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FORMAL CONTRACTS IN SUPPLY CHAIN MANAGEMENT: A CASE STUDY

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ABSTRACT

Although adequate management of relationships is often considered a key factor in Supply Chain Management, the use of formal contracts in this context has still been little studied or reported, even in the automotive industry. This article discusses the major findings of a study conducted in a representative supply chain of the auto industry to verify the use of contracts and how they affect the relationships of the companies in question. Based on an intentional sampling approach, a case study was made of an automaker that uses the industrial condominium configuration, two first tier suppliers operating inside the condominium, and a first tier supplier operating outside the condominium (a conventional supplier). Additionally, a basic framework was built to guide and define the key content of the research, which considered two premises and eleven parameters in the companies in question. The results pointed to some key findings, such as the fact that, whereas the formal

contract in the conventional arm's length relation has a "commercial" bias, in the condominium relations it has a "management" bias.

Keywords: Supply Chain Management, Automotive Industry, Formal Contracts

1. INTRODUCTION

Many industrial companies in the last decade have come to realize that internal operational excellence (restricted to the companies' physical limits) no longer ensures greater competitiveness or positive results in the market. Usually, competitors have also made internal improvements (such as programs of just-in-time, group technology, quality certification, etc.) which, particularly in the more competitive industrial segments, have ceased to be differentiating elements in the market. In this context, Supply Chain Management (SCM) has expanded rapidly to become a new and promising frontier in the unceasing search of industrial companies for greater competitiveness and improved performance. From an overall point of view, SCM can be understood as a contemporary area within the scope of business management, which has seen the convergence of a series of themes and interests of traditional areas, such as production management, logistics, purchasing and marketing (Pires & Cardoza, 2007). Nevertheless, although adequate management of relationships is often considered a key factor in Supply Chain Management, the use of formal contracts in this context has still been little studied or reported, even in the automotive industry.

Over the last century, the Automotive Industry (AI) developed and expanded, becoming the most representative one in the world in various aspects, particularly from the economic

standpoint. Its pioneering spirit and competitiveness has long placed it at the forefront of technological and management innovations, soon making it a reference for the industrial world as a whole. The same goes for SCM; in other words, in several aspects, the AI developed and placed itself in the vanguard in respect to various innovations introduced in recent years. As a mature industry, the AI has faced competition on a global scale and in highly competitive markets. It has also experienced high levels of idle capacity of about 30% on a worldwide scale.

In Brazil, following a long period of stagnation, the AI once more received significant investments starting from the mid-1990s, with the establishment of new and innovative plants and the restructuring and updating of existing ones. This allowed the country an unprecedented level of modernization, as well as the possibility of housing on its territory some of the world's most state-of-the-art plants, especially in terms of SCM, with innovations such as the modular consortium and industrial condominiums. However, the sector constantly seeks new sources of competitive advantage (e.g., in product design), given that several countries (such as China and India, with their cost-related advantages) represent a potential threat to their growth.

From this standpoint, this article discusses the major findings of a study conducted in a representative supply chain of the auto industry in Brazil to verify the use of contracts and how they affect the relationships of the companies in question.

2. SUPPLY CHAIN MANAGEMENT

Generally, a *Supply Chain* (SC) is defined as the processes involving suppliers-clients and linking companies from the initial source of raw material to the end product's point of consumption, i.e., as a group of organizations involved through links downstream and upstream in the various processes and activities that produce value in the form of products and services released to the end consumer. Figure 1 illustrates a SC.

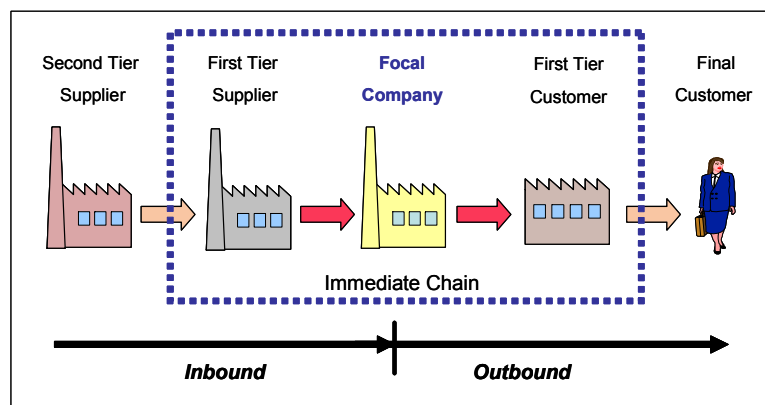


Figure 1 – Illustration of a Supply Chain (SC)

Figure 1 indicates that the focal company has a set of suppliers acting directly with it (first tier suppliers), another set of suppliers of these suppliers (second tier suppliers) and so on. Similarly, the focal company has a set of clients with whom it relates indirectly (represented by the retailer and the end client).

