCM has been implicitly associated with inter-enterprise integration (Houlihan, 1985), because it is identified as a network of related organizations through upstream (upstream) and downstream (downstream) connections of fundamental processes for these organizations, in order to create value in products / services provided to the end customer through these activities (Christopher, 1998).

Given the importance that integration in SCM represents for a company and for the development of the business sectors, the literature has been keen to determine factors that affect the ability of organizations to integrate in their SCM. One of models proposed was developed by Lambert and Cooper (2000). These authors suggested three factors that promote a better integration process in SCM, namely: (a) network structure of the supply chain, i.e. member companies of the network and their relationships, (b) processes, i.e. activities that generate value for the customer, and (c) management components, i.e. management decisions in SCM. The last factor is the management components of Lambert and Cooper (2000), which introduced two divisions that determine the focus of many later studies.

The first of the above divisions refers to management of physical and technical components, which are characterized by being tangible and easily measured, and therefore are identified as hard factors, such as physical proximity and sharing of active aspects. The second division refers to components of management and behavior, which are identified as less tangible and more difficult to change, which are identified as soft aspects, and relate to: (a) management methods, (b) power and leadership structure, (c) risk and reward structure, and (d) culture and attitude.

Since the technical and tangible determinants of integration into SCM have been extensively evaluated by several studies (Bennett & Klug, 2012; Chen, Daurgherty, & Roath, 2009B; Gélinas & Bigras, 2004), and behavioral determinants have been forgotten, other research has suggested further studies on these soft determinants. In this regard, there are specific factors, which may be part of the above classification of behavioral components of Lambert and Cooper (2000). These components include confidence, sharing knowledge, culture, and commitment among others, may be determinants relevant processes for the SCI (Agan, 2011; Naslund & Hulthen, 2012; Wu, Chiag, Wu, & Tu, 2004).

A suitable approach to the identification of the soft determinants is the view of SCM as a social network (Cooper, Lambert, & Pagh, 1997). According to the Theory of Social Network Analysis (SNA), a network is a group of organizations with extensive relationships among them (Cooper et al., 1997). Besides, each new relationship with another organization grows exponentially the number of potential new business links in the supply chain, and becomes a supply network, with greater reliance of all members (Cardozo, 2011; Scott, 2000).

According to the SNA, the study associated with the strength of weak ties (Granovetter. 1983), and prior literature related, it has also suggested that soft factors are essential for the SCI. A concept that can adequately explain these soft relationships of a company with its business partners (Harland, 1999) in an enlarged SCM (supply network) can be the social capital. This concept implies that relationships and interactions of actors in a network increase their access to the resources required. Thus, an increase on social capital (CS) contributes to all organizational functions, including integration (Szeto, Wright, & Cheng, 2006).

However, integration into SCM is not an automatic process and has different obstacles. Katunzi (2011) identified this statement after a review of the literature, with five factors that prevent integration in SCM: (a) silo mentality, whereby a department or company

seeks to win at the expense of others; (b) lose visibility in SCM, i.e. having no mechanisms for coordinating operations with its business partners; (c) loss of trust, i.e.of loss good reputation among its partners; (d) loss of knowledge, that is, forget the processes of education and training; and (e) activities that cause the whip effect, i.e. activities that cause inefficiencies and high costs in SCM.

In the United Kingdom, several researchers have developed different studies in which they have associated the variables of Social Capital (SC) and Supply Chain Management. Thus, they have established a positive association between social capital and improvement to the buyer into SCM, in terms of innovation and cost (Carey, Lawson, & Krause, 2011).

Likewise, a positive relationship was identified in the dimensions of social capital and the improvement in the performance of buyers (Lawson, Tyler, & Cousins, 2008; Villena, Revilla, & Choi, 2011), with a development with suppliers into SCM too (Hughes & Perrons, 2009; Son, Kocabasoglu-Hillmer, & Roden, 2016). Horn, Scheffler, and Schiele (2014) developed a study in which they show that internal integration is a precondition of external integration with suppliers, who in turn have a positive influence on the success of global supply.

In Colombia, the Government recognized the importance of increasing the competitiveness of the business sector, in Law 811 of 2003 for the productive chains, published in the National Council for the Economic and Social Policy (CONPES, 2008) 3527, on June 2008. Additionally, the government developed the National Policy for competitiveness and productivity of the country, which seeks to develop business models based on strengthening the integration of sectors, clusters, and value chains of world class, as well as strengthening productivity in relation to employment (Conpes, 2008). The Colombian government has generated stimulus such as, meetings on productivity and competitiveness, creation of clusters, the formation of production chains and changing production programs (Ministerio de Comercio Industria y Turismo [MinCIT], 2017).

Definition of the Problem

A high level of integration of organizations process for managing their supply chains has proved to be an important factor in the performance and competitiveness of companies and sectors. Therefore, it becomes essential to identify determinants that enable organizations to integrate their processes with their peers in the SCM. There are a lot of studies that explain the technical or hard factors that enable the SCM (Bennett & Klug, 2012; Lambert, Emmelhainz, & Gardner, 1996), but there is a déficit on the studies related to behavioral or soft factors of the SCI.

Additionally, according to the study of Katunzi (2011), four out of five barriers to integration in SCM, proposed by him, can be associated directly to soft factors. Therefore, there is a gap in the literature to identify the soft factors as crucial to the SCI and some researchers suggest a further research in this field, but there is a déficit on studies related with behavioral or soft factors of SCI (Borgatti & Li, 2009; Lazzarini, Chaddad, & Cook, 2001; Lee, 2005; Naslund & Hulthen, 2012, Wu et al., 2004).

A proper approach to the identification of soft factors in a network from the supply perspective is the social capital (Szeto et al., 2006; Vainio, 2005), which integrates through structural, cognitive and relational dimensions, essential aspects to improve organizational performance, motivating the organizations to integrate into the SCM (Nahapiet & Ghoshal, 1998). However, this relationship has only been proposed in a study by Min et al. (2008), as part of a conceptual study, and by Horn et al. (2014) and by Chen et al. (2018) who developed studies with a segmented perspective of social capital and, with a limited vision of integration.

Furthermore, the integration of industrial sectors is a must for any country given the importance of competitiveness of the industry in economy. In this sense, despite having a long productive experience, the Colombian industry has not achieved a sustained growth and development (MinCIT, 2017). Therefore, the Colombian government has created incentives

such as meetings of productivity and competitiveness, creation of clusters, formation of production chains and the Productive Transformation Program (PTP), among others (MinCIT, 2017). However, all these incentives have not strengthened industry, whose weakness are reflected in the low levels of growth compared to other economic sectors, since it has gone from being the 13.6% of the GDP in 2000 to the 10.8% in 2014 (MinCIT, 2017).

Due to this decline in the significance of industry within the Colombian economy, it is important to evaluate other alternatives to increase its competitiveness and promote the development that the local industry generates in different economic sectors. In consequence, it is necessary to research other factors, such as social capital, that have not been sufficiently studied, in order to explain the motivations of the local industry to integrate into its SCM and be more competitive.

Purpose of the Study

The present research analyzes through a quantitative study, whether Social Capital (CS) is related to the Integration of business processes in the Supply Chain Management (SCI) in the real sector in Colombia, moderated by the Environmental Uncertainty (UE) and Size (S) of the companies involved.

In other words, it seeks to provide evidence of Social Capital (independent variable) in its relationship with the Process Integration in the Supply Chain Management (dependent variable) of companies associated with the real sector in Colombia, mediated by the size and uncertainty of the environment (moderating variables).

This study is descriptive, as it should identify social capital and its relationship with integration processes of the SCM. The reason is that there is little research that evaluated this relationship, and the existing research has been developed in other contexts and countries. The study proposes a cross-sectional research that will use surveys for data collection and will be conducted in a short period of time.

The research will also seek to develop an understanding of the SCM as a supply network (Lambert et al., 1996; Borgatti & Li, 2009), in which social capital allows to provide academics and administrators with mechanisms to estimate more accurately the impact of relational structures on the integration process of the supply chain, according to the suggestion of Lee (2005), and Otto, Lee, and Caballero (2011). In this sense, the present research will also seek to respond to the proposal of Ramstad (2009), according to which the various networks of the SCM complementary may coordinate innovation expertise and promote more effective learning.

Significance of the Study

Since business integration is considered one of the priority processes of any company for its survival (Parsons, 1951), managers need to identify integration as one of its critical success factors (Porter, 1999). In this context, it is essential to know the soft factors that allow the integration processes and can be carried out in the SCM, with the most immediate strategic allies of any organization. However, the four most significant barriers to business integration refer to soft determinants (Katunzi, 2011), which is a call to identify how these soft factors can make a significant difference in the integration processes in the SCI.

However, most of the studies that have evaluated the factors that foster SCI refer to technical elements and have forgotten the behavioral and soft factors. Specifically, social capital as a determinant of SCI has not been evaluated yet. In this sense, the research of González (2012) proposed that social networks play a fundamental role in the SCM. However, in the absence of more studies on this regard, a significant gap has been created in the literature, especially to explain some aspects of the relationships in the structures of supply networks, which has limited the possible identification of the reasons why integration processes may be successful or not.

Given this situation, several researches identify the need to deepen the study of soft factors as determinants of SCI, because they are still unknown. These factors can be conceived as a support, and without them no relationship could be established. Therefore, the soft factors can be very significant for interpreting motivation of industries to integrate their processes in the SCM (Borgatti & Li, 2009; Golicic, Broyles, & Wodruff, 2003; Lambert et al., 1996; Lazzarini et al., 2001; Lee, 2005; Naslund & Hulthen, 2012; Stadtler, 2009; Wu et al., 2004).

This study aims to contribute to close this knowledge gap and allow defining a framework that determines the relevance of soft factors structured in social capital to motivate and facilitate SCI among companies associated with the Colombian real sector. As SCI is associated with business sustainability, and requires the development of more studies (Bastas & Liyanage, 2018), boosting these growth strategies (Porter, Ketels, & Delgado, 2007) could provide benefits in the productivity and performance of the Colombian industrial companies, making them more competitive and sustainable.

Nature of the Study

This research seeks to encourage the analysis of the supply chain management as a network structure, relating the concept of social capital, usually associated with the relationship of social networks as a determinant of the integration of the processes of the different companies of the supply chains. These relationships are associated with the real sector in Colombia and moderated by the size of the companies involved and by the uncertainty of environment.

These variables have been partially related in other research, and the most related studies come from Min et al. (2008) that associated the variables of social capital and collaboration in the supply chain, as an approach to a theoretical model. On the other hand, Horn et al. (2014) and Chen et al. (2018) that proposed relationships of some of the dimensions of these variables in other contexts.

On the one hand, according to Hernandez, Fernandez, and Baptista (2004), quantitative research is a tool to test the objective of theories, examining the relationship between variables. This is consistent with the objective of this research that seeks to establish a causal link between social capital and the level of processes integration in the SCM, achieved by manufacturing companies in Colombia. On the other hand, quantitative research models have been the most used for the initial research operations in Europe and in the USA, as they have helped to build scientific knowledge in operations management (Bertrand & Fransoo, 2002).

Wu et al. (2004) used a quantitative methodology to identify the determinants of the integration of business processes into the SCM among manufacturing companies in Taiwan. Likewise, Lee (2005) used a quantitative model to identify the degree of integration of the supply chain in the pork industry in Argentina. Similarly, quantitative research is proposed since it will be supported on assumptions about theories in a deductive way, allowing to generate validations to avoid bias. Thus, quantitative research will make possible to generalize and replicate the results obtained in the Colombian industrial subsectors to a wide industrial sector in the country, as well as other countries with similar characteristics (Hair, Anderson, Tatham, & Black, 2004). In this sense, research seeks to confirm the hypothesis of the relationship between CS and SCI.

This study is framed in the concept of basic or fundamental research because it corresponds to an interest of researcher, to expand knowledge of humanity about social capital and its impact on the SCI, with purely academic motivations and without any evident commercial purpose regarding the findings of the research (Hernández et al., 2004).

A deductive logic was followed, based on an extensive review of the existing literature. Subsequently, different propositions were formulated to corroborate the relationship of variables in the field work, through the application of a structured methodology using a survey method. Variables were measured from the results of surveys, so

that that numerical data were analyzed using statistical procedures, in a written final report (Saunders, Lewis, & Thornhill, 2009).

Survey was used as an instrument for gathering information, which corresponds to a structured methodology, with closed questions on the Linkert scale, in order to obtain concrete and numerical data that would allow the generation of measurable information, with instruments that have been widely applied in research on this field (Boon-itt & Wong, 2010; Connell & Voola, 2013; Hosseini et al., 2012; Sukati, Hamid, Baharun, Alifiah, & Anuar, 2012; Thatte, Rao, & Nathan, 2013). This study covers the identification and description of target population, evaluation and verification of the information gathering instrument, completion of surveys for the determined sample, study, structuring and validation of the data, statistical analysis of information and presentation of results.

In this way, the study has a descriptive purpose since it seeks to provide information on the current conditions and relationships that are presented in the SCI processes in companies associated with the real sector in Colombia (Hernández et al., 2004). The study is part of a transversal concept, because it was developed in a single moment in time, applying the surveys only on one occasion and within a significant sample of the population of companies related to the industrial sector that operates in Colombia, in order to infer characteristics of the sample on the entire population.

Research Questions

This study proposes the following six research questions. The first question corresponds to the general purpose of the investigation, and the other questions are aimed at determining the relationship between the first order variables with the SCI as second order variable.

1. Which is the relationship between social capital (CS) and the integration of processes in the supply chain management (SCI) in companies associated with the real sector in Colombia?

2. Which is the relationship between relational capital (RC) and the integration of processes in the supply chain management (SCI) in companies associated with the real sector in Colombia?

3. Which is the relationship between cognitive capital (CC) and the integration of processes in the supply chain management (SCI) in companies associated with the real sector in Colombia?

4. Which is the relationship between structural capital (SC) and the integration of processes in the supply chain management (SCI) in companies associated with the real sector in Colombia?

5. To what extent is the size (S) of the organizations a moderating factor between social capital and the level of processes integration in the supply chain management (SCI) in companies associated with the real sector in Colombia?

6. To what extent is the uncertainty in environment (UE) of organizations a moderating factor between social capital and the level of processes integration in the supply chain management (SCI) in companies associated with the real sector in Colombia?

Hypothesis

Organizations are not closed systems but, on the contrary, they are structures that must relate to other companies to fulfill their purposes. Therefore, it is essential to coordinate business processes with other companies, through integration, in order to improve their individual performance, in a profitable and efficient manner (Soonhong & Mentzer, 2004). In this context, the SCI can be considered as a systematic and strategic coordination and collaboration of business processes from the end user through all the supplying organizations in a supply chain, to provide products, services and information that add value to the client (Cooper et al., 1997; Mentzer et al. 2001; Stank, Keller, & Daugherty, 2001A).

Different integration levels can be identified within the supply chain. According to Flynn et al. (2010), these levels can be consolidated under three dimensions: (a) internal

integration, which corresponds to the adequate coordination of the processes of different functional areas of a company; (b) integration with suppliers, which refers to agreements established by a company with its suppliers; and (c) integration with customers, which refers to the combination of activities and flows with customers of the company. These dimensions correspond to levels of SCI that have been widely accepted in the literature and, therefore, are used in this research.

According to the critical analysis carried out by Naslund and Hulthen (2012) on SCI, they found that although companies understand that there are two types of factors in the SCI, technician (hard) and behavior-oriented (soft), they only know about technician factors. For this reason, they present as a suggestion the need to evaluate the soft or relational aspects, which have been addressed by the SNA, because these are required to understand how behavioral factors affect the integration of processes in the SCM.

One of the suitable terms for the identification of soft factors that may determine the SCI is found in CS, which is understood as a set of relationships that allows improving organizational effectiveness (Nahapiet & Ghoshal, 1998). Since SCM requires a multidimensional vision with horizontal and vertical relationships, such as a network (Lambert et al., 1996; Lee, 2005; Borgatti & Li, 2009), and the term of social capital is associated with contacts and relationships on social networks (Burt, 2000), this perspective is very appropriate for the purposes of this research.

According to Min et al. (2008), a positive relationship between CS and collaboration in the supply chain was suggested, which would mean that a higher CS would be associated with in-depth knowledge and benefits of member companies, as a result of these relationships. Therefore, this could generate a higher level in the SCI. In this sense, the first question of this research is: Which is the relationship between social capital (CS) and the integration of processes in the supply chain management (SCI) in companies associated with the real sector in Colombia?. The following hypothesis is formulated:

H1: CS is positively and significantly related to SCI in companies associated with the real sector in Colombia.

Social capital is defined as an exchange of knowledge that facilitates social interaction and contains three dimensions: (a) relational capital, (b) cognitive capital, and (c) structural capital (Nahapiet & Ghoshal, 1998). Dimension of relational capital is associated with the analysis of social resources generated as a result of trust relationships, respect for norms, obligations and identity among parties. One of the most significant elements of this perspective is trust or social judgment, which can be described as the belief that the other party is reliable and integrated (Dwyer & LaGace, 1986).

Trust should facilitate transfer of knowledge among SCM members and minimize efforts to protect these knowledge and skills (Inkpen & Tsang, 2005). Based on this proposal and on the study by Carey et al. (2011), which found a positive relationship between social capital and innovation in supplier-buyers, it is expected that there is a positive relationship between relational capital and SCI. Therefore, the second question is: Which is relationship between relational capital (RC) and the integration of processes in the supply chain management (SCI) in companies associated with the real sector in Colombia? The following hypothesis is proposed:

H2: RC is positively and significantly related to SCI in companies associated with the real sector in Colombia.

Cognitive capital dimension represents proportionate resources that give meaning and shared understanding to the members of a network (Nahapiet & Ghoshal, 1998). In this sense, the proposal of Inkpen and Tsang (2005) is significant, since they proposed two elements of this dimension. The first one is the degree to which the members of the network share common purposes. The second one is shared culture, which refers to the degree to which values and behavior govern relations, and is a factor that defines relationships between the organizations of a SCM and a challenge associated with the SCI (AlSagheer, Mohammed,

Ahli, Airways, & Dhabi, 2011; Lambert & Cooper, 2000)

Consistent with the proposals presented, it is expected that there is a positive relationship between cognitive capital and the level of integration of the SCM, the third question emerges as: Which is the relationship between cognitive capital (CC) and the integration of processes in the supply chain management (SCI) in companies associated with the real sector in Colombia?. The following hypothesis is proposed:

H3: CC is positively and significantly related to the SCI of companies associated with the real sector in Colombia.

The third dimension of CS corresponds to structural capital, which determines patterns of relationship between actors in the network and is usually analyzed from the perspective of the links and configuration of the network (Inkpen & Tsang, 2005). Links are considered fundamental aspects in the concept of social capital because the links of actors of the network allow opportunities for transactions (Adler & Kwon, 2002). Additionally, the configuration of the network determines patterns of association between its members and defines ease of exchanging knowledge through the extensive contacts in it (Krackhardt, 1992).

According to the findings of Autry and Griffis (2008) that identified a positive relationship of structural and relational capital with management of innovation in the SCM, the fourth question is: Which is the relationship between structural capital (SC) and the integration of processes in the supply chain management (SCI) in companies associated with the real sector in Colombia?. The next hypothesis is raised:

H4: SC is positively and significantly related to the SCI of companies associated with the real sector in Colombia.

According to Wagner and Neshat (2012), large organizations may be more prevented to integrate, due to the uncertainty and complexity of the relationships. On the contrary, more small companies would handle lower levels of uncertainty and, therefore, could be more

easily integrated. Thus, the fifth question is: To what extent is the size (S) of organizations a moderating factor between social capital and the level of processes integration in the supply chain management (SCI) in companies associated with the real sector in Colombia? The following hypothesis is posed:

H5: S of the organizations affects in an inversely proportional way the relationship between CS and SCI of companies associated with the real sector in Colombia.

Uncertainty of the environment (EU) where companies operate, in an industrial sector, can be a factor that favors or hinders the proper development of the SCI. Therefore, the studies of Boon-itt & Wong (2010) found that there is a proportional but inverse relationship between the complexity of the environment and the level of integration in the supply chain. Therefore, the sixth question is: To what extent is uncertainty in environment (UE) of the organizations a moderating factor between the social capital and the level of processes integration in the supply chain management (SCI) in companies associated with the real sector in Colombia? The following hypothesis is posed:

H6: UE affects in an inversely proportional way the relationship between CS and SCI of companies associated with the real sector in Colombia.

Theoretical Framework

From the perspective of social network theory, a SCM can be defined as a group of independent organizations (nodes) that interact with each other in a system (business sector) through repetitive and lasting partnership, in order to generate technology development and innovation to improve organizational performance (Barringer & Harrison, 2000; Droge, Jayaram, & Vickery, 2004; Dyer & Singh, 1998; Inkpen, 1998; Porter, 1999). The concept of social capital is developed from this theory, and it is considered as the independent variable in this study.

Therefore, social capital can allow the exchange of knowledge that facilitates social interaction, so that current organizations carry out their functions and strengthen integration

processes (Szeto et al 2006; Vainio, 2005). This concept is used in this research in three dimensions: (a) relational capital, (b) cognitive capital, and (c) structural capital.

The concept of SCI will be understood as the level at which companies collaborate strategically with their business partners, through inter and intra-organizational processes with the purpose of achieving efficiency and effectiveness in the flows of products, services, money, information and decisions, trying to generate the maximum value to client (Flynn et al., 2010). This corresponds to the dependent variable of the present study and is evaluated under three dimensions: (a) internal integration, (b) integration with suppliers or backward integration, and (c) integration with clients or forward integration.

According to the previous statements, this research aims to identify if an increase in social capital, represented in a greater number of companies seeking to establish relationships with other companies in its SCM, allows higher levels of integration. This integration means that companies properly coordinate not only their internal processes, but also with suppliers and ultimately their customers in the SCM.

Two moderating variables are proposed for this study: uncertainty of the environment and size of the company. Uncertainty of the environment is related to the unpredictability of the demand, which generates a lack of adaptation of the organization to contingencies. Four dimensions of uncertainty will be considered: (a) supplier uncertainty, (b) client uncertainty, (c) competitors' uncertainty, and (d) technological uncertainty. (Boon-itt & Wong, 2010)

For the size of the company, the categories of micro, small, medium and large companies are considered, as established by the Colombian government according to the number of workers of the companies (MinCIT, 2017). It is expected that these moderating variables have a negative effect on the relationship of the independent and dependent variable, according to which the higher the levels of uncertainty and size, the companies would have less propensity to integrate their processes in the SCM. See Figure 1.

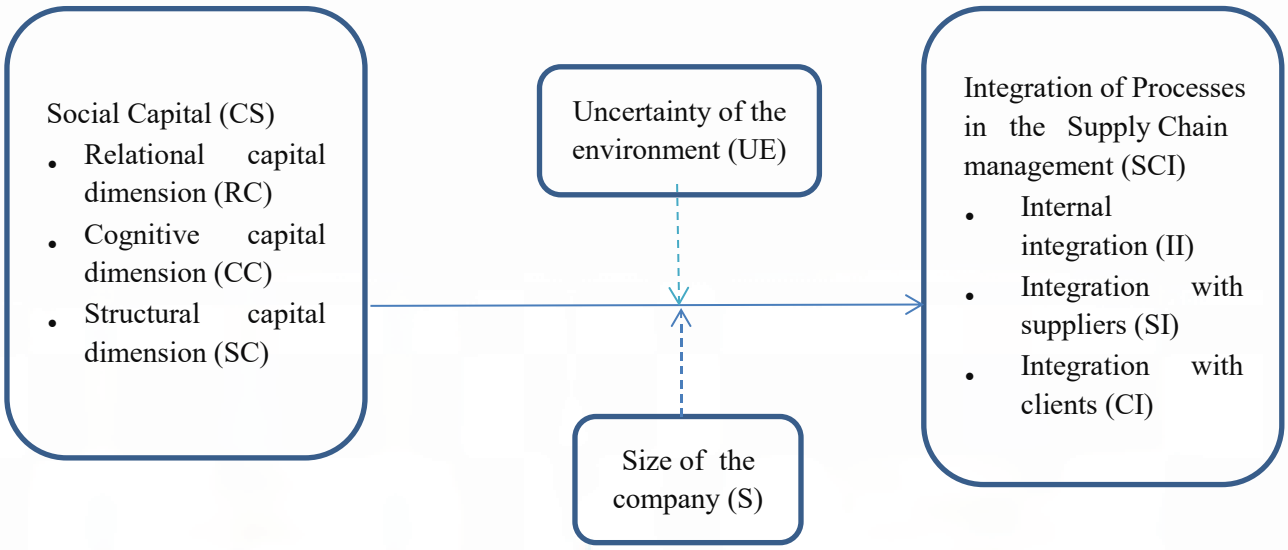

Figure 2. Conceptual model of the impact of Social Capital on Integration of Processes in the Supply Chain Management, moderated by uncertainty of the environment and size of the companies

Definition of Terms

According to the concept of SCM, this corresponds to a way of integrating supply and demand, through the planning, management and control of all the links in the chain to provide added value to the final customer (Lockamy & McCormack, 2004; Vickery, Jayaram, Droge, & Calantone, 2003). From this definition, it is identified that integration is one of the essential functions of the SCM, because it allows the association of companies from the same sector with the purpose of generating efficiencies that impact the final customer (Thompson, 1967).

