**UNIVERSITY OF SALAMANCA**

**FACULTY OF ECONOMICS AND BUSINESS**

DEPARTMENT OF BUSINESS ADMINISTRATION AND BUSINESS ECONOMICS

PhD PROGRAM IN BUSINESS ECONOMICS



DOCTORAL DISSERTATION

**TITLE:**

THE EFFECT OF INTEGRATING WITH SUPPLIERS AND CUSTOMERS ON OPERATIONAL PERFORMANCE: EVIDENCE FROM BRAZILIAN MANUFACTURERS

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Salamanca, 2019.



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HACEN CONSTAR

Que la presente tesis doctoral, que lleva por título “The effect of integration with suppliers and customers on operational performance: evidence from brazilian manufacturers” y que presenta D. Hannah de Oliveira Santos Bezerra ha sido realizada bajo nuestra dirección en el Departamento de Administración y Economía de la Empresa de la Universidad de Salamanca y que cumple todos los requisitos necesarios para proceder a su defensa pública.

Y para que así conste y surta los efectos oportunos, se expide el presente certificado en la ciudad de Salamanca a 22 de Noviembre de 2019.

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*"Confia no Senhor de todo o teu coração*

*e não te estribes no teu próprio* *entendimento".*

*Provérbios 3:5*

**ACKNOWLEDGEMENTS**

Primeiramente, quero agradecer à Deus que me proporcionou forças suficientes para que eu pudesse chegar até aqui. A cada amanhecer eu pude sentir minhas forças sendo renovadas para que eu pudesse prosseguir nessa caminhada. Certamente eu não aguentaria sem a convicção do Seu amor e cuidado diário com a minha vida.

Depois, agradeço ao meu marido, Victor Hugo, que sempre acreditou em mim e não me deixou desistir quando eu, por inúmeras vezes, quis. Obrigada por dividir comigo não somente as alegrias de uma vida à dois, mas dividir as cargas nos dias mais sombrios. Obrigada por cada palavra de motivação. Você enxergou meu potencial quando eu não acreditava em mim. Obrigada também por todas as revisões que você fez no meu trabalho e no inglês. Agradeço a Iker, meu filho, que também é fruto desse período, e que apesar de ser muito pequeno para entender essas palavras, eu quero deixar registrado que o futuro dele também me motivou para o término desse trabalho.

Agradeço aos meus pais, Neidenalva e Hermes, que mesmo longe demonstraram que eu não estava sozinha nessa jornada. Em especial à minha mãe, que muitas vezes aqueceu meu coração com palavras de amor e entusiasmo, sempre me mostrando meu potencial. Vocês me ensinaram o que eu não posso aprender com os livros. Ao meu irmão e cunhada, Helton e Priscila, que torciam fervorosamente pela concretização desse sonho e por disponibilizar seus ouvidos e orações nas horas em que mais precisei.

Aos meus sogros, Gilvanise e João, que também demonstraram fielmente a torcida pelo meu sucesso nessa empreitada do doutorado. Aos meus cunhados e cunhadas, que se alegraram com cada conquista e a cada passo em direção ao fim, Juliana, Felix, Pollyana, Arthur, Marcela e João Paulo.

Agradeço as minhas avós, que mesmo sem entender o propósito de se ausentar por tanto tempo, sempre me davam palavras de ânimo nas ligações. Aos meus tios, tias, primas, primos por sempre se preocuparem por mim e por sempre me lembrarem o quanto a família é valiosa.

Às minhas amigas que estão no Brasil que lutaram pela nossa amizade apesar da distância: Ivnna, Dayanna, Gabrielle, Nayara, Édyla, Larissa, Laysla, Natália Ferraz, Rita de Cássia. Eu amo vocês!

E aos amigos que fiz nessa amada cidade Salamanca: Natália Caline, Nathalia, Estefany, Lauren, Renata Maria, Alice, Sara, Guiomar, Jackeline, Tatiana, Janine, Thiago Almeida, Sabrina, Dora Lucía, Sandra, Fernando e Carlos. Especialmente à Ana e Daniel que cuidaram de Iker com tanto amor e zelo para que eu pudesse me dedicar ao término desta tese. Muito obrigada por cada palavra, oração, apoio, cafezinho e tempo disponibilizado a mim. Levarei vocês no meu coração, para sempre!

Agradeço aos meus orientadores, Gustavo Lannelongue e Javier Gonzalez-Benito, por compartilharem do valioso conhecimento que possuem, do tempo e da paciência durante todos esses anos.

Ao departamento de *Economía de la Empresa* pela colaboração e ajuda durante todo o meu doutorado.

Finalmente, agradeço à Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (Capes), que me permitiu, através do financiamento deste trabalho, me dedicar exclusivamente à esta pesquisa.

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**CHAPTER 1****: GENERAL INTRODUCTION**

## Introduction

Studies have long articulated the need for a close and integrated relationship between manufacturers and their Supply Chain (SC) partners (e.g., Lambert et al., 2005). However, only recently has there been a call for a systematic approach to Supply Chain Integration (SCI), as increasing global competition has led organisations to rethink the need for mutually beneficial cooperative supply partnerships (Lambert and Cooper, 2000, Wisner and Tan , 2000) and the joint improvement of interorganisational processes has become a high priority (Zhao et al., 2008).

SCI is recognized as a strategy to improve business performance in highly competitive environments. In recognition of this, manufacturing companies are pursuing a variety of supply chain management practices (Narasimhan and Kim, 2001). However, there is no formal definition of which factors constitute supply chain integration. In the literature, integration has been a key theme in studies that deal with Supply Chain Management (SCM) (e.g., Lee et al., 1997; Stank et al, 2001; McCarthy and Golicic, 2002). SCI has been conceptualized on several levels: functional, internal and external, encompassing customer, manufacturing, distribution and procurement issues (Stevens, 1990). While some studies focus on individual SCI dimensions, in particular, the integration with customers or suppliers (Cousins ​​and Menguc, 2006, Koufteros et al., 2007), others examine SCI as a single construct (Rosenzweig et al., 2003). Based on this, we saw the need to develop work that could consider SCI from an upstream and downstream perspective to provide a broad view of SCI.

Besides that, previous studies have focused on analysing the relationship between SCI and performance and their findings vary according to factors such as the practices analysed, the sample size and the countries studied. For instance, some articles show that this relationship is positive (e.g., Frohlich and Westbrook, 2001; Stank et al 2001; Vickery et al., 2003; Towill and Childerhouse, 2003), while other authors found no evidence to support this statement (e.g., Ho et al 2002; Sriram and Stump, 2004). These results led to important findings, but they still lack explanation about the relationship between SCI and performance.

Based on above, the general objective of this work is to analyse the influence of integration dimensions on operational performance. To reach our objective, we use the Brazilian scenario, to analyse how Brazilian manufacturers are developing their relationships with suppliers and customers, and to which extent the adoption of these practices effectively impacts on organisational operational performance.

This study has two main contributions. The first concerns the identification of the main integration dimensions most addressed in the literature and, in sequence, the identification of integration practices corresponding to these dimensions. To identify the integration practices, we conducted a systematic study on the literature of SCI and performance.

The second contribution is to carry out the analyses of the proposed relations considering the development of dimensions at the upstream and downstream level. In the same way that we identified the integration dimensions most discussed in the literature, we observed that the SCI studies hardly consider the analysis of integration dimensions considering the relationships developed with suppliers and customers, and therefore, in this study, we decided to consider integration dimensions at level upstream and downstream.

## Objectives and proposal of the thesis

Analysing the literature, we identified some peculiarities in the analysis of SCI.Researches deal with integration as integration strategies (e.g., Frohlich and Westbrook, 2001) or through specific integration dimension, such as the use of e-business technologies impacts integration and organisational performance (e.g., Sanders, 2007). Therefore, we identified the need to investigate the integration of SC according to the main integration dimensions and that have a direct effect on SCI management process. This work aims to fill a GAP identified in order to analyse the integration from the perspective of several integration practices developed between suppliers and customers to verify if the practices exert an influence on operational performance. There are three specific objectives proposed in this thesis, which were discussed in four articles and will be detailed below.

### Specific objectives

Our first objective is to investigate systematically the existing literature regarding the SCI and organisational performance, with the purpose of identifying GAPS and trends in the area as well as to map the existing literature regarding the main authors, academic organisations and countries studied. In view of this, our objective is to present a comprehensive and integrated view of published literature on all aspects and facets of SCI and organisational performance to facilitate studies, practices and research.

Our second objective is to verify the effect of competitive priorities, as drivers, in the adoption of integration dimensions with suppliers and customers. For this, we present a conceptual model and an exploratory study that discuss the competitive priorities as drivers for the adoption of integration practices between industrial companies and their suppliers and customers.

Therefore, our third objective is to analyse the effect of integration dimensions with suppliers and customers on operational performance. Notably, to analyse the impact of adopting different integration dimensions and the impact on organisational operational performancebased on five dimensions of activity that companies usually integrate their operations with suppliers and customers, as highlighted in literature. One of the factors that drives this research is the geographic context that the practices are being analysed in this work, which is in a developing country and that is still little explored with respect to the integrated management of SC, specifically with regard to integration with suppliers and customers.

At the time of this work, many papers had validated SCI scales to determine the company's relationship with suppliers and customers, but these scales are not useful for the performance of our work, since we want to analyse the impact of the practices of integration into five main integration dimensions. Therefore, this work sought to construct measures for integration practices in SC, which will serve as a basis for future research in the area, extending the research to other geographic contexts and contributing to the operations management literature. To comply with this objective, we reviewed the literature on integration in SC, and collected the most used measures in the works in each integration dimension, analysed the data through a statistical analysis and inferred the results according to the established hypotheses.

## Choice of the Brazilian scenario as the focus of research

Our investigation is conducted in Brazil, an emerging market which economy size (GDP) has passed from 65 to 9 positions in the last 20 years (International Monetary Fund, 2019).Brazil is one of the so-called emerging markets: it is the "B" of the BRICS group and it is a member of several economic organisations, such as the Common Market of the South (Mercosur). It has hundreds of trading partners, and about 60% of the country's exports refer to manufactured and semi-manufactured products. Despite the importance of the Brazilian scenario, little was developed regarding the vision of integration with partners of SC or in relation to recommending what would be the best relationship between companies. This leads to an interest in developing this exploratory study that cover an important segment of Brazilian industry and it represent an opportunity to boost practices and knowledge in these companies.

We believe that studies in different geographical contexts may present different results on the relationship between integration practices and organisational performance (Laosirihongthong et al., 2013). In this sense, we contribute to the literature by constructing a comprehensive model that encompasses constructs used in other investigations(e.g.Chiou et al., 2011; Green et al., 2012; González-Benito, 2007), providing empirical evidence analysing the adoption of integration practices in SC and operational performance from the interactions between organisation, supplier and customer on the context of six sectors of manufacturing industries in Brazil.

## Relevance of the thesis

Given the above, we make the following contributions to the literature. First, we extend prior works by analysing more dimensions than those covered by previous studies (e.g., Vachon and Klassen, 2008; Frohlich and Westbrook, 2001). Previous works address specific dimensions of the organisation to empirically analyse the relationship between integration practices and performance**,** such as Petersen et al. (2005), who examine whether supplier involvement in new product development can produce significant improvements in financial returns and / or product design performance or the work of Prajogo and Olhager (2012) which investigates information integration (IT) and material flows (LO) among supply chain partners and their effects on operational performance. In this study, we consider the integration practices developed in five integration dimensions identified as the most studied in the SCI literature, each of which includes five items related to the integration between organisation and suppliers or customers.

Second, to the best of our knowledge, there is no measure in the integration management literature that considers the jointly adoption of integration practices between suppliers and customers.Many authors consider jointly integration according to the measure used by Frohlich and Westbrook (2001) which uses quartiles to conceptualize integration through its direction and extension (for customers and / or suppliers), other studies deal with integration with suppliers and customers separately (e.g., Liu et al., 2012). Thus, we have created a measure that captures the integration practices developed jointly with suppliers and customers andwill serve as a basis for future studies aimed at analysing the company's integration with suppliers and customers.

Third, most of studies that analyse the relationship between SCI and performance use samples from countries such as the United States (e.g., Iyer et al. 2009; Droge et al., 2012) and China (e.g., Jayaram et al., 2011; Lai et al., 2014). The lack of empirical research in developing countries indicates a gap in the area of SCI, since it is not possible to know how integration practices are being developed in the industries of these localities with respect to the integration of SC, and to identify the points that these countries should focus on developing their integration activities in SC, being an opportunity to explore the geographic context of Brazil, which is still little studied despite its importance as we previously pointed out.

