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## ARTICLES

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# TRANSACTION COSTS IN ENVIRONMENTAL PURCHASING: ANALYSIS THROUGH TWO CASE STUDIES

## ABSTRACT

Environmental purchasing has been one of its most significant elements in Green Supply Chain Management (GSCM). By implementing environmental purchasing, companies adopt additional criteria for evaluating suppliers, which, as argued, generates additional transaction costs. From the GSCM theoretical basis, and looking through the analytical lenses of Transaction Cost Economics (TCE), this article aims to discuss the transaction costs involved in the supplier selection process with the environmental purchasing approach. As result, this article presents five propositions of TCE within the GSCM in the light of two cases, which relate the possible transaction costs involved in each stage of the environmental purchasing process and also according to the main transaction elements.

**KEYWORDS** | Green supply chain management, environmental purchasing, transaction cost economics, selection of suppliers, sustainable supply chain.

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## INTRODUCTION

The complexity of supply chain management (SCM) has increased since the 1990s, and its scope has been extended beyond the assessment of traditional elements such as cost, quality and logistics, also incorporating other aspects such as environmental considerations. This dynamic is a result of the pressure experienced by companies for improving not only their social and environmental performance, but their supply chain (Vachon & Klassen, 2006).

In addition to the pressure and expectations of consumers, investors and buyers, due to strategic drivers such as cost savings, increased quality of products and services, risk management and even reputational issues (Walker, Di Sisto & McBain, 2008), companies are leading the so-called green supply chain management (GSCM). According to Srivastava (2007, p. 54), GSCM means "integrating environmental thinking into supply-chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life.

The buyer-supplier relationship is particularly important in this context, since the upstream activities are often responsible for large part of the environmental impact of the product, taking as perspective the complete life cycle (Tate, Ellram & Dooley, 2014). This fact has led to the development of the adoption of the so-called environmental purchasing. Carter, Kale and Grimm (2000) found that the adoption of environmental purchasing criteria proved to be positively related to the net income and negatively related to cost of goods sold. However, methodologically, the study addressed only the so-called production costs, ignoring the transaction costs that may be present in the supplier-buyer relationship.

Despite the fact that GSCM is becoming a widely explored field of research, few studies have been conducted to investigate how is the relationship between its agents, with regard to the environmental aspects, as well as very little research seeking to explore the behaviors, designs and structures with an inter-organizational approach (Sarkis, Zhu & Lai, 2011; Wetzstein, Hartmann, Benton Jr. & Hohenstein, 2016). In this study, in order to better understand this supplier-buyer inter-organizational relationship, we will focus on the purchasing process, which is, according to Srivastava (2007) definition, an important part of the GSCM process.

In this sense, the Transaction Cost Economics (TCE) is considered one of the promising organizational theories to address the issue of building relationships in GSCM. There is a clear need for the development of studies seeking to understand how the various uncertainties involved influence the relationships within the GSCM and how is the organizational commitment of the company in the relationship with other supply chain agents (Srivastava, 2007). After all, as Simpson and Power (2005) asseverate, "the inclusion of environment as a part of purchasing criteria, may attract significant transaction costs if not managed appropriately" (p. 64). Brito and Berardi (2010) also acknowledge the need of conducting studies that address the cooperation between agents in the supply chain, with regard to control procedures, definition of minimum standards and exclusion of suppliers, highlighting the need for the management of transaction costs in the relationships, not only regarding social and environmental issues, but for taking the SCM as a whole.

Therefore, seeking to address this theoretical gap, this paper aims to discuss the transaction costs involved in the supplier selection process according to an environmental purchasing approach. The concept of transaction costs is suitable for this intent because contributes to explain "the organization of firms and the way they interact along a supply chain" (Hobbs, 1996, p. 16).

This paper is divided into four main sections. First, we review the literature by discussing the purchasing process and the particularities of environmental purchasing. Then, we discuss the literature on TCE and we address the integration between GSCM and environmental purchasing and TCE. Second, in the methods, we describe the case research strategy and the procedures for data collection and analysis. Third, we discuss the cases of the two companies studied, comparing with the literature, which led us to develop five propositions. Finally, we conclude the paper by drawing final considerations.

## THE PURCHASING PROCESS

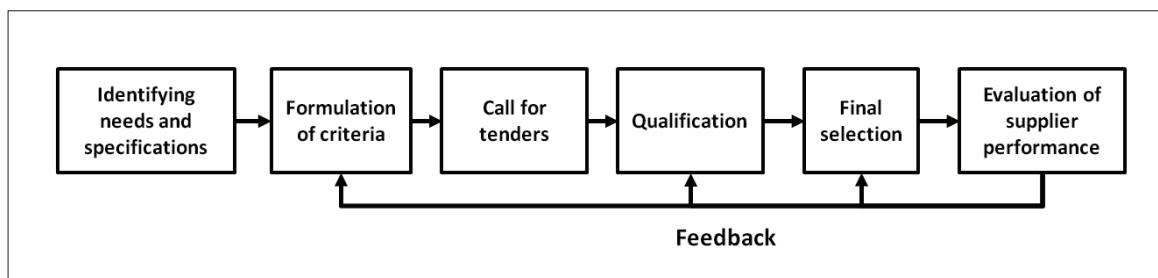
Broadly speaking, the purchasing process can be considered as the process of relationship with suppliers. With some suppliers, companies build closer and long-lasting relationships, and with others companies build the so-called conventional relationships. For both cases, companies adopt a supplier selection process. Those responsible for the purchasing process first analyze the supply strategies and then identify

the products and services regarded as central for the success of the company in the present and future. After that, they choose the supplier evaluation criteria, including aspects such as stability, profitability potential, quality, capacity and technology compatibility, volume to be purchased versus the supplier's ability to meet it. Intermediating the relationship with suppliers, the company works with product and service agreements (PSA). Specific PSAs are developed for each key supplier of the company. And for the other

suppliers, there are generic PSAs for each set of suppliers. Based on these evaluation criteria and PSA, the company develops ways of measuring supplier performance, seeking to identify the profitability (Croxton, García-Dastugue, Lambert, & Rogers, 2001).

