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Research article

Maturity level of environmental management in the pulp and paper supply chain

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Abstract: This research aimed to identify the level of maturity in environmental management in a focal company of a pulp and paper supply chain. Methodologically, it is characterized as a qualitative exploratory case study. Semi-structured interviews were used to collect the data. The adoption and use of Environmental Management Supply Chain (ESCM) practices was assessed using a model based on 53 practices grouped into 8 types of practices. Qualitative data analysis software (NVivo) was used to analyse the data and support the development of findings. It was found that 85% of the ESCM practices were adopted by the company. Internal environmental management practices, waste and risk minimization and eco-design were fully adopted. Furthermore, a proactive maturity level was found, embedded in the company's strategic planning. Proactivity in environmental management encourages continuous improvement, cost reduction, cleaner production, and reuse and recycling of products.

Keywords: environmental management; supply chain; maturity model; paper and pulp

1. Introduction

The growing importance of environmental supply chain management (ESCM) has been mainly driven by the gradual deterioration of the environment, reduction of natural resources, increase of waste generation and increasing levels of pollution [1,2]. Thus, companies are increasingly pushed to recognize their impact on the environmental, social and economic dimensions caused by their internal operations and the operations of their suppliers [3].

Thus, ESCM should be a company-wide effort and not simply implementing some practices perceived as ecological. It should be a comprehensive and coherent approach to improve environmental and organizational performance at all levels of the organization and its activities with buyers and suppliers in the supply chain [4,5]. Nowadays, it is recognized how important is to protect the environment for future generations [6], and the balance of economic and environmental performance has become increasingly important for organizations that face competitive, regulatory and consumer pressures [7–10].

ESCM has attracted a growing interest in the academic and professional literature since the 1990s, and it is rooted in both environmental management and supply chain management [11]. However, most research on ESCM seeks to focus on economic performance [1,12,13].

Previous studies [1,14–16] have shown that companies can be positioned at different levels of environmental management maturity. A higher maturity level should contribute to more effective continuous improvement activities and a higher competitive advantage through the entire supply chain [15]. Thus, environmental impacts should be estimated based on a global assessment of the entire supply chain and the development of organizational programs for environmental management asks for the commitment of all resources involved within the entire supply chain [15,17,18].

This asks also for appropriate performance measurement systems [19]. However, there is a lack of consensus in the literature on the evaluation of ESCM practices [1,18,19]. The maturity of environmental management practices is related to the type and number of practices adopted and several levels can be established. For the purpose of this research, three levels of ESCM maturity were considered namely, reactive, preventive and proactive [1,16,17].

Therefore, considering the above-mentioned aspects, the ESCM practices and maturity level of environmental management of a Brazilian pulp company were studied. The use of these practices increased company's likelihood to be competitive through an evolutionary process [1,2,20,21]. This article contributes to the discussion on environmental maturity in supply chains through the perspective of the focal company.

Furthermore, as argued by Gunarathne et al. [17], most studies have been focused on organizations from developed countries, except a few, as for example, the work of Ferreira et al, Maialle et al. and Ferreira et al. [1,15,16]. Indeed, developing countries face greater difficulties to reach higher levels of sustainable practices, due to insufficient and ineffective legislation and inefficient governmental actions [17]. In this way, this research intends to contribute to the literature on environmental supply chain management, using a qualitative approach to support a holistic analysis of a pulp and paper supply chain. Sustainability practices are important for the entire supply chain because they help to improve social conditions, providing employees and the surrounding community with conditions for a higher preservation of natural resources. For instance, reducing the extraction and exploitation of resources and ensuring that future generations can have access to them in a balanced manner.

2. Theoretical background

2.1. Environmental supply chain management

The search for sustainable development is a constant challenge, being related to the attitudes and actions of individuals, managers and companies in order to preserve natural resources. It seeks to maintain the ecological balance by reducing pollution, encouraging recycling and eliminating environmental impact [10,22]. From this perspective, companies and industries have been taking several actions, initiatives, and strategies to offer more sustainable products characterized by the least possible environmental impact [22,23].

Environmental management is a set of initiatives developed to mitigate the impact of organizations' operations on the environment [2]. For Jabbour [24], environmental management represents a consistent set of actions that change the organizational structure through integrated guidelines, shared responsibilities, and strategic and operational practices. With increasing environmental concerns, companies have been recognizing that environmental issues as pollution must be addressed in the supply chain management [25]. Therefore, one of the first steps to face this challenge is to redefine the entire supply chain, accommodating environmental concerns such as those related to minimizing the use of waste and resources [26].