Thus, Integration of Processes in the Supply Chain Management (SCI) is understood as degree to which two or more organizations with some form of industry relationships (like supplier-customer, direct competition or cooperation), establish agreements to consolidate their mutual interaction of processes exchanging information, resources, and technologies, and sharing risks and benefits, which together allow them to perform and develop better competitive advantages that could not be achieved as individual companies (Borgatti & Li, 2009; Cooper et al., 1997; Lambert et al.,1996; Pires & Carretero, 2007; Poirier et al., 2005).

This definition is appropriate to the purpose of this research because it assumes that integration of processes in the SCM has a relation with intangible factors, such as mutual trust and identification of common long-term objectives, which is part of what it seeks to corroborate this study.

The internal integration term is understood as the way an organization defines, develops and improves internal processes that support its operation transversely, with assistance todifferent areas of the company (Lockamy & McCormack, 2004). The integration with suppliers refers to integration of activities, agreements and flows established by a company with its suppliers to improve their relationship. Finally, the integration with customers refers to integration of activities, agreements and flows with customers of company to improve this relationship (Flynn et al., 2010).

Additionally, there is a growing current that suggests a broader perspective for the analysis of the SCM, which not only considers linear and dyadic relations among the organizations of the SCM, but also a vision of social networks, which allows to understand more clearly how the relationships of actors are in the supply chain (Golicic et al., 2003, Lambert & Cooper, 2000, Lazzarini et al., 2001, Min et al., 2008; Naslund & Hulthen, 2012). The reason is thate relations in the SCM are established simultaneously with different actors, and with different purposes, so that organizations can fulfill their mission.

Under this perspective, it is proposed that social capital would adequately interpret these soft factors for the SCI. In this sense, a high possibility is identified that the concept of social capital could determine relational resources among the companies of a supply chain (Nahapiet & Ghoshal, 1998). Thus, maintaining an extensive network of contacts allows an organization to have an opportunity to access information and resources at a lower cost than an organization without these relationships.

The concept of social capital is understood according to the definition of Min et al. (2008), which incorporates the context of SCM and identifies it as "the set of relationships

and interactions between different actors and processes derived from these interactions within the supply chain " (p. 4). The dimension of relational capital is understood as relations assets associated with the SCM, and defined by trust and commitment, which align and regulate collective assets within the supply chain (Lin, Cook, & Burt, 2005; Uzzi 1996).

Cognitive capital is understood in this research as set of values and organizational rules shared by members of the SCM that allow shared goals and behaviors (Lin et al., 2005; Nahapiet & Ghoshal, 1998). Finally, the dimension of SC is understood as the position of the actors in the SCM and how its social interaction is, to allow its relationship with other actors (Tsai, 2000).

The uncertainty of the business environment in the supply chain means heterogeneity and concentration in environmental elements (Dess & Beard, 1984). It will be determined as uncertainty with suppliers, customers, competitors and technological, which is associated with the rapidity of changes demanded by the market and the level of competition in the sector of a company (Boon-itt & Wong, 2010; Richey, Chen, Upreti, Fawcett, & Adams, 2009).

The size of the company was defined under the authority of the guidelines of the Colombian government, according to laws 590 of 2000 and 905 of 2005 (MinCIT, 2017). According to this normativity, a micro company has between 1 and 10 workers, a small company, between 11 and 50, a medium-sized company, between 51 and 200, and a large company has more than 200 workers.

Assumptions

An analysis of the surveys could reflect unexpected behaviors because practices in supply chain management are interdependent, that is, what is done in a link of the chain affects the result of other links, which means that there can exist behaviors that cannot be isolateds. It is assumed that people who participated in surveys had the best willingness and honesty to fill them out. However, the study evaluated people's perceptions about dimensions

of social capital, integration of processes in supply chains and uncertainty of environment, which does not cease to be a valid source for this type of studies (Powell, 1995).

Previous conceptualization that interviewees could have on the topics of SCI and social capital are a valid source of information. It is considered that the executive staff that answered the survey has great knowledge of the policies and processes of their company, and that this may be different according to the size of the company that attended the survey.

It is also assumed that there were no incidental or unexpected events that could seriously distort results of the study, in the established terms. The people who answered the surveys properly understood the questions posed. Additionally, they adequately knew their organizations to give the most appropriate answers according to their understanding.

Limitations and Delimitations

The study was cross-sectional, since information was collected in a single moment, therefore, variations on time of these variables were not evaluated.

The study was carried out with companies associated with the Colombian sector, since it was sought to measure the impact of variables in different companies of the same industrial sector, even though they had different roles in the SCM, which was the purpose of this study. Different sub-sectors associated with the Colombian real sector were evaluated in order to analyze the integration of the supply chains of these subsectors, including those defined by the Colombian Government in the Productive Transformation Plans (PTP).

There were risks in the collection of information, biases, preconceptions, time limitations and others that at some point could affect some part of the data. Therefore, according to the way the survey was developed and the selection of the sample, the data have a high subjective component and represent opinions of the people surveyed, which, although it is effective to compare groups of different companies, it can incorporate biases.

The unit of analysis are companies associated with the Colombian real sector. It was carried out only in Colombia, in subsectors of the manufacturing industry, and corresponds to

companies that manufacture goods, with their suppliers and distributors within the supply chains. The size of the companies was determined according to the number of direct workers and was classified into micro, small, medium and large companies.

The companies participating in the study were selected by convenience sampling, based on personal contacts of the researcher and sending personalized emails to business executives. The reason is that a random sampling, by the role of the company in the SCM, was complex to structure. Additionally, it was very uncertain to achieve an adequate sample size due to the difficulty in obtaining a good level of survey response.

Summary

The importance of inter-enterprise integration was presented in this chapter. Given its essential function as a tool for the survival and development of organizations, different schemes have generated inter-enterprise integration, through the sharing of risks and benefits, to generate advantages that companies could not reach individually. One of most accepted integration schemes is the supply chain (SCM) as mechanism to establish agreements, especially in the logistics activities between companies of the same sector to improve its performance and meet theneeds of customers at end of the chain (Drucker, 1962).

According to the literature review, several studies have linked processes of integration of companies in the supply chain (SCM), and performance achieved by these companies. It is generally found a positive correlation between SCM and business performance. But some authors have identified the need for further studies displaying the SCM as a network, which would assess a greater number of relationships in business interactions, analyze hard and soft flows and detect managerial and behavioral components that determine these relationships.

Nevertheless, few studies have been found that identify soft and intangible factors associated with behavioral determinants, in the integration processes of the SCM. Neither uncertainty nor size of the companies have been evaluated as mediating variables on this relationship. The concept of social capital, which evaluates the relational resources and

interactions between actors of the SCM, could be a relevant and meaningful factor to determine a close integration of the companies in the supply chain to improve their competitiveness.

This objective is pursued in order to suggest alternatives of improvement for the relationship in the SCM, in the Colombian manufacturing industry and thus increase its performance and competitiveness, and allow it to be sustainable and become a strategic sector in the Colombian economy. The research used a quantitative methodology and a deductive approach, with a survey instrument that was applied among companies associated with the real sector in Colombia.

The next chapter identifies in the literature review how inter-company integration processes have been developed, especially in supply chains, in addition to what has been the evolution of the concept of social capital. Additionally, studies carried out to identify the determining factors in the integration of processes in the supply chain management are evaluated.

Chapter 2. Review of the Literature

The formation of companies that the industrial era brought can be considered the seed that generated the need for communication and intraorganizational association, since industrial organizations began to be so complex that required the labor division and specialization to operate properly (Smith, 2001). In this sense, the manifesto by Marx and Engels (1967) was clear to consider the necessity to leave behind the isolation and selfsufficiency and open a way to relationships in all directions and universal interdependence. The pursuit of organizational efficiency involved the development of the functional organization. This kind of organization favored labor specialization and faster decision making by means of rules and regulations that command labor and internal relations, which were known as the bureaucratic theory (Weber, 1968).

The functional organization model has been used for many decades, but the dynamics of the market and the size of the organizations have changed significantly. This issue has generated the necessity for a better understanding and control of activities in each functional unit and its interaction with other corporate units, to provide an integrated and swift response to the market requirements. This has been the motivation for organizations that have identified need to integrate internally, and thus achieve operational efficiencies and greater response opportunity to permanent changes in the environment. That is how Lawrence and Lorsch (1967) see it when they define integration as the "quality of the state of collaboration that there is among organizational units, that is required to achieve effort unity according to the demands of environment" (p. 11).

Since these concerns on the need for inter-enterprise integration have emerged, this chapter reviews how this concept has been developed and how it has become a critical factor in business management. This process may identify different proposals on ways of integration that have been generated, highlighting the importance of the concept of supply

chain to understand supply networks. In this context, integration levels associated with these forms of integration are identified.

Additionally, it is essential for this study to present the research that have identified the determinants of inter-enterprise integration, and in particular the soft factors that drive the supply chain integration. This study seeks to specifically assess social capital as a decisive determinant in this relationship, as well as the mediating variables that have been identified, the size of the company and the uncertainty of the environment.

Supply Chains

One of first concepts that defined the need for organizational interaction was logistics as a key aspect in coordination and organizational interdependence (Thompson, 1967). This concept of logistics can be considered as a basic input to understand the term supply chain management (SCM). Although there is no consensus on the origin of the termSCM, it was used by John B. Houlihan in 1985 to incorporate various concepts of integration between different companies, which were unknown until then (Houlihan, 1985).

The definition of SCM as the integration of logistics activities of individual companies in an industrial sector was attributed to Drucker (1962), who displayed the importance of establishing agreements between companies in the same sector to improve their performance and satisfy the needs of customers at the end of the chain (Drucker, 1962). The first conceptualization of the SCM structure is supplied by the consultants Bechtel and Jayaram (Lambert et al., 1996), who together with Stevens (1989) suggested the need to integrate various links in the supply chain, such as suppliers, manufacturers and customers, to generate differentiation factors in organizations, as an extension of the concept of value chain posed by Porter (1990).

Ellram and Cooper (1990) proposed the concept of SCM with an integrated vision to manage total flows (of materials and information), but they only associated a distribution channel from supplier to end user. Taking these ideas, Cooper et al. (1997) provided a

complementary vision to this concept and defined it as the integration of business processes. In this way, the SCM is defined as a set of companies from end user to first-tier suppliers, who can provide products, services and information with an additional component, which means that this chain has to provide value to the end customer. It is worthy of mention in this proposed vision of integration from customer to suppliers (upstream) because it emphasized the importance of the customer.

Later, Lambert and Cooper (2000) generated a different view when considering that the SCM is structured from a focal company. Then, members of a supply chain include all the businesses and companies that have a direct or indirect interaction with the focal firm, through its distributors or providers from a point of origin or point of consumption. Stank et al. (2001A) complemented this definition by specifying that these interaction processes are the integration, coordination and collaboration between companies. Integration is the understanding of a vision, goals and shared resources; collaboration is a process of decisionmaking between interdependent parties, involving decisions and shared responsibilities; coordination means creating structures, frameworks and metrics that ensure collective behavior.

Meanwhile, Mentzer et al. (2001) expanded this vision of SCM finding that the management of the supply chain is a strategic function. They claimed, that the SCM involves the systematic coordination of strategic and business functions to other companies in its supply chain, to enhance long-term performance of each company and the supply chain as a whole. Several authors provided a more complete and detailed definition of SCM to identify it like a way to integrate supply and demand among businesses through planning, management and control of all the value added activities, from identification of supply, procurement, processing and distribution, which includes partnerships with third parties, to delivery to end user. (Lockamy & McCormack, 2004; Vickery et al., 2003).

Following this trend, Akkermans, Boger and Boss (1999) identified specifically the characteristics of the supply chain management. They also established that the SMC is composed of different steps and processes of collaboration. The other important feature was that the focus of the SCM should be coordination and integration, just as they suggested that the purpose of the SCM should be the improvement of relations with customers adding value while improving profitability.

This conceptualization implies common goals of the members of the chain that serve to the end customer, managing flows downstream and upstream, and a greater commitment of companies to increase the integration in the SCM (Asif, 2011). However, these definitions together with the proposals by Bowersox, Closs, and Cooper (2007) identified that usually these chains comprise a group of three or more undertakings linked by ascending and descending flows with dyads relationships (buyer-seller). This proposal is not as consistent with the new visions.

Nevertheless, the proposal of Lambert and Cooper (2000) suggested that the relationship between these companies in the SCM should not only be sequential and dyads (between customer-supplier), but with multiple interactions. Likewise, Lazzarini et al. (2001) suggested the concept of netchain (network and chain) for the analysis of the supply chain, which allows a vertical view of organizational relationships analysis, concerning the sequencing of successive states of representative value, and a horizontal view, which identifies the structure of inter-relationships.

Under the same perspective, after reviewing several studies, Lee (2005) identified that interactions between companies in the SCM should not be sequential as a string, but must be identified with a network vision (Capo-Vicedo, Tomás-Miquel, & Expósito-Landa, 2007). Meanwhile, Min et al. (2008) also criticized these traditional definitions of sequential relationships of the SCM, because they did not consider that companies have different relationships in multiple chains, which can be associated with the concept of network, and

this is a natural process unmanaged. Likewise, they suggested that when the SCM is managed, it must be referred to a specific group of companies to gain competitive advantage. This view of the supply chain management will be very important for this research, because it considers the supply chain not as a sequence of processes in dyadic relations, but as network of relationships between different actors, with common purposes.

However, the development of the SCM concept has had a drawback, as it has evolved over the empirical basis of the experience of companies and lacked the structure of consistent theory that support it as a science (Carter & Rogers, 2008). They suggest that the SCM, unlike other disciplines, has not been developed on a theoretical basis, because it has been supported on the experience of multiple organizations that have identified the need to manage business processes with suppliers and customers to achieve more efficiencies in developing their management with end users of the chain. On this basis it is that a theory is trying to be consolidated.

Interempresarial Integration

Inter-enterprise integration and the coordination of various systems has been a key element in the development of organizations, and it is, therefore, one of the priority processes of any company for survival (Parsons, 1951; Dwyer & Singh, 1998; Williamson, 1981). One of the pioneers in developing the interorganizational integration concept was Thompson (1967) who stressed the importance of this kind of integration in his study of organizational domains. He places special emphasis on vertical integration, which is understood as associated companies in same industry to generate efficiencies that impact the end customer.

From the perspective of inter-organizational relationships (IOR), the integration is considered as flows and long-term relationships established between an organization and one or more organizations in their environment (Oliver, 1990). The IOR studied why and under what circumstances companies are related. Causes and circumstances that lead to the interorganizational relationships are given by environment and inter-organizational factors

that increase the likelihood that the IOR occurs. From the perspective of Babiak and Thibault (2008), the IOR is a strategic action planned between two or more organizations voluntarily in order to serve purposes of mutual benefit in the long run (Chen, Mattioda, & Daugherty, 2007).

In this context, Mohr et al. (1996), proposed that sharing common interests and goals can facilitate communication media and government to manage relationships among companies. In this sense, they distinguished between a high-level of integration characterized by a collaborative communication that allows members of the relationship a sense of belonging. From another part, a low integration where collaborative communication is scarce and coordination is done by the price mechanism, and each party can make decisions with low restrictions.

Kim, Cavusgil, and Calantone (2006) identified inter-enterprise integration as systems integration and process integration across the companies, without which enterprises cannot understand the benefits of inter-organizational relationships (Bala & Venkatesh, 2007; Berente, Vandenbosch, & Aubert, 2009), therefore, they suggested more studies about it.

The Process of Integration of Supply Chains and Networks

Integration was identified as one of the essential features in the supply chain management (SCM), because it is usually described as the integration through standard interfaces to reduce the effort required for processing information among partners of the chain (Malhotra, Gosain, & El, 2005; Mentzer et al., 2001). This view has been increasing with the use of collaborative systems that enable visibility across the supply chain (Grover & Saeed, 2007).

A supply chain is supported on some key elements to develop. These elements were proposed by Stevens (1989), who suggested that the states of integration in the supply chain were based on the following: (a) autonomy of units, each company makes its decisions and plans independently; (b) limited integration, each company decides how to generate

competitive advantages in its integration process; (c) internal integration, the structure of an organization must change to be functional by processes; and (d) development of integration of the supply chain, the strategic objective of this integration is the vertical integration of the SCM.

According to the current trends of integration in the SCM , these concepts do not seem to be very consistent, because a deep integration of companies in the SCM requires joint plans for the entire chain integrating to a higher level in networks, and not just a form of horizontal or vertical integration.

The literature has identified some strategic motivations for integration in the supply chain too. According to the research conducted by Newman, Hanna, Gattiker, and Huang (2009), four domains were proposed to analyze the processes of integration in the SCM: (a) collaboration, which refers to the response to operational requirements of the organizations involved; (b) understanding, which is being aware of the needs and constraints of enterprises in the chain; (c) improvement, to create value through processes in associated companies; and (d) design, which relates to the proposals of new products into the chain enterprises.

Generally, the literature has found that there are two major divisions to catalog interorganizational processes of integration, which are directly associated. The first one is the integration of internal processes, which refers to simplify connectivity and the company's own functions. Its purpose is to eliminate functional silos or structures and improve coordination among functional areas to meet the market demand (Lawrence & Lorsch, 1967; Morash & Clinton, 1998).

The second division corresponds to the integration of external processes, which refers to connectivity and simplification in the form of joint activities with suppliers, distributors and customers (Aryee et al., 2008; Chen et al., 2009A; Stank, Keller, & Closs, 2001B). Among the different authors, there is also a consensus on the proposal that internal

integration is a prerequisite for external integration in the SCM (Stevens, 1990; Croxton, García-Dastugue, & Lambert, 2001).

Hammer and Champy (1993) developed one of the first proposals regarding the form of integration in the supply chain. They established three forms of integration: (a) intraorganizational integration, which refers to the proper coordination of processes in different functional areas of a business; (b) interorganizational collaborative integration, which refers to the agreements that a company establishes with its suppliers and customers; and (c) operational interorganizational integration that identifies the importance of optimizing resource flows along the supply chain. A similar proposal was presented in the study of Newman et al. (2009), with differences in the approach to effectiveness, which is achieved with internal, functional and cross-functional integration, when a relationship between different areas is achieved.

However, one of proposals that has been more widely accepted in the literature to identify SCM integration was made by Flynn et al. (2010). These authors suggested that integration in the SCM is a level at which companies collaborate strategically with its partners, through inter and intra organizational processes in order to achieve efficiency and effectiveness in flows of goods, services, money, information and decisions, seeking to generate the maximum customer value. Although there are various concepts in literature to identify integration in the supply chain (SCI), there is a clear tendency to consider the proposal of Flynn et al. (2010) as the most appropriate.

This proposal suggested three dimensions: (a) internal integration, (b) integration with suppliers or backward integration, and (c) integration with customers or forward integration. However, some authors discriminate in more detail these levels of integration and this is how they identify several additional levels: (a) functional integration between departments, (b) integration with customers, (c) integration with suppliers, and (d) integration with distributors

(Turgay & Ekemen, 2013; Saxena & Jaiswal, 2012), which includes a differentiation between dealer and customer.

One way to evaluate integration of the SCM has been the use of states, i.e. identifying the main processes or phases that define and are essential for transforming raw materials into products and services to the end customer. These steps are identified as: (a) planning, that is, identifying activities, time and resources required to develop the SCM; (b) supplying, which identifies systems and procurement schemes and relationships with suppliers and transport; (c) production, which refers to the processes of internal logistics related to the transformation of products and services; (d) delivery and distribution, which is associated with the availability and timely delivery of goods and services to clients; and (e) return management, that is, the collection and reuse of products and materials from customer to suppliers (Pires & Carretero, 2007).

The development and integration of internal processes of organizations facilitates the development of collaborative business processes, enabling organizations to create dynamic and flexible collaboration to adapt synergistically to the changing conditions in a globalized world. For this reason, processes acquire a significant value in integrated management to inter-organizational dynamics (Aryee et al., 2008; Boon-itt & Paul, 2006; Boon-itt & Wong, 2010; Fabbe & Roussat, 2011; Gélinas & Bigras, 2004; Hosseini et al., 2012; Lambert & Cooper, 2000; Lee et al., 2007; Liu, Li, & Zhao, 2009; Naslund & Hulthen, 2012; Newman et al., 2009; Sukati et al., 2012; Trkman, Stemberger, Jaklic, & Groznik, 2007).

According to the proposal that integration in the SCM is generated through business processes, Lockamy and McCormack (2004) developed a maturity model to identify level at which business processes are managed to allow integration of the SCM. The model proposes five levels of processes of maturity ranging from emerging to the most robust, namely: (a) ad hoc, where processes are not predictable and havelow functional cooperation and customer dissatisfaction; (b) defined, when the processes are defined and documented, but these

processes are developed with traditional practices and low customer satisfaction; (c) linked, which is cooperation between the different links in the chain with improved performance and customer satisfaction; (d) integrated, when collaborative processes throughout the chain are developed and costs are dramatically reduced ; and (e) extended, i.e. when competition occurs between different supply chains, integration is high.

From the different studies identified concerning integration of the supply chain, the studies that evaluated the relationship between the three types of integration, internal, with suppliers and customers, with different aspects of performance, usually showed a positive relationship that was evident in these variables. Thus, Sukati et al. (2012) found a positive correlation to evaluate the integration of the supply chain with strategic and operational performance. Likewise, Sezen (2008) found a correlation between integration and information sharing in the supply chain, with performance of the supply chain. On his part, Lee et al. (2007) identified that external integration is the most important factor to stabilize costs, while integration with suppliers is the best strategy to achieve a reliable performance of the supply chain.

Meanwhile, Flynn et al. (2010) related the three forms of integration (internal, with suppliers and customers and with operating performance and business) and found that there is a positive relationship between integration in the supply chain and performance, but it is stronger in areas of internal integration and with customers. Boon-itt and Paul (2006) made a similar research, but in this case they only evaluate the effect of technology and uncertainty of the demand in the SCI and customer performance. They found that internal integration and with suppliers, not with customers, were associated with the excellent performance of customer deliveries.

Moreover, factors usually preventing that organizations integrate in the SCM were also found. These barriers to integration in the SCM can be a factor to potentialize the ability of the company to achieve business results, because it requires greater efforts to overcome

these barriers and develop effective links of the supply chain (Richey et al., 2009). The different factors hindering the integration of companies in the supply chain were studied by Katunzi (2011), who identified four potential barriers to integration: (a) the silo mentality, not considering the impact of their actions on other; (b) lack of visibility in the supply chain, not working in a coordinated manner; (c) lack of confidence, not having good image and reputation among members of the chain; and (d) lack of knowledge, companies do not share and collaborate with their peers of the chain.