Igarashi, de Boer and Fet (2013) corroborate Croxton et al. (2001), presenting the flow of the supplier selection process in six steps, as shown in Figure 1.

Figure 1. Supplier Selection Process



Source: Igarashi et al. (2013, p. 248).

Although this process generally applies to a broad number of situations, there are situational factors that determine the type of purchasing method to be used. The main situational factors are the number of suppliers available, the importance of the purchase, the prior relationship with the supplier and the amount and nature of uncertainty present. In purchasing, the selection methods also vary according to the type of purchasing situation, classified as new buy, straight rebuy and modified rebuy (de Boer, Labro & Morlachchi, 2001).

In addition to the discussion of how the supplier selection process occurs, there is an urgent need to discuss the factors considered in the selection. Especially due to the fact that the supply chain management have focused on building long-lasting and strategic relationships (Spekman, 1988), the choice of suppliers have been increasingly guided by a larger number of factors, both quantitative and qualitative (Ghodsypour & O'Brien, 1998), which further reinforces the importance of the supplier selection process. The traditional criteria such as quality, delivery and cost, as described in the seminal study of Dickson (1966) (apud Weber, Current & Benton, 1991), are still prevalent and ubiquitous, however, new criteria such as management, research and development, flexibility, reputation, safety and the environment, among others, have been used (Ho, Xu & Dey, 2010).

It is essential to recognize, however, that depending on the specific context, the factors are considered or not and are assigned different weights for the different attributes considered (Dulmin & Mininno, 2003). The priority is to develop the best value in the supply chain, before the various criteria (Ketchen Jr. & Hult, 2007). Next, we explore the supplier selection process focusing on the environmental aspect, hereafter referred to as "environmental purchasing."

## ENVIRONMENTAL PURCHASING

Advancing from its initial development to date, Shi, Baldwin, and Cucchiella (2012) point out that the studies approaching purchasing based on environmental criteria include issues that are highly related to inter-organizational aspects, such as support to the development of the environmental management systems of suppliers; meeting between suppliers of the same industry for sharing challenges and know-how; choice of suppliers based on environmental criteria; certification of products that meet environmental requirements; audits aimed at certifying the environmental performance of suppliers, among others.

Given its expanded scope, Sarkis et al. (2011) argue that the concept often comes up as a substitute to the concept of GSCM. This is because often the supply or procurement department, depending on the organi-

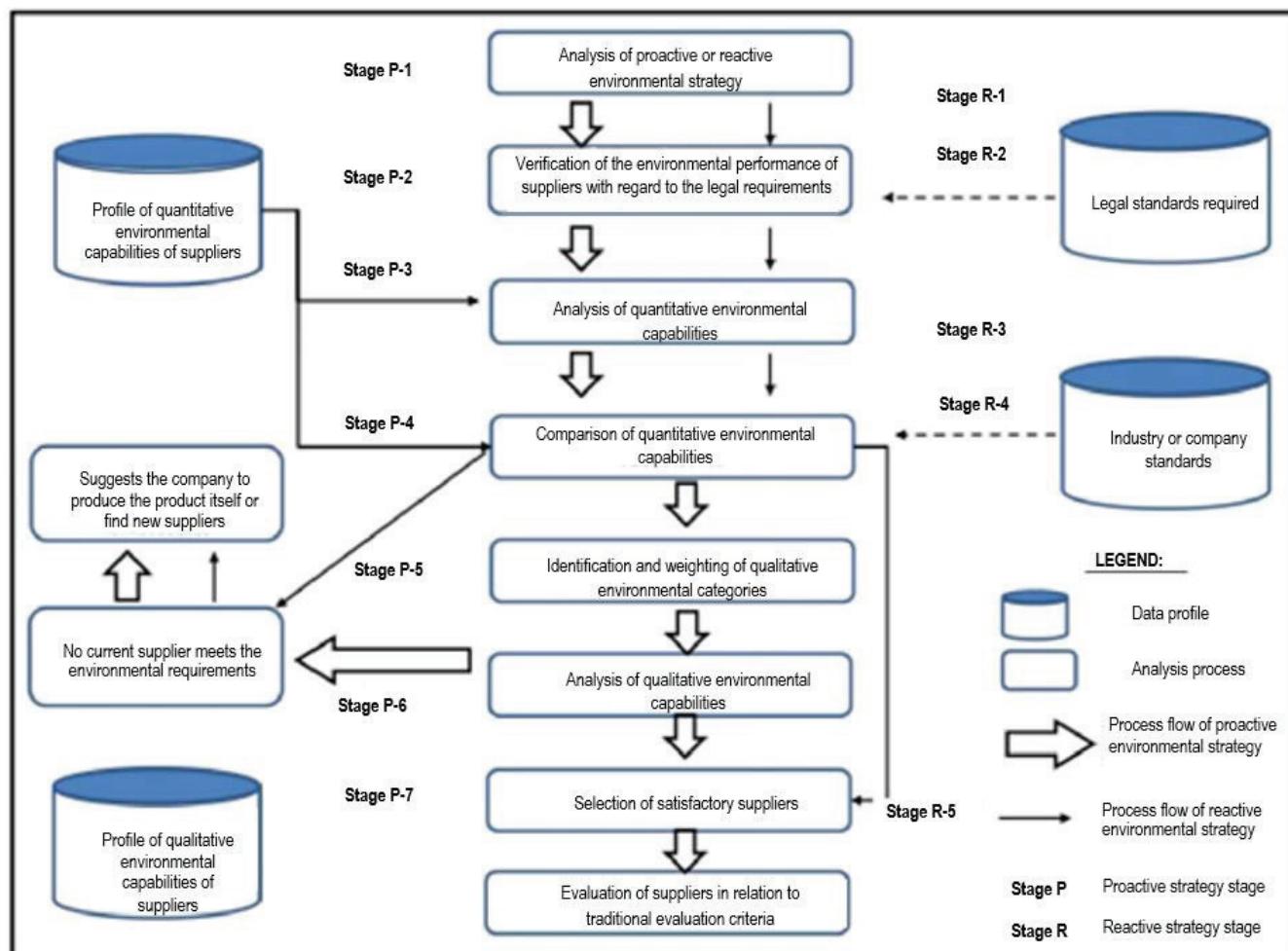
zational structure and the importance of the supply function, may be largely the main activity of the supply chain (Zsidisin & Siferd, 2001). This reflects in its definition as “the set of supply chain management policies held, actions taken, and relationships formed in response to concerns related to the natural environment [...]” (p.69). These concerns involve the acquisition of raw materials, selection, supplier evaluation and development, suppliers operation, internal logistics, packaging, recycling, reuse, efficiency in the use of resources and proper disposal of waste (Zsidisin & Siferd, 2001).

