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# Marketing – Environment Sustainability Alignment: an Exploratory and Propositional Study

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**ABSTRACT:** The purpose of this paper is to present a model of alignment between marketing and the environment in the sustainable operations context. The model is generated from the literature review of Environmental Marketing and Sustainable Products and Operations. A database is used to test the proposed alignment model. Marketing and environment variables are extracted from the database and are included in the Social Responsibility Ethos Institute's Indicators. The answers correspond to respondents' perceptions of their enterprises social accountability level. As a result, the marketing-environment alignment model is validated, partially. Additionally, the data analysis revealed two groups of enterprises in the sample, according to Kärnä, Hansen and Juslin (2003): (1) the smallest, formed by proactive enterprises with the highest environmental consciousness score, and (2) the largest, formed by reactive and consumption enterprises with the lowest environmental consciousness score.

**Keywords:** *Alignment, Marketing, Environment, Sustainability*

## INTRODUCTION

The alignment study of the marketing process with the environment sustainability is based on the literature, which describes and prescribes that companies have required their marketing departments to present solutions for a safer commercialization of products anywhere in the globe regarding market needs and the society demand (Bartels, 1988; Jones, 1994). Solutions include: (1) external packages that are able to identify, increase the product value or simply pack the product, (2) internal packages that separate and protect product components, (3) the owner's manual, (4) the warranty certification, and (5) the product itself. Each one of these elements integrates the product mix and has an environmental impact associated to the volume it produces putting natural resources integrity at risk. The responsibility for the proper disposition of these elements after consumption falls mostly on the final consumer and not on the enterprise that has produced them. Each knowledge area has given its contribution to the environment preservation and recovery. Thus, the marketing process has also to contribute by avoiding the environmental degradation and, consequently, by positioning companies favorably in relation to the environment sustainability index.

The research question of this study is: How can marketing actions, translated as conception, production and distribution of consumer goods, be represented in order to be aligned with environment sustainability and protection?

Therefore, the purpose of this study is to present: (1) an alignment model between marketing actions and the environmental sustainability criteria for goods/services, (2) propositions that made the model creation possible, (3) the test of the model and (4) the sample characterization as proactive, reactive and consumption enterprises, according to Kärna et al (2003). A database from a former research is used for data analysis. Thus, the association of marketing practices with the environment, in the context of industrial, commercial, and service providing enterprises can be argued.

The proposed alignment model describes functional marketing influences on decisions that involve production, commercialization, and the provided service to attend sustainable characteristics of products, consumers, and environmental laws.

## 2 ENVIRONMENTAL MARKETING EVOLUTION

Environmental marketing or green marketing has been discussed since 1990, when green marketing was defined as a holistic management process that aims at identifying, anticipating, and satisfying consumers and society requirements in a profitable and sustainable way (Peattie, 1995). Camino (2007), who studied stakeholders' perspective towards green marketing, says that green marketing may have been started with the description of the existence of an aggressive and defensive strategy related to environmental marketing by McDaniel and Rylander, in 1993.

Since then, many studies have been made as, for instance, the one of Sheth and Parvatiyar (1995) which presented a consumption marketing evolutionary approach towards sustainable marketing. Menon and Menon (1997) focused on green marketing as a three stages hierarchic strategy (functional, business level, and strategic level). Banerjee (1999), Wehrmeyer (1999) and Pujari and Wright (1996) had studied business practices adjustment to the external environment. Models and approaches presented in ideological studies of the alignment of marketing with the environmental sustainability have received recent contributions. For example, Miles and Covin (2000) have described the existence of two kinds of enterprises in terms of environmental management: the defensive and the proactive. The defensive enterprise aims at fulfilling governmental regulations while the proactive one aims at gaining a sustainable competitive advantage through a strategic positioning in environmental management. Crane (2000) contributes by revealing two behaviors of the green marketing: passive behavior and collaborative behavior. Kärna, Hansen and Juslin (2003) have also contributed to theory advancement by revealing the existence of three enterprise groups regarding the environmental context: (1) proactive, (2) reactive, and (3) consumption companies. The first group develops aspects related to the environmental sustainability independently of what the environmental laws claim. The second group aims at the attendance of governmental regulations, and the third one attempts to meet imposed rules though it presents the lowest level of environmental sustainability when compared with the former groups. Based on this, the authors identified a marketing need: to be oriented to a new kind of market, the sustainable development one (Kärna et al., 2003).