According to Camargo et al. [10], this implies the development of production systems that generate less negative impact through the adoption of actions and incentives for the use of good practices. For example, promoting innovation in products and services that contribute to sustainability, especially with regard to the environmental performance of some manufacturing industries and agribusinesses characterized by high environmental impacts. Such balance of economic and environmental performance has become increasingly important for organizations [7,27], and has been forcing them to move forward to strengthen their supply chains [28]. This situation evokes the concept of Green Supply Chain Management (GSCM) or Environmental Supply Chain Management (ESCM), which represents the combination of environmental thinking and supply chain management encompassing product design, supply and selection of materials, manufacturing processes, delivery of the final product to consumers and management of the entire product life cycle from a circular economy perspective [11,29,30].

The integration of commercial and production activities and the collaboration between upstream and downstream partners has been moving the perspective from the isolated company to the arena of the supply chain. The focus shifted from a single organization to a network of organizations that collaborate to provide real-time solutions [31,32]. Thus, ESCM promotes efficiency and synergy among business partners, in addition to improving environmental performance [8], representing win-win relationships in terms of environmental and economic performance [30].

The objective of ESCM initiatives is to eliminate or minimize negative environmental impacts (e.g., on air, water and land) and the waste of resources (e.g., energy and materials), from the extraction of raw materials to the final use of the product and its disposal [33,34]. Indeed, within the realm of ESCM, companies seek to reduce or eliminate the environmental impacts resulting from their activities. This is important because all stages of a product's life cycle can affect the environmental impact of its supply chain, ranging from resource extraction to manufacturing, use/reuse, and final recycling or disposal [5].

In ESCM, the supply chain is managed as a "green system", and each process focuses on environmental management and risk control [35]. It is strongly related to interorganizational environmental issues, e.g., industrial ecosystems, industrial ecology, product life cycle analysis,

extended producer responsibility and product management [27]. For Srivastava [11], the scope of ESCM ranges from reactive monitoring of general environmental management programs to more proactive practices implemented through various "R" (reduce, reuse, refuel, restore, recover, recycle, refuel, reverse logistics, etc.).

Companies may adopt ESCM initiatives because government regulations, pressures from stakeholders (e.g., customers and the society), and their strategic options in terms of economic, environmental [5,36,37] and social aspects [38]. According to the literature, governmental or regulatory institutional pressures may be the main motivator for the implementation of ESCM practices [27,35,39,40].

The implementation of ESCM can improve both the image and reputation of the organization [41]. In this regard, Liu et al. [42] argued that, nowadays, customers not only ask for cheap and quality products, but also demand for products which can be labelled as environmentally friendly. This leads organizations to analyze the implementation of ESCM practices throughout the entire supply chain, from design to the end of the product's life [43].

2.2. Maturity level of environmental management practices in the supply chain

The analysis of a company's environmental management maturity allows classifying companies into several levels based on organizational aspects, the commitment of resources, and the development of organizational programs for environmental management [1,15,43]. However, there is no unanimity regarding the criteria used to classify companies into such levels of environmental maturity. There is some agreement about the existence of evolutionary stages, which are important to offer insights on the adoption of environmental practices [1,2,15].

According to Liu et al. [17], most studies related to environmental management practices in supply chains seek to systematize and classify such practices according to the stage of development or environmental management maturity, in which the organizational activities carried out reflect the level of environmental management over time.

ESCM practices can be summarized into the following ones: (i) planning (return on investment, internal and external environmental management, storage and green construction); (ii) product and processes (waste reduction and risk minimization, reverse logistics and eco-design) and iii) communication. They can be identified a total of 53 different practices according to Ferreira et al. [1]. A conceptual framework of environmental management practices enables a broader analysis of the practices in use and those which can be carried out [2].

Planning practices include external aspects such as selection, evaluation and contracts with suppliers, cooperation with customers and suppliers, and participation in eco-industrial platforms, investment in waste reduction and in the increase of the shelf-life of goods and materials [30]. On the other hand, internal environmental management practices are related to the commitment of senior managers, multifunctional cooperation and eco-design [44].

For Ferreira et al., Potrich et al. and Teixeira et al. [1,2,45], planning practices reflect the measurement procedures that define a company's environmental policy. They are developed with the purpose of establishing environmental objectives for the selection, implementation and evaluation of these practices, and they help the company to act proactively towards a correct allocation of resources.