However, according to the literature review, the most recurrent tendency is the need to research the benefits of integration of the supply chain beyond the dyad level, so more research is suggested in multidimensional level (Naslund & Hulthen, 2012; Wu et al., 2004). Therefore, integration into the SCM acquires another dimension with the concept of social network. A social network is an independent group of persons or organizations that work consciously and cooperating with each other in a repetitive and sustainable exchange (Inkpen, 1998). Networks can also be considered as a set of systems, actors and nodes that interact (Borgatti & Li, 2009). This concept can be likened to the companies and their relationship structures, such as in a supply chain.

From this perspective, it becomes important to identify what is a social network and how the soft aspects that define the network can become an essential element to study processes of integration of the supply chain, which usually have been forgotten (Naslund & Hulthen, 2012). Social networks that were developed from social psychology can be an ideal complement to apply the SCM, because hard (technicals) and soft links (human behaviors) that defined the supply chain can be better understood through of the parameters of relations of individuals, identifying competitive advantages through the dissemination of social information, control and coordination, among other s(Borgatti & Li, 2009).

Business integration in supply networks is the level of narrowness in the relationship (vertical and horizontal) that two or more organizations want to set voluntarily to the long

term, based on mutual trust and common objectives. This type of integration seeks setting processes of mutual interaction by sharing information, resources, and technologies, share risks and benefits, which together allow them to perform better and the development of competitive advantages that could not be achieved by individual companies (Borgatti & Li, 2009; Cooper et al., 1997; Lambert et al., 1996; Pires & Carretero, 2007; Poirier et al., 2005).

From the perspective of integration in supply chains and networks, integration is conceived as the degree of coordination among members of the supply chain, so that through the unity of effort they meet the demand of the environment, and take actions to maintain control of this chain. A tight integration in the SCM is characterized by high levels of communication and collaboration among members, usually with frequent meetings and shared access to business systems.

According to the study by Lee (2005), companies in Argentina using a pork supply system and employing the IOR theories in the study of the relationship networkwere identified three key integration features: (a) accessibility, or the possibility that each member of the network has access to any other member; (b) density, the degree of complete associations between network members; and (c) centrality, when a member has a large number of connections with other members, like a star, which allows them to have superior access to information and, therefore, it is more likely to increase the number of their alliances in the future (Dyer & Singh, 1998, Gulati, 1995; Mitchell, 1969; Park, 2012).

Von Hippel (1988) argued that if there are well developed mechanisms in a network system to transfer knowledge among different users, suppliers and manufacturers will be able to generate production innovation in networks and share knowledge. These studies suggested that companies, with its allie partners, are in many cases the most important source of new ideas and information that generate new technologies and innovations to improve performance.

According to the research of Lee (2005), integration is the state of cooperation and coordination between departments or members of a chain for a unified response to the demands of the environment and thus maintain the chain control effort. Prospect of social networks can help substantially to understand the behavior of the SCM, in theory and practice, and thus have better tools to adequately estimate the relationship among organizational structures, density of network and integration of the supply chain. The mentioned study shows that the level of coordination and communication (network density) that organizations establish on a network has an impact on the integration of the supply chain.

The networks are a challenge because they have changed the way of thinking, to give answers to what can be experienced, and firms should not be afraid to confront the implications that this experience can generate (McSwite, 2009). This mobilization of ideas requires the creation and maintenance of connectivity with other actors or groups of actors (components) that could share these ideas, which is the foundation of the network (Henneberg, Swart, Naude, Jiang, & Mouzas, 2009). Likewise, Cooper, Hamel, and Connaughton (2010) found that the main motivations to belong to a network are social support to handle stress, security of belonging to a group and access to resources.

According to results of the review of the literature, the dyadic view of organizational relationships generates a difficulty in the integration of the supply chain management (Min et al., 2008; Naslund & Hulthen 2012). Therefore, a broad view of the coordination of processes in the SCM is suggested, though there is only a small empirical evidence that supports this proposal.

In the same way, the SCI is associated with the management of sustainability of organizations, and requires, in this sense, further studies (Bastas & Liyanage, 2018). Given the importance of the perspective of networks for the study of organizational integration, an approximation is proposed from the identification of the soft factors represented on social

capital, as determinants in the SCI, evaluating business relationships in broad areas of multilateral interactions.

The Colombian Industrial Sector and Integration

As in any economy, the Colombian industrial sector constitutes the secondary sector that consists in all the activities of processing raw materials into goods or goods that are the basis for the manufacture of new products (Ocampo, 1987). This sector is divided into two sub sectors, the extractive and transformation sectors. Following the global trend, until 1989 Colombia developed processes to protect the local industry and import substitution, in which the country achieved progress in growth and stabilization of economy.

However, this growth was not the result of greater efficiency and the growth model began to run low, pressured by the globalization of markets (Peres, 1997). In this context, President Cesar Gaviria (1990-1994) promoted an economic opening to improve the availability of goods and services and make the economy of the country more competitive in the global environment. Afterward, the National Competitiveness Council (CNC) was created to incorporate the country into international economy through the development of quality, productivity, and competitiveness as the basis for generating sustainable competitive advantages (Peres, 1997).

In 1994 the Competitiveness Strategy was developed to get Colombia out of underdevelopment and incorporate the country into the global economy (Peres, 1997). Subsequently, the Colombian government evidenced the importance of gathering groups of companies into productive chains, to improve the productivity of some sectors. Thus, the Law 811 of 2003 was defined which sought for the creation of productive chains of agriculture, forestry, fisheries and aquaculture (Diario Oficial, 2015). The government of Colombia based on this law and through the National Council for Economic and Social Policy published the Conpes 3527 of 2008, which developed the National Policy of Productivity and Competitiveness (Montoya, Montoya, & Castellanos, 2010).

The first aspect of this policy is associated with the development of models of interenterprise integration strengthening the productive sectors, through mechanisms such as clusters and world-class supply chains. As a mechanism for strengthening the National Competitiveness Policy, the Productive Transformation Program (PTP) was structured in the National Development Plan of Colombia 2010-2014 and developed by the Ministry of Commerce, Industry and Tourism (MinCIT, 2017). This program aims to promote productivity and competitiveness of those sectors with high export profile through the efficient coordination between the public and private sectors.

This program initially aimed to support the agricultural, manufacturing and services sectors. Five subsectors were identified in the manufacturing sector, to support improvement: (a) industrial publishing and graphic communication, (b) fashion system, (c) vehicles and auto parts industry, (d) cosmetics and toiletries, and (e) metalworking, steel and shipyard. These programs were structured in four basic areas: (a) development of human capital required by the PTP sectors, (b) legal and regulatory framework to boost ideal conditions for developing productivity and competitiveness, (c) infrastructure and sustainability PTP in each sector, and (d) promotion of association of companies and links in each sector, encouraging research and development (MinCIT, 2017).

Despite formation of production chains and the Productive Transformation Programs, among others, strengthening of industry is not evident, since its weakness is reflected in the low levels of growth compared to other economic sectors. Thus, the Colombian economy grew more than 4% annually of ove between the years 2012 to 2017, but the industry presented a lower growth in this period (Banco de la República, 2018). Additionally, the industry has lost importance in the economy going from being 13.6% of the GDP in 2000 to the 10.8% in 2014. Similarly, this weakness is evident in the growing trade deficit with the upper country that is 6.95% of the GDP in 2016 (MinCIT, 2017).

Very few studies were identified in Latin America about the integration of the supply chain, and to a lesser extent in Colombia. This is evident from the review of the literature on SCM in Latin America developed by Ruiz, Mahmoodi and Ayala (2011). They found that collaboration and integration remains a critical success factor for supply chains, and although Latin America share the same cultural traits, there are significant differences from one country to another or even from one region to another. Therefore, they suggested further study of these forms of collaboration and integration in the region, because they found that there are significant challenges in supply chains in Latin America and one of the obstacles is integration. In this sense, the research directed by Montoya et al. (2010) identified the need for integration of SMEs in Colombia to increase its competitiveness.

According to a study by Trujillo, Alvarez, and Rodriguez (2014), that measured insertion of the Colombian economy in global value chains, the local economic sectors show a low level of insertion. Although its behavior is stable, since 2007 these sectors showed a tendency to a lower insertion. The only sector highlighted into insertion indicators and supported on a PTP was part of the textile subsector. These results seem to contradict the integration policies in the manufacturing sector. For his part, Campos (2019) found that downstream integration when using performance systems increases the efficiency of the supply network.

However, according to the research Roldan (2015) on the problems of supply chains in Latin America, he found the need to develop policies and strategies unified for each business sector in order to internationalize them. For Colombia, this finding was consistent with the document Conpes, which seeks unified policies and associated by sector for internationalization. In this sense, the study of Torres and Garcia (2008) about governance in the SCM in Colombia found that the main obstacles encountered for establishing strategic alliances in a chain is the lack of trust between parties.

Factors Related to the SCM Integration

There are diverse and fragmented proposals that have been developed on motivational aspects of inter-relationships. In this sense, two main groups of factors can be distinguished: hard factors are associated firstly with physical and technical aspects of integration and, secondly with relationship issues concerning human behavior and soft aspects. The literature review show that most studies have focused on the review of physical and technical aspects. Regarding physical aspects, there is a proposal that identifies three groups of motivators for vertical integration: market integration, reduced costs, and uncertainty absorption (Pennings, Hambrick, & MacMillan, 1984).

The proposal of Lambert et al. (1996), with its four factors of integration in supply networks, can be considered as a seminal proposal, as it consolidates different elements that had not been analyzed so far. It also allows a complete overview of the determinants of integration, namely: (a) motivators, such as reduced costs, increased service levels and market advantages in stability of benefits; (b) facilitators, such as cultural compatibility, mutual desire and symmetry; (c) management components, such as commitment and confidence, communication, planning, monitoring all operations, profit sharing, style of contract, scope and financial investment; and (d) results, which reflect that integration has achieved its objectives.

Regarding component management, Lambert et al. (1996) divided it into two groups. The first group comprises the physical and technical components, which are usually identified by being hard and, in that sense, tangible, visible and measurable. They are also characterized by being easy to change. The second group is represented by the components of management and behavior that tend to be soft and, therefore, more intangible, and difficult to measure and change. This group of components is especially relevant, because it defines organizational behavior and could determine the way in which technical components should

be carried out. For this reason, it is identified that its evaluation is particularly relevant to this research.

According to the IOR theory, six critical causes for the formation of all kinds of relationships were identified in all organizations: (a) need, which establishes regulatory and legal requirements of organizations to associate; (b) asymmetry, which is the potential power and control that can be exercised over other companies; (c) reciprocity refers to cooperation, collaboration and coordination between firms; (d) efficiency, which refers to improve the relationship between internal inputs and outputs and thus its external position; (e) stability, or adaptability to environmental uncertainty; and (f) legitimacy, which is to improve or maintain reputation, image and reputation consistent with the established standards (Oliver, 1990).

Several authors attribute the motivations of power and control to generate IOR. Only efficiency is influenced by internal factors, other elements are influenced by external factors. They suggest future studies that focus on determining the conditions that support or facilitate the formation of relationships. From the studies by Wu et al. (2004) and Asif et al. (2011), there are two types of factors that affect integration in the SCM.

The first one relates to factors that can be considered hard, such as the joint investment of the partners in the SCM, degree of dependence among associates and the possibility of selling products of partners, which would increase commitment and thus allow to develop business in the SCM. The other ones can be considered soft factors, such as the degree of trust, power, continuity and communication between peers, which would allow commitment and this in turn would improve the integration of business processes of the SCM.

Similarly, the theoretical model proposal of Chen, Daugherty and Landry (2009B) was identified. They found that the cost orientation and customer orientation can have a positive impact on the integration of processes in the supply chain. Cost orientation can be determining because organizational culture focused on finding cost advantages that can

eliminate redundancies and reduce inefficiencies. Customer orientation would improve visibility of information, as well as foster external relationships that simplify business processes.

All these proposals can identify the relevance of assessment and the impact of hard and soft factors on inter-organizational integration. This concept was proposed by Aryee et al. (2008), and Borgatti and Li (2009), who suggested the combination of hard and soft variables to assess the performance and integration into supply chains. The study made by Gimenez, Van der Vaart, y Van Donk (2012) also suggested that integration into supply chains occurs only in highly complex environments of supply. In this sense, Min et al. (2008) proposed that social capital together with information sharing, collaboration and resource exchange affect superior performance in the supply chain.

Soft factors are elements of relationships associated with human behavior that were repeatedly proposed as key elements in inter-enterprise integration. One of these factors was the coordination, understood as the extent to which various participants in a relationship are working well together in meeting a collective set of tasks. They are considered as key aspects of integration (Mohr et al., 1996). Another relevant factor identified as fundamental in developing inter-enterprise integration was engagement, which is set as the desire to continue a relationship and ensure its permanence. This factor constitutes a promise by members to give continuity to the relationship of integration and provide stability (Wilson, 1995; Anderson & Weitz, 1992).

Trust is also a major factor in the development and perpetuation of successful social relationships within organizational networks (Oliver, 1990; Dyer & Singh, 1998). It was defined as the expectations, assumptions and beliefs that a member of a relationship has about the possibility that future actions of other members of the relationship will be beneficial, favorable or at least not harmful. Some factors that were identified as significant in the development of trust in integration processes are speed of the integration, quality of

communication, and acquired multiculturalism. Similarly, there are studies in the literature that have defined trust as the level of confidence of one party on another, according to factors such as perception of competence, benevolence, integrity, transparency and value of congruence (Mayer, Davis, & Schoorman, 1995).

Another soft factor such as organizational culture was evaluated in the study of Braunscheidel, Suresh, y Boisnier (2010). As a result of the study, the impact of culture on integration in the supply chain was determined. These researchers found that there is a significant impact of culture on integration practices in the SCM. Specifically, it was evident that hierarchical culture has a negative impact on internal and external integration, while adhocracy culture has a positive impact on external integration, which may be because this culture encourages entrepreneurship and creation of new knowledge.

Another aspect associated with culture, such as employee satisfaction, was identified as a determinant in internal integration, mediated by internal communication (Jacobs, Yu, & Chavez, 2016). In turn, internal integration was identified as a prerequisite for external integration in the supply chain. The flexibility is another factor, which has been identified as a fundamental business capacity. It refers to the speed at which changes are generated and, in this way, contributes to the creation of value in inter-company integration, because it allows greater integration with information systems of the associated companies (Saraf, Langdon, & Gosain, 2007).

In their study also found that two types of relational assets are significantly associated with the outcomes of the integration process. One outcome is to share knowledge with the business channel partners and another is to process coupling with customersFor this reason, they suggested that the degree of sharing information among managers of organizations with managers of other organizations influenced in the improve performance (Şahin & Topal, 2019) and integration in the supply chain (Dyer & Singh, 1998; Lee, 2005). Also, the theoretical proposal made by Aldana-Bernal and Bernal-Torres (2018) reviews the research

that evaluated different soft factors as determinants of SCI. They proposed that various soft elements can be consolidated into three fundamental factors, capital social, organizational culture and knowledge management, which could be decisive for the development of SCI.

Social Capital as a Motivating Factor to the Integration in the SCM

The term capital was introduced by Marx and Engels (1967), who suggested it as a fundamental factor of production. However, a more modern approach to this term was provided by Brewer (1984), who defined it as the accumulation and development of resources with the expectation of positive returns on them. In recent years, capital has been increasingly associated with intangibles economic factors or soft factors such as intellectual, human and social capital (Austry & Griffis, 2008). In this context, social capital suggested that actors who invest in relations with other actors can get a positive return on this investment through economic and psychological benefits and their ability to leverage this relation in order to access base resources (Lin, 1999).

CS is understood as an exchange of knowledge that facilitates social interaction. In other words, the CS proposes that the links established in the networks allow access to resources and, therefore, the main benefit for the development of an organization is the opportunity to acquire knowledge from other members of the network (Adler y Kwon, 2002). Management of this knowledge facilitates social interaction to members of the network and it is identified as a key factor for the development of organizational functions and, to strengthen the SCI in planning and control processes (Karahanna & Preston, 2013; López et al., 2014; Simanca et al., 2016; Szeto et al. 2006; Vainio, 2005).

In the same way, Autry and Griffis (2008) proposed that because a supply chain is a group of related companies that take advantage of these relationships to achieve positive returns, the theory of social capital has a high potential for the analysis of the SCM. Therefore, according to need to study soft factors in the integration of supply chains, social

capital is presented as an appropriate concept to identify these relationship factors in the integration of processes.

Social capital has been associated with the development of social networks. For this reason, it is defined as a set of existing and potential resources possessed by an individual or an organization, as a consequence of their membership of a network of relationships (Nahapiet & Ghoshal 1998; Inkpen & Tang, 2005). This definition had its origin in the work of Granovetter (1983), who found that people usually do not behave with perfect economic rationality, but they are affected by embedding insocial networking with other actors who are able to influence their access to resources and information.

As a result, it was identified as the fundamental proposition of social capital that establishing relationships with other members of a network allows access to resources. The more accepted classification of the dimensions of CS in the literature was performed by Nahapiet and Ghoshal (1998), who suggested three dimensions: (a) structural, (b) cognitive, and (c) relational. Since CS can be identified as an asset, its three dimensions will also be considered as an organizational capital.

The dimension of SC refers to patterns of relationships between actors in a network, about whom it reaches and how this relationship is performed. This first dimension seeks to identify the presence or absence of links between actors (Burt, 2000). It can be analyzed from the perspective of links of members of the network, which means that a fundamental function of the members of a network is to create links in order to generate network transactions. Another perspective is the network configuration, which means that patterns of association among network members (hierarchy, density and connectivity) affect their exchange of knowledge (Lee, 2005). Finally, the perspective of network stability refers to how to change the membership of a network.

The relational dimension of capital refers to a particular relationship of people, such as respect and friendship, that influences behavior. Key aspects are trust and integrity (Inkpen

& Tsang, 2005; Putnam, 2004). Trust is a major factor in the development and perpetuation of a successful network of inter-relationships (Dyer & Singh, 1998). Trust can be defined as the expectations, assumptions and beliefs that the future actions of each member of a relationship will be beneficial, favorable or at least not harmful, to the others (AlSagheer et al., 2011; Wu et al., 2004).

The cognitive dimension of capital represents the resources that give meaning and shared understanding to members of the network. They were defined as shared goals, culture and language that are necessary for having common interpretations between the parties (Inkpen & Tsang, 2005; Nahapiet & Ghoshal, 1998). Shared goals refer to the degree to which the network members share an understanding and approach to common achievements. Organizational culture has been identified as the extent to which the rules of behavior govern the relationship. Thus, this is a factor that defines relationships among organizations in the SCM and a challenge associated with integration in the SCM (AlSagheer et al., 2011; Lambert & Cooper, 2000).

The World Bank has also promoted the development and measurement of social capital as a variable key for economic development (World Bank, 2015). As a result, it has examined three interrelated concepts with capital: (a) the linking of capital, which defines links and common characteristics of people within groups; (b) capital jumpers that refer to the horizontal connection of groups of persons with a similar status; and (c) the association of capital, i.e. the relationships between people of different rank or formal authority (Grootaert et al. cited in Sheingold & Sheingold, 2013).

According to the qualitative study of Austry and Griffis (2008), the term capital of supply chain was proposed as formed by structural and relational capital. They made statements about a positive relationship between the capital of the supply chain and the performance of the supply chain management innovation. Research in order to substantiate these relationships empirically was conducted by Molina and Martinez (2010) in a studio with

220 manufacturing firms in Spain, which showed a positive relationship between the variables of CS and innovation.

According to a study by Chou and He (2011), in the field of software development they found a positive relationship between structural and relational capital and expertise into teams of software. But they also found a non-significant relationship between cognitive capital and the integration experience. The importance of the concept of social capital is also noted in the research of Wagner, Beimborn, y Weitzel (2014). They found that IT business alignment can be addressed through social capital by promoting knowledge, confidence, and respect.

There are several researches that have linked social capital and supply chain management, especially in the United Kingdom. In this sense, some studies found a positive relationship between social capital and the promotion of relations with suppliers in the SCM (Cousins, Handfield, Lawson, & Petersen, 2006), while other identified a positive relationship between social capital and the supplier-buyer interactions in the SCM (Roden & Lawson, 2014; Hughens & Perrons, 2011). Likewise, several studies have found a positive relationship between social capital and the improved performance of buyers in the SCM (Lawson et al., 2008; Son et al., 2016; Villena et al., 2011).

In another study, Carey et al. (2011) found a relationship between social capital and the improvement in innovation and cost of buyers in the SCM. Some of these researches have consolidated as data collection instruments that are very relevant to this research, since they relate the dimensions of social capital according to the model of Nahapiet and Ghoshal (1998) to the management of the supply chain (Carey et al., 2011). These instruments have been validated by different researchers and have been used in several studies in this field.

Consequently, the results of the research by Oliveira (2013) suggested that if managers of social networks create mechanisms to promote the development of entrepreneurs in social capital through the creation and strengthening of links, they may expect positive

results in the business performance. According to the study by Pulles and Schiele (2013), a theoretical framework proposed that allocation of resources in regional clusters can be prioritized according to the social capital developed for these groups. This proposal was supported in the fact that the exchange of resources among members of clusters could create competitive advantages for those who develop better.

There is a study that relates the dimensions of social capital and business integration (Horn et al., 2014), in which these variables were associated from an internal and external perspective, to determine their effect on the success of global supply. It identifies a positive relationship between the dimensions of internal social capital with internal business integration, and in dimensions of external social capital with business integration with suppliers. Therefore, the variables evaluated, scope and relationships established are different to those raised in this study.

Another study related social capital to SCI (Chen et al., 2018). However, in this study, social capital only considered the structural capital associated with senior management ties (business and political). In the SCI it only incorporated external integration with suppliers and customers. This study found that business management ties affect external integration, but not the political management ties, which had an insignificant effect on external SCI.

Few studies were identified in literature linking social capital and SCM, asevidenced in review by Matthews and Marzec (2011) on the implementation of the concept of social capital in operations research. In this review, only five documents were found that linked social capital and SCM and none of them directly related social capital and integration of the supply chain, thus, they observed the need to address research on this field. Similarly, it was evidenced in Colombia that there are few studies related to social capital.

In this sense, the study of Rubio (1997) found that Colombia has developed what he calls a perverse social capital. This was identified through firms that create networks, contacts, relationships with power, systems and norms of behavior that inspire rent seeking

or criminal behaviors in society. Therefore, successful organizations were more efficiently to reach a position on a network, reinforce unproductive social roles, whereby they restrict a broader economic growth.

Within the few studies made in Colombia about social capital, it was identified the study by Roman, Gómez and Smida (2013), who aimed to measure social capital in innovative small businesses in the cities of Cali and Medellín. They found strengths in the social relations of these small businesses developed, but weaknesses in the relational profile associated with teamwork and internal cooperation outside of these companies.

Moderator Value of Size and Environmental Uncertainty

The size of a company compared to other with whom it will establish a process of integration can be a determining factor for the relationship, especially in small and medium enterprises (Gélinas & Bigras, 2004). This evidence found in studies by Bala and Venkatesh (2007) identified differences in factors that affect relationships with key companies such as relational depth, extensibility of relationship and regulatory pressure according to the firms' size. Similarly, there were factors that affect relations with non-dominant companies such as relational specificity and mechanisms of influence (coercive, mimetic and normative pressures), when small and medium firms were involved (Christensen & Bower, 1996). Likewise, Mohr (1996) found size as a control variable in interorganizational integration.

In Colombia, the size of a company was defined by Law 590 of 2000 and 905 of 2005 (MinCIT, 2017), according to which a SMEs (micro, small and medium enterprises) should be comprised of up to 200 workers and 30,000 legal monthly minimum wage, and large companies are those exceeds these indicators.

The uncertainty of the environment was identified as a motivating factor towards business integration when absorption processes are given (Pennins et al., 1984). According to Grover and Saeed (2007), uncertainty and complexity are associated with unpredictability of demand, which shows the lack of adaptation to contingencies. These factors must generate

coordination mechanisms that allow a better inter-company integration. Meanwhile, Saeed and Mahotra (2011) considered that uncertainty in the operating environment of an organization can substantially change the integration processes in the supply chain, due to the speed of change of products, the markets and environment.