The decision regarding the adoption of an environmental purchasing process, however, is not conducted in an isolated manner, as it may significantly impact other factors such as price, quality, time and flexibility

(Angell & Klassen, 1999), which makes the purchasing process more complex and more subject to trade-offs (Enarsson, 1998; Handfield, Walton, Sroufe, & Melnyk, 2002). On the other hand, Ghadimi, Dargi and Heavey (2016), quantitatively investigated the effects of integrating environmental and social sustainability into the process of supplier selection and order allocation and concluded that the financial performance of manufacturing improved, as well as that can lead to long-term sourcing relationships for the buyer-supplier dyad.

For this reason, the supplier selection process involves multicriteria. Figure 2 highlights the interaction of environmental purchasing as sub-process of the supplier selection process.

Figure 2. Decision-making in the Environmental Purchasing process



Source: Humphreys, Wong and Chan (2003, p. 351)

Analyzing Figure 2, it can be said that the environmental purchasing subprocess influences the supplier selection process in the Formulation of Criteria and Qualification stages. This influence is due to the orientation of the focal company and the establishment of environmental criteria in addition to the traditional criteria adopted.

### Environmental purchasing criteria

In terms of environmental criteria, the effectiveness of the supplier selection methods is assessed in the

light of three aspects. First, both qualitative and quantitative aspects must be subject to consideration. Second, it must be complete, in the sense that it should cover the largest number of relevant environmental aspects as possible. Third, the objectivity of the method of application should be a key aspect, as it aims to facilitate the decision-making process (Noci, 1997).

Some of the main quantitative and qualitative environmental criteria of supplier selection proposed in the literature are shown in Table 1.

Table 1. Environmental purchasing criteria

Quantitative criteria	Qualitative criteria
Emissions; Solid and liquid waste generated; Energy consumption and energy sources; Water consumption; Use of recyclable materials	Support from the top management; Training of employees; Information exchange; Environmental reputation; Design for environment (including recycling, reuse, remanufacturing, disassembly and disposal); Environmental management system (environmental policies, certifications); Environmental expertise (clean technologies used, use of eco-friendly materials, pollution reduction capacity and handling of materials from reverse logistics); Evaluation of suppliers (second-tier evaluation); Relationship with stakeholders; Compliance with environmental legislation; Logistics and transportation (means of transportation, geographic location, existence of reverse logistics).

Source: Adapted from Enarsson (1998), Handfield et al. (2002), Humphreys et al. (2003)

As shown in Figure 2, the evaluation of the quantitative environmental criteria is made prior to the qualitative criteria. One of the reasons that justify it is that they are more easily verifiable and easy benchmarking, either with the industry standard or government regulations, and therefore, they tend to be less costly to evaluate. Thus, suppliers who do not meet these basic requirements, may occasionally be eliminated in the beginning of the process.

Given the variety and complexity of the suppliers evaluation criteria, involving the management itself, the production process, product and logistics (Enarsson, 1998), as shown in Table 1, it is possible to foresee the difficulties faced by a company when implementing an environmental purchasing process. Rezaei, Nispeling, Sarkis and Tavasszy (2016), for instance, mentioned the often limited compatibility between environmental and traditional purchasing criteria and the trade-offs between these

criteria sets.

Govindan, Kaliyan, Kannan and Haq (2014) conducted a study precisely seeking to identify the main barriers to the adoption of GSCM. Based on the literature review, expert opinion and a survey conducted with companies from various sectors, they initially identified 47 barriers, which, after another round of empirical validation with companies, resulted in 26 key barriers, categorized as outsourcing, technology, knowledge, financial, involvement and support. In terms of level of importance, the key barriers were ranked, and the most important was "Complexity of measuring/monitoring environmental practices of suppliers", ahead of others such as "Lack of new technologies, materials and processes" (2<sup>nd</sup>) and "Restriction of resources" (5<sup>th</sup>). This barrier is directly related to environmental purchasing with regard to the informational transaction buyer-supplier.

## TRANSACTION COST ECONOMICS AND ENVIRONMENTAL PURCHASING

When conducting transactions with other companies, the companies do so with contracts, and according to this perspective, they may be characterized as a nexus of contracts (Coase, 1937). Similarly, the supply chain is a broad nexus of contracts mediated by the transaction characteristics and the institutional environment (Zylbersztajn & Farina 1999). The transaction characteristics influence the way the relationship between the agents will be governed, which in turn influence the transaction costs.