ESCM process practices include waste reduction and risk minimization, in which different products must be designed with compatible raw materials, parts and components for a better disposal and recycling [30,46]; and reverse logistics, which is the process of recovering products from the point of consumption to the point of origin for reuse, recycling and remanufacturing. They can be classified

into two groups, those related to products (practices focused on the design and development of new products) and those related to processes (development and implementation of manufacturing processes and operational processes, environmental responsibility and reverse logistics) [1,45].

Finally, communication practices aim to inform the company's social and institutional environment about the actions taken in favor of the environment. They communicate the environmental commitment of the organizations [1,2,39,45]. This set of practices, typically, involves environmental reporting, sponsorship of events or collaboration with environmental organizations [1].

By assessing the adoption and use of ESCM practices, one can define the maturity of environmental management at three different levels: reactive, preventive or proactive [1,17,47,48]. For Jabbour et al. [49] and Jabbour [24], corporate actions in environmental management can be measured and equated with these levels of maturity.

At the reactive level, there is a small number of ESCM practices, usually imposed by restrictive environmental legislation. They are seen by companies as an external cost and a legal issue to be managed. At the second level, designated as preventive, companies adopt a considerable number of ESCM practices, and it is assumed that costs are lower when pollution generation and environmental problems are reduced. However, environmental issues are not yet considered in the company's strategic plan. At the proactive level, companies adopt a large number of ESCM practices that are considered to be one of the pillars of the competitive advantage, and are explicitly considered in the company's strategy [1,43].

The literature (e.g., [30]) presents a very low rate of adoption of ESCM practices. However, if adopted they may contribute to a higher environmental and economic performance [4,50,51], particularly, when moderated by quality management practices. Indeed, Jabbour et al. [43] state that quality management is an important precedent for higher levels of environmental management and the adoption of external ESCM practices. As far as company size is concerned, Zhu et al. [52] concluded that large and medium-sized organizations are more likely than small-scale organizations to implement environmental practices, the later driven mainly by external pressures.

This path seems to be the most common, as stated by Zhu et al., Zhu et al., Rehman et al., and Ninlawan et al. [5,27,40,53]. In fact, companies have increased their environmental awareness much more because of regulation and competitive pressures than because proactiveness and internal motivations.

In addition, Sharma [54] stated that the high level of involvement of employees helps in the construction of effective and efficient ESCM practices, especially when employees are empowered and contribute to decision-making. Also, Sharma [21] concluded that proactive environmental management requires the support of human resources at a strategic and operational level.

2.3. Institutional theory

Several institutional pressures are the main forces that lead companies to implement ESCM [55]. Particularly, governmental or regulatory institutional pressures, which are the main reasons behind the implementation of external ESCM practices [27,35,39,40].

However, Henriques et al. [56] and Seuring et al. [57] emphasize that there are several types of pressures and incentives: demands and legal regulations; customer demands; response to lobbying activities; environmental and social pressures and the loss of reputation risk. On the other hand, there are barriers to the implementation of ESCM, namely its high costs; difficulties and complexity in the coordination of activities, as well as a lack of communication in the supply chain [30,36,57,58].

Among other, Masoumik et al. [59] investigated theories that could support and explain the

voluntarist behavior of companies when adopting environmental strategies. The research revealed that institutional theory can be applied to clarify such behavior.

For the institutional theory developed in the 1970s and 1980s, legitimacy is fundamental for the acquisition of organizational resources, survival and performance of organizations [60–61]. Indeed, organizations adopt new structures and practices not necessarily because they are effective or efficient, but because they provide a certain legitimacy [62]. Three theoretical branches can be highlighted: the Old Institutional Economics (OIE), the New Institutional Economics (New Institutional Economics - NIE) and the New Institutional Sociology (New Institutional Sociology - NIS) [63], which, although different theoretical assumptions, focus on the institution and institutional change [64].

The institutional theory highlights the pressures of the external environment and organizations' conformity to such environment. In this context, the isomorphism phenomenon arises [60] as a result of the acceptance of a certain practice interpreted as legitimate and consequently reproduced by the organizational agents until it is institutionalized [64–65]. In this perspective, the competitive organizational environmental is complemented by three institutional isomorphic pressures known as normative, coercive and mimetic [66,67].