This work contributes to the study of integration in SC by providing a broad view of integration practices and their impact on organisational performance, as well as providing an overview of the integrated supply chain management and operational performance area. Thus, we contribute to the debate about the effectiveness of the implementation of integration practices in organisational performance through the construction of a research tool that is able to capture the analysis of practices of integration with suppliers and clients in five integration dimensions, since previous work approach integration practices in certain dimension or considering integration as a strategic vision, and also through the application of this tool in a geographically scarce context, such as the Brazilian context, and that the results of this research can bring development to companies and consequently to their supply chains.

### Structure of the thesis

This doctoral dissertation is structured in six chapters that complement each other. The first paper (chapter 2), called bibliometric analysis of the relationship between supply chain integration and organisational performance, compiles the papers that analyse this relationship. The purpose of this chapter is four, namely: (1)create a representation of the structure of the research area by dividing elements (papers, authors, journals, variables used to define SCI and performance) into different groups (Zupic and Čater, 2015) using rigorous bibliometric instruments. It also helps to identify the most influential researchers within clusters and to clarify which fields of study were paramount for the expansion of the research and identifies which topics are most addressed by these researchers; (2) Distinguish the different dimensions of SCI. In particular, it is important to put together all the major integration dimensions highlighted in the literature on SCI into a different groups by similarity (3) Find the GAPS in the literature on SCI and Performance; (4) Identify trends/opportunities for future research to develop in the field of operations management. In order to achieve the objectives of this chapter, two types of analyses were performed: (1) a bibliometric analysis, able to identify author influence, affiliation and variables used and (2) a network analysis that identifies current and emerging areas and outlines deep relationships within a specific scientific field and in the process of identifying key articles.

The third chapter is dedicated to the descriptive analysis of the sample used in chapters 4 and 5. In this chapter we test the validity of measurement tools by comparing three groups of variables: industry, company position in SC, and life cycle for integration practices. These analyses describe the main characteristics of the companies surveyed and also the main features of the sectors in which the companies perform their activities.

The fourth paper (chapter 4) aims to analyse if Competitive Priorities (CP) affect to the adoption of integration dimensions among a focal plant and its suppliers and customers. We present a conceptual model and an exploratory study that address competitive priorities as drivers to the adoption of integration dimensions between manufacturing firms and their suppliers and customers. For this, we review the literature and identify the arguments that lead to propose four hypotheses that prove the impact of each of the competitive priorities considered in the operational performance.

Finally, in the fifth article (chapter 5), we present the main model of this work that addresses the relation of the five integration dimensions most representative and addressed in the literature and operational performance. Despite the variety of studies that contemplate the integration in SC with suppliers and customers, most of the studies focus on the relationship with suppliers and forget about the relation with customers, and this is the main argument in the development of this study: the consideration of the integration dimensions developed both with suppliers and with customers.

In chapter 6, the final chapter of the thesis, we will collect the main results found in previous chapters, emphasizing the main theoretical and practical implications for the academics and managers. We present the limitations that we find for the accomplishment of this work and the future research that we want to approach from this work.

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# CHAPTER 3: DESCRIPTIVE ANALYSIS OF THE SAMPLE

## . Introduction

In this chapter we will present some descriptive analyses of the 117 companies that are part of our sample. It seems important to us to be able to test the validity of our measurement tools by comparing some groups of variables: industry, company positioning in the supply chain and product life cycle. As we show follow, this data allows us to have a global view of companies and their behaviour that validates the measurement tools used in the multivariate analyses. That is, companies integrate their activities according to the product they manufacture / sell or according to their position in the supply chain.

This chapter describes the sample used in the following two chapters of this thesis, namely: Competitive priorities as drivers of supply chain dimensions integration: evidence from brazil and the effect of the adoption of integration dimensions with suppliers and customers on operational performance: evidence from brazil manufacturers. We have chosen to place it part of the chapters so that the information we will report here is not repetitive as the sample is the same for both chapter 4 and chapter 5.

## . Sample description

### 2.1 Company positioning in the SC

The second question in the questionnaire refers to the company position in the SC (see Figure 1). As can be seen below, most of the companies surveyed sell end products to other intermediaries (retail or wholesale distributors) who are selling to end consumers (54%), followed by companies selling products to other manufacturers who sell their products as components / parts of other end products (16%), selling products that are components / parts of other end products (17%), and soon, from companies that sell products directly to end consumers (13%).

0‑1Figure 1 - Company positioning in the supply chain.

### 2.2 Sector

To specify which sectors mostly adopt the integration dimensions, we relate the averages of the integration dimensions with suppliers and customers by industry type. The results achieved for the dimensions with suppliers show that the highest averages are QM dimension with the primary metal sector, which is justified by the fact that products in this sector, such as steel, iron and aluminium, require high quality control. Also, the average of the LO dimension with the food and kindred products sector is high. In this sector, products are generally perishable, which suggests that companies have the logistics system that is integrated with both suppliers and customers (Figure 2 and Figure 3) to avoid product losses.

The EM dimension also reaches high averages in the food and kindred products, textile, chemical products and rubber and plastic sectors. Environmental issues are important for any industry, but especially for those four industries that often generate large amounts of waste in the manufacture of their products. The dimensions of QM and LO are the most prevalent in all sectors analysed.

0‑1Figure 2 - Mean of dimension integration with suppliers by industry type.

The results achieved for the customer integration dimensions are similar to those of the supplier integration dimension, indicating that companies consider sector integration equally important (Figure 3).

0‑2Figure 3 - Mean of dimension integration with customers by industry type.

To statistically prove that the average practices for each of the sectors surveyed were different, we applied an ANOVA test for integration practices developed with suppliers. The results shown in the following tables refer to the results that came out significant and that due to the length of the data we decided not to expose the results in which the relationships did not come out statistically significant.

The first step was to perform a test of variance homogeneity (Levene statistic) in which we were told if it is greater than 0.05 that there is homogeneity, and to decide that the variance of the groups is equal and we search for significant differences between the groups using ANOVA. The results of Table 1 show that of the 25 tested variables 13 are statistically significant and therefore we can perform the ANOVA test.

0‑1Table 1 – Homogeneity test of variances.

|  |  |  |  |
| --- | --- | --- | --- |
| **Integration practices with suppliers** | **Levene Statistic** | **df** | **Sig.** |
| Information systems synchronized | .466 | 5 | .801 |
| Investment in information technologies | .948 | 5 | .453 |
| Share advanced information | .778 | 5 | .568 |
| Use information technology | 2.099 | 5 | .071 |
| Education and training | .986 | 5 | .430 |
| Recognize achievements and performance | .384 | 5 | .859 |
| Monitor the fulfilment of specifications | 3.957 | 5 | .002 |
| Quality certifications | 1.178 | 5 | .325 |
| Assess the capabilities | 1.301 | 5 | .269 |
| Logistics activities integrated | 1.691 | 5 | .143 |
| Use of logistics software | 1.364 | 5 | .243 |
| Containers and packaging instruments adapted | 1.093 | 5 | .368 |
| Optimize the usage of vehicles’ capacity | 1.119 | 5 | .355 |

For the case of the variables “access to the information systems” and “monitor the fulfilment of specifications” such as homogeneity, we draw the welch test to verify if they are significant, and that we cannot do it with Anova. The results can be seen in Table 2 and we find that the significance is greater than 0.05, so there are no significant differences in the averages for “access to information systems” and “monitor fulfilment of specifications”.

As we can see in tables 2 and 3 for all variables except synchronized information systems, share advanced information and use of logistics software, we can accept the null hypothesis that there are no mean differences between groups. Data indicate that companies adopt integration practices equally, as averages approach the maximum value 5.

0‑2Table 2 – Robust evidence of equality of means - Welch.

|  |  |  |  |
| --- | --- | --- | --- |
| **Integration practices with suppliers** | **Welch Statistic** | **df** | **Sig.** |
| Access to the information systems | 2.376 | 5 | .054 |
| Monitor the fulfilment of specifications | 2.670 | 5 | .033 |

0‑3 Table 3 – Integration practices with suppliers by sector - ANOVA.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Integration practices with suppliers** | | **Sum of squares** | **df** | **Quadratic mean** | **F** | **Sig.** |
| **Information systems synchronized** | Between groups | 28.209 | 5 | 5.642 | 4.240 | .001 |
| Within groups | 147.706 | 111 | 1.331 |  |  |
| **Share advanced information** | Between groups | 15.896 | 5 | 3.179 | 2.346 | .046 |
| Within groups | 150.429 | 111 | 1.355 |  |  |
| **Use of logistics software** | Between groups  Within groups | 20.303  192.928 | 5  111 | 4.061  1.738 | 2.336 | .047 |

It was found that in the practices "information systems synchronized", "share advanced information" and "use of logistics software" there are significant differences from the average of the groups (sectors) so we can reject the null hypothesis of the group means are equal (see table 3). Therefore, we must search among which groups the differences with the post-hoc test using the Bonferroni statistic, using a sig level of 0.1. For this, we apply Bonferroni contrast, and in this case, we barely show you the results with significant values given to the extent of the amount given, as said previously. The results can be seen in Table 4.

We found that the significant differences of means of “information systems synchronized” are between:

1. The “food and kindred products” sector with “chemical products” and “rubber and plastic” sectors.
2. The “primary metal” sector with “chemical products” and “rubber and plastic” sectors.

We found that the significant differences in means of “share advanced information” are between:

1. The “rubber and plastic” sector with “primary metal” sector.

We found that the significant differences in means of “use of logistics software” are between:

1. The “food and kindred products” sector with” fabricated sector” sector.

0‑4Table 4 - Bonferroni multiple comparisons.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Dependent variable** | **(I) Sector** | **(J) Sector** | **Mean difference**  **(I-J)** | **Standard error** | **Sig.** |
|
| 1. **Information systems synchronized** | Food and kindred products (20) | 22 | .312 | .420 | 1.000 |
| **28** | **1.029\*** | **.357** | **.070** |
| **30** | **1.239\*** | **.375** | **.019** |
| 33 | -.150 | .420 | 1.000 |
| 34 | .425 | .348 | 1.000 |
| Textile (22) | 20 | -.312 | .420 | 1.000 |
| 28 | .717 | .394 | 1.000 |
| 30 | .927 | .411 | .391 |
| 33 | -.462 | .452 | 1.000 |
| 34 | .113 | .387 | 1.000 |
| Chemical products (28) | **20** | **-1.029\*** | **.357** | **.070** |
| 22 | -.717 | .394 | 1.000 |
| 30 | .210 | .346 | 1.000 |
| **33** | **-1.178\*** | **.394** | **.052** |
| 34 | -.604 | .317 | .893 |
| Rubber and plastic (30) | **20** | **-1.239\*** | **.375** | **.019** |
| 22 | -.927 | .411 | .391 |
| 28 | -.210 | .346 | 1.000 |
| **33** | **-1.388\*** | **.411** | **.015** |
| 34 | -.814 | .338 | .263 |
| Primary metal (33) | 20 | .150 | .420 | 1.000 |
| 22 | .462 | .452 | 1.000 |
| **28** | **1.178\*** | **.394** | **.052** |
| **30** | **1.388\*** | **.411** | **.015** |
| 34 | .574 | .387 | 1.000 |
| Fabricated metal (34) | 20 | -.425 | .348 | 1.000 |
| 22 | -.113 | .387 | 1.000 |
| 28 | .604 | .317 | .893 |
| 30 | .814 | .338 | .263 |
| 33 | -.574 | .387 | 1.000 |
| 1. **Share advanced information** | Food and kindred products (20) | 22 | .145 | .424 | 1.000 |
| 28 | .622 | .360 | 1.000 |
| 30 | .922 | .378 | .245 |
| 33 | -.239 | .424 | 1.000 |
| 34 | .258 | .352 | 1.000 |
| Textile (22) | 20 | -.145 | .424 | 1.000 |
| 28 | .477 | .398 | 1.000 |
| 30 | .777 | .415 | .955 |
| 33 | -.385 | .457 | 1.000 |
| 34 | .113 | .391 | 1.000 |
| Chemical products (28) | 20 | -.622 | .360 | 1.000 |
| 22 | -.477 | .398 | 1.000 |
| 30 | .300 | .349 | 1.000 |
| 33 | -.862 | .398 | .489 |
| 34 | -.364 | .320 | 1.000 |
| Rubber and plastic (30) | 20 | -.922 | .378 | .245 |
| 22 | -.777 | .415 | .955 |
| 28 | -.300 | .349 | 1.000 |
| **33** | **-1.162\*** | **.415** | **.090** |
| 34 | -.664 | .341 | .807 |
| Primary metal (33) | 20 | .239 | .424 | 1.000 |
| 22 | .385 | .457 | 1.000 |
| 28 | .862 | .398 | .489 |
| **30** | **1.162\*** | **.415** | **.090** |
| 34 | .497 | .391 | 1.000 |
| Fabricated metal (34) | 20 | -.258 | .352 | 1.000 |
| 22 | -.113 | .391 | 1.000 |
| 28 | .364 | .320 | 1.000 |
| 30 | .664 | .341 | .807 |
| 33 | -.497 | .391 | 1.000 |
| 1. **Use of logistics software** | Food and kindred products (20) | 22 | ,274 | ,480 | 1,000 |
| 28 | 1,009 | ,408 | ,222 |
| 30 | ,839 | ,428 | ,790 |
| 33 | ,581 | ,480 | 1,000 |
| **34** | **1,175\*** | **,398** | **,058** |
| Textile (22) | 20 | -,274 | ,480 | 1,000 |
| 28 | ,735 | ,451 | 1,000 |
| 30 | ,565 | ,470 | 1,000 |
| 33 | ,308 | ,517 | 1,000 |
| 34 | ,901 | ,442 | ,661 |
| Chemical products (28) | 20 | -1,009 | ,408 | ,222 |
| 22 | -,735 | ,451 | 1,000 |
| 30 | -,170 | ,396 | 1,000 |
| 33 | -,428 | ,451 | 1,000 |
| 34 | ,166 | ,363 | 1,000 |
| Rubber and plastic (30) | 20 | -,839 | ,428 | ,790 |
| 22 | -,565 | ,470 | 1,000 |
| 28 | ,170 | ,396 | 1,000 |
| 33 | -,258 | ,470 | 1,000 |
| 34 | ,336 | ,386 | 1,000 |
| Primary metal (33) | 20 | -,581 | ,480 | 1,000 |
| 22 | -,308 | ,517 | 1,000 |
| 28 | ,428 | ,451 | 1,000 |
| 30 | ,258 | ,470 | 1,000 |
| 34 | ,593 | ,442 | 1,000 |
| Fabricated metal (34) | **20** | **-1,175\*** | **,398** | **,058** |
| 22 | -,901 | ,442 | ,661 |
| 28 | -,166 | ,363 | 1,000 |
| 30 | -,336 | ,386 | 1,000 |
| 33 | -,593 | ,442 | 1,000 |



### Company positioning in SC

Just as we do for the sector variables, it seemed interesting to know where the industries according to sector were positioned in SC. To do so, we make an analysis in which we contrast means of sectors and company position, and the results can be seen in Figure 4 and indicate that most companies that sell products to other intermediaries are concentrated in the “fabricated metal” sector.

2.3‑1Figure 4 – Mean of sectors by position of companies in the Supply Chain

We also analysed the relationship of the media between dimensions integration with suppliers and the company's position in SC (Figure 5), and found that companies that are positioned closer to customers (sell products to other intermediaries) have the highest averages in the LO dimension with suppliers, followed by the QM, EM, DNP, and IT dimension. This result shows that the closer to the customer, the more companies tend to integrate activities with suppliers to accurately deliver products. Companies that “sell products to other manufacturers, who sell their products as components / parts of other end products” scored higher in the QM dimension with suppliers. Companies that focus on this SC position need to adhere to the required quality standards, as their products will be part of another end product, so they must perfectly meet the quality requirements demanded by the customer.

2.3‑2Figure 5 – Mean of company positioning in the SC by dimensions of integration with suppliers

In addition to the relation between the dimensions of integration with suppliers means and the company's position in SC, we also found it interesting to know the relationship of averages of integration practices with customers and the company's position in SC. The results of average customer dimensions by company positioning in SC obtained lower averages than those of suppliers, and slightly more constant, especially in the position where companies sell final products directly to consumers. The QM dimension scored higher in the position in which companies sell to other intermediaries, who sell their products as components / parts of other end products, and the fact that their products are part of other products requires them to have a higher level of quality integration, monitoring compliance with customer specifications so that there are no failures or shortcomings.

We note that the use of IT dimension integration practices differs depending on where the company is positioned in SC. For companies that sell products directly to consumers, IT practices with suppliers do not have much influence compared to averages for customer practices. For companies that sell products directly to consumers, IT practices are strongly adopted (Figure 5 and Figure 6).

2.3‑3Figure 6 – Mean of company positioning in the SC by dimensions of integration with customers.

### 2.4 Life cycle

In our third analysis, we contrast the relation between the product life cycle, and the position companies occupy in the SC. We found that companies that are positioned closer to consumers, such as those selling products to other intermediaries, have greater life-cycle variety, with higher values for the three options presented in the questionnaire (Figure 7).

0‑1Figure 7 – Company positioning in the supply chain by life cycle.

For analyses that cross sector and life cycle (Figure 8), the results show that the food and fabric sectors have shorter cycles and the sectors that use steel raw material have the longest due cycle (over 10 years).

0‑2 Figure 8 – Mean of sectors by life cycle.

We also relate the export percentage to the sector in order to know which sector has the highest export percentage. The results show that most companies surveyed export less than 25% of their production (Figure 9), with few sectors exporting 50% or more of their production. The two sectors with the highest percentage rates are chemical and metal fabricated. This result is in line with Brazilian macroeconomic characteristics, as chemical industry has annual net sales from domestic production of US$113.5 billion and is the third largest industrial sector in the economy, representing 10% of overall industrial GDP (Global Business Report, 2018).

0‑3Figure 9 – Mean of sectors by export percentage.

## . Description of variables and mean of values of integration practices

In this section we analyse what is the behaviour of the main variables of our model with the sample data. Regarding the 5 variables (25 items used, 5 for each dimension) that comprise our model of supplier and customer integration practices (see Table 5) It should be noted that for the IT dimension the critical factor with the lowest value is “access to inventory and resource information systems available from both suppliers and customers” (2.49 and 2.83) and with greater value “use of information”. information technology with suppliers and customers to process order and / or invoice transactions”. The lowest critical values found for the QM dimension are “recognition of achievements and performance of suppliers and customers in the form of rewards”. (3,12 and 3,24) and most valuable was “monitoring fulfilment with supplier and customer specifications” (4,00 and 4,07). In the EM dimension we find that the lowest critical factors are environmental packaging (3,02 and 2,99) and the highest values are in two items: "mutual understanding" and "reduce environmental impact", both with 3.54 for suppliers and "reduce environmental impact" for customers with 3.62.

The values for the DNP dimension vary the most. The lowest value of supplier practices is “collect ideas” (3.16) and for customers they are concentrated on two items: “collaborate in product design” and “share prototype” (3.28, both) and the highest values for suppliers are also concentrated in two critical factors: “participate in development teams” and “share prototypes” (3.25, both) and for “launching new products” customers (3.87). The lowest averages for the LO dimension are for the use of logistics software critical factor for both suppliers and customers (3,15 and 3,21) and the highest values are in the critical factor “optimize the usage of vehicles ‘capacity” (3,86 and 3,88). The results show an interesting phenomenon since almost all items have a difference between practices with suppliers and with customers always negative (see Table 5). That is, customer practices are stronger than the supplier ones, so companies place particular interest in complying with customer practices.

In addition to these data, through the averages included in Table 5, the results show that the surveyed companies have a relationship with both suppliers and customers in almost all integration practices (averages approach the maximum value), except for access to data systems. IT inventory and available partner resources (average 2.49 for suppliers and 2.83 for customers). That is, the surveyed companies do not access partner information systems, which does not mean that they do not have access to stock information, but do not access this information directly from partner information systems.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *0‑5Table 5 – Mean of values of supplier and customer integration practices.* | | | | |
|  | **Critical factor** | **Practices with suppliers**  Media (d.t.) | **Practices with customers**  Media (d.t.) | **Differences: Suppliers - customers** |
| **Information**  **Technologies** | Information systems synchronized | 2,84 (1,23) | 3,21 (1,20) | -0,37 |
| Access to the information systems | **2,49** (1,28) | **2,83** (1,26) | -0,34 |
| Investment in information technologies | 3,09 (1,25) | 3,44 (1,19) | -0,35 |
| Share advanced information | 2,88 (1,19) | 3,17 (1,19) | -0,29 |
| Use information technology | **3,53** (1,17) | **3,85** (0,99) | -0,32 |
| **Quality Management** | Education and training | 3,40 (1,09) | 3,48 (1,13) | -0,08 |
| Recognize achievements and performance | **3,13** (1,23) | **3,24** (1,17) | -0,11 |
| Monitor the fulfilment of specifications | **4,00** (1,01) | **4,07** (0,96) | -0,07 |
| Quality certifications | 3,85 (1,09) | 3,71 (1,17) | 0,14 |
| Assess the capabilities | 3,80 (1,00) | 3,73 (1,08) | 0,07 |
| **Environmental Manageme**nt | Mutual understanding | **3,54** (1,07) | 3,56 (1,02) | -0,02 |
| Reduce environmental impact | **3,54** (1,15) | **3,62** (1,14) | -0,08 |
| Environmental certifications | 3,16 (1,19) | 3,09 (1,23) | 0,07 |
| Interchange environmental technical advice | 3,46 (1,10) | 3,41 (1,14) | 0,05 |
| Environmental packaging | **3,02** (1,14) | **2,99** (1,17) | 0,03 |
| **Development of New Products** | Launching new products | 3,22 (1,18) | **3,87** (0,93) | -0,65 |
| Participate in development teams | **3,25** (1,14) | 3,36 (1,12) | -0,11 |
| Collaborate in product design | 3,00 (1,17) | **3,28** (1,15) | -0,28 |
| Share prototypes | **3,25** (1,15) | **3,28** (1,16) | -0,03 |
| Collect ideas | **3,16** (1,15) | 3,42 (1,19) | -0,26 |
| **Logistics** | Logistics activities integrated | 3,72 (1,09) | 3,81 (1,02) | -0,09 |
| Use of logistics software | **3,15** (1,36) | **3,21** (1,28) | -0,06 |
| Containers and packaging instruments adapted | 3,71 (1,05) | 3,85 (0,94) | -0,14 |
| Optimize the usage of vehicles’ capacity | **3,86** (1,06) | **3,88** (1,06) | -0,02 |
| Arrangements requirements | 3,84 (0,97) | 3,77 (1,00) | 0,07 |

# CHAPTER 6: GENERAL CONCLUSIONS

## Introduction

This work aimed to analyse the effect of adopting integration dimensions on operational performance. In addition to the results achieved regarding the main objective, we present the conclusions regarding the systematic analysis of the literature on SCI and performance, and the competitive priorities as drivers of the adoption of integration dimensions. Next, we also present the main theoretical and practical implications for both the academic and business worlds. Finally, we enumerate the limitations of work and the future lines of research we are considering working. These considerations imply that this work has the function of identifying future lines of research in the SC management area, improving the company's competitiveness through the adoption of integration dimensions and improving operational performance in terms of unit product cost, performance product satisfaction, customer satisfaction, flexibility, fast new product launches, customer support, product quality and customer requirements.

## 2. Conclusions

This work aimed to analyse the effect of adopting integration dimensions with suppliers and customers on operational performance. To do so, we analyse the Brazilian environment, which presents some special characteristics that make it an interesting setting for this study, as it is one of the biggest economies in the world and manufacturers account for 25% of its GDP. Although its importance, Brazil is an environment still understudied as most of the specialized literature on SCI is centred on the US, China and the Eurozone, for which this study contributes to the existing literature by making an analysis of the integration between suppliers and customers in the supply chain and also by using a geographical a new geographical scoop.