The transaction costs in a relationship may be *ex-ante*, incurred when searching for information, formulating, negotiating and registering contracts between companies, and *ex-post*, related to the cost of monitoring and enforcement of the contract (Williamson, 1985). These costs are influenced by behavioral elements, by the attributes of the transactions and the choice of governance mechanisms to govern the relationship.

As for the behavioral elements, TCE assumes that economic agents have limited rationality and opportunistic behavior, tending to act in a self-interested manner. As for the bounded rationality, it is clear that, faced with a highly complex environment, subject to many uncertainties, it is unlikely that the agents manage to anticipate, without a huge financial effort and time, all possible contractual problems and risks that may occur in the course of the relationships. With regard to the opportunistic behavior, it is understood that by having information asymmetry between agents and therefore, a party holds certain privileged information or taking advantage of unexpected contingencies *ex-ante*, some agents behave in a self-interested manner, benefiting themselves and to the detriment of the other agents (Williamson, 1985).

As for the transaction attributes, the TCE discusses three main elements that could affect the perception of agents regarding which governance mechanism is the most appropriate: frequency, uncertainty and asset specificity.

Frequency refers to the number of times the agents carry out transactions in a given period, being most relevant when considering the possibility of opportunistic behavior and the average costs of preparing the contracts. The transaction frequency is generally classified as one-time, occasional and recurrent (Williamson, 1979; 1985). Uncertainty refers to the in-

ability to predict all events involving the transactions, related to the complexity of the environment in which companies operate and the dynamism with which the relationship between the agents may evolve, which is what makes contracts be imperfect (Williamson, 1979; 1985).

Finally, asset specificity can be understood by measuring how a certain asset developed to serve a specific transaction between certain agents can be re-employed without losing its value, in the event the transaction is interrupted (Williamson, 1979; 1985). In fact, the higher the asset specificity, the greater the need for coordination between agents (Williamson, 1985). Ultimately, in the absence of specific assets in a relationship, it would not require the presence of safeguards, as the price mechanism would be sufficient (Zylbersztajn, 2005).

The central studies of TCE, by often discussing the suppliers' decision to buy or produce internally, relate naturally with the SCM (Ketchen Jr. & Hult, 2007). Hobbs (1996) was the first researcher to propose and highlight the potential of using TCE to investigate the SCM. In 2008, Williamson (2008), the most prominent theoretician of TCE, published an article highlighting the potential of the use of TCE in SCM and proposing some research agendas seeking to integrate the two concepts. Over time, Chicksand, Watson, Walker, Radnor, and Johnston (2012), based on a systematic review of three of the most important journals in SCM, noted that most articles about SCM are lacking a framework based on organizational theories.

The trend identified by Chicksand et al. (2012) is replicated in the area of GSCM and environmental purchasing, but in a more significant manner, as very few studies use TCE to investigate such phenomena (Zsodis & Siferd, 2001; Carter & Easton, 2011; Sarkis et al., 2011; Appolloni, Sun, Jia & Li, 2014). Toubolic and Walker (2015), in a literature review about sustainable supply chain covering the period between 1995 and 2013, found out only 14 papers that use TCE to ground their analysis. For the same period, Appolloni et al. (2014) identified only two papers using TCE as theoretical lens to analyze environmental purchasing. Actually, there is a trend in most of the papers of not using any theoretical lenses. Thus, lack research both empirically and theoretically grounded in order both to test and build theory (Appolloni et al., 2014; Toubolic & Walker, 2015).

Seuring (2001) recognized that the costs within GSCM include direct costs, indirect costs and transaction costs,

however, he refrained from conducting an in-depth discussion on the latter. More recently, emphasizing the relationship between suppliers and focal company, Igarashi et al. (2013) noted that there were no studies addressing the environmental purchasing process from the standpoint of transaction costs. However, Tate et al. (2014) point out the importance of studying how transaction costs are distributed between suppliers and buyers and identifying the benefits of environmental initiatives in the supply chain.

As already discussed, the study directly or indirectly addresses some of these theoretical gaps by proposing as the research goal the discussion of the transaction costs involved in the supplier selection process according to an environmental purchasing approach.

## METHODS

This study is characterized as exploratory, since it aims to provide a greater familiarity with the problem, namely the transaction costs in environmental purchasing. The study is based on a qualitative approach, beginning with a literature review, in order to generate insights on the subject to then justify the subject, methods used and make the necessary assumptions to conduct the study (Flick, 2009).

As research strategy, we used the case study method, which, according to Fiss (2009), is appropriate to un-

derstand a phenomenon within a given context and based on a holistic perspective. Furthermore, an exploratory case study is aimed to refine questions to be explored in other subsequent studies (Seuring, 2008). We also used two cases seeking to offer the possibility of more robust analytical conclusions and make comparisons between them (Yin, 2010).

In order to choose the cases to be studied, Yin (2010) recommends the formulation of a set of criteria. In this study, the fundamental criterion is that the company represented a focal role of the supply chain, which, according to Seuring and Müller (2008), usually means to direct or control the supply chain and be responsible for making the product design and establishing direct contact with the end customer. In addition, we identified companies that would show the development of the adoption of a supplier selection process that considered environmental aspects, in order to ensure that the phenomenon become observable. Finally, we gave priority to companies of different sectors in order to privilege the external validity and enrich the discussion of contrasting aspects.

Based on the criteria for choosing the cases, we invited three companies to participate in the research, two of which agreed to participate in the study, Alpha and Beta. Table 2 summarizes some of their characteristics, as well as their representatives interviewed.