Coercive isomorphism occurs when there are pressures from organizations, such as the government, to adopt a certain type of structures and procedures, representing a certain degree of submission [60], that is, organizations adopt and adapt processes according to regulatory and societal pressures, making practices in the industry more homogeneous. Coercive isomorphism is the mechanism by which organizations conform to government regulations and cultural expectations capable of imposing uniformity on organizations [60].

Mimetic isomorphism occurs when, facing uncertainties in the environment and difficulties in defining their strategies, companies mirror themselves in other organizations (for example, through competitive benchmarking) and have them as a model [67]. Consultants are also key players in the diffusion of mimetic isomorphism. Finally, normative isomorphism is related to rules, norms, professionalization, dissemination of knowledge by specialists and definition of working methods, such as management processes and models, customer and market requirements that characterize certain professional groups [60]. This type of pressures can be exerted internally by managers or externally by stakeholders related to professional groups [67].

3. Materials and methods

A case study approach was followed in this research, and data were collected through seven semi-structured interviews with managers of the company "Celulose Irani", which operates in the pulp and paper supply chain, complemented by interviews with two of its suppliers and one of its customers, during a period of four months.

The script of the interviews was designed considering the 8 groups and 53 practices of ESCM presented before. To gather the necessary information, the interviewees were chosen for their strategic position in the supply chain. They relate to each other, have an interface with suppliers and customers or participate in internal management, planning and continuous improvement.

Table 1 details the set of ESCM practices according to their classification and the respective description, as these practices are the basis of semi-structured research and a guide for the identification of practices in the documents collected from the company.

Table 1. ESCM Practices.

Classification	No.	Type	Practices
Planning Practices	1	External	1.1 Environmental specifications for suppliers, including requirements for the items purchased.
			1.2 Cooperation with suppliers for environmental objectives.
			1.3 Audits of environmental management in internal suppliers.
			1.4 Certification of suppliers with ISO 14001.
			1.5 Evaluation of second tier suppliers on environmental practices.
			1.6 Cooperation with customers for eco-design.
			1.7 Cooperation with customers for a cleaner production.
			1.8 Cooperation with customers to use green packaging.
			1.9 Collaboration with eco-industrial parks.
	2	Return on investment	2.1 Reduction of inventories.
			2.2 Sales of scrap and used materials.
			2.3 Sales of unnecessary equipment.
	3	Internal	3.1 Senior managers' commitment seniors on ESCM.
			3.2 Mid-level managers involvemeny3.3 Multifunctional cooperation for environmental improvements.
	4	Green building and storage	4.1 Careful use of building materials (e.g., use of recycled concrete, steel, asphalt and other materials).
			4.2 Thermally insulated construction.
			4.3 Natural lighting (for example, use of natural light as a source of interior lighting).
			4.4 Energy-efficient lighting systems.
			4.5 Energy-efficient handling equipment.
			4.6 Use of alternative energy sources (for example: solar or photovoltaic panels).
			4.7 A better use of water systems (for example: minimization of water waste and the use of "gray water").
Product related practices	5	Eco-design	5.1 Design of products with reduced consumption of materials and energy.
			5.2 Design of products for reuse, recycling and return of materials and components.
			5.3 Product design in order to prevent or reduce the use of hazardous inputs or manufacturing processes.
Process related practices	6	Waste and risk minimization	6.1 Waste reduction.
			6.2 Low consumption of hazardous and toxic materials.
			6.3 Control of hazardous substances for the environment.
			6.4 Raw materials containing no prohibited substances.
			6.5 Green products.
			6.6 Green manufacturing practices.
			6.7 Manufacture of green products.
			6.8 Green product patterns.
			6.9 Use of recyclable materials whenever possible.
			6.10 Reduction in consumption, whenever possible.
			6.11 Reuse of materials whenever possible.
			6.12 Total environmental quality management.
			6.13 Compliance with environmental legislation and audit programmes.
			6.14 ISO 14001 certification.
			6.15 Use of Environmental Management Systems.

	7	Reverse logistics	7.1 Reverse logistics and disposal of waste.
			7.2 Redesign of logistics for a higher environmental efficiency.
			7.3 Environmentally location of facilities.
			7.4 Use of alternative fuels.
			7.5 Eco-friendly transportation.
			7.6 Use of less polluting vehicles.
			7.7 Consolidated shipping and cargo optimization.
			7.8 Routing systems to minimize travel distances.
			7.9 Vehicle maintenance.
Communication	8	Communication	8.1 Periodic environmental reports.
Practices			8.2 Sponsorship of environmental events/collaboration with ecological organizations.
			8.3 Environmental marketing.
			8.4 Providing regular and voluntary information about environmental management to customers and institutions.