In terms of competitiveness, researches have analyzed the effect on consumers of products, which are considered as green (Baker & Ozaki, 2008; Hartmann & Ibáñez, 2006; Polonsky, Carlson, Grove & Kangun, 1997). Green products have practically and theoretic-

cally contributed to an important decision taking in marketing and business strategies. They have revealed subjective particularities about consumers' desires related to the ecological content of products, and to the consumers' behavior regarding the brand and the enterprise's image. Competitiveness in supply chain studies have also been looking for consumers' environmental requirements, so that such requisites can be considered by suppliers to align the supply chain with the sustainability of the environment (Simpson, Power & Samson, 2007).

### 3 THE CONTEXT OF SUSTAINABLE PRODUCTS AND OPERATIONS

The demand for products and services with sustainable characteristics has been increasing. Population in general has been constantly exposed to environmental degradation and the drastic reduction of available natural resources as much for products manufacturing as for human survival.

The fact is that only a little part of the whole population, which is theoretically informed about the repercussions of non-controlled consumption, can be considered conscious. Therefore, the few conscious people can not decisively influence sustainable product and service sales for humans. However, enterprises that develop and make products and services for the consumer market have the required conditions to, and can influence sustainable products production, as well as the government (Miles & Covin, 2000; Sheth & Parvatiyar, 1995).

Sustainable manufacturing or green manufacturing goals require the development of process technologies and know-how to obtain products that use renewable, non-toxic materials, without producing waste or greenhouse gases (Allwood, 2009). This sustainable focus involves: the acquisition of raw-material and components aligned to renewable, recyclable, reusable, eco-material concepts; products manufacture with reduced processes waste and reduced waste of production resources; and products expedition and distribution. All of this to: (1) reduce the quantity of packages, which must be degradable, recyclable or reusable, and (2) allow the emission of low levels of greenhouse gases along the distribution system.

Sustainable manufacturing means to ensure the environmental sustainability throughout the value chain, involving all of supply chain. Dey, LaGuardia and Srinivasan (2011) argue firms need to visualize and map out their supply chains conjointly with logistics. According to the authors, logistics operations must

start early and must start simple. Logistics play an important role in identifying and eliminating inefficiencies and, mainly, in the reducing the carbon footprint.

Carter and Rogers (2008) present a middle theory in the supply chain context that configures as a framework for sustainable supply chain management (SSCM). This definition is based on the triple bottom line of sustainability, environmental performance, social performance and economic performance, and they included in this framework four support facets, risk management, transparency, strategy and culture. Authors argue that social and environmental behaviours sometimes are not profit-compatible. Vachon and Klassen (2008) proved that environmental collaboration upstream toward suppliers and downstream toward customers/clients tends to improve the manufacturing performance. Environmental collaboration includes some aspects as joint environmental goal setting, shared environmental planning, and working together to reduce pollution or other environmental impacts. Some of the manufacturing performance indicators measured in this study were: production costs, labor productivity, perceived overall product quality, air emissions, water emissions, lead-time and others. Environmental Collaboration can incentive the manufacturing companies to promote sustainability throughout of all value chain, the performance improvement.

Fabe-Costes, Roussat and Colin (2011) propose that in a supply chain configuration the enterprise commitment pro-environmental sustainability is more pronounced because it is necessary to scan the adequate sustainable design for these chains. Member enterprises must also be committed to the environmental sustainability focus. Otherwise, in this context, the effort of any enterprise oriented to the achievement of sustainable products/services will have been in vain. According to the authors, to reach the society and consumers' sustainable level, it is necessary to scan the firm level, its managerial functions involving supply, production and distribution processes.