According to the findings of Boon-itt and Wong (2006), environmental uncertainty is a contingency factor affecting the integration of tmr chain. Therefore, they proposed a model according to which high levels of uncertainty significantly affect integration of the SCM. Boon-itt and Wong (2006), suggested four dimensions to environmental uncertainty: (a) uncertainty of suppliers, (b) uncertainty of customers, (c) uncertainty of competitors, and (d) technological uncertainty.

Other researches were developed with these same guidelines. Pathak, Day, Nair, Sawaya, and Kristal (2007) suggested keeping the adaptability of businesses through the analysis of complexity of the overall system and the surrounding environment. Likewise, Bozarth, Warsing, Flynn, and Flynn (2009) argued that the uncertainty of three functions of the SCM upstream, manufacturing and downstream, have a negative impact in the performance of these supply chains. For thair part Lee, Yeung, and Cheng (2009) identified two dimensions of environmental uncertainty. First is technological change and second refers to variability or uncertainty in market where companies play.

Gimenez et al. (2012) state that uncertainty is given by variability, which can be reduced by internal control. Therefore, variability is not a problem, but a way companies develop organizational practices that allow them to reduce these levels of variability. They als ofound in their research that the uncertainty given complexity is directly related to integration in the supply chain, thus the greater the integration, the more complex and vice versa. For their research, they identified five dimensions of complexity: (a) won orders, (b) volume and variety, (c) the execution time, (d) percentage of direct labor, and (e) lot size.

Summary

Business integration was identified as one of the fundamental elements of any organization for its survival (Parsons, 1951, Dyer & Sing, 1998, Williamson, 1981). Essential characteristics of supply chain management (SCM) were also presented, because the integration function is developed through standardized interfaces, which allows to reduce the effort required to process information among partners of the companies into chain (Malhotra et al., 2005; Mentzer et al., 2001).

A review of the evolution of the concept of supply chain integration has been carried out and it was identified in the second halfof the last century as a way to integrate supply and demand among businesses through planning, management and control of all the value-added activities, from sourcing, procurement, processing and distribution, which includes partnerships with third parties to deliver to the end user an added value (Lockamy & McCormack, 2004; Vickery et al., 2003).

This study identified that there is a broad consensus on the three types of integration in the supply chain, which can be: (a) internal, (b) with suppliers, and (c) with customers (Flynn et al., 2010). Likewise, the proposal of several authors (Lazzarini et al., 2001; Lambert & Cooper, 2000; Min et al., 2008) is accepted by this study. According to these authors, relations between these companies in the SCM should not only be sequential and dyac (between customer-supplier), but also defined in multiple areas, such as a network. Therefore, the assessment in the SCM was performed as networks, as they can also be considered as a set of actors and systems nodes interacting (Borgatti & Li, 2009). This concept can be likened to enterprises and their relationship structures, such as in a supply chain.

From this perspective, the identification of what a social network is and how soft aspects define it, which have been habitually forgotten, could be a fundamental aspect when studying the integration processes in the supply chain management. (Naslund & Hulthen,

2012). That is why technical aspects (hard) and human behaviours (soft) that define the supply chai, can be better understood through parameters of relations of individuals, identifying competitive advantages through the dissemination of social information, control and coordination among others (Borgatti & Li, 2009). It is widely shown in the literature that there is a positive and significant relationship between integration and organizational performance, therefore, a higher level of integration in the SCM could mean a better performance of companies in the SCM.

According to the globalization trends in Colombia, the Productive Transformation Program (PTP) was created to promote the productivity and competitiveness of those sectors with high export profile through the efficient coordination between the public and private sectors (MinCIT, 2017). However, these programs in the manufacturing sector have not achieved expected results because the industry growth indicators remain below the average of the national economy.

Different variables that attempted to explain integration in the SCM were identified in the literature, however, most studies focused on identifying technical or hard factors of integration and few studies on its soft aspects. Therefore, further studies were suggested in this field by Naslund and Hulthen (2012). From this perspective, social capital was identified as a concept that could better interpret integration in supply chains, because it was defined as a set of existing and potential resources possessed by an individual or an organization as a result and derived from its membership to a network of relationships (Nahapiet & Ghoshal, 1998; Inkpen & Tsang, 2005).

Following the literature review, the size and uncertainty of a company were identified as factors that could affect the relationship between social capital and the level of integration of the SCM. According to this assessment, a gap in the literature is identified, thus, this study will seek to explain the relevance of social capital variables and the integration of companies in the supply chain. In the next chapter, the reader will find a detailed description of the

methodological design that was used for developing the present research, and the guidelines under which information was collected and analyzed.

Conclusions

The importance of integrating the companies in a supply chain and the positive effect of this integration in organizational performance (Naslund & Hulthen, 2012) is observed in the literature. But there are several gaps in the literature on various aspects of the management of supply chains. Firstly, the SCM has been usually evaluated from the perspective of the dyac (supplier-customer), which is considerated only one of the great potential in the SCM (Lambert & Cooper, 2000; Lazzarini et al., 2001; Min et al., 2008).

Secondly, inthe network perspective into the supply chain identified the multidimensional relationships that could better explain the interaction between companies of the chain (Borgatti & Li, 2009). Thirdly, if the SCM can be understood as a group of companies with hard and soft links, the latter are unknown to the managers of the supply chain (Naslund & Hulthen, 2012).

From elsewhere, the concept of social capital it is quite recent in organizational management (Nahapiet & Ghoshal, 1998), and there are few developed studies to assess their importance in supply chains, and their integration, except for some contributions made by researchers from the United Kingdom who have generated some studies on this subject (Carey et al., 2011; Cousins et al., 2006; Hughes & Perrons, 2009; Lawson et al., 2008; Son et al., 2016). Finally, there is no theoretical model that specifically identifies the variables of integration in SCM, social capital, size and uncertainty and their relationship. The only existing conceptual proposal established a connection between social capital and integration in supply chains (Min et al., 2008) in addition to a study that relates the dimensions of social capital and business integration in another context (Horn et al., 2014).

Since the programs of the Colombian government to promote the competitiveness of different industrial sectors in Colombia have not achieved the expected development, it is

necessary to evaluate how social capital can help industrialists in the real sector in Colombia to relate and integrate better. It is also important to identify the sectoral policies to improve the Colombian industry performance and encourage all the companies to work together, such as private firms, the state, and academia. The project herein aims to identify which dimensions of social capital have an impact on the three dimensions of integration of the supply chain of the Colombian industry, through its various links. It seeks to establish how industry can become more competitive facing the challenges of growth in the country.

Chapter 3: Method

According to the foregoing, this research aims to identify, through a quantitative study, how the dimensions of social capital (CS) are related to the level of integration of processes in the management of supply chains (SCI) in companies associated with the Colombian real sector, moderated by the variables of size of the organizations (S) involved and the uncertainty of the environment (EU). This research is relevant to the extent that it deepens on the analysis of the processes of integration in supply chains, given that business integration has been identified as one of the key success factors of any organization (Porter, 1999).

In addition to the literature review, it has identified that the research of the supply chain has focused on assessing dyads relationships within a supply chain. This aspect has disowned in part the importance and needs to evaluate the network perspective that identified each company as a link with multidimensional relations (Borgatti & Li, 2009; Lambert & Cooper, 2000; Lazzarini et al., 2001; Min et al., 2008). This approach has limited the analysis of the potential of networks for the development and transfer of knowledge among members of a supply chain, but it has identified new options for improving performance as a whole (Ramstad, 2009; Henneberg et al., 2009).

Although there are several studies in the literature review that identified the causes and factors that enable business process integration, there are few studies evaluating the social and human factors (soft), and specifically the social capital as a motivating factor to the integration in the SCM. Various researches suggest the need for further study of other factors of integration in the SCM, especially soft aspects because they are still unknown, and can be very significant in the interpretation of the motivation of industry to its integration in the SCM (Borgatti & Li, 2009; Golicic et al., 2003; Lambert et al., 1996; Lazzarini et al., 2001; Lee, 2005; Min et al., 2008; Naslund & Hulthen, 2012; Stadtler, 2009; Wu et al., 2004) Therefore, this study wants to identify as a result the impact of the dimensions of social

capital to develop a strategy in the Colombian industrial sector that allows to motivate and facilitate the entrepreneurs in Colombia to integrate in the SCM. Thereby this research seeks to improve business productivity, increase the performance, make it more competitive and allow its sustainability. Then, it will also support the emergence and improvement of the performance of the industrial sector in Colombia, to benefit the country and the region.

Until now, the problem has been identified, its study has been justified, and the research questions, the theoretical framework for the research proposal and the review of the literature justifying the development of this study have been proposed. In the current chapter, the methodological design of the research is presented, its convenience and all the development of the methodology used for the research process is sustained, so that the pertinence and quality of the results found can be guaranteed.

Research Design

According to Gray (2009) and Saunders et al. (2009), there are two approaches to scientific research: (a) deductivism, and (b) inductivism. This research will be conducted according to the deductive approach, therefore, it begins with theory and a hypothesis that is expected to corroborate should be generated. The variables to be measured should be operationalized, the empirical evidence to support or not the hypothesis is developed and thus research findings can be generated.

This study will be developed from the theory of Smith (2001) that proposed that the companies seek to identify ways to maximize their profits. Since the companies are a set of internal and external relationships (Coase, 2007), these firms should determine if they can minimize costs by producing on its own or integrating with other companies. From these proposals, the theory of interorganizational relationships (IOR) arises, which to seek integration through standard interfaces that reduce the effort required for processing information among chain partners (Malhotra et al., 2005; Mentzer et al., 2001; Oliver, 1990).

Moreover, from the theory of social network analysis (SNA), the concept of social capital was developed, according to which it is a collection of current and potential resources that an individual or an organization has as a result of its membership of a network of relationships (Nahapiet & Ghoshal, 1998). As stated by the suggestions of various researches and the proposition made by Min et al. (2008), social capital and integration into supply chains should be positively related. Therefore, this study wants to corroborate this theory proposing a hypothesis test by empirical testing in the Colombian industrial sector. This research process clearly corresponds to a deductive research.

For this type of research, studies usually work with a positivist perspective, which seeks to interpret the reality that is available to the senses and concepts should be objectively measurable. Therefore, it is based on facts and not in values. In this type of study, the theories must be tested through empirical evidence (Gray, 2009). Consistent to these characteristics, the present research applied an objectivist epistemology, and a positivist perspective, because it aims, to collect and analyze the data through a statistically significant sample, to corroborate the hypothesis and thus generalize its findings to the entire population.

According to Hernández et al. (2004), quantitative research is a way to prove the objective of the theories by examining the relationship between the variables, which is consistent with the objective of this research that aims to establish the form of relationship between social capital, with the level of process integration in the supply chain management (SCI), achieved by companies associated with the real sector in Colombia. Therefore, the research is quantitative, since it is identified in the positivist current and additionally sought to define how the dimensions of the variable of social capital are correlated with the integration of processes in the management of supply chains (SCI), mediated by the uncertainty of the environment (EU) and the size of the companies.

The research is basic or fundamental, because it corresponds to the researcher interest in expanding the knowledge of mankind on the field of social capital and its relationship to

the business processes integration in the SCM. The motivators are purely academics and there is no apparent business purpose to the findings of the investigation (Hernández et al., 2004).

As a method of information gathering, the surveys were used. These correspond to a structured methodology, with closed questions on a Likert scale, with seven categories, to achieve concrete and numerical data, allowing the generation of measurable information. The variables were measured from the results of the surveys so that these numerical data were analyzed using statistical procedures (Saunders et al., 2009), and are presented in this report.

This study is basic, because it had a coverage of all the reserch process from the identification and description of the objective population. In this way, performed the assessment, verification of information gathering tool them wahe application of the surveys into the given sample, and its evaluation. Also were structuring, validated, analyzed statistically of data to presentation of results (Saunders et al., 2009).

In this way, the study has a descriptive purpose given that it search to provide information on current conditions and relationships that are presented in the SCI in companies associated with the real sector in Colombia (Hernández et al., 2004). The study is framed in the transversal concept, because it was developed in a single moment in time. The surveys were applying only one time, within a significant sample of the population of the companies associated to the real sector that operate in Colombia, in order to infer characteristics of all population.

Appropriateness of Design

The operations processes are all different since many variables can affect how kinds of operations, like the type of manufacturing or technology. However, quantitative empirical research can help to validate the underlying assumptions about the processes of operations and its problems presented, as theoretical models developed (Bertrand & Fransoo, 2002).

This study of the SCM is part of this field of operations, which is a field that every day has been gaining importance by a rapidly growing number of studies (Van der Vaart & Van Donk, 2007; Matthews & Marzec, 2012).

The importance of operations management is generally justified because it refers to real-life situations, with models that should be applied (Bertrand & Fransoo, 2002). For this reason, it is widely justifiable for this research, because the quantitative empirical model proposes to validate the underlying assumptions about the processes of integration of SCM, in accordance the theoretical models presented.

The best opportunities for quantitative empirical research models have been identified from the results, based on the development of mathematics, to generate more rigorous empirical scientific knowledge in the field of operations management (Bertrand & Fransoo, 2002). This justified the application of this model in footsteps of scientific research positivist, to generate knowledge that can be truly applied in solving the problems of integrating of processs in the supply chains in Colombia. It could allow different industries to identify improvements in their development and survival, due to risk of this industry not achieving higher levels of performance for its competitiveness.

On the other hand, the quantitative research model has been the most used for initial research of operations in Europe and USA. It has helped to build scientific knowledge in operations management (Bertrand & Fransoo, 2002). This situation is evidenced by various quantitative studies conducted to study the variables identified. As an example, it can cite to Boon-itt and Wong (2010), who conducted a comprehensive study to identify the factors of integration of the supply chain, the environmental uncertainty, and the competitive capabilities. Meanwhile Sukati et al. (2013) correlated variables as integration of the supply chain, the chain responsiveness and the competitive advantage of companies through quantitative research.

In this sense the causal link between the independent variable defined as social capital and the dependent variable defined as the level of integration processes in the SCM, is based from studies by different researchers. They found that some variables making up social capital have a direct and positive relation to the integration processes in the SCM. So as to from different studies a significant and positive relationship between market orientation and integration it has found (Agan, 2011). In this context, the market orientation is understood as a set of factors related to social capital, such as trust, empathy, union, reciprocity and values shared.

Thus, the study of Agan (2011) developed between manufacturers in the United States of America (USA), found a significant impact on market orientation and the SCI. Likewise, in a longitudinal study of Connell and Voola (2013) on integration in clusters. This research used a survey method three times for six years, and each year the result was feedbacked to the managers of the companies, in order to implement improvements. They found that factors of market orientation had a significance increasing as a determinant of integration.

For their part, Wu et al. (2004) with data collected through surveys, identified a high degree into of soft factors such as trust, power, dependence and commitment could have a direct and significant impact on the SCI. Also, Braunscheidel et al. (2010) found through a quantitative study, that organizational culture influence to the companies to adopt practices of internal and external integration.

Likewise, Lee (2005) developed an exploratory study using a quantitative model to identify through measures of SNA the degree of integration of the swine supply chain. Also, Szeto et al. (2006) found in a quantitative study in China, supported in surveys, that the processes of the social capital and the fostering business relationships need to be planned very carefully. Thus, it has been identified that the variables such as commitment, the culture, the confidence and the social capital it should have a positive effect on the integration process in the SCM and not vice versa.

In the same way, other studies positively associated the dimensions of social capital with different aspects in performance, in the management of the supply chain (Carey et al., 2011; Cousins et al., 2006; Hughes & Perrons, 2009; Horn et al., 2014; Lawson et al., 2008; Roden & Lawson, 2014; Son et al., 2016). The relevance of quantitative methodology is also evident from the critical review of Naslund and Hulthen (2012) on the integration studies in the supply chain, who selected 49 articles for analysis empirically grounded due to depth of analysis.

Also, in the critical review by Van der Vaart and Van Donk (2008), it evidenced that only quantitative studies of integration in the supply chain based on surveys were selected. They identified more than 200 studies using survey methodology for research development, which shows that quantitative studies are the most common in this field. Then, due this is a quantitative research, it is supported in assumptions about the theories in a deductive way. This research also generates validations to avoid bias, and thus be able to replicate the results obtained on other Colombian industrial sub-sectors, and in other countries with similar characteristics (Hair et al., 2004). In this sense, it intend to confirm the hypothesis about the SCI.

The survey is identified as a strategy associated with the deductive approach (Saunders et al., 2009). It is widely used in business and management research to answer questions of what, who, where, how, how many, how much. This is consistent with the critical review of van der Vaart and van Donk (2008) who used it as selection criteria to their study about the integration in supply chains. This make the survey appropriate strategy for this research because, it seeks to identify the dimensions of the social capital as are related to the SCI.

Additionally, the survey strategy has allowed it to collect a large amount of quantitative data, which using descriptive and inferential statistics, has made it possible to establish relationships among the variables analyzed (Saunders et al., 2009). This is the

method, that has been used in the current study, with the purpose to determine how the relationships are between the variables of social capital, the SCI, uncertainty and the size. In this sense, the research relied on the collection of information from different sources, supported by a survey method, which has been widely applied in research in this field (Boonitt & Li, 2010; Connell & Voola, 2013; Hosseini et al., 2012; Sukati et al., 2012; Thatte et al., 2013).

The study is cross-sectional, because it searches to evaluate the presented conceptual model at a time, as proposed by Saunders et al. (2009). According to it, cross-sectional studies are usually associated with the use of the survey strategy. Finally, it is a basic study, because it aims to contribute to knowledge and give to filling a gap in the literature.

Research Questions

Six research questions and their respective hypotheses were proposed. For the first question of this investigation, Which is the relationship between social capital (CS) and the integration of processes in the supply chain management (SCI) in companies associated with the real sector in Colombia?., the following hypothesis is posed:

H1: CS is positively and significantly related to SCI in companies associated with the real sector in Colombia .

For the second question, Which is relationship between relational capital (RC) and the integration of processes in the supply chain management (SCI) in companies associated with the real sector in Colombia?, the following hypothesis is posed:

H2: RC is positively and significantly related to SCI in companies associated with the real sector in Colombia.

For the third question, Which is the relationship between cognitive capital (CC) and the integration of processes in the supply chain management (SCI) in companies associated with the real sector in Colombia?, the hypothesis is proposed:

H3: CC is positively and significantly related to the SCI of companies associated with the real sector in Colombia.

For the fourth question, Which is the relationship between structural capital (SC) and the integration of processes in the supply chain management (SCI) in companies associated with the real sector in Colombia?, the hypothesis is raised:

H4: SC is positively and significantly related to the SCI of companies associated with the real sector in Colombia.

For the fifth question, To what extent is the size (S) of organizations a moderating factor between social capital (CS) and the level of processes integration in the supply chain management (SCI) in companies associated with the real sector in Colombia?, the following hypothesis is posed:

H5: S of the organizations affects in an inversely proportional way the relationship between CS and SCI of companies associated with the real sector in Colombia.

For the sixth question, To what extent is uncertainty in environment (UE) of the organizations a moderating factor between the social capital and the level of processes integration in the supply chain management (SCI) in companies associated with the real sector in Colombia?, the following hypothesis is posed:

H6: UE affects in an inversely proportional way the relationship between CS and SCI of companies associated with the real sector in Colombia.

Population

Because the study was conducted among companies associated with the real sector in Colombia, the grouping made by the Ministry of Commerce, Industry and Tourism of Colombia (MinCIT, 2017) was used in the subsectors, presented in Table 1, with the respective representativeness in the selected sample.

Table 1 *Participation of Subsectors in the Sample*

Subsector	%

Food products	11.4
Chemical and pharmaceutical	7.8
Automotive	6.5
Apparel and footwear	4.7
Metalworking	4.7
Textiles	3.0
Soaps and cosmetics	3.0
Plastic products	2.6
Machinery and equipment	1.3
Editorial and paper	1.3
Other	53.4

Some of these sub-sectors correspond to those defined in the PTPs of the MinCIT, namely: (a) industrial publishing and graphic communication, (b) fashion system, (c) auto parts and vehicle industry, (d) cosmetics and cleaning, and (e) metalworking, steel and shipyard, which had representativeness in this sample.

In orders to evaluate the different companies that make up the chains and the supply networks of the identified subsectors, assembling companies (or original equipment manufacturers EOM) were involved with 45.7% of the sample, the suppliers of first and even second level with 29.7%, and distributors and marketers with 24.6%. In this sense, the unit of analysis was the company, as a link in the SCI.

Since the informality of some companies is a factor that fundamentally affects the willingness to integrate in the management of supply chains in the long term, only formal companies were considered in this study, so for the sample it was validated that the companies had a Tax Identification Number (NIT) and / or registration before the Chamber of Commerce in the respective location. Similarly, regarding the size of the companies, the sample presents an important representativeness, containing 44.4% of large companies, 25.0% of microenterprises, 15.4% of medium-sized companies and 15.1% of small business companies.

Informed Consent

The participants selected for the survey were aware of the objectives sought by this research and their participation was voluntary. Because different strategies were applied to collect the information, the procedure was as follows. When the surveys were conducted presentially, participants were explained the importance of reading and approving informed consent. Some participants refused to complete the survey due to confidentiality policies of their organizations, and this action was respected by the researcher.

For participants who completed the survey virtually, the Gloogle surveys link where they would find the survey was sent to their emails (with access to the virtual survey). As one of the first steps for the completion, the objectives of the research and the informed consent was presented to the participants, to ensure the total freedom and awareness of the person about the confidential treatment of the information provided. If they wanted to continue, they had to approve the informed consent.

In the informed consent, with the confidential handling of the information to purposes of the academic research and the statistical treatment of the data, were presented to the participants. It was proposed as an incentive for the people who answered the survey, make available to them the statistical data of the study, once these are analyzed and published. The format of the informed consent that was given to the participants of the sample can be seen in Appendix A.

Sampling Frame

A sample is a subset of the population to be analyzed. That is, a significantly subset of all companies associated with the selected sub-sectors of real industry in Colombia (Hernández et al., 2004). Simple probabilistic sampling seeks that all companies in the subsectors have the same probability of being selected, so that this sample is representative of

the population (Kerlinger & Lee, 2002). But, usually for studies in this area, using surveys, they have reported a response level below 35% (Hosseini et al., 2012; Gimenez et al., 2012; Powell, 1995), which generates a high uncertainty in the information to be collected.

Additionally, the approach that was taken by the researcher with the business associations, had very little receptivity. Similarly, the risk involved in sending mass emails can not ensure that the person responding is an executive who knows the company. Performing a stratified random sampling, due to the role of the company in the SCM, was very difficult to elaborate, since, given the difficulty to obtain an adequate level of response, it was very difficult to obtain an adequate sample size.

Due to these reasons a sample was used for convenience. For this purpose, companies associated with postgraduate students from prestigious universities in Colombia were identified. In this way, it was sought to guarantee that the respondents were executives of medium-high level in these organizations, with a great knowledge of the processes of the company in which they were working. On the other hand, contacts of first and second level of the researcher were identified, who were contacted personally or through personalized emails to the potential respondents.

The participating in this study were companies associated to the real sector in Colombia, which was divided into 11 sub-sectors according to the division used by the MinCIT and constituted by manufacturing or assembling companies (EOM) of the finished products in each subsector. Additionally, companies associated to these subsectors as suppliers and marketers. The first of its, corresponds to the suppliers of inputs, materials, premiums, intermediate products and specialized services for some subsector of OEM companies. The second corresponds to the distributors and marketers of the products and services of the OEMs.

However, no filter was established regarding the role of the company in the SCI, achieving representativeness in each one of them. Nor was the size of the organization

leaked, and the sample shows an important representativeness, containing 44.4% of large companies, 25.0% of microenterprises, 15.4% of medium-sized companies and 15.1% of small companies. In relation to the geographical location of the companies, given that Bogotá is the researcher's headquarters, most of the contacts (more than 80%) that completed the survey were located in this city and its surroundings, which is consistent with the city which are more relevant due to the number of companies that it represents (Procolombia, 2016).