This doctoral thesis is structured in three core chapters (or scientific articles) in which we address three main objectives. In the first core chapter titled “Systematic review: supply chain integration and organisational performance” we make a systematic study to identify the results found in the prior literature on the relation between SCI and organisational performance. In this chapter, we identify gaps and trends in the area of operational management and we also map the main authors, academic organisations and countries where the studies in the path were developed. The results reveal that, although the relation between SCI and performance has long been studied, there is still a growing interest in the field as in the number of scientific researches in the path keeps increasing in the last years. We also found that most of the studies in this path are concentrated in a few countries, being USA and China and Euro-zone countries being the main ones, whereas there are very few studies carried out in other countries, such as American Latin and BRICs countries (except of China).

These findings evidence a lack of empirical studies in countries less developed and suggests that there is a gap in the area of SCI and makes difficult to researchers and policy makers to identify the points that these countries should focus on to develop their integration activities in SC. This also represents an opportunity to explore geographic areas that have not yet been studied, and more, to foment, through research and knowledge, the growth and development of industrial activities.

Another aspect that we could identify is that few papers employ the use of a cross-country comparisons. The use of samples that include multi-country studies may be interesting as it can show to which extent cultural factors may interfere or impel the implementation / development of SC integration.

In the chapter 2, we also seek to identify trends in the studies related to integrated dimensions. To do so, based on the extant literature, we first categorize the integration dimensions in five types, namely, Information technologies (IT), Quality Management (QM), Environmental Management (EM), Development of new products (DNP) and, finally, Logistic (LO). We then analyse recent studies in the path in order to identify the aspects that authors have approached the most in the recent literature.

The IT dimension is a very peculiar one as it is one of the dimensions that is constantly changing over the years. This dimension is very important because the SCI can only be active if technologies support the interactions and adapt the needs of SC partners. Based on it, the tendency is to focus on empirically analysing the new decentralized and transparent transaction mechanisms in industries and businesses and how the exchange of information, through blockchain technology, can provide companies reliability and transparency. In addition to the trend of blockchain technologies,two other points that are linked with the advances of technologies: industry 4.0 and Big Data. Again, the investigations should focus on expanding empirical evidence on the relationship between the use of Big Data in supply chain and operational performance. Additionally, to seeking to understand the role of managers in the assimilation, adoption and implementation of a SC based on Big Data.

Most of the articles deal with practices developed intra-organisational or developed in SC and not between suppliers and customers (e.g.,   
Vanichchinchai and Igel, 2010). We believe, it is necessary, then, to explore practices of inter-organisational quality, specifically among SC's partners. Many companies invest time and money on software purchases that promise to improve the efficiency of supplier and customer relationship management, being also necessary the investment in the training of those who handle the software and systems of production. Thus, future research should focus on the development of the intangible knowledge capabilities necessary to obtain an effective response to the expectations regarding the performance of integration practices in SC, such as the implementation of training and education programs of SC partners.

In the EM dimension, the prior literature has emphasized that the SCI can reduce environmental impacts and promote operational benefits by encouraging design for reuse and recovery / reuse of materials. Thus, these results contribute to the emergence of new business models based on circular economy. This concept reveals that a kind of raw material that is no longer useful for an industry can be recycled by another industry, constituting then a circular production system. Future research should analyse the motivations, barriers, implications, and organisational benefits of adopting circular production systems, and how suppliers and customers can be integrated into that system.

In the fourth dimension analysed (DNP), we could identify that researchers could make efforts to highlight aspects of the purchase of patent licenses and the purchase of research services. We know, for example, that buying a search service certainly requires more intense integration with the supplier than buying a license. However, one question that remains opened is if this difference influences the way in which the two Research & Development (R&D) commodities affect the DNP process. We believe that, exploring this issue can bring very interesting insights to innovation managers in charge of providing and selling R&D products.

Finally, studies dedicated to logistics practices should explore the use of specific logistics software with SC partners and try to answer whether software use improves or hinders flexibility in SC, since many logistic studies claim that software can bring more flexibility to the organisation.

In chapter 4, motivated by the strategic importance of competitive priorities in the structuring of the organisational objectives and also by the scarcity of empirical evidence on the relation between competitive priorities and integration dimensions, we sought to identify if and how the competitive priorities affect the adoption of integration dimensions. Thanks to bibliometric and literature review, it was possible to identify some areas that are not well explored in the area of SCI, such as the analysis of competitive priorities as a driver for adoption of integration dimensions with suppliers and customers. We found that competitive priorities, such as quality, delivery and flexibility, lead to the adoption of integration practices, helping to achieve companies’ goals at a strategic level. Therefore, companies that wish to achieve their priorities through their competitive priorities should make greater efforts for adopting the integration practices performed with suppliers and customers.

According to the previous literature CP cost and IT integration practices are positively linked because the adoption of IT practices can help companies reduce their inventories and consequently the decisions on stock’s levels through the sharing of information throughout the supply chain. Our results, however, do not present any significant relationship between the CP cost and IT dimension adoption. We attribute this result to the fact that IT integration practices demand great investments on software and the training of the employers, increasing then the costs of implementation.

Despite the lack of evidence in the literature on the relationship between flexibility and environmental management, our results show that there is a positive and significant relationship between CP flexibility and EM dimension, which is still an open road forfuture research may focus on delving deeper into this relation. This result demonstrates that manufacturing flexibility helps withstand a strong competitive response to environmental pressures. For example, when those involved in SC know and share environmental responsibilities, product changes, motivated by highly fluctuating demand and changing markets, happen frequently and satisfactorily.

The analyses also reveal interesting results found in previous studies related to two competitive priorities approached in this work, namely, cost and delivery. For instance, although many studies posit that when companies focus on the reduction of costs as a CP they should adopt IT dimension practices, we found that there is no significant relationship between the choice between the competitive priority cost and adoption of IT practices with suppliers and customers. Likewise, the results for the competitive priority of delivery shows that there is no significant relation between delivery and the adoption of logistics practices dimension, as the literature points out, these would facilitate information regarding the availability of raw material and products and status of shipping of products.

In Chapter 5, which deals with the effect of integration dimensions with suppliers and customers on operational performance, we analyse the effect of integration dimensions with suppliers and customers on operational performance. For doing so, using the same sample used in the previous chapters, we employ a regression multiple analysis and we make many additional tests such as sample error and confirmatory factorial analysis, in order to proof the reliability of our results.

We find a positive relation between the adoption of the integration dimensions and operational performance in all the analysed practices. The results suggest that adopting practices in a balanced way with suppliers and customers increases the flow of information through IT integration practices and enables fast delivery. It can also culminate in the increase of product quality by investing in the training of those involved in production, from raw material acquisition to delivery, avoiding rework.

Moreover, we believe that the incorporation of practices on QM dimension such as investment in training, evaluations and quality monitoring stimulate the improvement of performance in relation to the fulfilment of customer expectations in relation to the market, the quality of products offered and the performance of the product.

Regarding the EM dimension, the sustainable development of the company, complying with environmental standards and using materials from sources that use efficient resource management. The results also suggest that the more environmental integration practices are integrated into the mutual understanding of environmental responsibilities and working together with suppliers and customers to reduce impact, the greater the operational gains, such as reducing the time needed to design and/or manufacture environmentally friendly products, since suppliers will be aware of the criteria required to reduce the impact that the input or material they produce generates as well as ensure the customers' environmental requirements will be met.

Following our results in DNP dimensions, we believe that the use of DNP integration practices provides firms flexibility by training the technical staff in the ready attendance to the customer's requests regarding the modification or manufacture of a new product. Also, involvement with suppliers in DNP can increase flexibility in the design process and shorten the delivery time of a new product. Therefore, there is a need for some degree of compatibility in the structures for the operationalization of joint activities, such as engineering standards, test equipment, language used among those involved in the process, etc.

Finally, we ascribe the positive effect of LO dimension on op to the increase that the former provides on the capacity of firms to reach the deadlines established by the well-defined routes, according to the weight, capacity of the transport used. The adoption of LO dimension in a balance way with suppliers and customers, with the support of information technology, as pointed out in the questionnaire questions, also accelerates the response time for the development of services, maximizing then the time necessary to deliver what has been programmed.

In all the results achieved in the Chapter 5, technology plays a determining role in achieving the objectives of an organisation. It is possible to highlight que a process automation and management enhancements offered by software and other solutions not only help firms to better manage companies' resources, but also facilitates control strategies with SC partners, such as process mapping, data collection, and statistics on the performance of internal and external business activities, communication and integration systems that help respond to the demands, access and monitoring of performance indicators (inventory and sales, for example). Thus, SCM relies heavily on the help of the technological resources handled by the partners involved in chain activities.

In summary, our results suggest that to improve operational performance, companies might develop jointly actions between suppliers and customers, and one option for this is the use of information systems to monitor whether parties are meeting agreed targets and agreements. Given the final considerations made so far, one important question allows us to consider that if organisations that have well-integrated supply chains (force) across the line (equilibrium) will perform better in all dimensions of operational performance. These issues are important to decision makers as they provide insight into SCI's search strategies.

### 6.1 Implications for the academy

This work supposes some important endorsements for the literature in the area of operations management, specifically integration in the SC. First, because our model encompasses a systematic analysis of the literature on SCI and performance, pointing to variables used in previous studies, more relevant studies according to the citation they received, GAPS and possible variables to be studied in the future.

Second, the addition of positive empirical evidence to competitive priorities as a precedent for the adoption of integrated practices with suppliers and customers, since such a relationship is still a lack of the literature on supply chain management, thus a significant advance that should be completed with more background in the future. This model helps us to have a more complete view of the possible causes that lead a company to adopt integration dimensions and to enhance operational performance. The results demonstrate which properties can lead to the adoption of balanced practices with suppliers and customers.

Third, consideration of the five dimensions performed with suppliers and customers and their impact on operational performance. In addition, the consideration of more than one integration dimension is an important differential, since previous studies focus on specific dimensions. Our work points to IT, QM, EM, DNP and LO dimensions that can be performed with suppliers and customers to achieve operational performance. Among these dimensions, QM deserves attention due to the lack of literature related to operations management. In this sense, our results add evidence of the relationship between quality management and operational performance. EM practices also gain prominence due to the importance of the theme for the present and shows that they play an important role in the operational performance.

Another important contribution here is that, to the best of our knowledge, there is no measure that considers the adoption of integration dimensions in a balanced way with suppliers and customers. Therefore, we have created a measure to conduct the analysis of the adoption of practices in a balanced way. Our measure can serve as a basis for future studies in other samples or geographical contexts that aim to analyse the integration of a company with suppliers and customers.

### 6.2 Implications for managers

The results obtained in this work can be useful for the executives of companies that seek to implement integration dimensions, as these can improve the organisational operational performance as well as the performance of the SC. Companies that aim to compete on the basis of quality, delivery and flexibility should be aware of the adoption of integration dimensions with suppliers and customers. More specifically, companies that seek to compete through flexibility must pay attention to information technology dimension that are capable of transferring information about changes to the product or order in real time; quality management, will avoid rework and consequently decrease in the delivery time of the modified product or order; environmental management, how the company will adopt environmental certification systems, when a request for change is made, will meet these requirements; and finally, development of new product dimension reduce launch cycle times, reduce the number of nonconformities in components, and improve interframe and intra-firm communication.

This research provides indications for managers who seek to implement environmental management dimension as they could improve operational performance and even supply chain performance. Given the growing attention paid by leading global managers to the adoption and implementation of corporate environmental strategies, it is important that they understand key green integration practices that affect operational performance. Integration practices developed with suppliers such as mutual understanding of environmental responsibilities and working together to solve environmental problems and share know-how can help develop unique environmental competencies by enhancing the value chain. These integration practices may involve awareness-raising seminars on the importance of cleaner production, as well as guidance from suppliers to set up the environmental programs that need to be developed.

In similar fashion, customer practices can improve environmental capabilities as well as corporate reputation and thus help the company gain greater market share. Mutual understanding in this case may be accompanied by the provision of information on ecological issues concerning products and production methods. Other practices are also important when developed along with customers, such as improvement of packaging, eco-labelling, recovery of end-of-life products, use of environmentally friendly transport and packaging collection.

Although this study does not consider internal practices, it is important that managers consider organisational culture, that is, the adoption of integration dimensions should be supported by top management, that is, they must be committed and aligned with established goals for integration strategy to be developed with SC partners in order to strengthen the company's ability to communicate the environmental performance and impact of its products.

In all the models formulated in this work, the identification of key suppliers for each project / product is an important point that the managers must consider, considering the type of product, relationship that wishes to establish and degree of innovation. The proper use of the integration practices in the management of SC to lead the relationships established is able to overcome the productive potential of the integration, ensuring the achievement of the goals and established goals and the generation of benefits from the partnerships.