In Production and Operations context, some studies have revealed that the lean manufacturing concept implantation into industrial enterprises significantly contributes to green manufacturing and to the obtainment of sustainable products. The lean manufacturing approach emphasizes waste reduction throughout the enterprise (Miller, Pawloski & Standridge, 2010; Bergmiller & McWright, 2009; Sawhney, Teparakul, Aruna & Li, 2007). In addition, the remanufacturing process along the supply chain has emerged as a collaborative, sustainable and lean process, so that the residue of an enterprise is the raw material or the input resource to another enterprise into the chain (Kuik, Nagalingam & Amer, 2011).

In this work and based on the literature review, environmental marketing is viewed as a driver process which relates legislation, operations, manufacturing and marketing sustainable aspects with each other, and helps companies to achieve different levels of environmental sustainability demanded by consumers and the legislation (Figure 1).

#### 4 MARKETING – ENVIRONMENT: AN ALIGNMENT MODEL

Marketing 4Ps (place, promotion, product and price) revealed as efficient tools to logistical problems and product offers to the market (Kotler & Keller, 2006). On the other hand, the same tools have contributed to the environmental impact on the planet. Facts show the alarming situation faced by society with the flooding of urban areas due to the accumulation of packages and other disposable items inadequate discard (Dias, 2009).

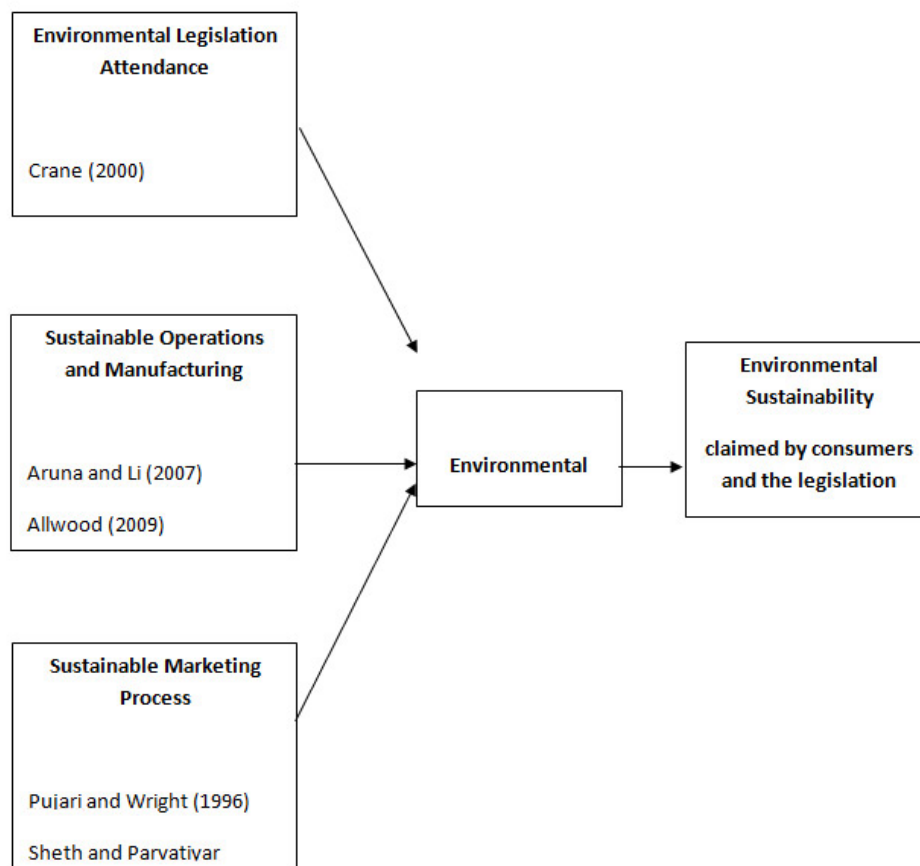
Therefore, proposition one (P1) can be expressed as follows:

P1: In industrial, commercial, and service providing

enterprises, the attendance to sustainability patterns of goods/services must begin with the marketing process, as this department has the competence to recognize, influence, and attend to the consumption market.