Source: [1,16].

Based on Table 1, it was possible to analyze the adoption and use of ESCM practices in the studied company. The interviewees were asked about these ESCM practices, and respective supporting evidence. At the end, in addition to identifying the practices adopted in each group, the relative importance of each group in the total of set of practices was also analysed.

In addition, it was used public and private information provided by the company, especially on the sustainability report. The collected data were used to discuss the company's maturity level in environmental management and, mainly, the reasons and implications of this from the perspective of institutional theory.

The analysis was based mainly on the data collected in the semi-structured interviews. The conclusions were triangulated among respondents, company documents (for example, sustainability reports, standards, certifications, etc.) and specific legislation.

In addition to the ESCM practices, they were also considered several drivers of these practices [14,47,48] which are: support from senior management, the organizational structure, interface among other areas, environmental objectives, existence of environmental management strategies and environmental focus. As in the case of ESCM practices, the evidence that the company is aligned with these factors was confirmed by the triangulation of internal data. Thus, it was possible to identify the relative importance of each set of ESCM practices, and to identify the maturity levels of environmental management in this focal company of the pulp and paper supply chain.

Thus, the methodologically steps adopted in this research were: (i) selection of respondents; (ii) analysis of ESCM practices adopted by the company; (iii) analysis of the environmental maturity level in accordance with ESCM practices.

4. Analysis of results

The studied company operates in the pulp and paper industry and has forestry and industrial activities, including processes for making kraft paper (made from virgin fibers), packaging and corrugated sheets (made from recycled material), which directly or indirectly impact on the environment, earlier or later. This study considered the upstream and downstream of the supply chain from the perspective of the focal company, since ESCM practices are related to the strategy and vision of the company, but also with the firm’s suppliers and buyers [3].

The company seeks to mitigate the environmental impacts arising from its activity, developing and implementing strategies and action plans that are in line with the most demanding laws and standards. These are some of such projects and initiatives (i) Construction of a plastic recycling plant; (ii) Treatment of ash from the HPB boiler; (iii) Treatment of calcium carbonate; (iv) Reduction and reuse of water; (v) Greenhouse Gas Emission Inventory (GHG); (vi) MDL Effluent Treatment; (vii) APP recovery; (viii) Environmental education; (ix) Depollution programs; (x) Ecological trails; (xi) Ecological gardens; (xii) Limnological Monitoring; and (xiii) Ichthyofauna studies.

To assess the adoption and use of the main environmental management practices by the focal company, they were analysed data obtained through the interviews and various materials available on the company's website, especially the sustainability report, as well as previous research published in the literature and current legislation. It was found that the focal company is strongly influenced by the legislation. This evidence is supported by the analysis of the interviewees and of the sustainability reports. These influences are important to explain the first maturity level . Therefore, the maturity level of environmental management in the focal company was assessed to identify specific evidence for each type of ESCM practices. According to Zhu et al. [5] and Ferreira et al. [1], the explanation for the implementation of ESCM practices is that they will result in a better environmental and economic performance.

Analyzing the group of external planning practices, it was observed a 89% adherence to ESCM practices. This finding confirms that the path to maturity in environmental management asks for the involvement of customers and suppliers. These practices are appreciated by employees, suppliers and customers, because they feel that they are fully involved in the process.

According to Geffen & Rothenberg [68], supplier relationships are also important for the adoption and development of innovative environmental technologies. In addition, the interaction between customer and supplier personnel, partnership agreements and joint research and development lead to improvements in environmental performance.

In the second group of ESCM practices, related to the return on investment, the company showed a 67% adherence, what is similar to the results of the research developed by Green et al. [4], conducted with 159 managers who work for US manufacturing organizations. The company must manage its assets and inputs in ways that generate the best economic return and the least impact on the environment.

The group of internal planning practices that involve a commitment to environmental management, are widely used by the company. It was collected evidence from both the interviews and sustainability reports, which are available for consultation in the company's website, particularly, information on environmental projects. The company adheres to 100% of these practices. The role of senior managers was described by Sharma [54] as very important for employee engagement in these initiatives. In his research, we also found that the high level of employee involvement helps to build healthy ESCM practices, particularly because the potential involvement of all employees in the decision-making process. In the focal company, these practices were advocated by all respondents.

