

Environmental Practices as Requirements for Supplier Evaluation and Selection in the Automotive Supply Chain

R.M. Vanalle^{*a}, L.B. Santos^b

Department of Production Engineering - Nove de Julho University, Av. Francisco Matarazzo, 612,
São Paulo, SP, Brazil

^arvanalle@uninove.br, ^bleandroblanco@gmail.com

Keywords: Supply chain; Auto Industry; Environment; Supplier selection; Brazil

Abstract. Sustainable supply chains are now growing in importance as shareholders, employees and consumers question whether the company and its associate suppliers are socially and environmentally responsible. This fact has been seriously considered in the auto industry supply chain where companies seem to be concerned with the environment performance of their vendors. In order to verify to what extent the environmental requirements have been imposed by the auto industry companies to their suppliers, this paper examines the case of a first tier multinational Brazilian auto parts manufacturer. The case analysis was able to demonstrate that environmental requirements are of key importance in the evaluation, selection and maintenance of a supplier as part of the respective supply chain.

Introduction

In the last decades environmental questions became a critical issue for governments and companies around the world [1]. As a result, regulations have been created to induce companies to adopt sustainability strategies to improve their economic, social and environmental performances [2]. Besides, it has become a widely accepted concept the fact that polluting the environment could harm the company image among consumers what could adversely affect its profitability and sales [3].

The society is also more concerned with the environment. As a consequence, the interest for the environmental performance of organizations has been growing and the ecological challenges are no longer limited to the manufacturing walls. In the present days, companies should look into their respective supply chains and assure that environmental friendly practices are being employed [4]. Sustainable supply chains are also growing in importance as shareholders, employees and consumers question whether the company and its associate suppliers are socially and environmentally responsible [5]. Seuring et al. [3] state that all members of a given supply chain should adopt green and socially responsible practices to ensure their continuing participation in the supplying process. Meanwhile they should maintain their competitiveness by adequately responding to economic requirements and related consumer needs.

Recognizing the present importance of sustainable supply chains, this paper aims to verify if companies are including environmental practices as requirements for supplier evaluation and selection. This will be done through a case study of a first tier multinational Brazilian auto parts manufacturer and its relationship with its direct vendors.

Literature Review

This paper deals with the environmental aspects involved in the client / supplier relationship in the auto industry. As a result the literature review will cover basically two main subjects: the green supply chain and the vendor selection process.

Green Supply Chain. Martins and Laugeni [6] state that the supply chain management relates to the management practices required for the companies to aggregate value to their clients from manufacturing to the actual product or service delivery to the final consumer. They mention the difference in vision from the supply chain concept and the traditional approach where the organizations were concerned with their immediate clients, not considering, for instance, the impact on the final consumer of a delivery delay. However, the supply chain vision improved with time and the organizations are now aware that for an efficient consumer satisfaction the entire production

cycle, from raw material to final delivery, should be a concern of every member of the chain. The success or failure of a group of companies taking part of a given supply chain depends on the performance of each and every one. The success is not achieved as the result of a good performance of a single firm. However a bad work of a single company could put in jeopardy the efficiency of the entire production network [7].

A supply chain is said green or sustainable when sustainability and sustainable development concepts are applied in addition to the traditional operational principles, i.e., economic, environmental and social friendly practices are considered part of the operational procedures on a regular basis [2]. Srivastava [8] defines sustainable supply chain management or green supply chain management (GSCM) as the integration of the sustainable thinking into the supply chain, including product design, raw material selection and their sources, the manufacturing processes, the delivery of goods to the final consumers as well as the product management after its useful life also known as reverse logistics.

Zucatto et al. [9] define the green supply chain management as way of environmental improvement that can involve initiatives in purchasing, in production, in shipping and in reverse logistics, including material suppliers, service contractors, salesmen, distributors and final users, all them working together to reduce or eliminate adverse environmental impact from their activities.

The terminology applied to the concept of sustainable supply chain and its many elements have been through many changes in the last years. It is possible to find in the literature names as: sustainable supply network management, environmental management of the supply chain, sustainable acquisitions, environmental acquisitions, green logistics, environmental logistics and sustainable supply chain [10].