The package compound is essential for sales accomplishment along the product transportation and handling to, and promotion in the store. However, it is important to cast a new look at this compound if the intention is to have into account environmental protection. The concept review begins with the product conception (including product redesign and a recyclable package), production and operations development (to reuse, reduce, and remanufacture resources to obtain the final product/service), up to the product/service divulgation to, and distribution in the market (Kuik et al., 2011; Leite, 2009). Furthermore, the product/service should be produced by a low energy consumption process, and with environmental friendly materials driving to the achievement of a more sustainable product. The communications strategy with the market must be dealt by the marketing department, and should emphasize the company cooperative character (Parvatiyar & Jagdish, 2000).

Figure 1: Environmental Sustainability – Theoretical Framework





Proposition two (P2) is the following:

P2: To align the product offer to environment preservation criteria implies to change the product compound. Concurrently, these changes must be understood, accepted and valued by the consumer, and internal competences related to product production, commercialization, and service rendering should be developed.

The responsibility of translating consumer's expectations into products that could satisfy them also applies to marketing (Churchil & Peter, 2000; Webster, 2002). It is up to production the performance of processes that meet defined marketing requirements. In a sustainable view, marketing has to provide the right product to the market, wherever it could be, which

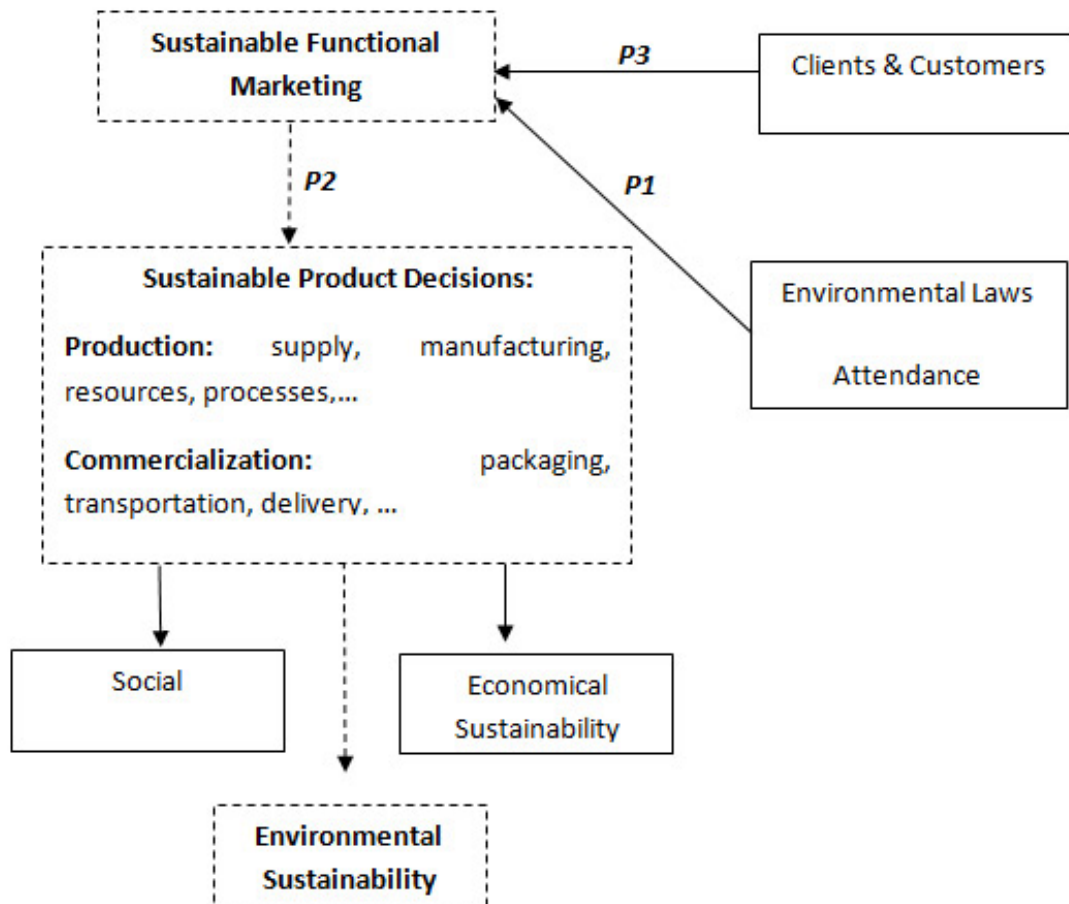
also implies sustainable attributes that could be generated in a product.