Table 2. Characteristics of the companies studied

Characteristics	Companies	
	Alfa	Beta
<b>Origin</b>	National (Brazilian)	International (foreign)
<b>Sector of operation</b>	Personal hygiene, perfumes and cosmetics	Automotive (automaker)
<b>Main supply chains integrated upstream</b>	Chemical raw materials, natural raw materials, and packaging	Ferrous metals, non-ferrous metals, non-metallic supplies (plastics, rubber and synthetic), glass, electrical and electronic systems, paint/resins/oils, chemicals, parts/components/assemblies
<b>Size</b>	Large (annual gross operating revenues exceeding R\$ 300 million, according to BNDES criteria)	
<b>Professionals interviewed</b>	(1) Coordinator of the Supplier Selection and Evaluation Area, of the Procurement department (Interviewee 1-Alfa); (2) Responsible for monitoring the social and environmental dimension and the supplier risk management. Had a previous role of financial analyst within the Procurement department (Interviewee 2-Alfa);	(1) Head of the Procurement department (Interviewee 1-Beta); (2) Engineer in the Environmental department (Interviewee 2-Beta).

The interviews were conducted between the months of November and December 2014 and in both companies, the professionals were interviewed simultaneously. Dyadic interviews allow the stimulation of participants to stimulate ideas that would often not be spontaneously recognized or remembered (Morgan, Ataie, Carder & Hoffman, 2013). The fact that the interviews involved both professionals working with procurement or the selection of suppliers and professionals who are involved more directly with environmental issues made the use of the technique even more relevant. The interview at the company Alfa lasted approximately 93 minutes and in the company Beta 55 minutes. They were recorded after the prior consent of the respondents, seeking to obtain a better use in the analysis and interpretation of data, especially because only one of the authors participated in the interview. During the interviews, we used a semi-structured script developed based both on the previous literature on environmental purchasing and TCE. The script basically consisted of the initial explanation of the research goals, questions about the role and experience of the respondents, followed by the approach to the issues.

Finally, with the data from interviews and the supplementary documents collected, we conducted a qualitative analysis of the material (Bardin, 2011), seeking to link the empirical evidence required for the presentation and discussion of the results.

After having determined the use of the qualitative analysis, we followed the recommendation of Seidman (2006) to structure the study seeking to prevent the lack of focus and establish the methods and procedures to be used. The preparation of the propositions based on the critical discussion of the revised theoretical framework and the empirical data, in this sense, was particularly relevant. According to Bacharach (1989), a set of propositions is a cornerstone of theorizing because it states the relationship among different constructs about the phenomenon being studied.

## PRESENTATION AND DISCUSSION OF RESULTS

In this section, we develop several propositions based both on literature review on environmental purchasing and transaction costs and supported by the exploratory cases. We did this process following the recommendation of "going back and forth between data and theory" (Siggelkow, 2007, p. 22), enacting an

interaction between the "empirical world" and "theoretical notions" (Dubbois & Araujo, 2007), in order to build more robust theory in the field of supply chain management and its relationship with social and environmental issues (Toubolic & Walker, 2015).

It should also be noted that, throughout this section, we discuss the characteristics of the supplier selection process according to the environmental purchasing approach adopted by each one of the two companies studied.

### Identification of requirements, formulation of criteria and call for tenders

The importance of defining the strategic inputs subject to an environmental purchasing approach is fully justified. Since companies integrate different supply chains (Mentzer et al., 2001) and must establish industry benchmarks in order to evaluate the suppliers – as seen in step four of Figure 2, it generates the need of having a very diverse list of information, in order to establish environmental purchasing criteria with adequate completeness (Noci, 1997). Thus, the company should make the decision about the appropriate environmental criteria considering the transaction nexus of all supply chains it integrates, as proposed by Shook, Adams, Ketchen Jr., & Craighead (2009), seeking to reduce the total transaction cost. This could mean the adoption of common criteria among suppliers of the different supply chains, albeit with differentiated valuation metrics between them.

By analyzing the cases, both companies use uniform environmental criteria to evaluate suppliers from different supply chains they integrate. There is a difference, whether the supplier supplies for the core operations of the focal company, although. Both companies are more stringent with those suppliers.

"We made no differentiation [between suppliers from different supply chains]. In fact, there is only difference for service suppliers, for which we demand compliance with social criteria, not environmental criteria. For every supplier related to the core operations of Alfa, we monitor its environmental performance.[...] Because for service providers, this is very difficult for us. Sometimes, there are spot purchases. So, the supplier will not waste time filling up a report for us. Besides, once we intend to build a historical record, if the suppliers often change, we cannot do that. So, that is the reason why we

consider only those suppliers important to our core operations, which composes our more stable portfolio of suppliers." (Interviewee 2-Alfa)

"Today, we have an instruction from our headquarters that until 2016 all of our suppliers [either related to the core operations or not related to the core operations] must comply with ISO 14001. [...] This will be a standard guideline for every supplier, since the beginning of selection process." (Interviewee 1-Beta)

Company Beta, however, stated that is more stringent with suppliers of the chemical industry. But, still, following the recommendations of its headquarters with regard to substances restricted by international treaties, even if authorized in Brazil. For the Brazilian subsidiary, there is no significant cost of monitoring these treaties or restricted substances, since its headquarters constantly provides an updated list.

"There is a huge list of substances that the world understand that are polluters, that they offer risks both for the environment and human health and therefore they must be banned [...] Which are those substances? Those substances are forbidden by any international protocol." (Interviewee 2-Beta)

"[...]There is this instruction [about the list of banned substances by international protocol considered by Beta]. However, considering our legislation [i.e, Brazilian Legislation], I cannot blame the supplier [for not complying with all the international protocols], or impose any penalty, because it is complying with our legislation. Nevertheless, this supplier would not be qualified to supply for Beta." (Interviewee 1-Beta)

Based on that, we develop the following proposition:

**Proposition 1:** *companies use uniform criteria for evaluating suppliers from different supply chain they are integrated upstream, nonetheless their diversity, in order to reduce the cost of formulating environmental purchasing criteria.*

As the number of defined criteria increase, the search for suppliers becomes more expensive, since the probability of finding a supplier that meets the criteria progressively reduces (Stigler, 1961). For this reason, also, the supplier selection process with environmen-

tal criteria, as well as the purchasing in general, is qualifying or based on ranking instead of being eliminatory, regardless of the type of purchasing situation considered (de Boer et al., 2001).