Lambert et al. (1998) identify three structural dimensions of a SC, namely:

- (1) a horizontal structure, defined by the number of layers (levels) of the SC;
- (2) a vertical structure, defined by the number of companies on each level of the SC;
- (3) the position of the focal company, defined by the horizontal position of the company taken as focal along the SC.

Lambert et al. (1998) also suggest the classification of the members of a SC into primary and support members. Primary members are the companies or business units that carry out activities (operational or management) that add value along the SC of a given product and/or service. Support members, on the other hand, are the companies or business units that supply resources, knowledge, etc., supporting the SC's primary members but not participating directly in the value adding process. It should be noted that a company may simultaneously perform primary activities in a business process in the SC and support activities in another process, and also play these roles in different SCs. Still with regard to nomenclature, Slack (1991) proposes a classification of SCs which is very useful in some analyses and situations, especially in this article. The author divides the SC into three levels: the total chain, the immediate chain, and the internal chain, as illustrated in Figure 1. Thus, the internal chain is the one composed of the flow of information and materials among departments, cells or operational sectors within the company itself. The immediate chain is the one comprising a company's immediate suppliers and clients. Lastly, the total chain is the supply chain (SC) itself, as a whole. It must also be kept in mind that several authors in this area prefer to use the term *Supply Network* rather than *Supply Chain*. Even some of the authors who use the term Supply Chain (SC) recognize that, strictly speaking, a SC is not a business chain of one-on-one relationships, but instead, a network of multiple businesses and relationships (Lambert, 2003). Lamming et al. (2000), on the other hand, argue that the term *chain* is an imperfect metaphor for dealing with the issues being considered in the context of SCM, since such issues rarely follow a linear behavior, but they admit that the term supply chain (SC) has, in fact, become very popular. This article considers that the term supply chain (SC) is adequate for its purposes and it is therefore employed hereinafter.

According to Lambert et al. (1998), the term Supply Chain Management was originally introduced by business consultants in the early 80s and soon began to attract the attention of professionals and academics acting in the area. Independently of any controversy about when exactly the term first appeared, the fact is that it gained much interest from the 90s onward.

In the academic world, SCM has only been recognized “officially” as a core topic in *Operations Management* (OM) in recent years. Lambert & Cooper (2000) point out that the theme has developed in the academic field at a slower pace than have its practices in the business sphere. This means that academia has been more of a follower than a leader in this development, so there is a relative paucity of research and structuring of knowledge in the area, which reinforces the purposes of this research.

3. THE AUTOMOTIVE INDUSTRY

As mentioned in the introduction of this article, in the last one hundred years, the Automotive Industry (AI) developed, expanded, and became the most representative one worldwide in various aspects, particularly from the economic standpoint. For a long time, the AI has been in the vanguard of technological and management innovations, thus soon becoming a benchmark for the industrial world as a whole. This situation has been no different for SCM, particularly insofar as innovations are concerned. Also, as an industry considered mature, the AI has in recent years experienced competition on a global scale in increasingly competitive markets. On a worldwide scale, it has been challenged to face issues such as:

- Strong pressure for reductions in prices and delivery times, improvements in quality and overall customer service, and for less polluting products and processes.
- The rapid change from differentiating criteria to competition qualifying criteria. A good example of this is change from the traditional *just-in-time* delivery standard to that of *just-in-sequence*, and the popularization of safety devices (such as airbags) in vehicles.
- The significant reduction in product life cycles and the rapid introduction of new products, with strong pressure to reduce the so-called *time-to-market* and product development costs.
- The pressures to supply new markets, both in geographical terms and in terms of new products.
- The strengthening of relationships and intensification of channels of communication and of integration in supply chains in general.

On the other hand, these issues can also be considered potential opportunities to be exploited by the sector's companies and supply chains. But the scenario grows in complexity when one considers the existence of a level of idleness of about 30% in a worldwide ambit. In general terms, one can also highlight some points of the current reality of automakers and their suppliers, especially that of first tier suppliers, as follows.