Proposition three (P3) is as follows:

P3: In a process view, marketing has to identify consumer's needs, to analyze his behavior, and to understand the environment where he is inserted in.

Figure 2 presents a proposed model that involves marketing decisions, environmental sustainability and their impacts on production, commercialization, and provided services as well as other interrelated implications. The dotted rectangles indicate the proposed alignment line. From now on, the analysis, which is used to test the proposed model, is described on the research method.

Figure 2: Marketing-Environment Alignment Model Proposition



## 5 RESEARCH METHOD

### 5.1 Exploratory Phase

The study is at an exploratory stage. It relates approaches and theoretical contributions of the environmental legislation, the marketing process, and operations and manufacturing management in the elaboration of an alignment model among them. The purpose of the model is to obtain products and services aligned with environmental sustainability requirements and sustainable parameters of industrial, commercial, and service enterprises, according to the present legislation. Propositions are presented as a result of this exploratory stage (Figure 2). Through the validation of the model, it can be used to infer on sustainable goods obtaining by enterprises.

### 5.2. Descriptive Phase: The Survey Database

The study also presents a descriptive stage that analyzes the survey data about ethics and social responsibility which was previously made, where the sample is a good representation of the non-durable, semi durable and durable consumption goods' population, including manufacturing, commerce, and service enterprises. The initial sample of this survey was composed by 435 responses. The analyzed data correspond to the answers of professionals, all of them University of Caxias do Sul Business Administration

course, about their perception of the level their companies were at the seven themes of the Ethos Institute of Enterprises and Social Responsibility (2001). The Institute uses a 5 levels scale (1 = the lowest level, and 5 = the highest level) to measure the social responsibility of companies which is presented on the Appendix A. The students at the Management School of University of Caxias do Sul are appropriate for representing the research population because they are enterprises' professionals of the region, occupy management positions in their enterprises and they know the terminologies and concepts about environmental sustainability and social responsibility issues discussed and addressed in the classroom and presented in the questionnaire. Considering the data regarding marketing and the environment alignment, the study presents only the Theme B: Customers and Clients, which represents the variable marketing, and the Theme A: Environment, which represents the variable environment, is presented in the Chart 1. Theme A – Environment - is formed by five indicators, and Theme B – Customers/Clients - are formed by three indicators according to the original Ethos Institute of Enterprises and Social Responsibility Indicators.

At both variables, the answers options, the five levels about social responsibility (Appendix A), are presented operations and manufacturing aspects combined with environment and marketing themes.

**Chart 1: Ethos Institute's Social Responsibilities Indicators.**

<p><b>Theme A: Environment</b></p> <p>Indicator 1: Organization knowledge of its impacts on the environment</p> <p>Indicator 2: Quantity reduction of enterprise input and output materials</p> <p>Indicator 3: Environmental improving practices promoted by the organization</p> <p>Indicator 4: Organization commitment level towards the environmental cause</p> <p>Indicator 5: Organization effort towards environmental education</p>
<p><b>Theme B: Customers/Clients</b></p> <p>Indicator 1: Marketing policies and organizational communications</p> <p>Indicator 2: Organization commitment towards customer/client service</p> <p>Indicator 3: Organization actions regarding the potential damage of its products and services</p>

### 5.3 Data Analysis

The final sample includes 315 valid responses, representative of the sample. The data have been submitted to a bi-variate correlation analysis and cluster analysis (Hair, Anderson, Tatham & Black, 1998).