### 6.3 Limitations

Our research presents some limitations that diminish its explanatory capacity. Some of them refer to the sample used. The sample size is reduced (117) given the size of the analysed country, which may have limited our ability to detect the relationships studied as significant. In addition, the sample only concerns Brazilian companies, and the results can not be extrapolated to other populations or to verify university statements about the implications found in this research.

For analysing our hypotheses, we do not include time series effects that can affect the inference of the results, as we use cross section analyses. Consequently, it is possible that, we cannot capture some non-linearities that can affect the relationship among the variables analysed, as some actions carried out into the companies’ lack time to present results. For instance, it is possible that  investments on software or information systems for sharing information throughout the SC can reduce firms’ costs only in the years next to their adoption as companies can face difficulties to make the IT systems work in a satisfactory way (for instance, difficulties to trainee their employees and to share the system with their SC partners ) in the first moments of their implementation. We believe that this constitutes a limitation of our work. Future research can employ panel data analyses to verify the effect of the time on the relations between the dimensions that we have analysed in this study. In addition to these factors, the use of only one data source can be considered a limitation of our work, which can generate a certain bias in the estimates (Common Method Bias). It would also be necessary to treat performance information as being purely financial, rather than through respondents' perceptions. Or rather, contrast the responses received with financial data.

Therefore, as a palliative effect of some of our limitations and aiming to expand our study, the following section deals with future and possible lines of research from our study.

### 6.4 Future investigations

This thesis may have contributed to solving some problems related to research in the management of SCI, but above all it has opened up new challenges for future research. We have identified three lines of work that future research can focus on. The first one concerns the inclusion of moderating variables in the relationship between adoption of supplier and customer integration dimensions and their impact on operational performance. They could include variables about SC risk, company position in SC, sector and / or complexity of the environment in which the organisation is inserted in order to deepen this relationship and to know if the results change with the inclusion of new variables. The second is to expand the research to other sectors or countries to compare the results obtained with other populations. And the third, to use financial data to contrast with the data obtained from the questionnaire and to reduce the probability of bias in the estimates.

# APPENDIX

1. **List of companies surveyed**
2. **Research questionnaire**

1. **List of companies surveyed by NAICS code**

20 – Food and kindred products

1. 4 VENTOS AGRO INDUSTRIAL S/A
2. AGROINDUSTRIAL SAPUCAIA S/A
3. AMIDO GLUCOSE S A INDÚSTRIA E COMÉRCIO
4. BIOPALMA DA AMAZÔNIA S.A. REFLORESTAMENTO, INDÚSTRIA E COMÉRCIO
5. CLEALCO AÇUCAR E ÁLCOOL S.A
6. COMPANHIA INDUSTRIAL ITABIRA DO CAMPO
7. JOBEX AGRO INDUSTRIAL S.A
8. MARCHESAN AGROINDUSTRIAL E PASTORIL S.A.
9. RAÍZEN S.A
10. RBF INDÚSTRIA DE IMPLEMENTOS AGRÍCOLAS S/A
11. ROCHA SANTOS AGROINDUSTRIA S/A
12. SANTA ADÉLIA
13. SOCOCO S.A. AGROINDÚSTRIAS DA AMAZÔNIA
14. USINA BOM JESUS
15. USINA SANTA FÉ
16. USINA DELLA COLETTA
17. USINA RIO PRADO
18. USINA SÃO FRANCISCO

22 – Textile

1. CACHOEIRA VELONORTE S/A
2. CIA FABRIL DOS FIAES
3. CIA TÊXTIL FERREIRA GUIMARÃES
4. CIA. HERING
5. CIA. INDUSTRIAL CATAGUASES
6. COMPANHIA TECIDOS SANTANENSE
7. COMPANHIA TÊXTIL DE CASTANHAL
8. COTEMINAS S.A.
9. DEMILLUS
10. INDÚSTRIA TÊXTIL NS BELÉM LTDA
11. KARSTEN S/A
12. KORDSA BRASIL S/A
13. LUPO S/A

28 – Chemicals products

1. ALTHAIA S.A. INDÚSTRIA FARMACÊUTICA
2. CLOROETIL SOLVENTES ACÉTICOS S/A
3. COLORMINAS - COLORIFÍCIO E MINERAÇÃO S/A
4. COMPANHIA BRASILEIRA DE LÍTIO
5. COMPANHIA NITRO QUÍMICA BRASILEIRA
6. CONSTRUTORA MARQUISE S/A
7. EUROFARMA
8. FCC - NUKOTE INDÚSTRIA E COMÉRCIO S.A.
9. FLINT GROUP TINTAS E FOTO POLÍMEROS S.A. (Antiga XSYS SOLUÇÕES PARA IMPRESSÃO S/A)
10. FÓSFOREIRA BRASILEIRA S.A.
11. INDÚSTRIA REUNIDAS RAYMUNDO DA FONTE S/A
12. KEMI BRASIL INDÚSTRIA E COMÉRCIO DE PRODUTOS QUÍMICOS S/A
13. KEMWATER BRASIL S/A
14. KLACE S/A. PISOS E AZULEJOS
15. KOLETA AMBIENTAL S/A
16. NORTEC QUÍMICA S.A
17. PELE NOVA BIOTECNOLOGIA S.A.
18. PETRÓLEO E LUBRIFICANTES DO NORDESTE S/A - PETROLUSA
19. PIRACICABA AMBIENTAL S.A.
20. PROQUIMIA PRODUTOS QUÍMICOS DO BRASIL S.A.
21. QUÍMICA GERAL DO NORDESTE S/A
22. QUÍMICA INDUSTRIAL FIDES S/A (Incorporada)
23. QUIRIOS PRODUTOS QUÍMICOS S/A
24. SWEDISH MATCH DO BRASIL S/A
25. TOTAL BIOTECNOLOGIA IND E COM S/A

30 – Rubber and plastic products

1. ENGEPACK EMBALAGENS S/A
2. FIBRASA S/A
3. INPLAC INDÚSTRIA PLÁSTICOS S/A
4. PLASKAPER TERMOPLÁSTICOS S/A. (Antiga TEGMEN PLÁSTICOS S/A)
5. PLÁSTICOS CREMER S/A (BAIXADA DEVIDO A INCORPORAÇÃO)
6. PLÁSTICOS METALMA S/A
7. PLASTICOS NOVEL PARANA S/A
8. PLÁSTICOS REGINA S/A
9. PLÁSTICOS SCIPIÃO S/A IND. E COMÉRCIO
10. PLAXMETAL S/A - INDÚSTRIA DE CADEIRAS CORPORATIVAS
11. POLIGONO PRODUTOS E LIGAS PLASTICAS DO BRASIL S/A
12. POLYPLASTIC S/A INDÚSTRIA E COMÉRCIO
13. SACOPLAST INDÚSTRIA E COMÉRCIO DE ARTEFATOS PLÁSTICOS S/A
14. SANDENE S.A.
15. SANSUY S/A INDÚSTRIA DE PLÁSTICOS
16. TERMOLAR S/A
17. TIGRE S/A - TUBOS E CONEXÕES
18. UNIPLAST S/A
19. YORK INDÚSTRIA E COMÉRCIO DE PRODUTOS PLÁSTICOS S.A.
20. YPLASTIC EMBALAGENS PLÁSTICAS S/A

33 – Primary Metal

34 – Fabricated Metal

1. AÇOFORJA IND DE FORJADOS S/A
2. ALPHATEC S/A
3. ALUNORTE ALUMINA NORTE BRASIL S/A
4. AUTOMETAL S/A
5. AXIAL ESTRUTURAS METALICAS S/A
6. AXIS S/A
7. BAUMER S/A
8. BRAMETAL S.A. (Antiga BRAMETAL BRANDÃO METALÚRGICA S/A)
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12. COMPANHIA BRASILEIRA DE ALUMÍNIO
13. COMPANHIA BRASILEIRA DE METALURGIA E MINERAÇÃO
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16. CONFAB INDUSTRIAL S/A
17. ELEKEIROZ S/A
18. ELEVADORES ATLAS SCHINDLER S/A
19. ESMALTEC S/A
20. FERRAMENTAS GEDORE DO BRASIL S/A
21. FORJAS TAURUS S/A
22. FUNDIÇÃO ALTIVO S/A
23. GERDAU AÇOMINAS S/A
24. GLOCK
25. LUPATECH S.A
26. MAIS SOLUCOES INDUSTRIAIS S/A
27. MANGELS INDUSTRIAL S/A
28. MARINGÁ FERRO-LIGA S.A.
29. MELT METAIS E LIGAS S.A
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31. METALÚRGICA SANTA CECILIA S/A
32. METALÚRGICA SCHWARZ S/A
33. METALÚRGICA VALENÇA INDÚSTRIA E COMÉRCIO S/A
34. METASA S/A INDÚSTRIA METALÚRGICA
35. METISA - METALÚRGICA TIMBOENSE S/A
36. MORLAN S/A
37. RIMA INDUSTRIAL
38. SAPA ALUMINIUM BRASIL
39. SIDERURGICA NORTE BRASIL
40. SIDERURGICA SÃO JOAQUIM
41. VALE MANGANÊS S.A.
42. **Research questionnaire**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| DEMOGRAPHIC DATA | | | | | |
| Years stayed at the organization  Please, indicate how long you have been working in this company. | | | | | |
| Under 2 years | | | | | |
| 2–5 years | | | | | |
| 6–10 years | | | | | |
| Over 10 years | | | | | |
| From the value chain perspective, please, indicate which of the following situations applies to your company. | | | | | |
| We sell end-products directly to consumers. | | | | | |
| We sell end-products to other intermediaries (retail or wholesale distributors), who are selling to end-consumers. | | | | | |
| We sell products that are components/parts of other end-products (OEM). | | | | | |
| We sell products to other manufacturers, who vend their products as components/parts of other end-products (OEM). | | | | | |
| Please, indicate how do you estimate the consequences of the following risks concerning your company?  (1 = Insignificant; 2=minor; 3=moderate; 4=major; 5= Catastrophic) | | | | | |
|  | **1** | **2** | **3** | **4** | **5** |
| Supply chain disruption |  |  |  |  |  |
| Strike |  |  |  |  |  |
| Malfunction of IT-system |  |  |  |  |  |
| Accident (e.g. fire) |  |  |  |  |  |
| Change in customer demand |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Information technologies | | | | | | | | | | |
| Integration practices | **With Suppliers** | | | | | **With Customers** | | | | |
| Please, indicate the extent to which you agree with the following statements regarding information technologies integration practices with your suppliers and customers | **Strongly disagree** | **Disagree** | **Neither agree  nor disagree** | **Agree** | **Strongly agree** | **Strongly disagree** | **Disagree** | **Neither agree  nor disagree** | **Agree** | **Strongly agree** |
|  | **1** | **2** | **3** | **4** | **5** | **1** | **2** | **3** | **4** | **5** |
| Our information systems are synchronized with those of our partners' |  |  |  |  |  |  |  |  |  |  |
| We have access to the information systems on stocks and available resources of our partners. |  |  |  |  |  |  |  |  |  |  |
| We invest in information technologies to align our technology with our partners |  |  |  |  |  |  |  |  |  |  |
| We share advanced information systems with our partners to track and/or expedite shipments. |  |  |  |  |  |  |  |  |  |  |
| We use information technology with our partners for transaction processing of purchase orders and/or invoices. |  |  |  |  |  |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Quality Management | | | | | | | | | | |
| Integration practices | **With Suppliers** | | | | | **With Customers** | | | | |
| To what extent do you agree with the following statements regarding quality management integration practices with your suppliers and customers? | **Strongly disagree** | **Disagree** | **Neither agree  nor disagree** | **Agree** | **Strongly agree** | **Strongly disagree** | **Disagree** | **Neither agree  nor disagree** | **Agree** | **Strongly agree** | |
| We provide education and training on quality requirements and know-how to our partners (or we receive education and training on quality requirements and know-how from our partners). |  |  |  |  |  |  |  |  |  |  | |
| We recognize achievements and performance of our partners in the form of rewards (or we are recognized for achievements and performance by our partners in the form of rewards). |  |  |  |  |  |  |  |  |  |  | |
| We monitor the fulfillment of specifications of our partners (or we are monitored about the fulfillment of specifications by our partners) |  |  |  |  |  |  |  |  |  |  | |
| We require quality certifications to our partners (e.g. ISO 9001) (or we are required for quality certifications by our partners - e.g. ISO 9001). |  |  |  |  |  |  |  |  |  |  | |
| We systematically assess the capabilities of our partner (or our capabilities are systematically assessed by our partners). |  |  |  |  |  |  |  |  |  |  | |
| Environmental management | | | | | | | | | | |
| Integration practices | **With Supplier** | | | | | **With Customer** | | | | |
| To what extent do you agree with the following statements regarding environmental management integration practices with your suppliers and customers? | **Strongly disagree** | **Disagree** | **Neither agree  nor disagree** | **Agree** | **Strongly agree** | **Strongly disagree** | **Disagree** | **Neither agree  nor disagree** | **Agree** | **Strongly agree** | |
| We develop a mutual understanding of responsibilities regarding environmental management with our partners. |  |  |  |  |  |  |  |  |  |  | |
| We work together with our partners to reduce environmental impact of our products and activities. |  |  |  |  |  |  |  |  |  |  | |
| We require (or we are required) environmental certifications to (by) our partners (e.g. ISO 14001).  We require environmental certifications to our partners (e.g. ISO 14001) (or we are required for environmental certifications by our partners - e.g. ISO 14001) |  |  |  |  |  |  |  |  |  |  | |
| We interchange environmental technical advice with our partners to meet environmental criteria. |  |  |  |  |  |  |  |  |  |  | |
| We require our partners to use environmental packaging (or we are required by our partners to use environmental packaging) |  |  |  |  |  |  |  |  |  |  | |
| Development of New Product | | | | | | | | | | |
| Integration practices | **With Suppliers** | | | | | **With Customers** | | | | |
| To what extent do you agree with the following statements regarding new product development integration practices with your suppliers and customers? | **Strongly disagree** | **Disagree** | **Neither agree  nor disagree** | **Agree** | **Strongly agree** | **Strongly disagree** | **Disagree** | **Neither agree  nor disagree** | **Agree** | **Strongly agree** | |
| Decisions about launching new products are made considering the opinions of both parts. |  |  |  |  |  |  |  |  |  |  | |
| Personnel of both parts participate in development teams. |  |  |  |  |  |  |  |  |  |  | |
| Both parties collaborate in product design and development. |  |  |  |  |  |  |  |  |  |  | |
| Both parties share prototypes along the development process. |  |  |  |  |  |  |  |  |  |  | |
| Both parties have established systems to collect ideas and proposals and improve products. |  |  |  |  |  |  |  |  |  |  | |
| Logistic | | | | | | | | | | |
| Integration practices | **With Supplier** | | | | | **With Customer** | | | | |
| To what extent do you agree with the following statements regarding logistics integration practices with your suppliers and customers? | **Strongly disagree** | **Disagree** | **Neither agree  nor disagree** | **Agree** | **Strongly agree** | **Strongly disagree** | **Disagree** | **Neither agree  nor disagree** | **Agree** | **Strongly agree** | |
| Logistics activities are integrated (e.g. standardized containers, compatible equipment). |  |  |  |  |  |  |  |  |  |  | |
| We use shared logistics software to manage inventory, meet demand, and actual sales data. |  |  |  |  |  |  |  |  |  |  | |
| Containers and packaging instruments of outgoing (or incoming) materials are adapted to the precise requirements of both parties. |  |  |  |  |  |  |  |  |  |  | |
| We coordinate to optimize the usage of vehicles’ capacity (shipment consolidation). |  |  |  |  |  |  |  |  |  |  | |
| Both parties have mutually adapted the delivery arrangements requirements (e.g. shipment size, frequency) |  |  |  |  |  |  |  |  |  |  | |