Automakers:

- The search for process simplification and greater SC efficiency and effectiveness and rationalization and reduction of the direct supplier base (first tier suppliers).
- Outsourcing of part of their traditional "territory".

- Definition of a new set of requirements to be met by suppliers, such as *global sourcing*, *follow-sourcing*, supply of systems and modules in *just-in-sequence* mode, participation in new product development (ESI), etc.

Autoparts:

- Compliance to a growing set of demands required by the automakers.
- Global scale competition and strong pressure for prices, quality, delivery times and services in general.
- Restructuring and reduction of the number of companies, with significant numbers of mergers and acquisitions.
- Redefinition of the scope of action (*core business*) and concentration of efforts on that business, mainly due to ever fiercer competition and the rising expenditures on research and development.

3.1. New Supply Chain Configurations

The implementation of new supply chain configurations (such as the so-called supply parks, industrial condominiums and modular consortium in the automaker's inbound operations of the auto industry is a relatively recent phenomenon which emerged over the last fifteen years. Since then, a series of these configurations have been implemented, principally in newly industrialized countries such as Brazil. Because these are new concepts, a consensus about their definition and applications has not yet been reached.

On the other hand, especially among practitioners, the labels industrial park, industrial condominium and modular consortium have become commonly accepted nomenclature. Hence, we will use this nomenclature in this article. It should be noted that most of the aspects of Reichhart and Holweg's (2005) proposal are complementary and totally consistent with this already well disseminated nomenclature.

- **Modular Consortium**

The modular consortium (one of the most innovative and, from various standpoints, revolutionary experiments in SCM in the worldwide AI) has been conducted by Volkswagen at its truck and bus chassis plant located in Resende (RJ), which has been fully operational since November 1996. In general terms¹, the modular consortium model implemented at that plant can be defined as a radical case of *outsourcing* between an automaker and a small number (initially seven and more recently increased to eight) of its direct suppliers, called "modulists". In the auto industry Volkswagen's truck and bus chassis plant in Resende is a pioneer (and still unique) in the full use of a modular consortium (Collins et al., 1997). Under this model:

- The key first tier suppliers (modulists) assume responsibility for the preassembly of the module and for its subsequent assembly directly on the automaker's final assembly line, as well as for investments in equipment and tools and most of the module's SCM.
- The automaker provides the plant and the final assembly line, coordinates it and carries out the final vehicle testing.

- **Industrial Condominiums**

Several plants dedicated to the production of automobiles and light vehicles were established especially in Brazil after the inauguration of Volkswagen consortium in Resende. All these factories were built and are operated based on the logic of what has become known as the industrial condominium, which differs from the modular consortium in at least two major aspects, namely:

- A small group of the automaker's first tier suppliers, called "systemists", are installed physically inside the walls surrounding the plant's boundary. These suppliers supply the automaker (generally with more complex systems, with difficult logistics, or that allow for easy postponement of product diversification and increase its customization potential) on a *just-in-sequence* basis directly beside the assembly line. But these systemists do not participate in the vehicle's final assembly, which remains in the hands of the automaker.
- To improve the viability of the business in terms of scale, in some cases the automaker does not require the systemists' resources to be dedicated exclusively to its supply. This ensures the systemists greater flexibility and less dependence on the automaker than in the case of the modular consortium.

- **Industrial Park**

Unlike its generic use in academia, in the business world the term "Industrial Park" normally has the same connotation as "Industrial Condominium", the only difference being that, in the latter case, the key first tier suppliers use their own facilities, which are located near the automaker but outside its physical perimeter.

Industrial Parks and Condominiums today offer an attractive alternative in terms of SCM innovation for the auto industry, but their application is a little more contained and not as radical as the modular consortium model.

However, it should be pointed out that these new models are still almost entirely restricted to the so-called immediate chain, reinforcing Rice & Hoppe's (2001) statement that, although one of the basic purposes of SCM is to integrate the principal processes along the SC, this is still far from actually being practiced. This statement is corroborated by the empirical finding of the well-known predominance of the so-called *dyad-by-dyad* relations of integration and collaboration in supply chains.

3.2. The Automotive Industry in Brazil

In Brazil, after a long period of stagnation, the sector once more received substantial investments starting in the mid-1990s, with the establishment of new and innovative plants and the restructuring and updating of existing ones. This afforded the country an unprecedented modernization in the sector, enabling it to have on its territory some of the world's most state-of-the-art plants, especially in terms of SCM (Humphrey et al., 2000; Pires, 2002).