"Actually, there is a score. The supplier [that complies with non-compulsory criteria], usually has an extra score. For example, if this supplier has the same price, we surely would give preference for it over the other tenders." (Interviewee 1-Beta)

"Today, we have many more actions regarding follow-up than the selection itself. In most cases, we oversee the suppliers already performing. Therefore, this is not an eliminatory gate." (Interviewee 2-Alfa)

"We have this distinction between what is essential [related to compliance with Brazilian legislation], which restrain the supplier from supplying, and what is not essential, which we would like them to improve, however it does not restrain them of supplying. In this case, we would follow-up their action plan devised in order to improve the environmental performance." (Interviewee 2-Alfa)

A different situation may occur, however, when assuming that the risk of environmental liabilities related to a certain environmental aspect is very high (Simpson & Power, 2005), then the decision to make it eliminatory comes into question, as the internal policy of company Beta indicates:

"Yes, they are the same [purchasing criteria, for all suppliers]. However, of course, it also depends on what the supplier supplies. If they supply a kind of chemical material that is dangerous, then, there is an extra concern about it. So, Beta oversees it closer. Actually, if this supplier does not present a group of documents, they may not even be able to supply. The Environment department establishes a blockade [into the company internal system], restraining them from supplying". (Interviewee 1-Beta)

For both situations, be it qualifying or eliminatory environmental criteria, we might expect an evaluation of the trade-off between the risk of environmental liabilities originated from the transaction

with the supplier and the level of adequacy of the environmental criteria established with the company's environmental strategy and direction, on the one hand, and the potential opportunity cost of not choosing a supplier who has an excellent performance in the other criteria, on the other hand. This represents, the alluded trade-off between economic and environmental attributes in purchasing decisions (Enarsson, 1998; Handfield, Walton, Sroufe, & Melnyk, 2002; Rezaei et al., 2016).

"If only the Supply department defends the supplier which has less [environmental] impact, but this is not emphasized when we calculate the impact of the final product, we lose momentum. That is what happens nowadays. It is useless if this impact is not considered when the top management of all departments are gathered in order to make a decision and we do not have a shared goal of carbon emissions, for instance. So this is a process we are working at[...]. Summing up, today, we consider environmental aspects in the main decisions, however, this is an additional element and I would not be able to weigh how much is considered or not". (Interviewee 1-Alfa)

In both companies, the environmental criteria related to the non-compliance with either national or international regulations are the only ones considered as eliminatory, following the trend identified by Winter and Lasch (2016) in the fashion and apparel industry. On the other hand, Alfa poses no requirement for the suppliers to have the ISO14001 certification as an eliminatory factor, while Beta does. As evidenced by one of the managers of the company Alfa, if the certification was an eliminatory factor, the company could incur opportunity cost of losing suppliers with excellent performance in items such as delivery and cost, even having an adequate environmental performance, as measured by the company's own monitoring and audit process.

"What often happens, in a matter-of-fact, regarding the environmental performance, is that it's not usual to eliminate one supplier that has a good performance in several [traditional] criteria, but poor performance in environmental criteria. However, in this case, we figure out 'why this supplier has such a good performance in everything else but environmental?' So, we will try to support this

supplier in order to improve its environmental performance. This is commonplace." (Interviewee 1-Alfa)

Company Alfa also rewards productive suppliers with relationships exceeding six months and which achieve the best overall performance in six different indicators, such as quality, cost and the environmental aspects monitored, and also for each one of them. The score of each supplier is obtained by weighing the performance of a particular supplier with the comparison with the other suppliers from the same supply chain, bringing therefore the relative performance. The different environmental aspects are also transformed into monetary units from an analysis of the positive and negative externalities based on a proprietary methodology developed by the company with the support from an external consultant. It is a symbolic recognition, but that is qualitatively considered in the negotiation and perpetuity of the relationship with the company. Thus, in the definition of the environmental criteria to be used in the monitoring, the company considers these aspects as qualifiers, somehow managing to align them with its environmental strategy.

"What we do is compare between suppliers from the same portfolio [industry]. For instance, we collect the data from a supplier, transform them into externalities and divide them for the tonnage they produce. This generates a factor, which is compared between other suppliers from the same portfolio [industry]. (Interviewee 2-Alfa)

"There is a prize for that supplier that had the best environmental performance and there is a prize for the best overall performance. There is a couple of differentiation; however the prizes are symbolical such as trophies, certificates, etc. Now, we are working to evolve this program in order to transform this recognition into a concrete benefit for the supplier when negotiating with Alfa." (Interviewee 1-Alfa)

"We take in account several factors when changing suppliers. In fact, this involves policy, relationship, commercial, quality, commitment[...] So, we know that embraces several factors and, in addition to that, if you decide to add environmental issues, it becomes difficult. So, we came

up with this solution of somehow, monetize everything." (Interviewee 1-Alfa)

Hence, this lead to the following propositions:

**Proposition 2:** *environmental purchasing criteria are used as a measure to qualify suppliers, not to eliminate them, unless the suppliers are not complying with national or international applied legislation.*

**Proposition 2a:** *in order to consider the opportunity cost of not choosing a supplier who has an excellent performance in the other traditional criteria, non-compliance with national or international legislation are the only criteria for eliminating a supplier for poor environmental performance.*

### **Qualification, Final selection and evaluation of supplier performance**

Supplier performance on environmental issues is often subject to risks of opportunism without proper safeguards and process of monitoring (Simpson & Power, 2005).