#### 5.3.1. Bi-variate Correlation Analysis

The association of the variables marketing and environment is analyzed through bi-variate correlation analysis with Pearson's coefficient. As a result, it is possible to make inferences about their alignment and the proposition P2 of the proposed alignment model.

#### 5.3.2. Cluster Analysis

Sample data are submitted to a Cluster Analysis in order to make inferences about propositions P1, P2, and P3. In this kind of analysis, it is possible to ob-

tain groups of enterprises, which focus on their marketing or environment actions, and on both marketing and environment actions simultaneously.

Additionally, Kärnä, Hansen and Juslin (2003) submitted the variables of their study to a Factor Analysis. Three factors were extracted, denominated as proactive, reactive and consumption green marketers, referring to the social responsibility of enterprises (Chart 2). The variables number of this study is small, two variables, making it impossible to use the same statistical analysis than Kärnä et al. (2003). Therefore, these authors' approach was adapted for this study, and responses and not variables were analyzed. Cluster Analysis can segregate enterprises from the sample according to their environmental consciousness level (proactive, reactive and consumption enterprises), and can confirm the propositions too.

**Chart 2: Kärnä et al. approach and the Associated Propositions**

Clusters by Kärnä, Hansen and Juslin	Enterprise Characteristics	Interaction with the Study Variables
Proactive green marketers	<p>Focusing on environmental issues in the marketing planning.</p> <p>Presenting high scores on environmental consciousness level.</p> <p>Enterprises attend such market needs as environmental laws, and tend to adopt a premium price by using an environmental strategy to create a sustainable competitive advantage.</p>	<p>The enterprises cluster tends to present high scores on the two variables, marketing and environment.</p> <p>P3 and P1 tend to be confirmed as well as the proposed alignment between the two variables.</p>
Reactive green marketers	<p>Presenting an environmental laws compliance model under a governmental balance.</p> <p>Enterprises attend the market needs and simply comply with all applicable regulations and laws. This is a traditional environmental management approach.</p>	<p>The enterprises cluster tends to present a medium score, or on two variables or on some of them, marketing or environment.</p>
Consumption green marketers	<p>Presenting lower scores in the sustainability factor. Enterprises compete primarily based on price, and tend to adopt the compliance model.</p>	<p>Enterprises tend to present low scores on the two variables, marketing and environment.</p>



This particular view of highlighting marketing combined with operations and manufacturing decisions and environmental actions simultaneously can be understood as the alignment Marketing – Environment, that provides a higher validation of the proposed alignment model.

## 6 TESTING THE PROPOSED ALIGNMENT MODEL

The 315 respondents included in the sample have been collected in enterprises located in the area covered by the University of Caxias do Sul. The interviewed companies belong to the following segments: metal-mechanics (22.9 %); furniture, construction and wood (11.4 %); plastics (3.6%); clothing and

footwear (4.8 %); paper, rubber and leather (4.1 %); food and beverage (9.2 %), and others (44 %) distributed into textile, chemicals and pharmaceuticals, and electrical material.

Relating to Marketing (Theme B) and Environment (Theme A) variables of Chart 1, it is possible to observe (Table 1) a positive and significant association ( $r = 0.479$ ) between them (Malhotra, 2003). The proposition P2 is confirmed for the proposed Alignment Model between Marketing and Environment in the context of environmental sustainability. The more marketing actions are turned on to communicate aspects and damages of products/service, more these enterprises are turned on to the environmental sustainability.

**Table 1: Marketing and Environment Correlation Analysis**

	Environment	Marketing
Environment	1.000	0.479**
Marketing	0.479**	1.000

Pearson correlation coefficient. \*\* Significance at 0.01 two-tailed.  
Standardized scores from 0 to 1.