Today practically all the world's major automakers have manufacturing units in the country. Nevertheless, production in Brazil still represents just over 3% of the worldwide production volume and, the country ranked ninth in the world in terms of production volume. Another point of concern is that the increase in production capacity over the last few years (somewhere in the order of 3.2 million vehicles per year) has not gone hand-in-

hand with demand. Despite the record production volume achieved in the last few years, this still represents a very high rate of idleness compared with worldwide standards.

One of the roots of this problem is that, although the country today produces some of the cheapest automobiles in the world, the product is still relatively expensive for the great majority of Brazilians. As a result, the greater focus on the so-called popular car has led to a controversial situation – specialization in a product with lower added value. However, this situation is gradually being reverted with the relative reduction of the legal advantages allocated to this class of vehicle. Also highly positive is the recent growth of local design engineering in the development of new products, as in the case of the Meriva (General Motors), EcoSport (Ford) and Fox (Volkswagen) models. Nonetheless, in general terms, the sector's competitiveness in the country is still dependent on prices as the main criterion for obtaining orders and on quality as the qualifying criterion during the supplier qualification process. In general, it has become evident that practically all the automakers that invested in the country in recent years exaggerated somewhat in forecasting the purchasing potential of the domestic market, and are today seeking other alternative markets, particularly export markets.

4. CONTRACTS IN SUPPLY CHAIN MANAGEMENT

As pointed out earlier, although adequate management of relationships is often considered a key factor in Supply Chain Management, the use of formal contracts in this context has still been little studied or reported, even in the automotive industry, and publications concerning the issue are still very few and/or incipient. In a rare and interesting article, Roxenhall & Ghauri (2003) point out that formal contracts in business relationships are generally drawn

up and signed but rarely actually enforced. Moreover, business people seem to consider that contracts are complicated and have no particular value. These authors analyze the subject, dividing it into three distinctive stages: contractual negotiation, definition of contract content, and use of the contract. As for the main reasons for drawing up contracts, they mention three:

- (1) Contracts can be regarded as a communication tool, i.e., one party wants to use the contract to transmit information to the other;
- (2) Contracts can be used as a way of increasing security, i.e., as a tool to reduce perceived uncertainty;
- (3) Contracts symbolize the existence of a business deal, i.e., it is normal practice to sign a contract.

The authors also pointed out three other basic ways in which companies use contracts in business relationships:

- (1) As proof of what was agreed upon, in case of a possible conflict;
- (2) As a way to control individuals within the companies involved in the contact;
- (3) As a tool to interpret aspects of the agreement that are not obvious.

5. CASE STUDY

To deal with the increasing frequency and magnitude of changes in technology and managerial approaches, case research has become one of the most powerful research methods in operations management (Lewis, 1998; Voss et al., 2002). Moreover, Voss et al.

(2002) highlight that “many of the breakthrough concepts and theories in operations management, from lean production to manufacturing strategy, have been developed through field case research” and that case study is a unit of analysis in case research.

Case studies allow for the investigation of contemporary phenomena within their real life context, particularly when the boundaries between them are not clearly defined. Therefore, they are recommended for current themes and situations where the researcher simply observes the facts and attempts to understand, systematize and analyze them (Yin, 2003; Voss et al., 2002). Case studies are especially useful when there is uncertainty in the definition of constructs (Voss et al., 2002), and has been recognised as being useful for examining basic questions, as is the case in this study, which proposes to verify the use of contracts and how they affect the relationships of the companies in question.

As for the definition of the case to be studied, Voss et al. (2002) stated that the traditional way of sampling is to identify a population and select a random or stratified sample from it; however, in case studies, this selection is usually based on distinct and intentional criteria. One of the first ways to conduct sampling is by selecting a representative case, such as the one chosen for this study. This study therefore took place in a supply chain, taking as reference (focal company) a major automaker (Original Equipment Manufacturer – OEM) and three of its first tier suppliers. Suppliers A and B are “systemist” suppliers installed inside the industrial condominium built by the auto manufacturer. Supplier C, in turn, is installed outside the physical limits of the condominium, as illustrated in Figure 2