The process of qualification may simply involve the provision of information about the environmental performance by the supplier, a process defined in this study as 'self-assertive', or the qualification via certification by third parties.

The self-assertion may occur through the completion of a specific questionnaire of the buyer or through the participation in voluntary environmental initiatives. A voluntary environmental initiative is regarded as a self-regulation mechanism of the industry and defined as a form of private regulation in which companies get together to establish their own rules to regulate corporate behavior in order to avoid common threats or promote common performance, based on the adoption of a common code of conduct. In general, since the environmental performance is not evaluated, but simply consists of declaring and/or certifying that it develops certain procedures, it is subject to opportunistic behavior (King & Lenox, 2000; Simpson & Power, 2005). If, on the one hand, it may be a mechanism that reduces transaction costs, since the focal company is not required to develop its own pattern of environmental criteria, but require the company's participation in this or that voluntary environmental initiative, on the other hand, it may cause uncertainty in relation to the actual environmental performance of the supplier. Therefore, environmental issues in-

volving the risk of significant environmental liability generated by the supplier may require other more stringent evaluation measures, thus increasing the transaction costs.

By analyzing the cases, both companies use the same criteria and monitoring systems, regardless of the suppliers or the risk of environmental liabilities. In this case, they adopt a process to closely monitor the suppliers who pose a greater risk of environmental liabilities. Company Alfa, through a close monitoring conducted by the supplier selection area and eventually by the risk management area; and company Beta, through more strict requirements for suppliers in the supply chains that pose greater environmental risks.

"How does the environmental data collection [from suppliers] work? We send an Excel sheet and suppliers return it filled up. [...] Then, we monthly follow-up how the supplier is evolving, comparing the production, and ask them to justify. [...] With this constant follow-up, analyzing and giving feedbacks, one stimulates a more precise and correct data supply. It is different from just asking the suppliers to fill-up with data, store these data and after a long time ask again to see them. Suppliers may inform a figure today, tomorrow inform another figure; they may feel free to make up whatever figure they want." (Interviewee 1-Alfa)

"The thing is: how to oversee if the supplier's plan of action is being effective. For chemical suppliers, every six months, they're automatically blocked in the internal system. Procurement department requires a new assessment to the Environmental department, which consists basically in a recertification, a re-homologation. So the Procurement department follows-up because all licenses [legal environmental licenses and also ISO 14001] expire. In this process, we also oversee whether the action plan agreed in the past between Beta and the supplier has been accomplished by the supplier." (Interviewee 2-Beta)

So, we develop the following proposition:

**Proposition 3:** *when there is risk of significant environmental liabilities originated from the transaction with a supplier, companies incur in more transaction costs ex-ante and ex-post.*

The environmental certification of the supplier by independent third parties may work as a mechanism to reduce the risks of opportunistic behavior without incurring additional transaction costs for the focal company. Here, it is possible to differentiate the ISO 14001 certification from other certifications focused on environmental performance. This is because the ISO 14001 focuses on the environmental management process and system, while other certifications tend to focus on the environmental performance of the product or production process. The certification bodies, often NGOs engaged in environmental issues, perform audits seeking to attest the environmental performance, not only the existence of an environmental management system. On the other hand, the major drawback of certification systems focused on environmental performance is that they usually have their scope limited to a particular industry or environmental issue and are quite numerous, different from ISO 14001, which has a global standard and for all industries (Vogel, 2008), generating therefore a certain specificity of dedicated assets.

Company Alfa, despite using self-assertive mechanisms, also audits all its production suppliers, thus not being a substitute for the other. Thus, Alfa incorporates the transaction costs by having to perform the monitoring and audit, and the suppliers incorporate occasional costs incurred with collection and the modification of their processes to suit the expectations of the company.

“In the audit, we have a checklist. This year we included a coherence verification between the informed data in the socio-environmental form and the audited data. For instance, if a supplier informed the use of a certain amount of electricity, the auditor asks the electricity bill for the period and check whether the data matches. [...] That was an evolution we are still working at. [...] Until last year, we trusted on the information that suppliers gave us.” (Interviewee 2-Alfa)

Furthermore, in spite of basing the audit checklist on ISO 14001 requirements, Alfa does not demand that suppliers have ISO 14001 certification. By doing that, while they consider a widely accepted pattern of requirements, Alfa also gives its suppliers some discretion on deciding whether adopting ISO 14001 is strategically and financially feasible. Alfa also acknowledges that more costs incur from auditing in-

stead of just demanding ISO 14001 certification from suppliers.

“Our checklist is designed based on the requirements of ISO 14001, nonetheless, we do not demand the certification. [...] Because, there are suppliers from different sizes, there are even larger suppliers which are not interested, and we may not interfere on their strategy. [...] There are companies that use that as strategy to reduce the number of audits. [...] From the moment you have a certified supplier [with ISO 14001, for instance], you may ‘close your eyes, because there is a third part overseeing and checking [the certificated company]. We do not proceed this way. We do not demand. On the other hand, if the supplier has the certification, they are not excused from the audit. Once the supplier has the certification, we corroborate it [performing the audit].” (Interviewee 2-Alfa)

Beta, on the other hand, requires ISO14001 certification and considers it as a proxy for the environmental performance of the supplier. Therefore, it seeks not to incur costs to the company, allocating the transaction costs involved in the supplier selection process with the use of environmental criteria to the suppliers. On the other hand, these suppliers which adopt ISO 14001 might not consider these costs as exclusive of transaction with a single company but with all the companies that require it, reducing the asset specificity.