Due the questions required a precise knowledge of each the company along with the relationships with its strategic allies, it was favored that the people who completed the survey had a high or medium level within the organization. However, the researcher was able to corroborate that when senior management did not have precise knowledge of the details, a call was made to a direct subordinate who supported him to answer some questions (Powell, 1995).

A total of 350 organizations were contacted between companies of the private and public sector (industrial and commercial companies of the state), after establish contacts to complete the survey, the filling of 261 questionnaires was obtained, of which 157 they were filled out in person and in a virtual way 104. For the virtual questionnaires the application of Google questionnaires was used, which allowed to guarantee that the respondents answered all the questions so that the questionnaire could be sent. Of all the questionnaires completed in person, the researcher carried out a third part, guaranteeing adequate and complete filling out .

For the other in person surveys, the researcher provided support the respondents to resolve their concerns in the processing. Even so, due to data quality procedures, 18 questionnaires were eliminated that corresponded to companies that are not associated with the supply chain of the Colombian real sector, and another nine surveys for repeated cases, in which more than one executive the same company answered the survey, because the unit of

analysis is the company. Finally, other surveys were discarded due to the absence of data of interest (Hair et al., 2004), using 232 surveys for the analyzes.

Confidentiality

To guarantee the confidentiality of the information in this research, it proceeded in the following manner. Contacts were made with different universities and teachers of these, for the application of the surveys among their graduate students. For those where a favorable response was obtained, the day and time of the application of the survey was defined with the teacher, according to their class schedules. Some time was taken from the class space to present the students the purpose of the research and the profile of the researcher. They were invited to voluntarily answer to the survey in that class space, presenting the informed consent, in order to obtain total freedom and conscience of the person about the confidential treatment of the information provided.

The same treatment was performed with the contacts and referrals of the researcher, including managers, who were invited, via email, to participate, presenting the objectives of the research, the profile of the researcher and the confidentiality treatment of the data. For those with whom a positive response was obtained, the form of application of the survey was defined, either with a personal visit of the researcher or through the virtual Google survey. In any case, the objectives of the research and informed consent were presented. The filling out of the survey took an average of 15 minutes.

The consolidated information of the surveys has only been handled by the researcher. This information has had a purely statistical treatment, to fulfill the objective of the investigation, without any other purpose.

Geographic Location

According to information from the Bank of the Republic (Banco de la República, 2018), which identified that more than 70% of industrial production in Colombia takes place in the five main cities of the country, the sample of this research has a important participation

of companies in Bogotá and its surroundings, and in a smaller proportion of the most important cities of Colombia and their annexed municipalities: Medellín, Cali, Barranquilla, Bucaramanga, Cúcuta, Cartagena and Ibagué, among others.

The study was carried out primarily in Bogotá and its surroundings, where 206 surveys were carried out. According to the Banco de la República (Banco de la República, 2018), in this area about 40% of the population of companies of industrial production in Colombia, is located. In other major cities of the country the remaining surveys were developed, among which are Medellin, Cali, Barranquilla, Ibague, Bucaramanga, Cartagena, Villavicencio and Santa Marta.

It is considered that these major cities are poles of industrial development, and given the tax, mobility and environmental conditions, industrial companies have been migrating to the municipalities attached to these cities. Therefore, for this investigation, the annexed municipalities were considered as part of these cities. However, no filter was established according to the city, but in accordance with the location of the researcher and the number of potential companies in each area of the country, then the number of companies per city was due to a convenience process and natural selection

Instrumentation

According to the literature review, the variables were operationalized in the following way. For the dependent variable SCI, according to the research by Chen et al. (2009A), what the experts valued the most when carrying out an evaluation of its essential factors, were first the process vision and secondly the internal and external perspective. In this sense, different instruments were found that sought to measure integration in the management of supply chains (Aryee et al., 2008, Chen, et al., 2009B, Hammer & Champy, 1993, Stank et al., 2001B), but in several of them, the vision by processes is not very clear.

However, recently it has been widely accepted to differentiate in the external perspective, among suppliers, distributors and / or customers. This is how a questionnaire

developed from the works of Narasimhan and Kim (2002) (cited by Flynn et al., 2010) and Morash and Clinton, (1998), and adjusted and verified by Flynn et al. (2010), which has been widely applied, tested and validated by different investigations to define the integration of processes in supply chain management. This research considers three dimensions for the SCI: (a) internal integration, (b) integration with suppliers, and (c) integration with clients.

Regarding the independent variable, the social capital, the World Bank has promoted through several questionnaires, its measurement as a fundamental variable of economic development (World Bank, 2015). However, it has been oriented to measurement of regions or countries and not so much to business development. However, the Nashul and Ghostland questionnaire, contemplates the dimensions of the business environment and has been widely accepted. In this context, it is in the United Kingdom where the dimensions of social capital proposed by Nahapiet and Ghoshal (1998) have adopted, and additionally it is developed in the perspective of the management of the supply chain, with different proposals of questionnaires (Carey et al., 2011; Cousins et al., 2006; Lawson et al., 2008; Roden & Lawson, 2014; Hughens & Perrons, 2011).

The instruments developed by Son et al. (2016) and Villena et al. (2011), had high reliability and validity because consolidating the experiences of the questionnaires of other researchers, and having been of the last instruments generated in the area. Additionally, they defined the indicators for the three dimensions of social capital: (a) relational capital, (b) cognitive capital, and (c) structural capital.

As regards the mediating variable of environmental uncertainty, different instruments were found in the literature that seek to measure uncertainty in the SCM environment. Saeed and Mahotra (2011) consider only the uncertainty in the operating environment; Bozarth et al. (2009), propose the uncertainty but associated to each of the three functions of the SCM, upstream, manufacturing and downstream; for Giménez et al. (2012) the uncertainty is associated with complexity.

Therefore, the questionnaire was taken from Boon-itt and Paul (2006), which relates the uncertainty of the environment as a contingency factor that affects the integration of the supply chain. For it, these researchers developed and validated the instrument by applying it to companies in the automotive sector in Thailand. In this way, this operationalization that suggests four dimensions for environmental uncertainty was adopted: (a) supplier uncertainty, (b) customer uncertainty, (c) competitors' uncertainty, and (d) technological uncertainty.

The organizational size variable is adopted as defined by laws 590 of 2000 and 905 of 2005 (MinCIT, 2017), which classify organizations among micro-enterprises comprised between 1 and 10 workers, small businesses, between 11 and 50, medium-sized companies, between 51 and 200, and a large company with more than 200 workers.

As can be seen, there is not a single questionnaire to measure the different variables proposed in the model. Therefore, questionnaires that measure in the best way the related variables, were taken from the review of the literature, under the context of the purpose of the research. Subsequently, were consolidated under a new questionnaire, which according to Hasan and Kerr (2003), ensures the validity of this instrument.

In this way, after consolidating the questions associated with the different variables of the instruments tested and validated by Flynn et al. (2010); Son et al. (2016); Villena et al. (2011), and Boon-itt and Paul (2006), e-mail communications were sent to these researchers. Responses was obtained from two reseachers, Son et al. (2016) and Villena et al. (2011), who stated that they have no objections with the use of their instruments. Of the other researchers, no response was obtained. The answers of these researchers are presented in Appendix B.

Subsequently, the translation of the consolidated questionnaire from English to Spanish was carried and added in this stage the objective of the research in the survey, the informed consent, and the information of the company, corresponding to name, size, sector

and role in the SCI. Likewise, the information of the respondent was incorporated with the identification of the name, position, profession, city and email.

Then the definition of terms and the instructions that should be considered for the correct completion of the survey were drafted. In this stage the ordering of the associated questions was carried out, for which the strategy of going from internal information of the company to external information was used, without interesting the variable to which they belonged. In order to have a development logical and more understandable of the questionnaire, five sections were defined: (a) internal aspects of the company, (b) information from strategic allies, (c) information related to strategic suppliers, (d) information from strategic clients, and (e) by last information related to the competition.

To ensure the correct understanding and interpretation of each question, two meetings were held with postgraduate students from a near university to Bogotá, where the complete questionnaire was validated, and adjustments were made to the wording of questions that were not very clear. Also, over questions that apparently had the same meaning. With the adjusted questionnaire, three experts and researchers were asked to review the instrument, which ensured its adequacy. Finally, a pilot test of the questionnaire was conducted with 15 students from another graduate group, not encountering any inconveniences in the application of the instrument. Then it proceeded to apply it to the selected population. See Appendix C, Survey of social capital with integration in supply chains.

Into the first part of the questionnaire regarding the internal aspects of the organizations, twelve questions were considered. The first nine corresponded to the Internal Integration dimension (II) of the SCI, which corresponds to the way a company structures its own strategies, practices and internal processes, and seeks to determine the degree to which collaborative and synchronized systems can meet the client's requirements completely. For this, the perspective of internal integration of the questionnaire elaborated by Flynn et al.

(2010) was used. The nine questions evaluated (1-9) were made with Likert scale categories from one to seven (1 to 7).

This first part, of internal aspects of the organizations, was complemented with the questions Uncertainty of the Environment (UE), in the perspective of Uncertainty of the Technological Environment (TI). According to the instrument of Boon-itt and Paul (2006), it is sought in these three questions (10-12) to establish the changes presented in the technological processes. It was also structured with Likert scale categories from one to seven (1 to 7).

The second question section of the questionnaire is referred to the relationship of companies with their strategic allies. In this section the questions associated with the three dimensions of CS taken from the instruments of Son et al. (2016) and Villena et al. (2011), were developed. The first questions in this section (13-17) corresponded to the dimension of relational capital (CR), which refer to the commitment and trust that arise from the relationship between strategic allies (Nahapiet & Ghoshal, 1998). These questions seek to determine how it is the relationship with these strategic allies. The five questions were evaluated with a Likert scale of one to seven (1 to 7).

The following questions in this section (18-21) evaluated the dimension of cognitive capital (CC), seeking to identify a shared vision, common goals and values between the company and its strategic allies (Nahapiet & Ghoshal, 1998). These four questions were structured according to the CS instruments (Son et al., 2016, Villena et al., 2011) evaluated with Likert scale from one to seven (1 to 7). Finally, the structural capital questions (22-26) were intended to measure the way in which the company and its strategic allies establish contacts and relate (Nahapiet & Ghoshal, 1998). It was developed through five questions evaluated with Likert scale from one to seven (1 to 7).

The third question section of the questionnaire refers to the relationship of the company with its strategic suppliers. In this section, the first questions (27-38) corresponded

to the dimension of integration with suppliers (SI), which seek to determine the degree to which the company structures with its strategic suppliers, plans, strategies, practices and collaborative, and synchronized processes. It was structured from the questions developed by Flynn et al. (2010), for the perspective of integration with suppliers. These twelve questions were evaluated with a Likert scale of one to seven (1 to 7).

The second part of this section considered the dimension of uncertainty of suppliers (IS), which aim to determine how predictable relations with strategic allies are. The four questions (39-42) were structured from the questionnaire of Boon-itt and Paul (2006), and were evaluated with Likert scale from one to seven (1 to 7).

The first part of the fourth section of the questionnaire evaluated the dimension of Integration with strategic clients (CI). In this section inquired about the degree to which the company structured with its strategic clients, plans, strategies, practices and collaborative and, synchronized processes. It was structured through the questions developed by Flynn et al. (2010), for the perspective of integration with customers. These eleven questions (43-53) were evaluated with Likert scale from one to seven (1 to 7).

The second part of this section considered the uncertainty dimension with customers (CI), which aim to determine how changing are the orders of strategic customers. The two questions (54-55) were structured based on the questionnaire of Boon-itt and Paul (2006), and were evaluated with a Likert scale of one to seven (1 to 7).

The last section of questions is intended to measure the relations of the company with the competition, through two questions (56-57). These seek to measure the dimension of uncertainty with the competition (IO), of the uncertainty variable of the environment (EU), which aim to determine how changing are the strategies of the competitors of companies. The questions were structured based on the questionnaire of Boon-itt and Paul (2006), and were evaluated with a Likert scale of one to seven (1 to 7).

Data Collection

The literature review has evidenced, that the preferred instrument to gathering information on issues of operations has been the survey. This tool should be preferably with closed answers in Likert scale of seven options (Turgay et al., 2013; Springinklee & Wallenburg, 2013; Hosseini et al., 2012; Giménez et al., 2012). For this reason, the survey was defined as the instrument for gathering information, which considered closed questions and a Likert scale (1-7) to facilitate the completion of questionnaires. Additionally, to seek a high level of response, since usually the Response level is identified below 35%. Thus a point was assigned to each of the seven Likert scales, starting at one (never) as the lowest and seven (always) as the highest.

Once the survey was consolidated and validated as an information gathering instrument and the pilot was carried out with a group of graduate students, and given that a convenience sample was used, two strategies were applied to collect the information. The first was to identify universities and teachers known to the researcher, which allowed the application of surveys among their graduate students. In this case, a space was defined with the teacher in his class hours for the application of the questionnaire in person.

The second strategy was to request among the business contacts and referrals of the researcher, the possibility of applying the survey in their organizations. For this purpose, personal appointments were requested for the application of the survey, and it was sent the link of Google surveys, if the respondent preferred it. In this case the survey could be answered at the time the person had time availability, in order to raise the level of response.

Initially, no filter was done of the potential companies surveyed regarding their size, the role in the SCM or the subsector where they performed. But, after the presentation of the purpose and context of the study, on the part of the researcher, some potential respondents identified that their organization was not associated with the real sector in Colombia and did not complete the survey. However, in the validation process of the surveys it was identified

that each company was associated with the real sector, and that only one person per organization had completed the survey, because the unit of analysis is the company.

The positions that respondents usually performed in their organizations referred to medium and high levels of responsibility, which is very positive for this study. Among these are highlighted the Managers and General Managers, Managers and Administrative, Financial and Commercial Directors, and Managers and Directors of Operations, Logistics and Processes. The information gathering process, with the application of the surveys, was carried out from April 2017 to March 2018.

Data Analysis

To perform the analysis of the data, an extension of the multivariate analysis methodology called Structural Equation Modeling (SEM) was used, which includes several models such as the analysis of the structure of covariance, the analysis of latent variable and confirmatory factor analysis among others (Hair et al., 2004). The data was analyzed using the IBM SPSS Statistics software (Statistical Package for the Social Sciences) V21, specifically for to perform reliability analysis (Chronbach's Alpha) and Unidimensionality of the presented factors, as well as for the Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). For CFA models and structural equations, the AMOS extension of the SPSS V25 was used.

The SEM unlike the multivariate models, which predict the behavior of dependent variables by linear combination of multiple independent variables through a single equation (Boon-itt & Paul, 2006; Hernández et al., 2004; Saunders et al., 2009; Turgay et al., 2013), simultaneously examines a series of equations of multiple dependence and cross. This allow statistical efficiency and facilitates the evaluation of relations comprehensively from the exploratory analysis to confirmatory analysis (Hair et al., 2004).

The SEM incorporates latent or unobserved variables in the relationships, and thus has the ability to measure observable and unobservable variables directly. Also, it can also

measure the errors of these observable variables (Raykov & Marcoulides, 2006), which could improve its reliability. Additionally, it allows to evaluate the relationships from the exploratory to the confirmatory analysis, and to contrast from a large-scale model to a theory (Hair et al., 2004). In the same way, the SEM has been applied in different fields of organizational behavior and operations (Hair et al., 2004). Before applying the SEM model the reliability, unidimensionality, and normality of the data among others was evidenced (Hernández et al., 2004; Saunders et al., 2009).

The first validation carried out on the surveys collected was to apply the data quality procedures, determining if they were filled completely, for this reason three surveys were rejected due to the absence of data of interest (Hair et al., 2004). Therefore, after debugging the questionnaires, the forms of companies that are not associated with the supply chain of the Colombian real sector, and the surveys for repeated cases were eliminated. Finally, 232 surveys were used for the analyzes.

The unidimensionality analysis of factors was carried out to determine if each indicator converges towards the evaluated factor and has an acceptable adjustment. For this, the Kaiser Meyer Olkin (KMO) sample was used as a criterion of suitability of the sample. Correlations between indexes are sufficiently small, recommending that they be above 0.8, and discarding values below 0.5 (Byrne, 2010). The significance must be close to 0 and the method used, being the best evaluated, is the maximum likelihood (Hair et al., 2004; Hoyle, 2015).

Table 2 *Analysis Unidimensionality CS Variables*

Variable	RC	Variable	CC	Variable	SC
KMO	0,817	KMO	0,777	KMO	0,885
Sig.	0,000	Sig.	0,000	Sig.	0,000
Indicator	Factor 1	Indicator	Factor 1	Indicator	Factor 1
P14	0,867	P20	0,875	P25	0,851
P15	0,776	P21	0,851	P24	0,849
P13	0,742	P19	0,742	P23	0,842
P17	0,741	P18	0,611	P22	0,763
P16	0,666			P26	0,745

Explained Variance	66,2%	Explained Variance	69,8%	Explained Variance	72,4%

The reliability analysis was performed for each of the primary latent variables (not directly measurable) of the theoretical model. It shows that the dimensions of the CS converge towards factors with KMO indexes greater than 0.777, as shown in Table 2. For each variable, the indicators load significantly towards a single factor (values greater than 0.4), and the variance explained is greater than 66% by each of them. Regarding the dimensions of the SCI, the IS is quite adequate, but the indicators of variables II and CI load towards two factors each, though with high KMO indicators (higher than 0.873). The SI variable is very consistent with the highest KMO, the best variance explained and all the indicators with a significant load on the factor (> 0.6).

Variables II and CI present several indicators with loads in the two factors, with relatively low weights, which could indicate that they are not adequately measuring these variables. All the variables are identified as significant as presented in Table 3. For the dimensions of the uncertainty of the environment (UE) two of the factors, uncertainty of the client and uncertainty of competitors, do not have sufficient indicators and are at the level of discarding them, additionally their indicators do not present high load values on the factor. The other two factors TI and SI present significant correlations and KMO below 0.798. Indicator loads on each factor are high, except for P42. See Table 4.

Table 3 *Analysis of Unidimensionality SCI Variables*

Variable	II		Variable	SI	Variable	CI	
KMO	0,873		KMO	0,928	KMO	0,891	
Sig.	0,000		Sig.	0,000	Sig.	0,000	
Indicator	Factor 1	Factor 2	Indicator	Factor 1	Indicator	Factor 1	Factor 2
P4	0,780		P36	0,787	P46	0,778	
P3	0,753		P33	0,780	P49	0,767	
P5	0,720	0,362	P35	0,776	P48	0,708	
P9	0,645	0,376	P29	0,759	P47	0,697	
P7		0,858	P37	0,731	P44	0,569	0,351
P8		0,735	P38	0,724	P43	0,537	0,369

P6		0,618	P31	0,712	P51	0,309	0,841
P2	0,423	0,567	P34	0,686	P52		0,719
P1	0,466	0,487	P32	0,681	P53		0,680
			P28	0,631	P45	0,447	0,571
			P27	0,612	P50	0,410	0,515
			P30	0,605			
Explained Variance	51,8%	14,6%	Explained Variance	54,5%	Explained Variance	51,1%	12,0%

Two of the premises for the use of the SEM models is that the data are continuous and normally distributed (Byrne, 2010). Because this research has worked with closed questions and categories, these are identified as discrete variables, however according to the studies of Byrne (2010) consolidating the results of various researches developed, it verified that when the questionnaires use Likert scale with more than four categories, these can be assimilated to continuous variables, so this research has no disadvantage in this sense because it uses seven categories in all questions.

Table 4 *Analysis of Unidimensionality UE Variables*

Variable	TI	Variable	SI	Variable	CI	Variable	CO
KMO	0,698	KMO	0,789	KMO	0,500	KMO	0,500
Sig.	0,000	Sig.	0,000	Sig.	0,000	Sig.	0,000
Indicator	Factor 1	Indicator	Factor 1	Indicator	Factor 1	Indicator	Factor 1
P11	0,860	P40	0,960	P54	0,421	P56	0,344
P10	0,718	P41	0,877	P55	0,421	P57	0,344
P12	0,711	P39	0,849				
		P42	0,504				
Explained Variance	72,0%	Explained Variance	73,2%	Explained Variance	82,4%	Explained Variance	79,3%

The other requirement of SEM about of the normality of the data, requires the univariate normal distribution of each variables and in the same way, the multivariate normality of the whole data set. Usually normality is evaluated from two indicators: asymmetry and kurtosis. According to the tests performed with the obtained sample, was identified that the non-observable second-order variables CS, SCI and UE contain mostly first-order variables, which can be considered to have a normal distribution. See Appendix D.

The asymmetry is related to the bias of the data curve to the right or left. It generally has a greater relationship with the means test, and kurtosis is strongly related to the tests of variances and covariances. Given that the SEM is based on the analysis of covariances, to identify the multivariate normality it is necessary to verify the multivariate standardized kurtosis (Byrne, 2010), which would indicate that when its value is <5.00 the data are normally distributed.

As shown in Appendix D, only the environmental uncertainty data have multivariate normality, which generated the need to use for the analysis of data the application of the bootstrapping procedure. This procedure consists of considering the sample as if it were the population and from it randomly constructed random subsamples with replacements (Byrne, 2010). With this procedure was possible to prove, for this study, the stability of the parameters and the goodness-of-fit indices of the proposed models.

Validity and Reliability

Reliability refers to how the different techniques of data collection and analysis of this information will provide consistent results (Saunders et al., 2009). One of the most important metrics for the reliability of the data is the Cronbach alpha coefficient, which measures the degree of correlation between all the variables that define a construct (latent variables of the first order) (Cronbach, 1951), which is expected to be it greater than 0.7 to ensure an appropriate level of reliability (Powell, 1995).

According to the results of this index presented in Table 5 and the values of the correlations of the indicators of each variable are presented in the Appendix E. The internal reliability analysis was performed with the Cronbach's Alpha to determine the statistical significance of the latent variables of first order, assuming the unidimensionality of the factors at a 5% level (Hair et al., 2004; Hoyle, 2015). Indicators of the CS adequately define the three dimensions when presenting significant correlation values (between 0.591 and

0.806) and the P value of the errors is also significant. The Cronbach's Alpha is significant presenting values higher than 0,856 for each of the three dimensions of the CS.

Regarding the dimensions of the SCI, the indicators of the three dimensions reflect a reliability in these measurements by presenting significant correlation values (between 0.560 and 0.748) with values also significant in the errors, and higher values of Cronbach's alpha to 0.878. When it is observed the contribution of each indicator to the value of Cronbach's alpha for each variable, it can be verified that only in the case of indicators P18 of variable CC and indicator P42 of variable IS, its absence improves Cronbach's alpha. Again, it is determined that the IC and IO variables have very few indicators and their Cronbach alpha values are the lowest. The other two uncertainty variables, TI and IS have more adequate Cronbach's alpha values (above 0.8).

Table 5 *Analysis Reliability with Cronbach´s Alpha*

Variable	Cronbach's Alpha	No. Elements
Internal Integration (II)	.878	9
Technological uncertainty (TI)	.801	3
Relational Capital (RC)	.869	5
Cognitive Capital (CC)	.856	4
Structural Capital (SC)	.904	5
Integration with Suppliers (SI)	.924	12
Supplier uncertainty (IS)	.876	4
Integration with Clients (CI)	.900	11
Uncertainty with Customers (IC)	.787	2
Uncertainty of the Competition (IO)	.740	2

The reliability and validity of the questionnaire was guaranteed in several ways. In the first place, widely tested questionnaires validated by previous studies were used (Flynn et al., 2010, Son et al., 2016, Villena et al., 2011, Boon-itt & Paul, 2006), which according to Hasan and Kerr (2003), ensures the validity of this instrument. In this way, after consolidating the questions associated with the different variables of the tested and validated instruments, the questionnaire was translated into Spanish since the target population have Spanish as their native language, and thus, the best understanding of each question was achieved.

Additionally, the consolidated and translated questionnaire was reviewed with graduate students, to verify their understanding and coherence. Later it was validated with peers, teachers-researchers who gave assurance of the adequacy to the purpose of the study, and prevention of tautologies. Finally, a pilot was developed with 15 graduate students who found no difficulties in filling out the complete instrument.