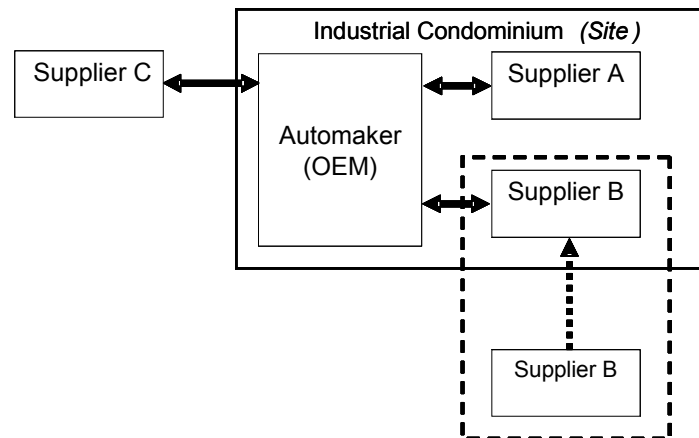


Figure 2 – Scope of the supply chain studied

In addition, due mainly to the contemporary nature of the theme (and of the supply chain in question) and the viability of carrying out the research, an exploratory and descriptive approach was used involving interviews based on a semi-structured questionnaire designed for this purpose (Yin, 2003). The interviewees were the main executives responsible for the areas of Logistics, Purchasing and Production in all the companies involved in this study, which are briefly described below.

- **The automaker**

The automaker (OEM) was a pioneer in the assembly of automobiles in the country, having established a plant in 1957 in the Greater São Paulo region. The plant represents a milestone in the country's industrialization process and in past decades had over 40 thousand employees. In early 2006, the plant was operating with about 20,500 employees, 15,000 hired by the company and 5,500 by suppliers. The production capacity at that time was 1,600 vehicles per day.

Following a corporate decision, in 2002 the plant concluded a reformulation which transformed it into an industrial condominium, after which it had twelve key suppliers

(systemists) installed inside the plant's facilities and began to produce a new worldwide automobile model developed at its German headquarters. This reformulation resulted in a structure with a high level of automation and state-of-the-art technology such as laser welding, robotized islands for the body framework, automated paint lines, palm top computers to control production in real time, modular system assembly, and body conveyor belts that adapt to the operator's height, among other features.

The industrial condominium under study is composed of twelve main companies that supply the automaker sequentially and usually at one to two-hour intervals. Installed in the condominium are the suppliers of (1) parts and systems for the body, chassis and power train, (2) wiring harness, (3) fuel tanks, (4) rear bumpers, (5) exhaust pipes, (6) wheels and tires, (7) rear and front axles, (8) seats, (9) pedals, (10) front bumpers, (12) door components, panel instruments and door linings. The systems/modules produced by the suppliers are transported and sequenced according to the automaker's master production schedule.

- **Supplier A**

Supplier A is a "systemist" installed inside the automaker's plant. In reality, its facilities represent a joint venture with the automaker. The company belongs to a German group acting in the automotive field, supplying parts and systems for the body, chassis and power train systems. In Brazil, this supplier furnishes the automaker with the rear and front axles, the front suspension, the auxiliary frame and the radiator.

- **Supplier B**

Supplier B is a “systemist” installed inside the automaker’s plant. This supplier, which belongs to a German group, designs and produces wiring harnesses mainly for the automotive industry. In fact, the wiring harnesses are produced in a plant installed in the interior of the state of São Paulo and are transported to the “condominium”, where they are set up to supply the automaker assembly line on a just-in-sequence basis.

- **Supplier C**

Supplier C belongs to a German group and designs and produces mechanical and electronic locks for the automotive industry. The plant is located in the interior of the state of São Paulo and supplies mechanical and electronic locks directly to the OEM in question.

5.1. Research Content

A basic framework was built to guide and define the key content of the research, which considered two premises and eleven parameters (divided into two groups), as illustrated in Figure 3.

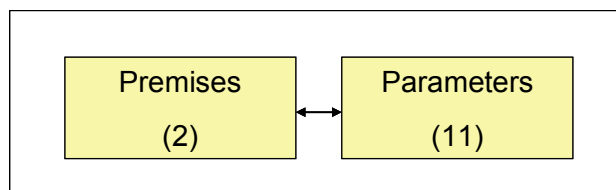


Figure 3 – Basic research content

- **Premises**

Considering mainly previously published research and the author's experience, two basic premises were chosen for verification during the study, as follows:

Premise 1: The higher the level of collaboration and process integration between the companies (automaker and supplier) the greater the level of details and/or formalities in the contract would have to be.