## 6.2. Cluster Analysis and P1 and P3

Table 2 reveals the existence of three enterprise groups in the sample. The Cluster 1 is composed by 19.7% of the surveyed enterprises that tend to develop the marketing and environmental processes in a higher socially responsible level. According to the respondents, P1 and P3 are confirmed. It would represent proactive enterprises according to Kärnä et al. (2003). This inference is possible because in the standardized scale from 0 to 1, the Environment variable score is 0.75 and the Marketing one is 0.83. These results place the enterprises at levels 4 and 5, the highest of the Social Responsibility Scale of the Ethos Institute. This kind of enterprises has environmental manag-

ing systems that include the supply chain, controls and reduces waste, has a zero environmental impact target, selects suppliers and looks for environmental improvement promotion in the supply chain, includes an environmental concern in the strategic planning process, and participates in environmental projects conjointly with other organizations. Furthermore, this kind of enterprises also worries about the environmental culture establishment, uses client information to promote quality improvement, and replaces components, items, and technologies which can cause potential damage to clients/customers.

**Table 2: Cluster Analysis.**

	Cluster 1	Cluster 2	Cluster 3	ANOVA Test F	F significance
Environment	0.75	0.32	0.38	209.039	0.000
Marketing	0.83	0.34	0.65	424.483	0.000
% of enterprises	19.7	38.1	42.2	0.479**	0.479**

N = 315 valid responses. Standardized scores from 0 to 1. K-means Cluster.

Cluster 2 is represented by 38.1% of enterprises that present the lowest scores in as much the environment as marketing practices. This result classifies the group as consumption enterprises according to Kärnä et al. (2003) classification.

Cluster 3 is represented by 42.2% of the sample enterprises that have marketing actions being developed at a socially responsible medium level with predominance of level 3. However, regarding the environment, the significance is lower, closer to a social responsibility of level 2. This group of enterprises can be classified as reactive enterprises. Based on the indicators level in Appendix A, both enterprise clusters, Clusters 2 and 3, usually monitor the impact of their activities regularly, reduce and reuse their input resources, act in a preventive way, and promote environmental education to their internal public. Furthermore, these enterprises register clients complaints and solve individual problems. Additionally, they usually adopt a corrective posture about the potential damage caused by the product to clients/ customers, and emphasize short time economic results. Table 2 also reveals that the Marketing variable is the most contributing one to differentiate the three clusters, since the value of the F-Test is over the double ( $F = 424.483$ ) of the one for the Environment variable ( $F = 209.039$ ), considering that both are significant.

## 7 CONCLUSION

The data analysis pointed out to the existence of a low percentage of consumption goods enterprises (19.7%) with marketing procedures related to products and clients (P3), and to environment protection (P1) at similar and adequate levels. Most of the sample companies (80.3%) presented environmental consciousness scores under 0.4 in a standardized scale from 0 to 1 (Table 2). This finding opposes to 61.9% of companies that have Marketing scores above 0.6. Based on the model proposed in Figure 1, it would be early to affirm that 19.7% of the companies have their marketing practices aligned to the environment. However, the correlation analysis (Table 1) revealed a significant association between the two variables (P2). The proposed alignment model of marketing with legislation attendance and of marketing with pro-environment characteristics for obtaining sustainable products and services reveals to be viable.

At operations and manufacturing level it is possible to identify a little group of enterprises in the sample, which is concerned with the production of sustainable products/services, looking for the development of sustainable processes along the supply chain. Most of the sample enterprises is developing its manufacturing/operations and marketing processes that can be considered as reactive to the environmental legislation and sustainability. This model must be tested in another survey considering the research context

and involving other sample and specific variables as marketing, environmental laws, sustainable actions along the supply chain, manufacturing and operations, and product distribution.

Environment and Marketing variables measured by indicators (customers/clients combined with operations and manufacturing aspects) can justify P1 and P3 propositions. P2 is partially confirmed by the correlation analysis of these variables, which revealed a low correlation coefficient but that is highly significant.