“In order to manufacture a final product, you have a process behind it. So, first you assess the product, as the product tells much about the process. So, you have the list of banned substances and the compliance with all regulations regarding that product. Afterwards, we assess the process. Because a company that has an ecological product and a pollutant process makes no sense. However, it is very difficult to oversee the supplier’s process. One way to do this is to demand all the required certifications. Then, having ISO 14001 means environmental protection. That is how we oversee it.” (Interviewee 2-Beta)

Thus, this lead to the proposition:

**Proposition 4:** *using ISO 14001 or others broad similar certification systems reduces the transaction costs of en-*

vironmental purchasing both for the focal company and the supplier.

Thus, pursuing certifications that are industry-specific such as the Forest Stewardship Council (FSC) for the pulp-and-paper industry, tend to be a quite viable option to reduce the transaction costs of environmental purchasing only for companies that integrate a single supply chain. Studies such as those of Muradian and Pelupessy (2005) and Klooster (2005) indicate that in commodity industries, seeking industry-specific certifications of this kind is relatively common. The adoption of broader certifications, focused on the process, on the other hand, may be justified to focal companies that integrate several supply chains, such as the automotive industry (González, Sarkis & Adenso-Díaz, 2008), seeking to reduce the transaction costs.

Take the case of company Beta. As already mentioned, Beta adopts the ISO14001 certification for all its production suppliers of different supply chains, as it believes that it is a successful way to monitor the performance of suppliers in terms of process, not only with regard to the final product. With regard to the evaluation of the environmental performance of the final product, the company believes that the adoption of international protocols of restricted substances as a minimum compliance criterion is sufficient, considering that some are specific to suppliers of the chemical supply chain. Therefore, Beta believes that simply having a product that has a proper environmental performance is not sufficient, thus requiring that the performance of the supplier's process also meets a minimum a threshold.

"[...]we always tell suppliers that they have to adapt themselves to our needs. Actually, this is for their own interest. If they do not comply [with the requirements], others [suppliers] will do. So, in a matter of fact, these suppliers would start to lose market share. It is a matter of survival. We say 'you do not have ISO 14001 certification, you are supposed to have until a given date'. Sometimes, we even eliminate a supplier in the pre-qualification [because it not possesses the certification]." (Interviewee 1-Beta)

"How do we do the homologation [of the supplier]? First item is whether the supplier is selling a clean, ecological product. However, imag-

ine the supplier is a heavy polluter, or they do not comply with regulation.[...] So, we also assess the supplier process. So, one requirement is ISO 14001. Why is that? ISO 14001 is an international standard of environmental protection. We are not able to audit the specificities of a supplier." (Interviewee 2-Beta)

Company Alfa just requires industry-specific certifications from suppliers in very special situations, such as the case of a new line of products labeled as organic. In this case, in order to be considered as 'organic', all the raw materials of the product are supposed to be certified as organic.

"There was this case, when a perfumery line started to use organic ingredients, including organic alcohol. In this case, this was an essential certification, because it was a product requirement." (Interviewee 2-Alfa)

Based on that, we make the following proposition:

**Proposition 5:** *companies that integrate more than one supply chain upstream tend to adopt broad certification systems seeking to reduce the transaction costs.*

## CONCLUDING REMARKS

Based on the review of the literature addressing the concepts of Supply Chain Management, environmental purchasing and transaction costs, this study discussed the possible transaction costs involved in the supplier selection process with the environmental purchasing approach.

As the main theoretical contributions of this study we present a contribution of general nature and others of specific nature. The contribution of general nature refers to the use of the Transaction Cost Economics in Supply Chain Management studies, and more specifically in the context of environmental purchasing, subjects in which several authors have identified the need of being addressed in the light of organizational theories.

The contributions of specific nature refer to the analysis of the possible transaction costs involved in each stage of the environmental purchasing process and also according to the main transaction elements. As result, five propositions were developed to contribute to the evolution of the knowledge in the field, in the light of two empirical case studies.

By addressing two empirical cases, this study also contributes to the practice by understanding in which situations within the process of green supply chain management, considering the economic and strategic logic, and under which conditions the use of the supplier selection according to the environmental logic is more or less likely to be adopted by the companies. It thus contributes to the discussion proposed by Orsato (2009) and others regarding "When does it pay to be green?". Therefore, it follows the direction of seeking to understand the elements that compel certain types of companies to perform the selection of suppliers with environmental criteria, one way or another. In the cases studied, it became evident, for example, the mediator effect of the environmental strategy, as pointed out by Humphreys et al. (2003), and of the segment of operation and supply chains integrated by the focal company.

However, since these evidences are based on case studies, there are clear limitations with regard to the generalization of the results. Thus, it is first important to enhance the external validity of the results by expanding the research with the study of other cases, particularly addressing companies in other industries. For example, it would be a contribution to replicate the case study in companies that work with commodities or extraction products. By generating more robust propositions, subsequently, the natural path is to perform descriptive studies, using surveys with probabilistic samples seeking to corroborate or refute the hypotheses.

Finally, there are several promising avenues for future research. This study did not discuss more thoroughly the mechanisms that govern the supplier-focal company relationship (Gimenez & Tachizawa, 2012) related to the acquisition of information, notably concerning the hiring of consulting firms, training and hiring of employees, as well as it did not explore asset specificity in depth. Another relevant aspect to be further studied is to understand the adoption of environmental criteria for selecting suppliers according to the purchasing situation and the kind of relationship between buyer and supplier. Whilst we focused the analysis of the first-tier supplier selection only for environmental purchasing, there is room for understand the transaction costs in environmental and social purchasing including second-tier and beyond suppliers, focus which remains understudied (Zimmer, Fröhling and Schultmann, 2016). There is also evidence on the relevance of exploring the different pattern of behavior regarding the environmental purchasing depending on the industry, such as

retail, financial services and automotive (Akhavan & Beckmann, 2016). In addition, there should also be a discussion of alternatives to measure the transaction costs involved in the environmental purchasing process and their validation with empirical studies.

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