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| --- | --- | --- | --- | --- | --- |
| The following items refer to your industry environment. Please use the scale below to indicate the extent to which you agree or disagree with the following statements: | Strongly disagree | Disagree | Neither agree  nor disagree | Agree | Strongly agree |
| The production technology in our industry changes fast |  |  |  |  |  |
| Technological advances in our industry are hard to predict |  |  |  |  |  |
| Core supporting technologies often change |  |  |  |  |  |
| Our competitors are very aggressive in their price decisions |  |  |  |  |  |
| Our competitors constantly propose new products or improved products to our target consumers |  |  |  |  |  |
| Our competitors offer highly substitutive products/services |  |  |  |  |  |
| Consumer demand for our products is very unstable |  |  |  |  |  |
| Demand and consumer preferences are hard to predict |  |  |  |  |  |
| Customer's requirement regarding part preferences often change |  |  |  |  |  |
| The following items refer to your competitive priorities (cost, quality, delivery and flexibility). Please use the scale below to indicate the extent to which you agree or disagree with the following statements: | **Strongly disagree** | **Disagree** | **Neither agree  nor disagree** | **Agree** | **Strongly agree** |
| We prioritize the production and distribution of products at low prices. |  |  |  |  |  |
| We prioritize low inventory levels. |  |  |  |  |  |
| We prioritize low price products. |  |  |  |  |  |
| We prioritize product manufacturing with high quality or certification standards (quality compliance, product durability). |  |  |  |  |  |
| We prioritize the production of quality products focusing on durability and reliability. |  |  |  |  |  |
| We prioritize high efficacy in attending the customer complaints. |  |  |  |  |  |
| We prioritize quick response to customer orders (delivery speed) and on-time delivery (delivery compliance). |  |  |  |  |  |
| We prioritize reliable delivery to our customers. |  |  |  |  |  |
| We prioritize responsiveness to changes in design modifications or production sequence. |  |  |  |  |  |
| We prioritize the changes in products (customization). |  |  |  |  |  |
| We prioritize the introduction of new products (updated and launching products). |  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Respect to number of active customers, how many does this company serve (approximately)? | Less than 15 [ ] | 16-30 [ ] | 31-45 [ ] | More than 45 [ ] |
| Respect to number of active suppliers, how many does the company have? | **Less than 15** [ ] | **16-30** [ ] | **31-45**  [ ] | **More than 45** [ ] |
| Respect to your product life cycle, indicate what is the average life cycle of your products (years)? | **Less than 5 years**  [ ] | **6-10 years**  **[ ]** | **More than 10 years**  **[ ]** | |
| Respect to percentage of purchases imported, indicate what percentage of purchases come from your home country? | **0-25%**  **[ ]** | **26-50 %**  **[ ]** | **51-75 %**  **[ ]** | **76-100%**  **[ ]** |
| Please idicate the percentage of exports (in monetary units) | **0-25%**  **[ ]** | **26-50 %**  **[ ]** | **51-75 %**  **[ ]** | **76-100%**  **[ ]** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| PERFORMANCE OPERATIONAL |  |  |  |  |  |
| Please rate the relative position of your facility with respect to your competitors according to the following indicators of operational performance  (very inferior (1), somewhat inferior (2), equivalent (3), somewhat superior (4), or very superior (5)). | **1** | **2** | **3** | **4** | **5** |
| Performance of our final products |  |  |  |  |  |
| Unit cost of manufacturing |  |  |  |  |  |
| Product quality (degree of conformity to specifications) |  |  |  |  |  |
| Customer support and service. |  |  |  |  |  |
| Time needed for designing and/or manufacturing products |  |  |  |  |  |
| Capacity to meet customers’ requirements in time |  |  |  |  |  |
| Pace of new product launching and range of products in catalogue |  |  |  |  |  |
| Flexibility to adapt production to different volumes of demand |  |  |  |  |  |

|  |
| --- |
| JOB TITLE  Please, indicate your working position in this company: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**RESUMEN**

**UNIVERSIDAD DE SALAMANCA**

**FACULTAD DE ECONOMÍA Y EMPRESA**

DEPARTAMENTO DE ADMINISTRACIÓN Y ECONOMÍA DE LA EMPRESA

PROGRAMA DE DOCTORADO EN ECONOMÍA DE LA EMPRESA



TESIS DOCTORAL

**TÍTULO:**

EL EFECTO DE INTEGRAR CON PROVEEDORES Y CLIENTES EN EL DESEMPEÑO OPERATIVO: EVIDENCIA DE FABRICANTES BRASILEÑOS

Tesis doctoral presentada por: Hannah de Oliveira Santos

Supervisado por: Dr. Javier Gonzalez-Benito

Dr. Gustavo Lannelongue

Salamanca, 2019.

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## Introducción

Los estudiosos han articulado durante mucho tiempo la necesidad de una relación estrecha e integrada entre los fabricantes y sus socios de Supply Chain (SC) (por ejemplo, Lambert et al., 2005). Sin embargo, solo recientemente ha habido un llamado a un enfoque sistemático para la Cadena de Suministro Integrada (CSI), ya que la creciente competencia global ha llevado a las organizaciones a repensar la necesidad de asociaciones de suministro cooperativas mutuamente beneficiosas (Lambert y Cooper, 2000, Wisner y Tan, 2000) y la mejora conjunta de los procesos interorganizacionales se ha convertido en una alta prioridad (Zhao et al., 2008).

CSI es reconocido como una estrategia para mejorar el desempeño del negocio en entornos altamente competitivos. En reconocimiento de esto, las empresas manufactureras están siguiendo una variedad de prácticas de gestión de la cadena de suministro (Narasimhan y Kim, 2001). Sin embargo, no existe una definición formal de qué factores constituyen la integración de la cadena de suministro. En la literatura, la integración ha sido un tema clave en los estudios que tratan con Supply Chain Management (SCM) (por ejemplo, Lee et al., 1997; Stank et al, 2001; McCarthy y Golicic, 2002). CSI ha sido conceptualizado en varios niveles: funcional, interno y externo, abarcando cuestiones de clientes, fabricación, distribución y adquisición (Stevens, 1990). Si bien algunos estudios se centran en las dimensiones individuales de CSI, en particular, la integración con clientes o proveedores (Cousins ​​y Menguc, 2006, Koufteros et al., 2007), otros examinan la CSI como una sola construcción (Rosenzweig et al., 2003). En base a esto, vimos la necesidad de desarrollar un trabajo que pudiera considerar la CSI desde una perspectiva ascendente y descendente para proporcionar una visión amplia de CSI.

Además de eso, los estudios anteriores se han centrado en analizar la relación entre CSI y el rendimiento y sus hallazgos varían según factores como las prácticas analizadas, el tamaño de la muestra y los países estudiados. Por ejemplo, algunos artículos muestran que esta relación es positiva (por ejemplo, Frohlich y Westbrook, 2001; Stank et al 2001; Vickery et al., 2003; Towill y Childerhouse, 2003), mientras que otros autores no encontraron evidencia para apoyar esta afirmación (por ejemplo, Ho et al 2002; Sriram y Stump, 2004). Estos resultados condujeron a hallazgos importantes, pero aún carecen de explicación sobre la relación entre CSI y el rendimiento.

Con base en lo anterior, el objetivo general de este trabajo es analizar la influencia de las dimensiones de integración en el rendimiento operativo. Para alcanzar nuestro objetivo, utilizamos el escenario brasileño, para analizar cómo los fabricantes brasileños están desarrollando sus relaciones con proveedores y clientes, y en qué medida la adopción de estas prácticas impacta efectivamente en el desempeño operativo de la organización.

Este estudio tiene dos contribuciones principales. El primero se refiere a la identificación de las principales dimensiones de integración más abordadas en la literatura y, en secuencia, a la identificación de las prácticas de integración correspondientes a estas dimensiones. Para identificar las prácticas de integración, realizamos un estudio sistemático sobre la literatura de CSI y el rendimiento.

La segunda contribución es llevar a cabo los análisis de las relaciones propuestas considerando el desarrollo de dimensiones a nivel ascendente y descendente. De la misma manera que identificamos las dimensiones de integración más discutidas en la literatura, observamos que los estudios de CSI apenas consideran el análisis de las dimensiones de integración considerando las relaciones desarrolladas con proveedores y clientes, y por lo tanto, en este estudio, decidimos considerar la integración dimensiones a nivel aguas arriba y aguas abajo.