Premise 2: The higher the level of physical proximity between the two companies (automaker and supplier) the lower the level of formalities and, hence, of details in the contract would have to be.

- **Parameters**

Moreover, and in order to guide the case study, eleven basic parameters were defined and divided according to two groups of concerns, as described below:

(1) Contract Feature Concerns:

- Negotiation Time – time spent to define and sign the formal contract.
- Validity Time – time defined formally for the contract's duration.
- Level of Details – ranging from high (customized) to low (standard) level of details in the contract.
- Type of Relationship – between the automaker-supplier and vice-versa, using a taxonomy ranging from the conventional arm's length to the partnership type.
- Basic Legal Content – according to formal Brazilian laws and regulations.

- Main Operational Penalty – stipulated in the contract concerning the supplier's obligations.

(2) Collaboration and Process Integration Concerns:

- Physical Proximity – location of the suppliers in relation to the automaker.
- Added Value – of the component and/or systems supplied to the automaker and relative to all vehicle components.
- Data Interchange – basic information technology used in the operational communication process.
- Early Supplier Involvement – to be practiced in the automaker's new product developments
- Just-in-sequence – the practice of this type of delivery directly or indirectly to the automaker's final assembly line.

5.2. Results

The main findings regarding the eleven parameters studied and involving the automaker and the three suppliers are listed in Table 1.

Table 1 – Main findings of the parameters under study

Parameters	Supplier A (Systemist A)	Supplier B (Systemist B)	Supplier C (Conventional Supplier)
Contract Features			
Negotiation Time	2 years	2 years	A few months
Validity Time	5 to 6 years (during the platform's life)	5 to 6 years (during the platform's life)	1 year
Level of Details	Medium/High	Medium/High	Low (standard)
Type of Relationship	Partnership	Partnership	Arm's Length
Basic Legal Content	Supply of Pre-assembly service	Supply of Systems	Supply of Components
Main Operational Penalty	When it is responsible for a stoppage of the automaker's assembly line	When it is responsible for a stoppage of the automaker's assembly line	When it fails to meet the automaker's master production schedule requirements
Collaboration and Process integration			
Physical Proximity	"In site", considered highly positive for contract management and integration	"In site", considered highly positive for contract management and integration	Distant, and moreover considered unimportant in the "arm's length" relationship
Added Value	High	High (second most expensive of the vehicle)	Depending on the model being supplied
Data Interchange	Via automaker's "EDI-JIT" restricted system	Via automaker's "EDI-JIT" restricted system	Via traditional EDI
Early Supplier Involvement (ESI)	Yes, in new products	Yes, in new products	Possibly/occasionally
Just-in-sequence (JIS)	Yes, directly	Yes, directly	Yes, but indirectly through a logistical provider working inside the condominium

As for the two premises, the first one was corroborated in the case studied here, since the automaker's contracts with the two systemists are more detailed than its contracts with conventional suppliers. The contracts with the systemists contain a complementary document called "matrix of responsibilities", which specifies mainly details and responsibilities about the "*modus operandi*" of the condominium. However, the second premise was not corroborated in the case studied, since the systemists installed inside the condominium have a series of additional and formal responsibilities with the automaker (described in the matrix of responsibilities), which are greater than those of the suppliers installed outside the site.

6. FINAL REMARKS

Conducted in an inbound immediate chain of a contemporary and representative supply chain in the auto industry using the industrial condominium configuration, this study highlighted four findings:

- (1) As Roxenhall & Ghauri (2003) pointed by, formal contracts are normally drawn up and signed but are rarely actually invoked during the operations management, serving more as a proof of what was agreed upon, to be used only in case of a possible significant conflict. In the management of operations and during the contract's duration, many decisions are made under the pressure of urgent due dates, and any possible implications in terms of a formal contract are postponed for later discussion (*post-factoring* legal procedure).

- (2) The physical proximity provided by the industrial condominium should be considered the main factor that leverages heightened collaboration and process integration between companies. Increased personal contacts and mutual trust are key points in this context.
- (3) While the contract has a “commercial” bias in the conventional arm’s length relation (the case of supplier C), in the condominium’s relations (the case of suppliers A and B) it also has a “management” bias, i.e., its “matrix of responsibilities” defines several aspects of the condominium’s daily “*modus operandi*”.
- (4) The subject of formal contracts can be considered a difficult one to research because it involves aspects mostly considered confidential or whose divulgement is restricted both inside and outside the companies, and therefore clearly requires further and deeper research.

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