The fourth group of ESCM planning practices, i.e., green storage and construction, shows a concern that all interrelated companies in the supply chain should share the same line of ecological thinking when building or improving areas used for storage or other constructions. In this group of practices, the company had 71% adherence, and there is room for growth in terms of ecological awareness, since this practice is advocated by all respondents. In its Sustainability Report, the company clearly stated its concern with these practices, and showed the results achieved.

The fifth group of practices are those related to eco-design, and the company adheres to 100% of the practices, which is indicative of a strong partnership with suppliers and customers. Eco-design is

an important dimension of ESCM, as these practices can be useful to reduce the consumption of energy, supplies and costs along the supply chain if managed at the beginning of the product or process design, as highlighted by Sharma, Mitra et al. and Zhu et al., (2012) [1,51,69]. This type of practices requires the participation of customers and suppliers as partners in environmental design to bring the results to all companies. This requirement can be evidenced by the reports of customers and suppliers.

The operational ESCM process practices emphasize waste and risk minimization. They are fully used by the studied company which indicates a particular concern about this group of practices, especially because full compliance brings financial and economic returns; in addition, there are environmental issues involved. In this context, the focal company uses the product life-cycle approach to ensure process efficiency.

Furthermore, reverse logistics is considered to be a proactive practice to do a better use of raw material and preserve resources. In addition, effective and efficient reverse logistics operations must also optimize storage, transport and logistics costs [2,15,70]. Reverse logistics practices have 77% of adherence in the studied company. It is noteworthy that the focal company promotes projects focusing on the reduction of the amount of recyclable materials that remain in the environment (e.g., paper shavings). In the company, reverse logistics addresses also processes involving containers, reuse of pallets, big bags, and reuse and sale of tubes.

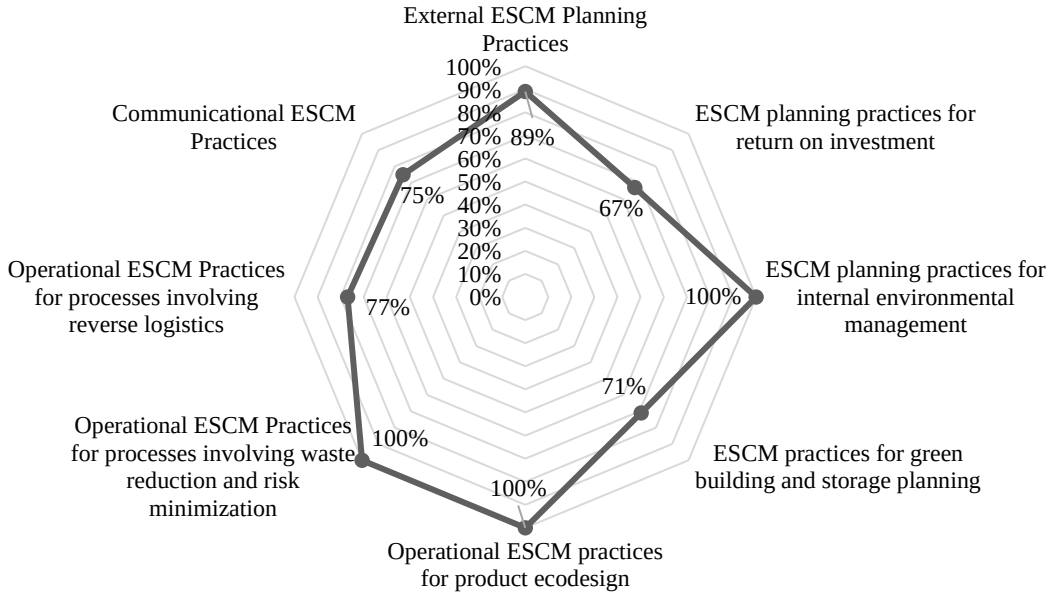

Figure 1. ESCM practices adopted by the company.

As regards ESCM communication practices, only environmental arguments in marketing are not used explicitly, since the commercial process and customer service are specific to each client. As highlighted by one interviewee, the company's business model is business to business (B2B), thus, it is not necessary to invest in TV advertising to target individual consumers. Therefore, marketing efforts are oriented to the management of the relationship between the organization and its customers.

The practices adopted per group can be mapped out, as shown in Figure 1.