## Objetivos y propuesta de tesis.

Analizando la literatura, identificamos algunas peculiaridades en el análisis de CSI. Las investigaciones abordan la integración como estrategias de integración (por ejemplo, Frohlich y Westbrook, 2001) o mediante una dimensión de integración específica, como el uso de tecnologías de comercio electrónico que impactan en la integración y el desempeño organizacional (por ejemplo, Sanders, 2007). Por lo tanto, identificamos la necesidad de investigar la integración de SC de acuerdo con las principales dimensiones de integración y que tienen un efecto directo en el proceso de gestión de CSI. Este trabajo tiene como objetivo completar un GAP identificado para analizar la integración desde la perspectiva de varias prácticas de integración desarrolladas entre proveedores y clientes para verificar si las prácticas influyen en el rendimiento operativo. Hay tres objetivos específicos propuestos en esta tesis, que se discutieron en cuatro artículos y se detallarán a continuación.

### Objetivos específicos

Nuestro primer objetivo es investigar sistemáticamente la literatura existente sobre el CSI y el desempeño organizacional, con el propósito de identificar GAPS y tendencias en el área, así como mapear la literatura existente sobre los principales autores, organizaciones académicas y países estudiados. En vista de esto, nuestro objetivo es presentar una visión integral e integrada de la literatura publicada sobre todos los aspectos y facetas de CSI y el desempeño organizacional para facilitar estudios, prácticas e investigaciones.

Nuestro segundo objetivo es verificar el efecto de las prioridades competitivas, como impulsores, en la adopción de dimensiones de integración con proveedores y clientes. Para esto, presentamos un modelo conceptual y un estudio exploratorio que discuten las prioridades competitivas como impulsores para la adopción de prácticas de integración entre empresas industriales y sus proveedores y clientes.

Por lo tanto, nuestro tercer objetivo es analizar el efecto de las dimensiones de integración con proveedores y clientes en el rendimiento operativo. En particular, para analizar el impacto de adoptar diferentes dimensiones de integración y el impacto en el desempeño operativo organizacional basado en cinco dimensiones de actividad, las empresas generalmente integran sus operaciones con proveedores y clientes, como se destaca en la literatura. Uno de los factores que impulsa esta investigación es el contexto geográfico en el que se analizan las prácticas en este trabajo, que se encuentra en un país en desarrollo y que aún está poco explorado con respecto a la gestión integrada de SC, específicamente con respecto a la integración con los proveedores y clientes.

En el momento de este trabajo, muchos documentos habían validado las escalas de CSI para determinar la relación de la empresa con proveedores y clientes, pero estas escalas no son útiles para el desempeño de nuestro trabajo, ya que queremos analizar el impacto de las prácticas de integración en cinco principales dimensiones de integración. Por lo tanto, este trabajo buscó construir medidas para las prácticas de integración en SC, que servirán como base para futuras investigaciones en el área, extendiendo la investigación a otros contextos geográficos y contribuyendo a la literatura de gestión de operaciones. Para cumplir con este objetivo, revisamos la literatura sobre integración en SC, y recopilamos las medidas más utilizadas en los trabajos en cada dimensión de integración, analizamos los datos a través de un análisis estadístico e inferimos los resultados de acuerdo con las hipótesis establecidas.

## Elección del escenario brasileño como foco de investigación.

Nuestra investigación se lleva a cabo en Brasil, un mercado emergente cuyo tamaño de economía (PIB) ha pasado de 65 a 9 posiciones en los últimos 20 años (Fondo Monetario Internacional, 2019). Brasil es uno de los llamados mercados emergentes: es la "B" del grupo BRICS y es miembro de varias organizaciones económicas, como el Mercado Común del Sur (Mercosur). Tiene cientos de socios comerciales, y alrededor del 60% de las exportaciones del país se refieren a productos manufacturados y semimanufacturados. A pesar de la importancia del escenario brasileño, poco se desarrolló con respecto a la visión de integración con socios de SC o en relación con la recomendación de cuál sería la mejor relación entre las empresas. Esto lleva a un interés en desarrollar este estudio exploratorio que cubre un segmento importante de la industria brasileña y representa una oportunidad para impulsar las prácticas y el conocimiento en estas empresas.

Creemos que los estudios en diferentes contextos geográficos pueden presentar diferentes resultados sobre la relación entre las prácticas de integración y el desempeño organizacional (Laosirihongthong et al., 2013). En este sentido, contribuimos a la literatura mediante la construcción de un modelo integral que abarca construcciones utilizadas en otras investigaciones (por ejemplo, Chiou et al., 2011; Green et al., 2012; González-Benito, 2007), proporcionando evidencia empírica que analiza la adopción. de prácticas de integración en SC y desempeño operativo de las interacciones entre organización, proveedor y cliente en el contexto de seis sectores de industrias manufactureras en Brasil.

## Relevancia de la tesis

Dado lo anterior, hacemos las siguientes contribuciones a la literatura. Primero, ampliamos trabajos anteriores analizando más dimensiones que las cubiertas por estudios previos (por ejemplo, Vachon y Klassen, 2008; Frohlich y Westbrook, 2001). Los trabajos anteriores abordan dimensiones específicas de la organización para analizar empíricamente la relación entre las prácticas de integración y el rendimiento, como Petersen et al. (2005), quienes examinan si la participación del proveedor en el desarrollo de nuevos productos puede producir mejoras significativas en los rendimientos financieros y / o el rendimiento del diseño del producto o el trabajo de Prajogo y Olhager (2012) que investiga la integración de la tecnología de información (TI) y los flujos de materiales (LO) entre socios de la cadena de suministro y sus efectos en el rendimiento operativo. En este estudio, consideramos las prácticas de integración desarrolladas en cinco dimensiones de integración identificadas como las más estudiadas en la literatura de CSI, cada una de las cuales incluye cinco elementos relacionados con la integración entre la organización y los proveedores o clientes.

En segundo lugar, según nuestro conocimiento, no existe una medida en la literatura de gestión de integración que considere la adopción conjunta de prácticas de integración entre proveedores y clientes. Muchos autores consideran la integración conjunta de acuerdo con la medida utilizada por Frohlich y Westbrook (2001) que utiliza cuartiles para conceptualizar la integración a través de su dirección y extensión (para clientes y / o proveedores), otros estudios abordan la integración con proveedores y clientes por separado (por ejemplo, Liu et al., 2012). Por lo tanto, hemos creado una medida que captura las prácticas de integración desarrolladas conjuntamente con proveedores y clientes y servirá como base para futuros estudios destinados a analizar la integración de la empresa con proveedores y clientes.

En tercer lugar, la mayoría de los estudios que analizan la relación entre CSI y el rendimiento utilizan muestras de países como los Estados Unidos (Ej., Iyer et al. 2009; Droge et al., 2012) y China (Ej., Jayaram et al., 2011; Lai et al., 2014). La falta de investigación empírica en los países en desarrollo indica una brecha en el área de LME, ya que no es posible saber cómo se están desarrollando las prácticas de integración en las industrias de estas localidades con respecto a la integración de SC, e identificar los puntos que Estos países deben enfocarse en desarrollar sus actividades de integración en SC, siendo una oportunidad para explorar el contexto geográfico de Brasil, que todavía es poco estudiado a pesar de su importancia como lo señalamos anteriormente.

Este trabajo contribuye al estudio de la integración en SC al proporcionar una visión amplia de las prácticas de integración y su impacto en el desempeño organizacional, así como también proporciona una visión general de la gestión integrada de la cadena de suministro y el área de desempeño operativo. Por lo tanto, contribuimos al debate sobre la efectividad de la implementación de prácticas de integración en el desempeño organizacional mediante la construcción de una herramienta de investigación que sea capaz de capturar el análisis de las prácticas de integración con proveedores y clientes en cinco dimensiones de integración, desde el enfoque de trabajo previo prácticas de integración en cierta dimensión o considerando la integración como una visión estratégica, y también mediante la aplicación de esta herramienta en un contexto geográficamente escaso, como el contexto brasileño, y que los resultados de esta investigación pueden llevar el desarrollo a las empresas y, en consecuencia, a su oferta cadenas.

### Estructura de la tesis

Esta tesis doctoral está estructurada en seis capítulos que se complementan entre sí. El primer documento (capítulo 2), llamado análisis bibliométrico de la relación entre la integración de la cadena de suministro y el desempeño organizacional compila los documentos que analizan esta relación. El propósito de este capítulo es cuatro, a saber: (1) crear una representación de la estructura del área de investigación dividiendo elementos (documentos, autores, revistas, variables utilizadas para definir CSI y rendimiento) en diferentes grupos (Zupic y Čater, 2015) utilizando rigurosos instrumentos bibliométricos. También ayuda a identificar a los investigadores más influyentes dentro de los grupos y a aclarar qué campos de estudio fueron primordiales para la expansión de la investigación e identifica qué temas son los más abordados por estos investigadores; (2) Distinguir las diferentes dimensiones de CSI. En particular, es importante reunir todas las principales dimensiones de integración resaltadas en la literatura sobre CSI en diferentes grupos por similitud (3) Encuentre los GAPS en la literatura sobre CSI y desempeño; (4) Identificar tendencias / oportunidades para futuras investigaciones a desarrollar en el campo de la gestión de operaciones. Para lograr los objetivos de este capítulo, se realizaron dos tipos de análisis: (1) un análisis bibliométrico, capaz de identificar la influencia del autor, la afiliación y las variables utilizadas y (2) un análisis de red que identifica áreas actuales y emergentes y describe a fondo relaciones dentro de un campo científico específico y en el proceso de identificación de artículos clave.

El tercer capítulo está dedicado al análisis descriptivo de la muestra utilizada en los capítulos 4 y 5. En este capítulo probamos la validez de las herramientas de medición comparando tres grupos de variables: industria, posición de la empresa en SC y ciclo de vida para las prácticas de integración. Estos análisis describen las principales características de las empresas encuestadas y también las principales características de los sectores en los que las empresas realizan sus actividades.

El cuarto documento (capítulo 4) tiene como objetivo analizar si las Prioridades Competitivas (PC) afectan la adopción de dimensiones de integración entre una planta focal y sus proveedores y clientes. Presentamos un modelo conceptual y un estudio exploratorio que abordan las prioridades competitivas como impulsores para la adopción de dimensiones de integración entre las empresas manufactureras y sus proveedores y clientes. Para esto, revisamos la literatura e identificamos los argumentos que conducen a proponer cuatro hipótesis que prueban el impacto de cada una de las prioridades competitivas consideradas en el desempeño operativo.

Finalmente, en el quinto artículo (capítulo 5), presentamos el modelo principal de este trabajo que aborda la relación de las cinco dimensiones de integración más representativas y abordadas en la literatura y el desempeño operativo. A pesar de la variedad de estudios que contemplan la integración en SC con proveedores y clientes, la mayoría de los estudios se centran en la relación con los proveedores y se olvidan de la relación con los clientes, y este es el argumento principal en el desarrollo de este estudio: la consideración de Las dimensiones de integración desarrolladas tanto con proveedores como con clientes.

En el capítulo 6, el capítulo final de la tesis, recopilaremos los principales resultados encontrados en capítulos anteriores, enfatizando las principales implicaciones teóricas y prácticas para los académicos y gerentes. Presentamos las limitaciones que encontramos para la realización de este trabajo y la investigación futura que queremos abordar a partir de este trabajo.

1. **Conclusiones de la tesis**

Este trabajo tuvo como objetivo analizar el efecto de adoptar dimensiones de integración con proveedores y clientes en el rendimiento operativo. Para ello, analizamos el entorno brasileño, que presenta algunas características especiales que lo convierten en un escenario interesante para este estudio, ya que es una de las economías más grandes del mundo y los fabricantes representan el 25% de su PIB. Aunque es importante, Brasil es un entorno aún poco estudiado ya que la mayor parte de la literatura especializada sobre CSI se centra en los EE. UU., China y la Eurozona, para lo cual este estudio contribuye a la literatura existente al hacer un análisis de la integración entre proveedores y clientes en la cadena de suministro y también mediante el uso de una nueva primicia geográfica.

Esta tesis doctoral está estructurada en tres capítulos centrales (o artículos científicos) en los que abordamos tres objetivos principales. En el primer capítulo central titulado “Revisión sistemática: integración de la cadena de suministro y desempeño organizacional”, realizamos un estudio sistemático para identificar los resultados encontrados en la literatura previa sobre la relación entre CSI y el desempeño organizacional. En este capítulo, identificamos lagunas y tendencias en el área de gestión operativa y también mapeamos los principales autores, organizaciones académicas y países donde se desarrollaron los estudios en el camino. Los resultados revelan que, aunque la relación entre CSI y el rendimiento se ha estudiado durante mucho tiempo, todavía hay un interés creciente en el campo, ya que el número de investigaciones científicas en el camino sigue aumentando en los últimos años. También encontramos que la mayoría de los estudios en este camino se concentran en unos pocos países, siendo EE. UU. y China y los países de la zona euro los principales, mientras que hay muy pocos estudios realizados en otros países, como América Latina y BRIC países (excepto China).