According to Seuring et al. [3], the sustainability applied to the supply chain has the objective of achieving the three dimensions of the sustainable development: economic growth with social development with no harm to the environment. This will only be attained if all the participants of the supply chain join their efforts to implement coordinated actions. Paula et al. [11] also inform that investors are now showing preference for companies developing sustainable activities in their plants since they have better chances to obtain a higher profitability because they are more prepared to deal with economic, social and environmental risks. This is confirmed in their research where social responsible investments are analysed. On the other hand, Seuring et al.[3] indicate that companies that do not adopt environmental friendly practices could face problems that would end up affecting its brand image with adverse impact on its sales. It is evident that this would also impact other members of the supply chain, reason why the overall vendor / client network should be considered as a whole.

Seuring et al. [3] affirm that many members of the supply chain only start considering ecological practices as a response to external pressures exerted by the society, by legislation or by other stakeholders as larger clients. However, there are other firms that recognize the environment protection as part of their central values and strategic thinking. Hence they develop several environmental related initiatives that become their competitive advantage, mainly considering the fast growing number of environmental conscious customers.

Pusavec et al. [2] describe the evolution of the production systems according to their environmental practices: a) Traditional production systems – based on disposal of wastes as a principle; b) Lean production systems – waste reduction for better resource utilization; c) Green production systems – apply the 3 R's principle (reduce, reutilize or recycle wastes); d) Sustainable production systems – apply the 6 R's principle (reduce, reutilize, recycle, recover, redesign and re-manufacture). In the Global Agenda 21 [12] the 3 R's concept is considered as a way to reduce the waste generation and their respective reutilization or recycling.

As per Pusavec et al. [2] the companies with sustainable production systems are the most valuable in the opinion of market investors, confirming the aforesaid Paula et al. [11] research. The efforts for implementing green manufacturing activities involve product design changes, the development of new raw materials and the reutilization, recycling or reduction of production wastes.

In their study, Santa-Eulalia et al. [5] mention that the material and information flow management as well as the cooperation among the partners in the same supply chain have as their main objective to achieve the three dimensions of the sustainable development (economic, social and environmental), taking into consideration the requirements imposed by their clients and other stakeholders as government, society and employees.

Supplier Selection Process. The supplier evaluation and selection process is a key element for a company. As a result it should be done with care and precision since it is normally the first step for a long last relationship [13]. In that line, to create this kind of relationships, the organizations develop partnerships to work in cooperation, sharing relevant information. Their objective by doing so is to obtain results that could be transformed into competitive advantage for both. The term strategic alliance is used to describe a relationship that includes the cooperative planning of activities to increase competitiveness through summing resources and competencies for a specific activity [14].

The ability of a firm to supply quality products or services at a reasonable price and on a timely manner is strongly influenced by its vendor's capacity to respond to the client requirements. Hence the company competitiveness depends on its supplying network. As a consequence, it should establish as one of its strategic objectives maintain a group of good suppliers fully capable of meeting those requirements [15].

The sustainability practices considered in the vendor selection process are as wide as the non-environmental related requirements. Several researchers have developed studies to identify the environmental variables included in supplier evaluation as in [16, 17, 18, 10, 20]. However Chunguang and Sarkis [21] provide a good summary of those requirements which are described in Figure 1.

Here the sustainability practices listed refer to the operational controls to be implemented to monitor the environmental performance of the supplier. It is interesting to note that many aspects shown are already part of the environmental management system. However, since the items are described on a broad sense, their application in actual real-life situations could translate into additional requirements that are not mandatory in a EMS implemented according to ISO 14001. As a result it is possible to conclude that having that kind of certification is not enough to environmentally qualify a vendor.