The reliability of the study was sought to guarantee according to the following strategies. In order to avoid the mistake of the participants due to anxiety or fatigue of the graduate students, the teachers sought the first minutes of class and spaces before the refreshments. It was also detailed in the presentation of the survey and potential respondents were informed of the average time they should have to answer the survey (15 minutes). The biases of the interviewer were tried to reduce through anonymity in data processing. Observer errors with a well-structured questionnaire. And finally the biases of the respondent, with the willingness to explain any question with other words. (Saunders et al., 2009).

The validity also refers to whether the results of the research are really what they seem to be (Saunders et al., 2009) because there could have been biases since the instrument was not taken at a single moment or was not well understood. It could have caused not completing the survey or doing it incorrectly. To avoid it, the potential interviewees were asked for a standard time in which their full completion was guaranteed, some guidelines were drawn up for finished of the survey and an effort was always done to have a personalized accompaniment.

Another test is the concept validity, which seeks to determine that the indicators are associated with a single factor and this is done through Exploratory Factor Analysis (EFA). Because the questionnaires have not been applied in the Colombian context and with the proposed model, and raising awareness, that according to the results of reliability and unidimensionality analysis, some indicators may not be adequate. Therefore, the researcher was decided to develop the technique of EFA to identify the underlying dimensions or

factors, that allow to describing and understanding the data with few factors (Hair et al., 2004).

As a mechanism that validates the behavior of the data obtained for this study, the sample was divided into two independent segments: the first subsample was done up of 60 surveys for generating the EFA, while in the second, the remaining 172 surveys were used for CFA. The EFA results identified that the consolidated data are associated with 14 factors, and only ten were expected, three from the SCI variable, three from the CS variable and four from the UE variable.

As presented in Appendix F, factors 13 and 14 are not significant since factor 14 is measured by a single indicator, which has a higher load in another factor. For its part the 13 factor is measured by two factors that also contribute to other factors in a relevant way, and therefore do not reach to be measured by at least three indicators (Byrne, 2010, Hair et al., 2004, Hoyle, 2015). The IS is a factor that fits quite well, because of eleven of its twelve indicators most of them load this factor. Only the indicator P28 does not register in this and if in another factor residually, therefore, it is eliminated this indicator.

The same situation happens with the RC factor, where its five indicators, P13, P14, P15, P16 and P17, contribute in a major way to this factor. Other indicators such as P18, P29 and P30 contribute significantly to this factor. In the same way, the SC factor is presented, with its five indicators P22, P23, P24, P25 and P26, contributing mainly to this. Indicators P24, P25 and P26 also contribute to other factors with lower weighting. The CC factor presents three of its four indicators, P19, P20 and P21, contributing significantly and mainly to this factor. The indicator P18 has no load on this factor but on others factor, therefore, it is eliminated. All of these factors are measured by at least three indicators (Byrne, 2010, Hair et al., 2004, Hoyle, 2015).

However, the factors of II and CI did not show this behavior, since their indicators were not directed to a single factor. Thus, the indicators of the CI factor P43, P45, P50, P51,

P52 and P53, contribute significantly and mainly to this factor. But the indicators P46, P47 and P48 together with the factor P28, constitute another underlying factor, which is not clearly identified, therefore, it is eliminated. The factor P49 contributes mainly to another factor and marginally to the main, and the P44 also contributes to other factors. For this reason are also eliminated.

The indicators of the factor II also present a division between two main factors. The indicators P2, P3. P4, P5 and P9 contribute mostly to the main factor, although P2 is not significant. Indicators P7 and P8, together with P48, constitute another underlying factor, but they present relevant loads to other factors, which are not validatable, therefore, they are eliminated. The same situation occurs with P1 and P6 that do not contribute to factor II.

Table 6 *Resulting Indicators by Firts Order Factor*

Factor	Indicators
Relational Capital (RC)	P13, P14, P15, P16, P17
Cognitive Capital (CC)	P19, P20, P21
Structural Capital (SC)	P22, P23, P24, P25, P26
Internal Integration (II)	P2, P3. P4, P5, P9
Integration with Suppliers (SI)	P27, P31, P32, P33, P34, P35, P36, P37, P38
Integration with Clients (CI)	P45, P50, P51, P52, P53

Finally, a single factor with significant indicators was identified for the uncertainty of the environment (UE). The TI factor presents the three indicators P10, P11 and P12 that contribute significantly and mainly to it, but there are other indicators such as P1, P6, P26 and P50 that contribute in a lower proportion to this factor. For the IS factor, the indicators P39, P40 and P41 contribute significantly and mainly to it, but even when the P42 contributes to main factor, it is not a majority as to the IO factor. The P24 also contributes in smaller proportion to the IS factor.

For the IO factor, although its two factors P56 and P57 provide a majority and significantly there are other indicators with the same condition as P42, P43, P44 and P6 which does not reflect much clarity in its result. For IC, its two factors contribute

significantly and mainly to it, likewise the P30. For these last two factors, it is not favorable for them to be defined by only two indicators.

Following the results evidenced by the one-dimensional analysis, the reliability análisis, and the EFA, it is decided to suppress some indicators that contribute significantly to other factors and / or contribute little to their theoretical factor. Likewise, the mediating variable of environmental uncertainty (UE) is suppressed, because consistency in its indicators is not evident, and it is determined that the construct is not adequately measured with a single factor. For similar reasons, some indicators were deleted, leaving the six latent variables of the first order of the CS and SCI constructs, with the indicators presented in Table 6.

Summary

In this chapter it was presented the convenience of methodology for the development of this deductive and quantitative research. This with a descriptive approach and through a basic study, that seeks to generate new knowledge between the independent variable of social capital and its relationship with the corresponding dependent variable to the integration of processes in the management of the supply chain, mediated by the variables of size of the organizations and uncertainty of the environment. It has been found in the literature that this type of study is relevant to the object of study, and this is confirmed by several investigations.

The instrument for gathering information was the survey, which was defined from different instruments that have been widely validated by previous studies, for the variables, integration in the supply chain (Flynn et al., 2010), the social capital measurement questionnaire (Son et al., 2016 and Villena et al., 2011) and the uncertainty of the environment (Boon-itt & Paul., 2006).

The population was defined as companies that operate in Colombia associated with the real sector and classified in any of the eleven manufacturing subsectors, of any size. For the study, companies were classified into three categories corresponding to companies: (a)

suppliers of intermediate products and services, (b) assembly companies and manufacturers of final products, (c) distributors and marketers of goods and services.

The sample was selected for convenience among companies mainly in Bogotá and in otner main cities of Colombia, where the largest number of industrial companies are concentrated: Cali, Medellín, Barranquilla, Bucaramanga, Cartagena and Ibagué. The survey for the information gathering was applied in person and virtually, among graduate students from universities in and around Bogotá and between business contacts of the researcher. A valid sample of 232 companies was obtained.

In order to carry out the validation and reliability analysis of the data, it was applied in Cronbach's alpha one-dimensionality and reliability analysis. Besides, the EFA was carried out to evaluate the underlying factors that describe the data. In the next chapter it will present the use of the multivariate analysis methodology through the statistical packages SPSS and AMOS, and the multivariate analysis technique through the SEM. This analysis will allow to develop the results of the SEM model in relation to the CFA, the application of the Structural Models and the realization of the goodness adjustments of these models, to identify their relevance and adequacy to the data.

Chapter 4. Results

This chapter presents the three major processes of the Structural Equation Modeling (SEM), which generate the evaluation of the hypotheses proposed in this study. The first one is associated to the Confirmatory Factorial Analysis (CFA), the second to the Model of Structural Equations proper, and finally the third process corresponds to the models of goodness of fit, that seek to identify if the data model obtained is related to the proposed theoretical model and so can then be acceptable or not.

The CFA is considered a preliminary phase of the structural model, and as a statistical technique it aims to validate a theoretical model. It allows the identification of patterns or interrelations among several latent factors that are measured by a group of observed

indicators, proposed for each variable. Since the CFA does not specify the directional relationships, it only shows if the latent factors are related to each other (Hair et al., 2004; Raykov & Marcoulides, 2006). This study evaluated the consolidated CFA of the latent factors and the theoretical model of first and second order with each construct, obtained from the EFA methodology.

The objectives of the CFA were, first, to verify the general structure of the model to determine if the six resulting first-order latent factors are identified and, in addition, to evaluate each factor of the proposed model independently, to define, thus, if they are necessary significant adjustments.

The CFA of the complete model effectively identified the six factors with their respective indicators, which shows that the three factors of CS and the three factors of the SCI are adequately measured by at least three indicators (Byrne, 2010; Hair et al., 2004; Hoyle, 2015). Additionally, each of them is contributing primarily to the respective factor, although several indicators have a significant burden on other factors, according to what is presented in Appendix G. The CFA was carried out for each of the two constructs of second order, social capital (CS) and integration of processes in the supply chain management (SCI). For each of them, the first CFA model was made up of the evaluation of the latent variables of first order (correlations) and, the second model of the CFA incorporated the constructs (latent variables of second order) for the evaluations (directional weights).

CFA for Social Capital

The most commonly recognized indices to identify the fit between the sample covariance matrix and the population covariance matrix of the proposed model (Byrne, 2010) as used in this investigation are explained below. One of the most recognized indices in this type of evaluation is the chi-square or CMIN (minimum discrepancy), which defines the degree of statistical verisimilitude and measures the level of adjustment of the test of the model's hypothesis. (Hoyle, 2015, Raykov & Marcoulides, 2006). A complementary index is

the CMIN / DF, which is a chi-square index adjusted by dividing it among the degrees of freedom of the model; it is suggested that this should be less than 2 (Byrne, 2010).

The Goodness-of-Fit Index (GFI) tries to explain the level of adjustment of variance and covariance of the matrices, independent of the sample size (Raykov & Marcoulides, 2006). The CFI (Comparative fit index) determines that the hypothesis of the model adequately defines the data of the sample. These two indicators have a minimum recommended level of 0.90 (Hoyle, 2015). Finally, the RMSEA (Root Mean Square Error of Approximation) tries to explain how well the model could fit the population covariance matrix, if it were available, indicating the average residual correlation, which should be less than 0.080 to be accepted and less than 0.050 to identify a very good fit (Hoyle, 2015).

The first evaluation of the CFA was performed with the latent variables of the first order of the CS construct (latent variable of second order). Figure 2 shows the standardized weights and correlations of the original CS model. According to what is presented in Table 7, the adjustment indices of the original model CIM / DF, GFI and RMSEA are not completely adequate. Therefore, several iterations were generated to identify if the model can be adjusted.

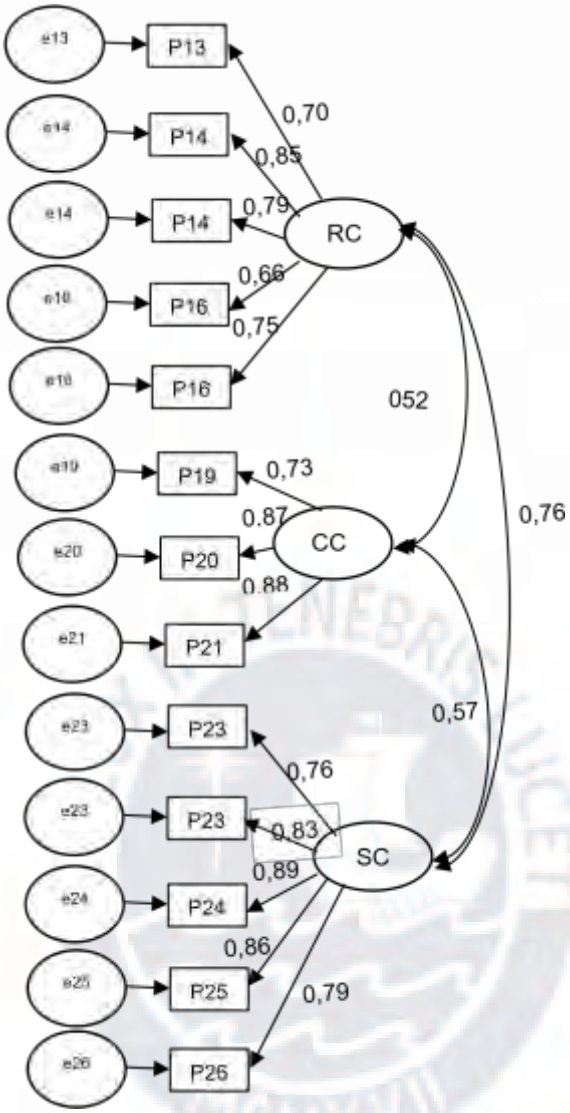

Figure 2. Standarized regression coefficients and correlations for the CS

The first iteration was identified by establishing a correlation between the errors of indicators P22 and P23. In the second iteration, another correlation was established between the errors of the P16 and P17 indices. For the third iteration, indicator P15 was eliminated from the RC variable that also improves the adjustment of the model. Finally, iteration four, established a correlation between the errors of indicators P23 and P24. As can be seen in Table 7, each iteration allowed the improvement of the adjustment indicators of the model to obtain acceptable adjustment indices.

All the indicators have a significant relationship with the latent variable of first order that grouped them, as well as these with the variable of second order (CS). Likewise, the

adjustment models were significant. Finally, the second order model is developed with the booststrapping procedure which reflects adjustments in the errors of the models, generating greater stability of the estimated parameters and their accuracy (Byrne, 2010).

These results show that social capital is being well measured by relational, cognitive and structural capital, and each of these latent variables of the first order, have indicators that allow us to affirm that they are adequately measured, and therefore the theoretical model of CS can be confirmed.

Table 7 *Adjustment indexes, Non-Standardized Coefficients and Standard Error for CFA Iterations for Firts Order Variables of CS*

ITERAC	CMIN	CMIN/DF	GFI	CFI	RMSEA	RC ⟷ CC		CC ⟷ SC		RC ⟷ SC	
CFA CS (Firts order)						weight	SE*	weight	SE*	weight	SE*
Initial	176.859	2.807	.865	.922	.103	.844	.152	1.559	.223	.893	.168
1° Iterac.	156.806	2.448	.884	.939	.092	.846	.152	1.581	.226	.884	.169
2° Iterac.	129.803	2.128	.895	.953	.081	.867	.155	1.580	.225	.881	.172
3° Iterac.	101.176	2.024	.910	.961	.077	.833	.153	1.581	.225	.922	.173
4° Iterac.	90.175	1.840	.919	.969	.070	.834	.153	1.620	.229	.933	.176
CFA CS (Second order with bootstrapping)						RC ⟵ CS		CC ⟵ CS		SC ⟵ CS	
1° Iterac.	90.175	1.840	.919	.969	.070	.514	.079	.894	.119	1.000	

* SE (Standard error for its acronym in English). All the coefficients are significant with p <.001

CFA for the Integration of Processes in the Management of the Supply Chain

The same evaluation of the CFA was performed with the latent variables of the first order of the SCI construct (latent variable of second order). The Figure 3 shows the standardized weights and correlations of the original SCI model. According to what is presented in the Table 8, the adjustment indices of the original model CIM / DF, GFI and RMSEA are not totally adequate, therefore, its generated several iterations to identify if the model could be better adjusted.

The first iteration was identified by eliminating indicator P3 from variable II. In the second iteration, the P32 indicator of the SI variable was eliminated. For the third iteration, the P50 indicator of the CI variable was eliminated. In iteration four, the indicator P35 of variable SI was eliminated. In the fifth iteration, the indicator P2 of variable II was

eliminated. Finally, the indicator P34 of variable SI is eliminated. As shown in Table 8, each of these iterations contributes to the best fit of the model and is positive in this sense. It is noteworthy that the variance between these variables presents a perfect relationship. The development of the second order model with the booststrapping procedure, in addition to generating greater precision to the parameters, presented adjustments in the indices of the model

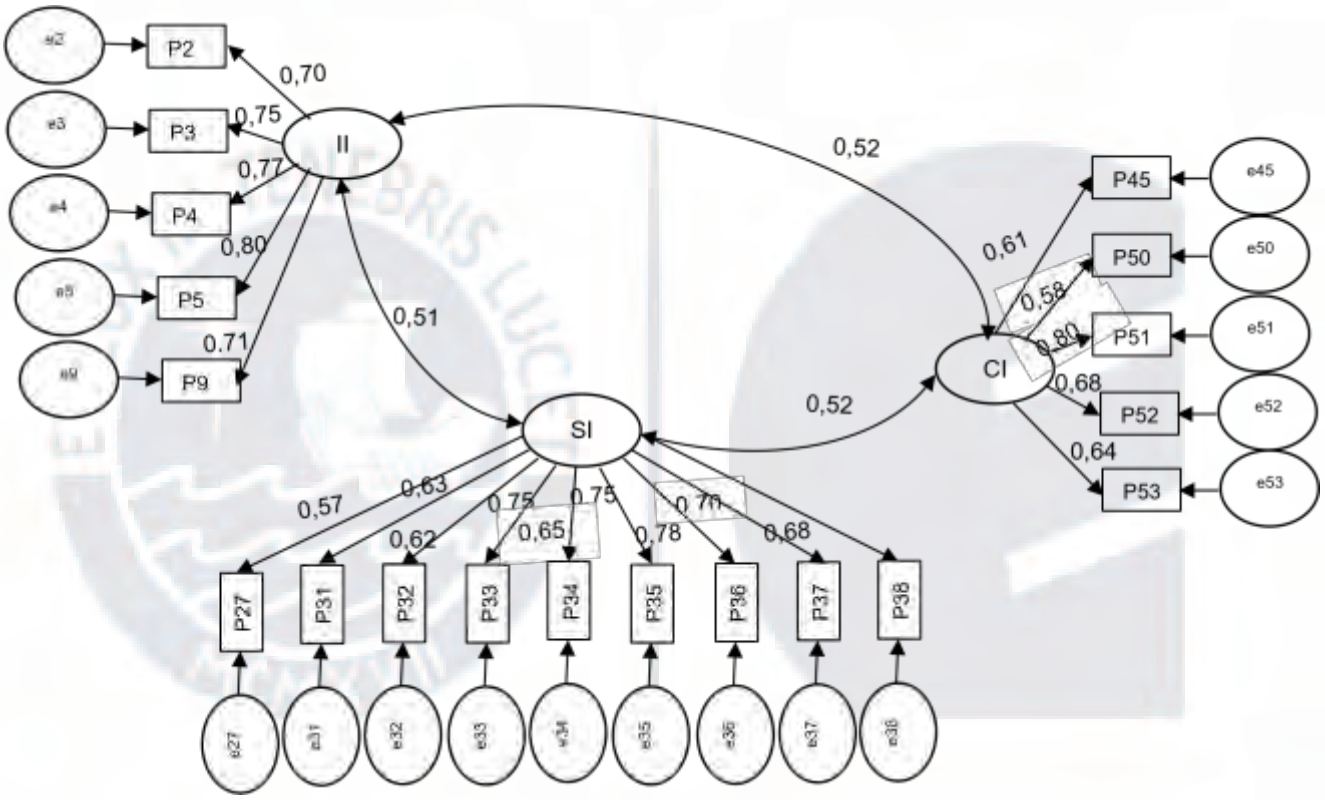

Figure 3. Standarized regression coefficients and correlations for the SCI

All the indicators have a significant relationship with the latent variable of first order that grouped them, as well as these with the second order variable (SCI). Likewise, the adjustment models are significant. These results show that the integration of processes in the management of supply chains is being well measured by internal integration, with suppliers and customers, and each of these latent variables of the first order, have indicators that allow it to affirm that its is adequately measured, and the theoretical model of the SCI can be confirmed.

Table 8 *Adjustment Indices, Non-Standardized Coefficients and Standard Error for Iterations of the CFA for the Firts-Order Variables of the SCI*

ITERAC	CMIN	CMIN/DF	GFI	CFI	RMSEA	CI<-> II		SI<-> II		SI <-> CI	
CFA SCI (Fists order)						weight	SE*	weigh	SE*	weight	SE*
Initial	361.153	2,376	.813	.882	.090	1.0		1.0		1.0	
1° Iterac.	300.717	2.228	.832	.897	.085	1.0		1.0		1.0	
2° Iterac.	244.483	2.054	.852	.916	.079	1.0		1.0		1.0	
3° Iterac.	209.217	2.012	.866	.925	.077	1.0		1.0		1.0	
4° Iterac.	165.026	1.854	.887	.938	.071	1.0		1.0		1.0	
5° Iterac.	140.776	1.852	.893	.943	.071	1.0		1.0		1.0	
6° Iterac.	107.839	1.685	.914	.957	.063	1.0		1.0		1.0	
CFA SCI (Second order with bootstrapping)						RC <-- CS		CC <-- CS		SC <-- CS	
1° Iterac.	101,010	1,629	.918	.962	.061	.734	.116	.738	.125	1.000	

* SE (Standard error for its acronym in English). All the coefficients are significant with p <.001

Structural Equations Models

The SEM, understood as a set of multivariate analysis techniques for estimating relations of multiple and crossed dependencies, allows to identify unobserved concepts in the relationships and to consider the measurement error in the estimate (Hair et al., 2004; Hoyle. 2015; Raykov & Marcoulides, 2006). This methodology phase seeks an explanation of the relations between the constructs (latent regressions). In order to validate the hypotheses proposed, it proceeded to do a structural model for each of the CS variables and the SCI variable. A model for the relationship between the CS and the SCI (latent second order variables), and finally a structural model with the mediation of size.

Model 1. Impact of CR on the SCI

In this phase, it seeks to determine through a SEM model, how is the relationship between the Relational Capital (CR) and the Process Integration in the Supply Chain Management (SCI). The initial model presents an acceptable adjustment, however, the GFI and CFI indices could be improved, for this reason some adjustments were made to the model. The first iteration eliminates the indicator P17 of the independent variable RC, which improves all the adjustment indices, but reduces the weighting on the dependent variable.

Table 9 *Indexes of Adjustment and Standardized Coefficients of the Impact of CR in the SCI*

ITERATIÓN	CMIN	CMIN/DF	*p*	GFI	CFI	RMSEA	RC⟶ SCI
Initial	201.469	1.752	0.000	0.872	0.936	0.066	0.598
Eliminate P17	170.280	1.703	0.000	0.885	0.943	0.064	0.428
Correl P27-P36	164.842	1.665	0.000	0.886	0.946	0.062	0.433
Correl P36-P37	156.313	1.595	0.000	0.894	0.952	0.059	0.453
Correl. P33-P36	148.190	1.528	0.001	0.902	0.958	0.056	0.466
Bootstrapping	148.190	1.528	0.001	0.902	0.958	0.056	0.466

The next three iterations establish correlations between the indicators of the SI variable, P27-P36, P36-P37 and P33-P36. All its improved the fit indexes of the model and slightly increased the load on the dependent variable, although its are significant. The last iteration reaches the p of 0.001, as presented in Table 9. Bootstrapping gives the guarantee on stability and accuracy the model. Given that the indices obtained are acceptable and significant, the H2 hypothesis is sustained, in the sense that there is evidence of a direct, positive and significant relationship of the Relational Capital (CS) with the Integration of Processes in the Supply Chain Management (SCI) in the companies studied, as shown in Figure 4.

Model 2. Impact of CC on the SCI

This model seeks to validate the impact of the exogenous variable of Cognitive Capital (CC) on the endogenous latent variable SCI (II, CI, SI). As presented in the Table 10, the initial model has acceptable adjustment rates, however, the GFI and RMSEA indexes are not totally adequate. Therefore, a first iteration was carried out, eliminating indicator P52 of the variable Integration with clients (CI). The second iteration establishes a correlation between the indicators P36-P37 of the variable SI.

With these two iterations done to the model all the indices are improved, and the different relationships are significant. This allows to infer that there is significant evidence to determine that there is a direct, positive and significant relationship of the Cognitive Capital (CC) on the Process Integration in the Supply Chain Management (SCI) in companies

associated to the real sector in Colombia, which supports the H3 hypothesis, according to the Figure 4.