Estos hallazgos evidencian la falta de estudios empíricos en países menos desarrollados y sugieren que existe una brecha en el área de LME y dificulta a los investigadores y responsables políticos identificar los puntos en los que estos países deberían enfocarse para desarrollar sus actividades de integración en SC. Esto también representa una oportunidad para explorar áreas geográficas que aún no se han estudiado, y más, para fomentar, a través de la investigación y el conocimiento, el crecimiento y el desarrollo de actividades industriales.

Otro aspecto que podríamos identificar es que pocos documentos emplean el uso de comparaciones entre países. El uso de muestras que incluyen estudios de varios países puede ser interesante, ya que puede mostrar hasta qué punto los factores culturales pueden interferir o impulsar la implementación / desarrollo de la integración SC.

En el capítulo 2, también buscamos identificar tendencias en los estudios relacionados con las dimensiones integradas. Para hacerlo, en base a la literatura existente, primero clasificamos las dimensiones de integración en cinco tipos, a saber, Tecnologías de la información (TI), Gestión de Calidad (GC), Gestión ambiental (GA), Desarrollo de Nuevos Productos (DNP) y, finalmente, Logística (LO). Luego analizamos estudios recientes en el camino para identificar los aspectos que los autores han abordado más en la literatura reciente.

La dimensión de TI es muy peculiar, ya que es una de las dimensiones que cambia constantemente a lo largo de los años. Esta dimensión es muy importante porque el CSI solo puede estar activo si las tecnologías apoyan las interacciones y adaptan las necesidades de los socios de SC. En base a esto, la tendencia es centrarse en analizar empíricamente los nuevos mecanismos de transacción descentralizados y transparentes en industrias y negocios y cómo el intercambio de información, a través de la tecnología *blockchain*, puede proporcionar confiabilidad y transparencia a las empresas. Además de la tendencia de las tecnologías *blockchain*, otros dos puntos están vinculados con los avances de las tecnologías: industria 4.0 y Big Data. Una vez más, las investigaciones deberían centrarse en ampliar la evidencia empírica sobre la relación entre el uso de Big Data en la cadena de suministro y el rendimiento operativo. Además, para tratar de comprender el papel de los gerentes en la asimilación, adopción e implementación de un SC basado en Big Data.

La mayoría de los artículos tratan sobre prácticas desarrolladas dentro de la organización o desarrolladas en SC y no entre proveedores y clientes (por ejemplo, Vanichchinchai e Igel, 2010). Creemos que es necesario, entonces, explorar prácticas de calidad interorganizacional, específicamente entre los socios de SC. Muchas empresas invierten tiempo y dinero en compras de software que prometen mejorar la eficiencia de la gestión de relaciones con proveedores y clientes, siendo también necesaria la inversión en la capacitación de quienes manejan el software y los sistemas de producción. Por lo tanto, la investigación futura debe centrarse en el desarrollo de las capacidades de conocimiento intangibles necesarias para obtener una respuesta efectiva a las expectativas con respecto al desempeño de las prácticas de integración en SC, como la implementación de programas de capacitación y educación de los socios de SC.

En la dimensión GA, la literatura previa ha enfatizado que el CSI puede reducir los impactos ambientales y promover los beneficios operativos al alentar el diseño para la reutilización y recuperación / reutilización de materiales. Por lo tanto, estos resultados contribuyen a la aparición de nuevos modelos de negocio basados en la economía circular. Este concepto revela que un tipo de materia prima que ya no es útil para una industria puede ser reciclada por otra industria, constituyendo entonces un sistema de producción circular. La investigación futura debe analizar las motivaciones, barreras, implicaciones y beneficios organizacionales de adoptar sistemas de producción circulares, y cómo los proveedores y clientes pueden integrarse en ese sistema.

En la cuarta dimensión analizada (DNP), pudimos identificar que los investigadores podrían hacer esfuerzos para destacar aspectos de la compra de licencias de patentes y la compra de servicios de investigación. Sabemos, por ejemplo, que comprar un servicio de búsqueda ciertamente requiere una integración más intensa con el proveedor que comprar una licencia. Sin embargo, una pregunta que queda abierta es si esta diferencia influye en la forma en que los dos productos de Investigación y Desarrollo (I + D) afectan el proceso de DNP. Creemos que explorar este tema puede aportar ideas muy interesantes a los gerentes de innovación encargados de proporcionar y vender productos de I + D.

Finalmente, los estudios dedicados a las prácticas logísticas deberían explorar el uso de software logístico específico con los socios de SC y tratar de responder si el uso del software mejora o dificulta la flexibilidad en SC, ya que muchos estudios logísticos afirman que el software puede aportar más flexibilidad a la organización.

En el capítulo 4, motivados por la importancia estratégica de las prioridades competitivas en la estructuración de los objetivos organizacionales y también por la escasez de evidencia empírica sobre la relación entre las prioridades competitivas y las dimensiones de integración, buscamos identificar si las prioridades competitivas afectan la adopción y cómo de dimensiones de integración. Gracias a la revisión bibliométrica y bibliográfica, fue posible identificar algunas áreas que no están bien exploradas en el área de CSI, como el análisis de prioridades competitivas como motor para la adopción de dimensiones de integración con proveedores y clientes. Descubrimos que las prioridades competitivas, como la calidad, la entrega y la flexibilidad, conducen a la adopción de prácticas de integración, lo que ayuda a alcanzar los objetivos de las empresas a un nivel estratégico. Por lo tanto, las compañías que desean alcanzar sus prioridades a través de sus prioridades competitivas deben hacer mayores esfuerzos para adoptar las prácticas de integración realizadas con proveedores y clientes.

 De acuerdo con la literatura anterior, el costo de CP y las prácticas de integración de TI están vinculadas positivamente porque la adopción de prácticas de TI puede ayudar a las empresas a reducir sus inventarios y, en consecuencia, las decisiones sobre los niveles de existencias a través del intercambio de información en toda la cadena de suministro. Nuestros resultados, sin embargo, no presentan ninguna relación significativa entre el costo de CP y la adopción de la dimensión de TI. Atribuimos este resultado al hecho de que las prácticas de integración de TI exigen grandes inversiones en software y la capacitación de los empleadores, lo que aumenta los costos de implementación.

A pesar de la falta de evidencia en la literatura sobre la relación entre la flexibilidad y la gestión ambiental, nuestros resultados muestran que existe una relación positiva y significativa entre la flexibilidad de la PC y la dimensión EM, que sigue siendo un camino abierto para futuras investigaciones que pueden centrarse en profundizar en Esta relación. Este resultado demuestra que la flexibilidad de fabricación ayuda a resistir una fuerte respuesta competitiva a las presiones ambientales. Por ejemplo, cuando los involucrados en SC conocen y comparten responsabilidades medioambientales, los cambios de producto, motivados por una demanda altamente fluctuante y mercados cambiantes, ocurren con frecuencia y satisfactoriamente.

Los análisis también revelan resultados interesantes encontrados en estudios anteriores relacionados con dos prioridades competitivas abordadas en este trabajo, a saber, el costo y la entrega. Por ejemplo, aunque muchos estudios postulan que cuando las empresas se centran en la reducción de costos como CP deben adoptar prácticas de dimensión de TI, descubrimos que no existe una relación significativa entre la elección entre el costo de prioridad competitivo y la adopción de prácticas de TI con proveedores y clientes. Asimismo, los resultados para la prioridad competitiva de la entrega muestran que no existe una relación significativa entre la entrega y la adopción de la dimensión de prácticas logísticas, como lo señala la literatura, esto facilitaría la información sobre la disponibilidad de materia prima y productos y el estado del envío de productos.

En el Capítulo 5, que trata el efecto de las dimensiones de integración con proveedores y clientes en el rendimiento operativo, analizamos el efecto de las dimensiones de integración con proveedores y clientes en el rendimiento operativo. Para hacerlo, utilizando la misma muestra utilizada en los capítulos anteriores, empleamos un análisis múltiple de regresión y realizamos muchas pruebas adicionales, como error de muestra y análisis factorial confirmatorio, para demostrar la fiabilidad de nuestros resultados.

 Encontramos una relación positiva entre la adopción de las dimensiones de integración y el desempeño operativo en todas las prácticas analizadas. Los resultados sugieren que la adopción de prácticas de manera equilibrada con proveedores y clientes aumenta el flujo de información a través de prácticas de integración de TI y permite una entrega rápida. También puede culminar en el aumento de la calidad del producto al invertir en la capacitación de aquellos involucrados en la producción, desde la adquisición de la materia prima hasta la entrega, evitando la reprocesamiento.

Además, creemos que la incorporación de prácticas en la dimensión QM como la inversión en capacitación, evaluaciones y monitoreo de calidad estimulan la mejora del desempeño en relación con el cumplimiento de las expectativas del cliente en relación con el mercado, la calidad de los productos ofrecidos y el desempeño del producto.

En cuanto a la dimensión EM, el desarrollo sostenible de la empresa, el cumplimiento de las normas ambientales y el uso de materiales de fuentes que utilizan una gestión eficiente de los recursos. Los resultados también sugieren que mientras más prácticas de integración ambiental se integren en la comprensión mutua de las responsabilidades ambientales y trabajando junto con proveedores y clientes para reducir el impacto, mayores serán las ganancias operativas, como la reducción del tiempo necesario para diseñar y / o fabricar productos amigables con el medio ambiente. productos, ya que los proveedores conocerán los criterios requeridos para reducir el impacto que genera la entrada o el material que producen, así como para garantizar que se cumplan los requisitos ambientales de los clientes.

Siguiendo nuestros resultados en las dimensiones de DNP, creemos que el uso de las prácticas de integración de DNP brinda flexibilidad a las empresas al capacitar al personal técnico en la atención inmediata a las solicitudes del cliente con respecto a la modificación o fabricación de un nuevo producto. Además, la participación con proveedores en DNP puede aumentar la flexibilidad en el proceso de diseño y acortar el tiempo de entrega de un nuevo producto. Por lo tanto, existe la necesidad de cierto grado de compatibilidad en las estructuras para la operacionalización de actividades conjuntas, como estándares de ingeniería, equipos de prueba, lenguaje utilizado entre los involucrados en el proceso, etc.

Finalmente, atribuimos el efecto positivo de la dimensión LO en el desempeño operacional al aumento que la primera proporciona en la capacidad de las empresas para alcanzar los plazos establecidos por las rutas bien definidas, de acuerdo con el peso, la capacidad del transporte utilizado. La adopción de la dimensión LO de manera equilibrada con proveedores y clientes, con el apoyo de la tecnología de la información, como se señala en las preguntas del cuestionario, también acelera el tiempo de respuesta para el desarrollo de servicios, maximizando el tiempo necesario para entregar lo que ha sido programado.

En todos los resultados logrados en el Capítulo 5, la tecnología juega un papel determinante en el logro de los objetivos de una organización. Es posible destacar las mejoras de gestión y automatización de procesos que ofrece el software y otras soluciones, no solo ayudan a las empresas a administrar mejor los recursos de las empresas, sino que también facilitan estrategias de control con los socios de SC, como el mapeo de procesos, la recopilación de datos y las estadísticas sobre desempeño de actividades comerciales internas y externas, sistemas de comunicación e integración que ayudan a responder a las demandas, acceso y monitoreo de indicadores de desempeño (inventario y ventas, por ejemplo). Por lo tanto, SCM depende en gran medida de la ayuda de los recursos tecnológicos manejados por los socios involucrados en las actividades de la cadena.

En resumen, nuestros resultados sugieren que, para mejorar el rendimiento operativo, las empresas pueden desarrollar acciones conjuntas entre proveedores y clientes, y una opción para esto es el uso de sistemas de información para monitorear si las partes están cumpliendo los objetivos y acuerdos acordados. Dadas las consideraciones finales hechas hasta ahora, una pregunta importante nos permite considerar que si las organizaciones que tienen cadenas de suministro bien integradas (fuerza) a través de la línea (equilibrio) tendrán un mejor desempeño en todas las dimensiones del desempeño operativo. Estos temas son importantes para los tomadores de decisiones, ya que proporcionan información sobre las estrategias de búsqueda de CSI.

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