Figure 1 shows the ESCM practices that were adopted and most frequently used by the company: ESCM planning practices for internal environmental management, operational ESCM practices for eco-design, and operational ESCM practices for waste reduction and minimization of risks (100% of

adoption). At the intermediate level, external planning ESCM practices had 89% of application; reverse logistics practices, 77%; communicational ESCM practices,75%; planning practices for green construction had 71% application, while planning practices for return on investment, 67%.

According to Zhu et al., Ferreira et al. and Ferreira et al. [1,16,24], environmental management can be organized into three levels of maturity, which have been advancing over time. Figure 2 shows the maturity levels in environmental management and ESCM practices.

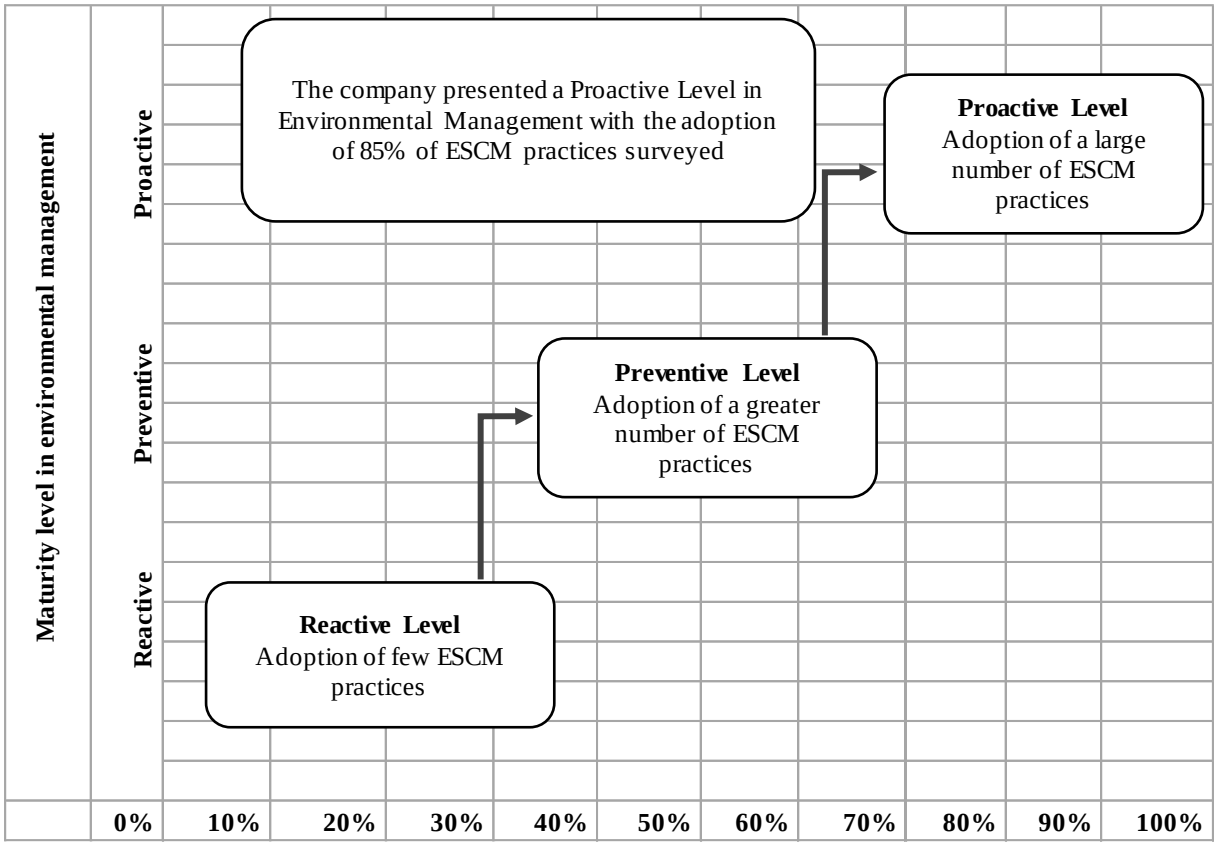

Figure 2. Maturity level in environmental management and ESCM practices. (Source: adapted from [1]).

For Ferreira et al., (2017), Jabbour (2010), Corazza, (2003) [1,47,71] at the reactive level of environmental management, environmental activities are institutionalized in the company in order to comply with environmental legislation. In this sense, and according to the data collected in the interviews and from the sustainability reports, the focal company considers important the compliance with the legislation.