Table 10 *Indexez of Adjustment and Standardized Coefficients of the Impact of the CC in the SCI*

ITERATIÓN	CMIN	CMIN/DF	*p*	GFI	CFI	RMSEA	CC⟶ SCI
Initial	184.492	1.855	0.000	0.887	0.938	0.071	0.656
Eliminate P52	143.837	1.673	0.000	0.904	0.954	0.063	0.655
Correl P36-P37	137.655	1.619	0.000	0.911	0.958	0.060	0.661
Bootstrapping	137.655	1.619	0.000	0.911	0.958	0.060	0.661

Model 3. Impact of SC on the SCI

This model evaluates how, the latent exogenous variable, the Structural Capital (SC) impacts on the latent endogenous variable SCI. The initial model presents acceptable indexes of adjustment, even though the GTI index is slightly below the recommended level. For this reason, some iterations are generated to improve the fit of the model. Accordingly, the indicator P33 of the SI variable is eliminated in the first iteration. In the second iteration, the indicator P22 of the variable SC is eliminated, and finally in the last iteration the indicators P35-P36 of the SI variable are correlated. Each of these iterations improves the model and allows to generate a quite adequate adjustment index, according to what is presented in the Table 11, with the different significant relationships.

Table 11 *Adjustment Indices and Impact Coefficients of the SC in the SCI*

ITERATIÓN	CMIN	CMIN/DF	P	GFI	CFI	RMSEA	SC⟶ SCI
Initial	230.490	1.759	0.000	0.874	0.942	0.067	0.745
Eliminate P33	198.437	1.726	0.000	0.885	0.948	0.065	0.742
Eliminate P22	171.279	1.713	0.000	0.894	0.950	0.065	0.732
Correl. P35-P36	161.212	1.628	0.000	0.898	0.956	0.061	0.733
Bootstrapping	161.212	1.628	0.000	0.898	0.956	0.061	0.733

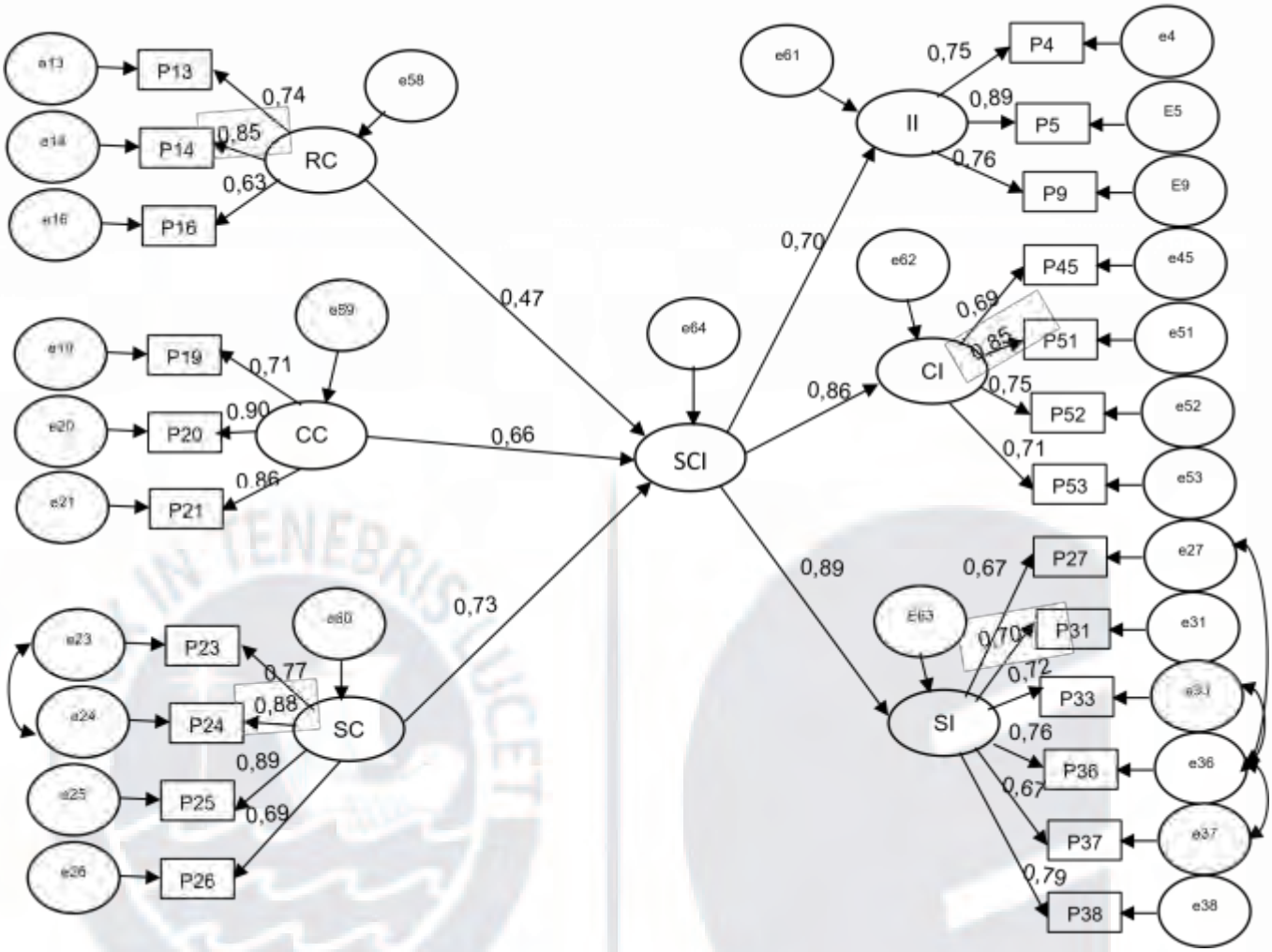

Figure 4. Impact of CS dimensions in SCI with standardized coefficients

Therefore, there is significant evidence to determine that there is a direct, positive and significant relationship of the Structural Capital (SC) on the Process Integration in the Supply Chain Management (SCI) in companies associated to the real sector in Colombia, which supports the H4 hypothesis, as shown in the Figure 4.

Model 4 - Impact of CS on SCI

This SEM model seeks to validate the main hypothesis of this study, regarding the impact of the second-order exogenous latent variable, Social Capital (CS, with the dimensions RC, CC and SC) on the endogenous second-order latent variable, Process Integration in the Supply Chain Management (SCI, with the dimensions II, CI and SI). The indexes of adjustment of the initial model are acceptable, however, it is observed that the GFI and CFI indexes not present a good adjustment.

In this way, different iterations were developed that looked for a more suitable model. The first and second iterations eliminated the indicators P36 and P37 respectively of the same SI variable, and generated an improvement in all adjustment indices, with an improvement in the weighting of CS on SCI. The third iteration correlated the indicators P52-P53 of the variable integration with clients (CI), with better adjustment in all the indices. The fourth and fifth iterations eliminated the indicators P16 and P45 of the variables RC and CI respectively, and show a marginal improvement in the adjustment indices with improvement in the weighting of CS on SCI.

Bootstrapping again gives greater security to the model on the its consistency and stability. This identifies several important aspects such as the RMSEA index of 0.047 that reflects a remarkable adjustment, the other aspect is that all the relationships are significant ($p < 0.001$), a GFI somewhat below the recommended (0.889), and a high load of CS on the SCI (0.769) as shown in the Table 12.

Table 12

Adjustment Indices and Standardized Coefficients of CS Impact in the SCI

ITERATIÓN	CMIN	CMIN/DF	P	GFI	CFI	RMSEA	CS → SCI
Initial	434.504	1.627	0.000	0.833	0.933	0.061	0.723
Eliminate P36	383.643	1.572	0.000	0.846	0.940	0.058	0.744
Eliminate P37	325.338	1.465	0.000	0.861	0.953	0.052	0.762
Correl. P52-P53	319.862	1.447	0.000	0.862	0.956	0.051	0.763
Eliminate P16	277.176	1.379	0.000	0.874	0.964	0.047	0.769
Eliminate P45	250.378	1.383	0.000	0.880	0.965	0.047	0.769
Bootstrapping	250.378	1.383	0.000	0.880	0.965	0.047	0.769

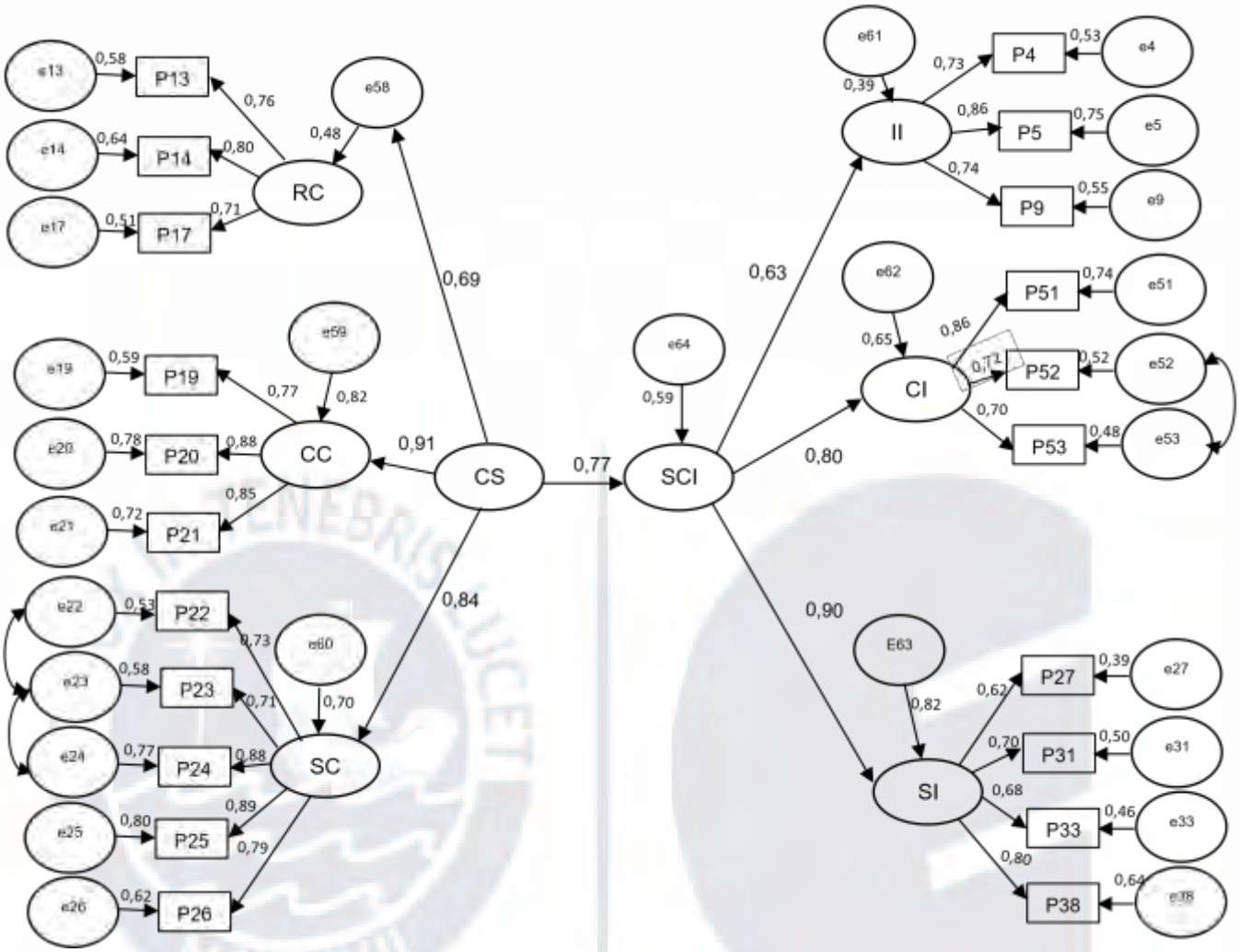

Figure 5. Adjustment índices and standardized size coefficients as a mediator between CS and SCI

According to the iterations of adjustment made to the model, there is significant evidence to determine that there is a direct, positive and significant relationship of the Social Capital (CS) in the Integration of Processes in the Supply Chain Management (SCI) in companies associated with the real sector in Colombia. These results support the H1 hypothesis, as shown in Figure 5. This is confirmed by the standardized residual covariance model, in which the covariances between the observable values have values lower than 2.58, which can be interpreted as there is no statistically significant discrepancy between the covariance of these variables (Byrne, 2010). See Appendix H.

Model 5. Size (S) and environmental uncertainty (UE) as moderating variables

between CS and SCI

In this model, it seeks to identify the size (S) of the organizations as a moderating variable in the relationship between the latent exogenous variable CS and the latent endogenous variable SCI. The initial model does not allow generating significant adjustments to it, observing that the adjustment indicators of the model are acceptable, except the GFI (0.823), and the weights are not very high.

Table 13 *Adjustment Indices and Standardized Size Coefficients as a Mediator Between the CS and the SCI*

ITERATIÓN	CMIN	CMIN/DF	P	GFI	CFI	RMSEA	CS → SCI	CS → S	S → SCI
Initial	389.267	1.937	0.000	0.827	0.908	0.074	0.330	0.279	0.598
Bootstrapping	389.267	1.937	0.000	0.827	0.908	0.074	0.33	0.279	0.598

The results presented in the Table 13 done it possible to show that the size partially moderates the relationship between CS and SCI. This allows its to suggest that there is no inverse moderation of the size (S) of the organizations in the relation of the Social Capital (CS) and the Integration of Processes in the Supply Chain Management (SCI) in companies associated to the real sector in Colombia, for which the H5 hypothesis is rejected. Similarly, as the environment uncertainty variable (UE) did not obtain acceptable indicators, this investigation could not corroborate the H6 hypothesis.

Summary

The CFA of the two second-order constructs of the proposed model, Social Capital (CS) and Process Integration in the Supply Chain Management (SCI) in companies associated with the real sector in Colombia, has been developed. It was evidenced that these constructs are adequately defined by the dimensions, and these dimensions (latent variables of the first order) are adequately measured by their indicators.

The generation of structural models made it possible to show that there is a direct and significant relationship between Relational Capital (RC) and the integration of processes in

the supply chain (SCI), which corroborates the H2 hypothesis. In the same way it is found that there is a direct and significant relationship between the other dimensions of Social Capital, which are Cognitive Capital (CC) and Structural Capital (SC), on the SCI. This supports the H3 and H4 hypotheses. It was identified in the same way that the relationship between the SC and the SCI is the strongest, followed by the CC and finally by the RC.

It was also found that Social Capital (CS) as an independent variable presents a direct and significant relationship with the Process Integration in the Supply Chain Management (SCI), which supports the main the H1 hypothesis of this study. The positive results of the goodness adjustments made to this model done it possible to show that there is a strong relationship between these variables. Additionally, it is evident that there is no significant statistical discrepancy between the covariance of the observable variables.

Size as a moderating variable does not identify an inverse relationship with the relationship between CS and SCI. In fact, it is identified that there is a moderation, not very strong, but it is direct, therefore, the H5 hypothesis is rejected. The uncertainty of the environment can not be evaluated because, the dimensions and their indicators, did not show a consistency, in the validation processes, that would allow them to be considered. Therefore, the H6 hypothesis can not be evaluated.

It was observed that the data represent the proposed models, and in each of them with the goodness adjustments done, they allowed generating more adequate models. Finally, the boostrapping procedures were able to overcome the concerns that could exist about the multivariate normality of the data, generating more stable and precise models.

Chapter V. Conclusions and Recommendations

This research has sought to help close an existing gap in the literature by identifying the soft determinants that facilitate the integration of organizations processes in the management of their supply chains, given the importance that the real sector has in the economy. It also wants to motivate to the Colombian industry, to develop integration practices to be sustainable. Therefore, through this quantitative, descriptive and basic study, it sought to assess whether social capital is directly, positively and significantly related to the integration of p.rocesses in the supply chain of companies associated with the real sector in Colombia, moderated by size of the organizations and the uncertainty of the environment.

As instrument to collected of information was used the survey, which were consolidated based on the literature review. Then these were validated and applied to 232 companies associated with the real sector in Colombia. The study was transversal and inquired about companies that play different roles in the SCM, suppliers, manufacturers and distributors, and was carried out among companies of different sizes that operated in different regions in Colombia. The conclusions, implications and recommendations resulting from this investigation are presented below.

The results obtained by this study allow it to contribute to knowledge about the integration of processes in the supply chain managenement, as well as stablish its relationship with soft factors, consolidated in the concept of social capital. It is important to point out that, due it is a second-order SEM model, the observable indicators measure the latent variables of first order. These variables were evaluated through the reliability analysis of Cronbach's Alpha, which were identified as significant. Additionally, the analysis of unidimensionality allowed corroborating that the observable variables are being well measured by their indicators.

These tests, together with the exploratory factorial analysis (EFA) and the confirmatory factorial analysis (CFA), allowed to filter some indicators because they did not

adequately measure the associated factors. Thus, it was possible to identify that the second order construct, Social Capital, determines the variables of relational, cognitive and structural capital, appropriately, in line with the proposal of Nahapiet and Ghoshal (1998). On the other hand, the integration of processes in the supply chain management adequately determines the internal integration with suppliers and customers (Flynn et al., 2010). But for the variables of internal integration and with customers, some indicators they are not contributing significantly to the associated factor.

This same inconsistency was presented for the dimensions of the UE, pero debido a los pocos indicadores que presentan, estas variables no pudieron ser corroboradas (Boon-itt and Wong, 2010; Giménez et al., 2012). The CFA showed that, without the indicators suppressed since the previous analyzes, the three dimensions of social capital and the three of the integration of processes in the supply chain management, were adequately defined, with at least three indicators and with a greater significant weight than 0.4 (Byrne, 2010).

The application of structural equations methodology is a guarantee and gives security to the researcher, because it requires different validations through the analysis of onedimensionality, reliability analysis, normality tests, exploratory factor analysis, confirmatory factor analysis, structural models and goodness adjustments of these models. This methodology gave assurance of the robustness of the results and that the data are a good representation of the proposed model.

The conducted study shows a positive, significant and direct relationship among the three dimensions of the CS and the SCI. Of the three dimensions of the CS, the SC dimension, followed by the CC, weighted significantly in the SCI and, to a lesser extent, the RC. These three variables present acceptable indices of adjustment of the models. These facts allow evidence that for industrialists associated to the real sector, in Colombia, establishing links with different companies in their segment is essential for integration processes. Their

priority is to identify that these relationships are based on a common language and culture, to define joint purposes within the SCI.

This result is consistent with the studies of AlSagheer et al. (2011); Lambert and Cooper (2000), and Autry and Griffis (2008), which identify a positive relationship of structural and relational capital with the management of innovation in the SCM, and with integration. With less relevance, the relational capital was identified through the establishment of bonds of trust with its allies. It is important to note that these three variables are directly, positively and significantly related to the SCI.

On the other hand, it is also evident that there is a direct, positive and significant relationship between the two main constructs that are CS and the SCI, with adequate indices of adjustment of the model. This allows to establish that the soft elements and, specifically, the social capital plays a preponderant role, as this is identified as a key factor for the development of organizational functions and to strengthen interorganizational integration, as proposed by Szeto et al. (2006).

It is also noteworthy that the CS, as a construct, has a greater effect on the SCI than each of its dimensions independently considered, and that it weighs significantly oin each of these dimensions, especially the CC and the SC. This evidence the importance of working in all these dimensions to achieve a prominent effect in the SCI processes through the construction of a relationship network that allow to provide resources to the organizations and acquire knowledge of other members of the network.

It is also noteworthy that the CS, as a construct, has a greater effect on the SCI than each of its dimensions independently considered, and that it has a significant weigh in each of these dimensions, especially in the CC and the SC. This evidence the importance of working in all these dimensions to achieve a prominent effect in the SCI processes. Then companies need to build a network of relationship that allows them to access resources and acquire knowledge of other members of the network (Adler & Kwon. 2002; González, 2012;

Nahapiet & Ghoshal. 1998).

Otherwise, the research shows that the relationship between CS and SCI is not necessarily mediated by size, and this could be a direct and not a reverse relationship. The uncertainty measurement of the environment was not adequate, and it is necessary to identify more adequate measurements. This could show that the concept of CS, independently of other variables, is a relevant and significant factor when determining whether organizations are able to integrate their processes with other organizations in their supply chains and networks.

In this sense, it is evident from the study that the CS constitutes an integral and multidimensional concept that explains more significantly the relations with the SCI than other soft elements of relationship. In other words, when the SCI is desired to manage, the companies not only have to structure an important network of relationships with their strategic allies of the chain, but they should also share a similar organizational culture with common goals and, finally, generate commitment and trust among the parties. The relevance of the variables SI and CI for the SCI in the model, it is consistent with several studies that propose a positive relationship between the CS and the relationships with suppliers and customers in the SCM (Cousins et al., 2006; Lawson et al., 2008; Son et al., 2016; Villena et al., 2011).

Implications

According to the results of this research, it can be evidenced that there is a significant relationship between the CS and the SCI in the companies associated with the real sector in Colombia. This can be identified as the need of the companies to integrate their business processes with other organizations in their SCM, so that the resources required in the long term be guaranteed. For this purpose, they have to work on the following three aspects: first, build a solid network of relationships at various levels with different companies in their network; then, they need to identify among the allies those with whom a common culture and common

purposes are shared, to strengthen these bonds; and, finally, they have to establish with them relationships centered on trust and commitment for future projects.

The social capital represents a significant factor as a direct determinant of the SCI, which implies that the directors and business managers must sponsor spaces of relationship among different areas of their companies. These relations should be in different organizational levels with their suppliers and distributors, to facilitate mechanisms of understanding and application of good practices towards the integration of inter-company processes. Thus, social capital could provide academics and business administrators with mechanisms to more accurately estimate the impact of relational structures on the integration of supply chain processes, as suggested by Lee (2005) y Otto et al. (2011)

On the other hand, the research suggests that the greatest impact that can be achieved in the integration projects of processes in the supply chain management would be obtained when working in the three dimensions of social capital as a whole. This allows to affirm that a company would obtain greater benefits in the integration of business processes with its allies of the SCM if this firm develops the three dimensions of the CS, consistently, in a longterm vision.

In this way, the present research provides an important contribution in the extension of knowledge about the SCI. In the same way identifies the importance of managing the CS dimensions to improve the organizational competitiveness. Additionally, for researchers who have focused on evaluating the SCM as a set of dyadic relationships, this research proposes to work the relationships of the SCM in a network environment (suppliers, manufacturers and distributors). These relationships are determined by the social capital, concept that is associated with the network perspective, that could facilitate the understanding of business integration processes in networks (Borgatti & Li, 2009; Cooper et al., 1997).

Finally, this study has verified that social capital is an adequate concept to consolidate the soft determinants of the SCI. Due the CS assesses the ways of relationship among

different actors in the supply chain, to allow them access to the resources that they require. Therefore, an increase in CS contributes to all organizational functions, including integration (Szeto, et al., 2006).

Recommendations

As a result of this research, it is determined that a fundamental function of directors and business managers must be to foster among their subordinates, and at all levels, the establishment of relationships. This should not be a function of general or communications manager only, but but of all the employees. Establishing a broad network of relationships could guarantee the resources that the company will need.

The decision to strengthen these relationships with suppliers, distributors and customers should not be subject only to the assets involved, the information systems or the proximity of suppliers and distributors, but primarily to sharing a culture and corporate goals. This could generate commitment and confidence to perpetuate these relationships in the long term.

The network perspective involves for future research about the SCM, a more open and complex set, where relationships are established in multiple instances and at different levels. Therefore, it is important to study in more detail the possible implications that concepts such as accessibility, density and centrality (Lee et al., 2005) have in relationships with suppliers and distributors, in the integration processes.

The mediating variable of size was not identified in this research as an inverse determinant in the relationship, however, future research could evaluate with other instruments, these relationships, in a broader group of companies, to corroborate whether there actually is mediation and in what direction is it identified.

Some of the variables showed inconsistencies from the analysis of unidimensionality and EFA and were corroborated with the CFA. This it implies it would be important to review the dimensions that define the variables of internal integration, integration with clients

and those associated with the uncertainty of the environment. This with the purpose of determining if these behaviors are presented only under the conditions of this study, or are replicated in other contexts and countries.