Category	Factors	Sub-factors
Environmental practices	Pollution control	Remediation
		End of process controls
	Pollution prevention	Product adaptation
		Process adaptation
	Environmental management system	Establishment of environmental policy and
		Identification of environmental aspects
		Environmental objective planning
		Environmental responsibility assignment
Environmental performance	Resource consumption	Energy consumption
		Raw material consumption
		Water consumption
	Polluent reduction	Pulluent agent production
		Toxic product production
		Waste production

Figure 1. Environmental variables considered in supplier evaluation and selection. Source: Adapted from [21]

Methodology

The research method applied in this paper was the case study as per [22], since the investigation presented herein is trying to answer questions mainly related to “how” and “why” and since it is also investigating a contemporaneous phenomenon in a real world context where the boundaries between the phenomenon and the context are not clear. As data collection procedure to examine the selected case, the semi-structured interview method was chosen because it is considered the most adequate method for collecting data in qualitative research [23, 24]. Patton [25] also reinforces this recommendation saying that the proposed data gathering method should be used when the researcher needs flexibility to obtain information in any direction that could be required, which is the case in this exploratory study.

For the case study it was selected a Brazilian multinational company belonging to the first tier of the auto industry where it supplies air brakes, suspension systems, shafts and coupling components for commercial vehicles assemblers. It employs about ten thousand people in plants located in Brazil, Argentina, USA and China. The interviewee was the Corporate Purchasing Director who was asked about the supplier selection process and the environmental requirements the company imposes to its vendors. During the interview it was possible to obtain the company Manual for Sustainable Supply as well as a copy of the 2010 Sustainability Report, which was also used to support the findings and conclusions of this work.

Case Study

In the interview it was possible to identify that the case company includes as part of its business vision the fact that it is possible to grow in harmony with the natural environment. To do that the firm has established that its main environmental objective is to minimize and prevent the impact resulting from the utilization of natural resources, allied to minimizing waste generation. When inevitable, pollution sources should be reduced to a bare minimum. To prove the point, the interviewee indicated that in a plant where a new foundry was installed, about 20% of the planned expenditures (US\$ 50 million) have been invested in environment protection systems.

In the case company, the vendor selection process begins with the identification of a new need generated by Manufacturing or Engineering. Then Purchasing along with the department where the need was originated discuss product / process requirements and also possible sources to be considered. The Manual of Requirements is then sent to the selected potential vendors who should confirm their interest in supplying the new item by returning the proper questionnaires dully answered. As part of the information requested there are questions related to: a) ISO 9001 Quality Management System (21 items evaluated); b) ISO 14001 Environment Management System (11 items); c) ISO/TS 16949 Peculiar Requirements for Auto Parts Manufacturers; d) ISO/IEC 17025 Labs and Calibration Requirements (12 items); e) OHSAS 18001 Health and Safety Management System (4 items); SA 8000 Social responsibility (34 items) and 34 other items related to commercial, financial and technical conditions. After receiving and analysing the aforesaid information, the company performs a vendor audit where a certain number of points will be granted depending on the supplier compliance to the specified requirements. If the number of points reaches a certain level, the vendor is considered approved. Only then the quotation process and the commercial negotiations take place.

It is of special interest for this study knowing which environmental requirements the company includes in its vendor certification process. Based on [21], on the Manual for Sustainable Supplying, on the 2010 Sustainability Report and on the information obtained during the interview, it was possible to identify the key environmental practices requested by the company from its vendors. They are summarized in Figure 2.

Among the points mentioned in Figure 2, the company under study emphasizes the utilization of the so called “grey” and “black” lists. The products included in the “grey” list have their utilization restricted either in the product design or in the manufacturing process. Their use can only be considered after an express authorization from a multi-functional team. The materials mentioned in

the “black” list are forbidden and no exceptions exist. The company also demands that the vendor’s suppliers be subjected to the same restrictions, as a way to minimize risks of severe adverse impact on the environment.

According to the interviewee, another aspect of high consideration in the vendor selection process is the system to collect, select and recycle or adequately dispose the vendor wastes. The company understands that forcing its suppliers to comply with those requirements will be contributing decisively to make its supply chain more sustainable, with favourable impacts in economic and environmental results.

After the vendor favourable evaluation and approval, the company performs periodic environmental audits to verify if improvements have been continuously implemented. Also, there is an Annual Vendor’s Meeting where the company discusses with its suppliers several business related subjects. Environment questions are among the most significant ones. Finally the interviewee also informed that the company has its representatives at the Environment Commission of the Metal Industry Union. Their objective is to support the associated firms (among which several company suppliers) in relation to environmental subjects. As can be noticed, the company demands sound environmental performance from its vendors, but also supports them to comply with those requirements.