At the intermediate (preventive) level, in addition to complying with the legislation, the focus becomes more operational, e.g., reducing pollution and waste, and improving productivity [51]. At this level, the motivation for change can be driven by normative pressures from external stakeholders [67]. An analysis of the company's ESCM practices, shows that the various certifications hold by the company demonstrate a concern with having well-aligned and adequate processes and products that meet regulatory requirements, ensuring that the final product meets the highest quality standards required by customers.

At strategic environmental management or proactive level, organizations see environmental management as one of the main sources of competitive advantage [16]. At this maturity level,

environmental issues are embedded in the company's strategy with clearly defined objectives that are accepted and followed by all members of the company, from top managers to the operational level. Furthermore, it has an impact on the entire upstream and downstream of the supply chain. To this end, a strong internal integration of all activities and processes is fundamental to ensure the levels of productivity and quality required to meet strategic objectives.

Given the evidence collected, there are indications that coercive isomorphism was the main motivator for initiating the environmental compliance process. Also, as both laws and punishments are strict, the company remains in full compliance, which serves as a background for other practices. In addition, customer requirements regarding product quality, which are also under pressure from other laws, influence the strategy of adhering to certifications.

The collected evidence indicates that the company is at the proactive level (Figure 1). According to Ferreira et al. [1], the ESCM practices increases as the organization achieves a higher level of maturity in environmental management; moreover, at the proactive level, companies adopt a large number of ESCM practices, i.e., they take continuous improvement actions, seek technological and environmental innovation, and foster collaboration among the company, customers and suppliers, which results in a higher reputation and environmental management gains.

Therefore, based on the data collected in the interviews and from the available documents, it can be argued that the company i) adopts ESCM practices that indicate cooperation with suppliers and customers for accomplishment of environmental objectives; ii) optimizes the production process with reduced extraction of natural resources and reduced consumption of raw materials and inputs; iii) minimizes waste disposal and environmental impact; iv) adopts green building practices; v) communicates with its markets and partners (stakeholders), and vi) commits to ESCM at all organizational levels.

The company has gone through the reactive level of environmental maturity, by fully complying with the legal requirements. It progressed through the preventive level, where it sought to standardize its processes and obtain certifications from the regulatory bodies that consider its processes and management as adequate. And it advanced to the proactive level, by strategically establishing environmental principles and objectives to ensure the sustainability of the business, thereby achieving competitive advantage and differentiation in the market.

5. Conclusions

ESCM can be seen as a process of evolution from reactive and preventive levels to a proactive level, by strategically establishing environmental principles and objectives to ensure the sustainability of the business, achieving competitive advantage and differentiation in the market. In this study, the focal company of a pulp and paper supply chain adopts 85% of the 53 ESCM practices analysed, with 100% adherence to internal environmental management practices, waste reduction practices and risk minimization and eco-design, as a result of the determination of current leaders and organizational principles based on the preservation of the environment (that is, suggesting a kind of normative isomorphism). In fact, institutional theory offers a good framework for understanding this process and the reasons behind it. Normative pressures support voluntary isomorphism and usually do not have a dominant role compared to mimetic and coercive pressures, which makes this case interesting also from a theoretical perspective.

In terms of environmental management, the company meets all the legal requirements and has the initiative to ensure that they are met in the chain as a whole. The company's strategic positioning is a determining factor for such environmental maturity. It performs internal and external actions with

specific objectives that take the entire supply chain into account; it takes a proactive approach, open to innovation and continuous improvement.

This research showed that proactivity in environmental management can be important for the process of continuous improvement, reducing costs, and encouraging cleaner production, reuse and recycling of products. The adoption of practices involving customers and suppliers makes the process more effective and efficient, as it generates a win-win environment, where the effort for new solutions generates gains that can be shared by all the companies involved. However, the role of the focal company is fundamental owing to the coercive pressures that complement and expand the initial normative pressures.

One of the limitations of the study is the lack of statistical data that can prove the existence of a relationship between ESCM practices and environmental and economic performance. As a case study, the findings cannot be generalized to other companies.

Further research should be carried out with other methods, e.g., internal and external focus groups, in order to find different perceptions on this phenomenon. In addition, there is room for more studies on the use of ESCM practices, particularly by small and medium-sized companies in the paper and cellulose industry and other industries, particularly, to find out about the extent of such adherence and about the relationship between environmental performance and economic performance.

Conflict of interest

The authors declare no conflict of interest.

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