Revisiting the research question, from a statistical analysis and a theoretical association with Kärnä, Hansen and Juslin's classification, all of the results reveal that it is possible to represent the marketing actions aligned with environmental sustainability as proposed by the Alignment Model presented in Figure 2.

## APPENDIX A

### Indicators of the Environment Theme:

#### 1) Organization knowledge of its impacts on the environment:

Level 1: The enterprise does not know the environmental impact caused by its activities/services.

Level 2: The enterprise knows and focuses its preventive action on the processes.

Level 3: The enterprise does environmental impact studies and monitoring activities regularly.

Level 4: The enterprise has formalized and standardized procedures to manage environmental management systems.

Level 5: The enterprise does impact studies along its supply chain, and participates of the product final destination and post-consume processes.

#### 2) Quantity reduction of enterprise input and output materials:

Level 1: The enterprise looks neither for reducing its resources nor for finding an adequate destination to its waste.

Level 2: The enterprise has been looking for reducing the consumption of energy, water, toxicological products, and raw materials.

Level 3: The enterprise intends to reduce and substitute input and reused resources.

Level 4: The enterprise controls natural resources utilization and waste production processes.

Level 5: The enterprise goal is to achieve a high level of sustainability and/or zero environmental impact.

#### 3) Environmental improving practices promoted by the organization:

Level 1: These practices currently do not exist in the enterprise.

Level 2: The enterprise controls exclusively its internal activities/services.

Level 3: These practices involve all enterprise activities/services, including transportation, and input and output materials.

Level 4: These practices involve all the supply chain, and the enterprise uses environmental criteria for its suppliers' selection.

Level 5: The practices are found along all enterprise products/services life cycle, as well as in post-consume.

#### 4) Organization commitment level towards the environmental cause:

Level 1: The enterprise does not attend to the national environmental legislation.

Level 2: The enterprise complies rigorously with the national environmental legislation.

Level 3: Additionally to complying, the enterprise develops programs for environmental improvement, and acts in a preventive way.

Level 4: The enterprise has committees to carry out environmental actions, including in its strategic planning process.

Level 5: The enterprise aims at exploring opportunities related to the environmental sustainability.

#### 5) Organization effort towards environmental education:

Level 1: The enterprise does not recognize environmental education.

Level 2: The enterprise recognizes the need for environmental education, but does not develop any educative environmental actions.

Level 3: The enterprise develops environmental education for its internal public.

Level 4: The enterprise develops environmental education for employees' families and the community.

Level 5: The enterprise participates in, or supports, educational projects in partnership with environmental organizations.

### Indicators of the Customers/Clients Theme:

#### 1) Marketing and Communication Policies:

Level 1: The enterprise does not develop any kind of marketing strategy.

Level 2: The enterprise focuses its marketing strategies on commercial objectives and emphasizes short time economic results.

Level 3: The enterprise has communication policies aligned to its environmental values and principles.

Level 4: The enterprise tries to clarify innovative environmental aspects of its products/services, as well as the necessary care with their use.

Level 5: The enterprise develops partnerships with suppliers, distributors, and technical assistance to create a new social responsibility culture.

## 2) Customer Service Excellence:

Level 1: The enterprise does not have a basic information customer service.

Level 2: The enterprise has a basic customer service to inform its consumers/clients and to deal with individual demands.

Level 3: The enterprise registers the voice of consumers/clients and makes reports for internal knowledge.

Level 4: The enterprise orientates, finds trouble causes, and uses the information to implement quality improvement policies.

Level 5: The enterprise acts proactively and preventively in products and services launching.

## 3) Recognition of Potential Damage by Products and Services:

Level 1: The enterprise is not concerned with potential damages.

Level 2: The enterprise is concerned with potential damages to its customers but does not make studies about it.

Level 3: The enterprise makes technical studies about potential risks, and adopts preventive or corrective actions quickly.

Level 4: The enterprise trains its internal employees and external partners to adopt preventive and corrective actions quickly.

Level 5: The enterprise works with its suppliers and distributors to substitute components, technologies, and products.

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