Factor	Sub-factors	Required Practices
Pollution control	Remediation	Is there a waste water treatment plant installed?
		Is there a formal procedure to identify potential accidents and respond to emergency situations?
	End of process controls	Is there a program for reduction of gas emissions?
Pollution prevention	Product adaptation	Is there a “grey list” (restricted utilization materials)?
		Is there a “black list” (forbidden utilization materials)?
		For packaging vendors: utilization of 100% recycled cardboard being: - Brown (89% recycled and 11% virgin); - White (76% recycled and 24% virgin).
	Process adaptation	Are the “grey” and “black” lists enforced?
Environment management system	All item related to EMS	Is the vendor ISO 14001 certified?
	Environment issues	Is there an effective environment issue control?
Consumption of resources	Raw material	Steel and aluminum suppliers should use as much recycled material as technically possible.
		The vendor reutilizes process wastes to save on raw material purchase?
	Energy	Is there a program to monitor and measure the consumption of electricity, natural gas, water and waste generation?
	Water	The vendor reutilizes effluents after proper treatment?
Pollutants production	Wastes	Are there evidences of a system to collect, select and recycle or adequately dispose the wastes?

Figure 2 – Environmental requirements requested from vendors.

Conclusions

In this paper it was presented concepts about the supply chain management, green supply and vendor selection process. A case study has shown how a company belonging to the auto industry is expanding its environmental friendly practices through its supply chain by demanding from its vendors the adoption of more sustainable operational procedures. It was possible to notice that having an ISO 14001 certification is not enough since additional measures to develop environmental practices for pollution prevention / control and continuous monitoring of the environmental performance are also required.

The case study makes clear that a company needs the support of its suppliers to improve the environmental conditions of its supply chain, especially when it requires from its vendors actions like reduction, reutilization, recycling, redesign, recuperation and re-manufacturing, all them vital for a better environmental performance. Main actions identified in the case company focus on: a) Enforcement of the “grey” and “black” lists which imposes to its suppliers cleaner products and processes, besides inducing the eco-design as a vendor response to comply with those requirements; b) Adequate collection, selection and recycling or adequate disposition of wastes as a way to diminish the adverse impact of the manufacturing activities on the natural environment. It is relevant to mention that the supplier’s refusal or impossibility to comply with those demands simply eliminates it from the vendor selection process.

Based on what the case analysis reported, it is possible to conclude that the company under study is actually concerned with improving its sustainability by acting to expand the ecological thinking throughout its supply chain. This has been achieved by introducing stringent environmental requirements for vendor selection and complemented by an on-going follow-up on supplier environmental performance, demanding continuous improvement.

Evidently, as a typical case study the conclusions obtained herein cannot be generalized. Also, the understanding of the environmental requirements throughout the auto industry in Brazil could be expanded by developing similar studies in the upper and lower levels of the supply chain, which could reveal how green it is in these days of deep environmental concerns.

References

- [1] Zucatto LC, Veiga CHA, Evangelisa M.LS. *Estudo comparativo entre as abordagens de supply chain management e de green supply chain management na perspectiva da sustentabilidade*. XXVIII Encontro Nacional de Engenharia de Produção. Rio de Janeiro, (2008).
- [2] Pusavec F, Krajnik P, Kopac J. Transitioning to sustainable production – Part I: application on machining technologies. *J Clean Prod*; **18**:174-84. (2010).
- [3] Seuring S, Sarkis J, Müller M, Rao P. Sustainability and supply chain management – an introduction to special issue. *J Clean Prod*; **16**:1545-51. (2008).
- [4] Nawrocka D, Brorson T, Lindhqvist T. ISO 14001 in environmental supply chain practices. *J Clean Prod*; **17**:1435-43. (2009)
- [5] Santa-Eulalia L.A, Araújo JB, Kettani O, Francioli LA, Azevedo RC, Bremer C.F. *An Essay on Green Supply Chain Design and Dynamic Alignment*. Proceedings of the 3rd International Conference on Information Systems, Logistics and Supply Chain. ILS, Casablanca (Morocco), April 14-16; (2010).
- [6] Martins PG, Laugení FP. *Administração da produção*. 2nd ed. São Paulo: Saraiva; (2006).
- [7] Chopra S, Meindl P. *Gerenciamento da Cadeia de Suprimentos*. São Paulo:Prentice Hall; (2006).
- [8] Srivastava SK. Green supply-chain management: a state-of-the-art literature review. *Int J Manag Review*; **9**: 53-80. (2007).
- [9] Zucatto LC. *Inovações em processos como uma forma de estruturar uma cadeia de suprimentos sustentável: são possíveis?* XXVIII Encontro Nacional de Engenharia de Produção. Rio de Janeiro; (2008).