This investigation did not determine the impact of the role of companies in the SCM on their decision to integrate with other companies in these networks. Therefore, future investigations this aspect could be evaluated. Similarly, the proposal of Carey et al., (2011), according to which structural and cognitive capital are determinants of relational capital, that this study did not cover, needs to be verified in future research.

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Appendix A. Informed Consent Form

Dear participant

I would like to express my sincere greetings and thanks for your participation in this academic research, answering the attached questionnaire, as part of my doctoral research with the Pontifical Catholic University of Peru and the Maastricht School of Management in the

Netherlands, which is entitled Social Capital and the Integration of Processes in the Supply Chain Management in the Real Sector in Colombia.

If you agree to answer the questionnaire, you will express your consent to participate in the research study. The completion of the questionnaire will take approximately 20 minutes and the information will be treated confidentially. The results of the study will be made available to you once all the information is statistically consolidated. Any concerns you may have, I will gladly assist you in the following email: jcaldana@pucp.edu.pe.

Regards,

Juan Carlos Aldana

Appendix B. Letters of Approval of Use of Questionnaires

The following are the communications received from the researchers on their approval of the use of the questionnaires developed by them.

Letter from Mr. Son.

Dear Juan

Thank you for your interest in our paper.

Of course, feel free to use the measures. They are published, so it is in a public domain.

A few things:

(1) Structural dimension measures may need to be used with caution. Some reviewers will find anything other than structural embeddedness measures not good. For example, IT measures we used many attract criticism.
(2) Cognitive: I think you can find better measures. For the moment, I am in the middle of a full teaching term.

I will give my thoughts on your proposal by the end of March.

If you do not hear from me, please drop me a line.

From: JUAN CARLOS ALDANA BERNAL [mailto:jcaldana@pucp.pe]
Sent: 14 February 2017 18:40
To: Son, Byung-Gak <B.G.Son@city.ac.uk>; Kocabasoglu-Hillmer, Canan <Canan.Kocabasoglu-Hillmer.1@city.ac.uk>; sinead.roden@tcd.ie
Subject: Re: Application for research development from Colombia

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Letter from Mrs. Villena

Hello Juan Carlos,

Thanks for your email and your interest in our research. I personally do not usually comment on thesis proposals of doctoral students, as the directors and the thesis committee are responsible for doing so. The only thing I can tell you is that you review the study that I am attaching because maybe it will help you with Figure 1 of your proposal. Especially look at the moderating role of environmental uncertainy and the way I control by the size of the firm.

Go ahead and use the variables that I use in my survey for the dark side paper. It is a common practice to use variables already validated in new studies if you recognize in the text the references you use as a basis.

Good luck with the doctoral thesis,

Regards,

Veronica

From: JUAN CARLOS ALDANA BERNAL [mailto:jcaldana@pucp.pe]
Sent: Saturday, March 25, 2017 2:40 PM
To: veronica.villena@ie.edu; elena.revilla@ie.edu; Thomas Choi <thomas.choi@asu.edu>
Subject: Application for research development from Colombia

Appendix C. Survey - Social Capital and the Integration of Processes in the Supply Chain Management in the Real Sector in Colombia

Objective: Analyze the perception of the managers of the companies on the relationship between the social capital and the integration of the agents of the supply chain management.

Authorization to use the data provided in the questionnaire.

Dear participant

I would like to express my sincere greetings and thanks for your participation in this academic research, answering the attached questionnaire, as part of my doctoral research with the Pontifical Catholic University of Peru and the Maastricht School of Management in the Netherlands, which is entitled Social Capital and the Integration of Processes in the Supply Chain Management in the Real Sector in Colombia.

If you agree to answer the questionnaire, you will express your consent to participate in the research study. The completion of the questionnaire will take approximately 20 minutes and the information will be treated confidentially. The results of the study will be made available to you once all the information is statistically consolidated. Any concerns you may have, I will gladly assist you in the following email: jcaldana@pucp.edu.pe.

Regards,

Juan Carlos Aldana

General information of the company

Company name _____

Select the Number of workers in your company:

Between 1 and 10		Between 1 and 10		Between 1 and 10		More than 200	

Select the sector to which your company belongs:

Food products		Apparel and footwear		Editorial and paper		Cosmetic soaps	
Leather manufactures		Plastic products		Textiles		Metalworking	
Chemical and pharmaceutical		Machinery and equipment		Automotive		Other	

Your company is:

Producer of raw / materials and o components r		Manufacturer of finished products OEM		Finished products marketer	

Respondent's name: _____

Position: _____, Profession:_____

City: _____

Email: _____

Instructions

Before answering the statements described below, I am interested in that you are understanding the following concepts, as follows:

- Strategic partner: it will be understood as a company (supplier, client, competitor) with which your organization has established relationships of great importance (by volume, exclusivity, amount traded, knowledge, influence in the market that this company has), and with the which your company is complemented in fundamental aspects for the development in the long term.
- Strategic supplier: it will be understood as a strategically, which regularly provides your organization with essential products and / or services for its transformation and / or commercialization.
- Strategic customer: it will be understood as a strategically firm that regularly purchases products and / or services from your organization and is very representative for your company.

To answer the statements, please you need to use the following score scale according to the behavior of your company:

1 = never

2 = occasionally, only in a very few occasions

3 = rarely done, only in a few opportunities

4 = in some opportunities

5 = frequently

6 = almost always

7 = always

A	Sentences	Score						
	Evaluate the following aspects of your company	1	2	3	4	5	6	7
1	There is consolidation of the data handled by the different areas of the company.							

2	There is consolidation of business applications between different areas of the company.							
3	There is integrated inventory management of the products (Raw Material, Product in Process, Finished Product).							

4	It is possible to consult in real time the updated inventory level.							
5	It is possible to consult in real time the information of the operational related to logistics.							
6	Periodic interdepartmental meetings are held for the different areas of the company.							
7	There are interfunctional groups (from several areas) that develop process improvement projects.							
8	There are interfunctional groups that develop new products.							
9	The company knows and can manage in real time all internal functions from raw material management, production, shipping and even sales.							
10	The technological processes used in your plant are new and / or complex.							
11	The main production technologies in your company change frequently.							
12	Its plant uses technological support (application support, software, hardware, outsourcing) that frequently changes.							
B	Affirmations regarding the relationship with strategic allies of your company	1	2	3	4	5	6	7
13	The relationship is characterized by a close interaction at multiple levels (senior management, middle management, operation).							
14	The relationship is characterized by mutual trust at multiple levels.							
15	The relationship is characterized by mutual respect at multiple levels.							
16	The relationship is characterized by mutual friendship at multiple levels.							
17	The relationship is characterized by high levels of reciprocity.							
18	Define frequently with your strategic allies, what is the best interest in the relationship.							
19	Your company shares with your strategic allies, the same culture, values and management style.							
20	Your company shares with your strategic allies, business objectives.							
21	Your company shares with your strategic allies, the same ambition and vision.							

22	Your company participates with its strategic partners in organized social events.							
23	Your company participates with its strategic partners in joint workshops.							
24	Your company participates with its strategic allies in multifunctional teams.							
25	Your company participates with its strategic allies in the definition of joint locations.							

26	Your company participates with its strategic allies in team building exercises							
C	Affirmations regarding the relationship of your company with your strategic suppliers:	1	2	3	4	5	6	7
27	Your company exchange information with its strategic suppliers through information networks.							
28	In your company there are fast order systems with their strategic suppliers.							
29	In your company there is a strategic partnership (longterm structural plans) with its strategic suppliers.							
30	In your company there are stable purchases through networks with their strategic suppliers.							
31	There is participation of its strategic suppliers in the purchase and production process.							
32	There is participation of its strategic suppliers in the design phase (products / services, processes).							
33	Your strategic suppliers share their production schedule with your company.							
34	Your strategic suppliers share their available inventory with your company.							
35	Your company shares of production plan with your strategic suppliers.							
36	Your company shares your forecast of demand with its strategic suppliers.							
37	Your company shares its inventory levels with your strategic suppliers.							
38	Your company help to its strategic suppliers to improve their processes so that they have a clear knowledge of needs of your company.							
39	The delivery performance of its strategic suppliers is unpredictable.							
40	The performance of the quality of its strategic suppliers is unpredictable.							
41	The performance of the product design of its strategic suppliers is unpredictable.							

42	Its strategic suppliers often increase or reduce their production capacity.							
D	Affirmations referring to the relationship of your company with your strategic customers	1	2	3	4	5	6	7
43	There is an association (long-term plans) with its strategic customers through information networks.							
44	There are systematized applications to support the orders of your strategic clients.							
45	There is sharing of market information from your strategic clients.							
46	There is communication with your strategic customers.							
47	There is a system of quick orders for your strategic customers.							
48	There is a follow up with your strategic clients for feedback.							
49	There are periodic contacts with your strategic clients.							
50	Your strategic customers share information from points of sale with your company.							
51	Your strategic clients share demand forecasts with your company.							
52	Your company shares inventory availability information with its strategic customers.							
53	Your company shares its production plan with your strategic customers.							
54	Your strategic customers change the order size of your orders throughout the year.							
55	Your strategic customers change the delivery date of their orders throughout the year.							
E	Relationship with your competition	1	2	3	4	5	6	7
56	The actions of its competitors regarding marketing promotions are unpredictable.							
57	Your competitors often introduce new features and / or parts in the product							

Thanks for the collaboration.

Appendix D. Data Normality Tests

Table D1

Normality Test Social Capital

Variable	min	max	skew	c.r.	kurtosis	c.r.
P18	1.000	7.000	-1.109	-5.939	.967	2.588
P22	1.000	7.000	-.251	-1.345	-1.096	-2.934
P23	1.000	7.000	-.107	-.574	-.997	-2.670
P24	1.000	7.000	-.153	-.821	-1.060	-2.838
P25	1.000	7.000	.155	.832	-.954	-2.554
P26	1.000	7.000	.064	.341	-1.148	-3.074
P19	1.000	7.000	-.451	-2.417	-.453	-1.214
P20	1.000	7.000	-.792	-4.241	.054	.144
P21	1.000	7.000	-.520	-2.785	-.527	-1.411
P13	1.000	7.000	-.899	-4.811	.248	.663
P14	1.000	7.000	-1.190	-6.371	1.399	3.746
P15	1.000	7.000	-1.476	-7.904	2.135	5.716
P16	1.000	7.000	-.774	-4.144	.052	.139
P17	1 .000	7 .000	-.859	- 4.597	.388	1.040
Multivariate					80.174	24.839

Table D2

Normality Test for the Uncertainty of the Environment

Variable	min	max	skew	c.r.	kurtosis	c.r.
P57	1.000	7.000	.267	.846	-.910	-1.439
P56	1.000	7.000	.053	.168	-1.072	-1.694
P55	1.000	7.000	-.259	-.819	-.744	-1.177
P54	1.000	7.000	-.744	-2.352	-.353	-.559
P42	1.000	7.000	.323	1.021	-.793	-1.254
P41	1.000	7.000	.170	.537	-1.044	-1.651
P40	1.000	7.000	.188	.596	-1.138	-1.799
P39	1.000	7.000	.381	1.204	-.966	-1.528
P10	1.000	7.000	-.444	-1.406	-.796	-1.258
P11	1.000	7.000	-.019	-.062	-.959	-1.517
P12	1.000	7.000	- .157	-.496	-1.277	-2.019
Multivariate					17.598	4.030

Appendix D. Data Normality Tests (continued)

Table D3

Proof of Normality Process Integration in the Supply Chain Management

Variable	min	max	skew	c.r.	kurtosis	c.r.
P53	1.000	7.000	-.345	-1.091	-1.028	-1.625
P52	1.000	7.000	-.255	-.805	-1.240	-1.961
P51	1.000	7.000	-.526	-1.664	-1.079	-1.706
P50	1.000	7.000	-.413	-1.307	-1.148	-1.815
P49	1.000	7.000	-1.869	-5.912	3.678	5.816
P48	2.000	7.000	-1.415	-4.475	1.704	2.695
P47	1.000	7.000	-1.227	-3.881	.625	.989
P46	2.000	7.000	-1.596	-5.047	2.597	4.106
P45	1.000	7.000	-.700	-2.212	-.719	-1.138
P44	1.000	7.000	-.644	-2.037	-.807	-1.275
P43	1.000	7.000	-.437	-1.382	-.890	-1.407
P38	1.000	7.000	-.384	-1.213	-1.033	-1.633
P37	1.000	7.000	.152	.482	-1.272	-2.011
P36	1.000	7.000	.052	.165	-1.262	-1.996
P35	1.000	7.000	-.101	-.319	-1.435	-2.270
P34	1.000	7.000	-.138	-.435	-1.338	-2.116
P33	1.000	7.000	-.297	-.938	-1.112	-1.758
P32	1.000	7.000	-.409	-1.295	-.806	-1.274
P31	1.000	7.000	-.582	-1.841	-.608	-.962
P30	1.000	7.000	-.931	-2.945	.333	.526
P29	1.000	7.000	-.389	-1.229	-.939	-1.485
P28	1.000	7.000	-.885	-2.799	.069	.110
P27	1.000	7.000	-.485	-1.535	-.823	-1.301
P1	2.000	7.000	-.981	-3.103	.743	1.175
P2	1.000	7.000	-.562	-1.777	-.027	-.042
P3	1.000	7.000	-1.747	-5.525	3.191	5.045
P4	1.000	7.000	-1.144	-3.618	.378	.598
P5	1.000	7.000	-.912	-2.884	.707	1.117
P6	1.000	7.000	-1.286	-4.065	1.169	1.849
P7	1.000	7.000	-.457	-1.444	-.986	-1.558
P8	1.000	7.000	-.315	-.996	-1.204	-1.904
P9	1 .000	7 .000	-.758	- 2.398	.001	.001

Multivariate	80.861	6.714

Appendix E. Correlation Values of First Order Latent Variables.

Table E1

Internal Integration (II)

Inter-element correlation matrix

	P1	P2	P3	P4	P5	P6	P7	P8	P9
P1	1.000	.606	.444	.373	.531	.426	.483	.375	.471
P2	.606	1.000	.460	.332	.513	.491	.536	.457	.463
P3	.444	.460	1.000	.657	.568	.316	.324	.251	.562
P4	.373	.332	.657	1.000	.604	.303	.227	.231	.518
P5	.531	.513	.568	.604	1.000	.469	.407	.381	.642
P6	.426	.491	.316	.303	.469	1.000	.584	.478	.414
P7	.483	.536	.324	.227	.407	.584	1.000	.679	.411
P8	.375	.457	.251	.231	.381	.478	.679	1.000	.422
P9	.471	.463	.562	.518	.642	.414	.411	.422	1.000

Table E2

Technological Uncertainty (TI)

Inter-element correlation matrix

	P10	P11	P12
P10	1.000	.617	.510
P11	.617	1.000	.611
P12	.510	.611	1.000

Table E3

Relational Capital (RC)

Matriz de correlaciones inter-elementos

	P13	P14	P15	P16	P17
P13	1.000	.676	.530	.473	.553
P14	.676	1.000	.707	.557	.586
P15	.530	.707	1.000	.461	.592
P16	.473	.557	.461	1.000	.629
P17	.553	.586	.592	.629	1.000

Table E4

Cognitive Capital (CC)

Inter-element correlation matrix				
	P18	P19	P20	P21
P18	1.000	.553	.488	.524
P19	.553	1.000	.651	.599
P20	.488	.651	1.000	.759
P21	.524	.599	.759	1.000

Table E5

Structural Capital (SC)

Inter-element correlation matrix					
	P22	P23	P24	P25	P26
P22	1.000	.733	.599	.641	.514
P23	.733	1.000	.726	.677	.580
P24	.599	.726	1.000	.731	.651
P25	.641	.677	.731	1.000	.694
P26	.514	.580	.651	.694	1.000

Table E6

Integration with Suppliers (SI)

Inter-element correlation matrix												
	P27	P28	P29	P30	P31	P32	P33	P34	P35	P36	P37	P38
P27	1.000	.440	.454	.376	.448	.469	.405	.390	.402	.564	.444	.469
P28	.440	1.000	.573	.543	.519	.404	.437	.457	.383	.423	.456	.463
P29	.454	.573	1.000	.528	.582	.529	.582	.500	.542	.587	.510	.558
P30	.376	.543	.528	1.000	.555	.340	.422	.460	.413	.402	.391	.439
P31	.448	.519	.582	.555	1.000	.585	.487	.458	.511	.517	.451	.559
P32	.469	.404	.529	.340	.585	1.000	.633	.383	.470	.534	.425	.513
P33	.405	.437	.582	.422	.487	.633	1.000	.578	.660	.637	.570	.539
P34	.390	.457	.500	.460	.458	.383	.578	1.000	.617	.490	.594	.482
P35	.402	.383	.542	.413	.511	.470	.660	.617	1.000	.663	.629	.587
P36	.564	.423	.587	.402	.517	.534	.637	.490	.663	1.000	.650	.544

P37	.444	.456	.510	.391	.451	.425	.570	.594	.629	.650	1.000	.494
P38	.469	.463	.558	.439	.559	.513	.539	.482	.587	.544	.494	1.000

Table E7

Uncertainty of Suppliers

Inter-element correlation matrix				
	P39	P40	P41	P42
P39	1.000	.816	.737	.442
P40	.816	1.000	.843	.474
P41	.737	.843	1.000	.465
P42	.442	.474	.465	1.000

Table E8

Integration with Clients (CI)

Inter-element correlation matrix											
	P43	P44	P45	P46	P47	P48	P49	P50	P51	P52	P53
P43	1.000	.593	.548	.454	.431	.471	.482	.402	.473	.333	.311
P44	.593	1.000	.611	.443	.583	.441	.463	.412	.452	.320	.285
P45	.548	.611	1.000	.430	.504	.418	.423	.453	.616	.472	.460
P46	.454	.443	.430	1.000	.585	.595	.672	.386	.372	.263	.280
P47	.431	.583	.504	.585	1.000	.579	.584	.485	.430	.390	.339
P48	.471	.441	.418	.595	.579	1.000	.663	.336	.453	.353	.340
P49	.482	.463	.423	.672	.584	.663	1.000	.500	.474	.317	.391
P50	.402	.412	.453	.386	.485	.336	.500	1.000	.601	.408	.367
P51	.473	.452	.616	.372	.430	.453	.474	.601	1.000	.653	.633
P52	.333	.320	.472	.263	.390	.353	.317	.408	.653	1.000	.604
P53	.311	.285	.460	.280	.339	.340	.391	.367	.633	.604	1.000

Table E9

Uncertainty with Clients (IC)

Inter-element correlation matrix		
	P54	P55
P54	1.000	.649
P55	.649	1.000

Table E10

Uncertainty with the Competition (IO)

Inter-element correlation matrix		
	P56	P57
P56	1.000	.587
P57	.587	1.000

Appendix F. EFA Factor Weight Matrix

Table F1

EFA Factor Weight Matrix

	Matrix of rotated factors[a]													
	Factor													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
P37	.746													
P35	.692													
P33	.689													
P36	.658													
P31	.654													
P34	.616		.325			.365								
P38	.608					.338					.304			
P27	.608													
P32	.597				.319									
P29	.505	.439												
P30	.440	.403										.307		
P14		.795												
P13		.786												
P17		.755												
P15		.745				.372								-.398
P16		.682												
P18	.344	.502												
P51			.906											
P52			.671											
P45	.306		.660											
P53			.659			.313								
P50			.529	.479		.341								

P6			.420	.401			.351							
P43			.379			.333	.354							
P12				.767										
P10				.742										
P11				.652										
P1				.497										
P22					.787									
P23					.736									
P25	.425				.734									
P24					.604			.342						
P26				.465	.527									
P47			.366			.771								
P46						.762								

Appendix F. EFA Factor Weight Matrix (continued)

Matrix of rotated factors[a]

	Factor													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
		.413				.563					.383			
P48														
P28						.305								
P56							.894							
P57							.788							
P42							.592	.333						
P44			.359				.420							
P40								.953						

P41				.805		
P39				.738		
P9					.807	
P3					.757	
P4					.597	
P5			.377		.541	
P2						
P20						.860
P21		.457				.574
P19	.349	.331				.548
P8	.349		.404			
P7			.344			.684
P55						
P54						
P49			.301		.504	

Extraction method: Maximum likelihood.
Rotation method: Varimax standardization with Kaiser. a.
The rotation has converged in 11 iterations

Appendix G. Confirmatory Factor Analysis

Table G1

Confirmatory Factor Analysis CFA

Matrix of rotated components[a]					
	Component				
	1	2	3	4	5	6
P33	.786					
P36	.785					
P35	.745				.319	
P37	.684				.333	

P32	.673					
		.427				
P34						
	.662					
P38						
	.629		.300			
P31						
	.607					
P27						
	.561					
P24		.824				
P25		.798				
P26		.789				
P23		.774				
P22		.706				
P14			.822			
P17			.758			
P16			.755			
			.752			
P15				.323		
P13			.687			
P4				.807		
P3				.781		
P5				.761		
P9				.756		
P2						
	.329			.541		
				.452		
P50		.360			.451	
P52					.725	
P51	.306					
		.321			.696	
P53						
	.375				.678	
P45						
	.336				.439	
		.321				.636
P19			.411			

		.596
P20	.536	
		.589
P21	.559	

Extraction method: Analysis of main components.
Rotation method: Varimax standardization with Kaiser. a.
The rotation has converged in 8 iterations.

Appendix H. Standardized Residual Covariances

Table H

Standardized Residual Covariances

	P_22	P_17	P_23	P_24	P_25	P_26	P_19	P_20	P_21	P_13
P _22	.000									
P_17	1.692	-.071								
P_23	-.048	1.181	-.035							
P_24	-.132	.071	-.052	.000						
P_25	-.002	.289	-.114	.011	.000					
P_26	-.553	-.061	-.042	.015	.239	.000				
P_19	.642	.707	.058	-.906	-.710	-.894	-.893			
P_20	.737	.304	.063	.176	-.385	-.249	-.831	.000		
P_21	.746	.390	.502	.652	.403	1.021	-.494	.615	.617	
P_13	1.204	-.532	.803	.077	-.355	-1.258	.854	-1.057	-.606	-.195
P_14	.335	-.106	.060	-.503	-1.000	-1.275	1.203	-1.029	-.312	.060
P_4	-1.288	-.978	-.055	-1.152	-1.811	-1.126	-1.412	-.892	-.854	.250
P_9	-.032	.668	.960	-.043	-.513	-.234	.229	.766	.501	.505
P_5	-.199	.194	-.034	-.685	-.706	.004	.636	.199	-.004	.966
P_53	.672	.384	-.267	.160	.368	.122	1.053	.306	.950	-.410

P_52	.071	.126	-.262	-.704	-.501	-1.292	.531	.743	-.682	-.438
P_51	1.182	.313	.853	.676	.223	.104	-.626	.826	.013	.628
P_38	1.106	1.805	1.158	.165	-.054	.072	-.431	-.406	-.948	.814
P_33	.274	.540	.629	.856	.024	-.188	-.430	.393	.221	-.896
P_31	1.139	1.177	1.705	.615	.529	.136	1.604	-.204	.219	1.177
P_27	.864	.120	-.240	-1.189	-1.001	.096	-0.157	-.103	-.098	-.312

Appendix H. Standardized Residual Covariances (continued)

	P_14	P_4	P_9	P_5	P_53	P_52	P_51	P_38	P_33	P_31	P_27
P_22											
P_17											
P_23											
P_24											
P_25											
P_26											
P_19											
P_20											
P_21											
P_13											
P_14											

	-.091										
P_4	-.718	.109									
P_9	.919	.234	.114								
P_5	.937	.194	.147	.222							
P_53	-.973	-.166	.391	.525	.034						
P_52	-.770	.748	.256	.218	.043	.036					
P_51	-1.266	.818	-.218	.239	-.043	.136	.052				
P_38	.876	.273	.766	.833	-.277	-.213	-.458	.057			
P_33	-1.238	-.518	-.793	-.528	1.643	-.203	.671	.167	.041		
P_31	1.107	.645	-.323	.372	-.624	-.290	-.448	.011	.073	.045	
P_27	-.263	-.378	.602	.836	.135	.219	.336	.249	-.467	.079	.035