- [10] Chunguang B, Sarkis J. Green supplier development: analytical evaluation using rough set theory. *J Clean Prod*; **18**: 1200-10. (2010)
- [11] Paula CS, Gonçalves M A, Coscarelli BV. *O perfil de publicações sobre sustentabilidade nos eventos da Associação Nacional de Pós-graduação e Pesquisa em Administração*. XV Simpósio de Engenharia de Produção; (2008).
- [12] Agenda 21 Global. Capítulo 21 – *Manejo ambientalmente saudável dos resíduos sólidos e questões relacionadas com os esgotos*. Available at <http://www.mma.gov.br/estruturas/agenda21/_arquivos/cap21.pdf>. Accessed in Oct 23(2010).
- [13] Rosa NT. *Definição de planos de ação para a implantação da gestão da cadeia de suprimentos entre uma empresa de médio porte e seus principais fornecedores*. Masters Thesis – Programa de pós Graduação em Engenharia, Universidade Federal do Rio Grande do Sul. Porto Alegre; (2004).
- [14] Kalnin JL, Baguinski DA, Costa CA. *Desenvolvimento de uma metodologia para a seleção de fornecedores na cadeia de suprimentos de uma empresa do ramo automotivo*. XXIX Encontro Nacional de Engenharia de Produção. Salvador, Bahia; (2009).
- [15] Frej TA, Viana JC, Alencar LH. *Modelo de seleção de fornecedores com apoio do método multicritério Promethee I*. XXIX Encontro Nacional de Engenharia de Produção. Salvador, Bahia; (2009).
- [16] Zhu Q, Sarkis J. An intersectoral comparison of green supply chain management in China: drivers and practices. *J Clean Prod*; **14**:472-86. (2006).
- [17] Zhu Q, Sarkis J. The moderating effects of international pressures on emergent supply chain management. *Int J Prod Research*; **45**:18-19. (2007).
- [18] Walton SV, Handfield RB, Melynk SA. The green supply chain: suppliers into environment management process. *Int J Purch & Mat Manag*; **34**: 2-11. (1998).
- [19] Hervani AA, Helms MM, Sarkis J. Performance measurement for green supply chain management. *Benchmarking*; **12**(4): 330-53. (2005).
- [20] Linton JD, Klassen R, Jayaraman V. Sustainable supply chains: An introduction. *J Oper Manag*; **25**: 1075-82.(2007).
- [21] Chunguang B, Sarkis J. Integrating sustainability into supplier selection with grey system and rough set methodologies. *Int J Prod Economics*; **124**: 252-64. (2010).
- [22] Yin RK. *Case study research: design and method*. 6th.ed. Newbury Park, CA.: Sage; (1990).
- [23] Bryman A. *Research methods and organization studies*. London: Routledge; (1995).
- [24] Collins J, Hussey R. *Pesquisa em administração*. Porto Alegre, RS: Bookman; (2003).
- [25] Patton MQ. *Qualitative evaluation and research method*. Newbury Park, CA: Sage; (1990).

Energy, Environment and Sustainable Development

10.4028/www.scientific.net/AMM.260-261

Environmental Practices as Requirements for Supplier Evaluation and Selection in the Automotive Supply Chain

10.4028/www.scientific.net/AMM.260-261.935