

# ECODESIGN IN THE FURNITURE INDUSTRY: OPPORTUNITIES AND CHALLENGES FOR ORGANIZATIONAL INSERTION

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## 1 Introduction

The relation between environmental sustainability, economic performance, and competitiveness has been widely discussed and explored in the literature. However, it still presents great blanks for its use in the organizations, considering the diversity of perspectives about this relation (CARRILLO-HERMOSILLA; GONZALEZ; KONNOLA, 2009). The traditionalist perspective establishes environmental regulation as a fundamental directive whose purpose is to maximize the socio-environmental benefits under the perspective of the corporate responsibility for the prevention and correction of environmental passives resulting from the production of products and services. In this context, the environmental policies can establish an adverse impact to competitiveness as they are interpreted as impositions that generate additional costs to the companies. Ergo, they develop defensive strategies in the organizational behavior, resulting in the adoption of technologies known as end-of-pipe (BARBIERI, 2007; CARRILLO-HERMOSILLA; GONZALEZ; KONNOLA, 2009; HART, 1997; MAÇANEIRO et al., 2015; WINTER, 1988).

The revisionist perspective approaches a more dynamic behavior in the sustainability and competitiveness relation through which the technological innovation plays the main role of initiatives to improve the environmental performance, still focusing in cost reduction, productive efficiency increase, and accreditation to new market niches. Therefore, the technological and organizational changes play a determinant role in the structures' conditioning to obtain sustainability (BERNAUER et al., 2006; CARRILLO-HERMOSILLA; GONZALEZ; KONNOLA, 2009; HART, 1997; MAÇANEIRO et al., 2015; WINTER, 1988).

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Under this perspective, sustainability evolved as a recurring subject in the entrepreneurial context, mostly catalyzed by the consuming markets' interest in assuming sustainable practices through daily habit changes and especially at the purchase of the products reconfigured under this prerogative (CUPERSCHID; TAVARES, 2002; DIRYANA; KURNIAWAN, 2015; YU-SHAN, 2008).

Therefore, the market of environmentally friendly products establishes a new portfolio of offers and opportunities. Besides of acting in the configuration of products and services, this approach constitutes a new brand, recurrently indicated by the prefixes "eco" and "bio," in the composition of supposed neologisms to this demarcation (CHEN, 2010; DIRYANA; KURNIAWAN, 2015; PEATTIE, 1995; POTOSKI; PRAKASH, 2003).

Focusing in the industrial furniture sector, more specifically the wood furniture industry, we can foresee a fertile environment for the adoption of eco-efficient strategies, especially by the use of natural extraction methods and renewable raw materials. Therefore, linking the sustainability concept in the development of this sector's items represents a proper means for innovation, differentiation, and indication of superior value.

This application has been showing potential for almost two decades in the Alto Vale do Rio Negro Pole, north of the state of Santa Catarina, which presented a strong application for exportation within this period. Due to the environmental demands of the international market, especially for the supply of retailers and distributors of the European Union and the United States, the manufacturers of this region developed a series of actions to adequate their production lines, promoting important alignments for the promotion of cleaner technologies and for products that do not harm the environment.

Considering the current period of national business resumption, in an obvious intent of reconquering the internal market, some manufacturers of this furniture cluster adapted concepts that were consolidated in exportation, constituting new offers for the Brazilian consumer. This realization consists in a program whose conception prioritizes a sustainable behavior through which the participating industries adjust their production processes to offer the client not only a high-quality furniture, but especially an environmentally friendly one. This program also includes the adherence to an environmental seal called "Biomóvel," which ratifies the accreditation of companies and products to the established conditions.

In this sense, the focus hereof is to analyze the adherence of the certified companies to the seal, identifying eventual changes in the production process, in the way of thinking of the company's managers and employees, or in the search for sustainable products. Based on our evaluation, our purpose was to examine the current status of the activities related to the prerogatives established by the Biomóvel seal in the certified companies.

## 2. Eco-Innovation

Eco-innovation is more commonly related to technological changes in the production and product processes. Additionally, it can be considered as a change in the behavior of individual users or organizations (CARRILLO-HERMOSILLA; GONZALEZ; KONNOLA, 2009; ELKINS, 2010). Fundamentally, it is the development process of new offers

that add value to the client and business, but significantly reduces the environmental impact (FUSSLER; JAMES, 1996; FOXON; ANDERSEN, 2009).

Generating eco-innovation mostly depends of the benefits received by the innovator to improve its competitiveness and aspirations in the sustainability performance. Four fundamental dimensions must be contemplated in this process: add value for clients or users; establish a competitive advantage over other alternatives; present the suppliers' necessary capability and resources; obtain financings to generate income flows (CARRILLO-HERMOSILLA; GONZALEZ; KONNOLA, 2009).

Generally, eco-innovation finds a double hindrance for its existence and diffusion in the market and society that subjects its possibilities to a low level of development and effectiveness (RENNINGS, 1998). Firstly, by the external technological changes, revealing a market dynamic flaw caused by the knowledge's public property nature, whose production is expensive but whose reproduction is of low cost. And by the environment's externalities, because the environmental innovations' social benefits cannot be easily transformed into benefits for the entrepreneurs that are pioneers thereof, since their actions are not always valued and adopted by the market (CARRILLO-HERMOSILLA; GONZALEZ; KONNOLA, 2009; RENNINGS, 1998; SARTORIUS, 2005).

Some important internal factors affect the development and adoption of eco-innovations. The first of them is related to the company's characteristics: financial situation (availability, pressure for short, medium, and long term return); company size (flexibility, conditions for resource and installation optimization); position in the value chain (manufacturer, supplier, or contractor, and its role in the environmental proactive strategy); time of existence in the business ("settling" in the long term condition, comfort zone by the historically recurring practices in the business); local or multinational character of the company (corporate standards and identity); exportation-oriented production (products with use demands and conditions different from the sociocultural profile of the origin region); characteristics of the sector (sectorial inclination to innovation) (CARRILLO-HERMOSILLA; GONZALEZ; KONNOLA, 2009; MAÇANEIRO, 2012).

We must also observe the sector's technological competences, the company's conditions to absorb, adapt, and develop eco-innovation, satisfying its demands. It generates the necessity of investing in R&D, training, and teaching for eco-innovative practices to establish conditions to generate engagement and collaboration in the information flow (ARIMURA; HIBIKI; JOHNSTONE, 2005; CARRILLO-HERMOSILLA; GONZALEZ; KONNOLA, 2009; CHANG, 2011).

Still regarding internal factors, the company's strategic environment and organizational factors must be pondered: corporate culture favorable to general and private change, proactivity in the environmental protection, and innovation; encouraging "green" innovations, adoption of units to evaluate the passivity, reactivity, and proactivity. Finally, the employees' demands: alignment between the industrial and motivational goals (CAI; ZHOU, 2014; CARRILLO-HERMOSILLA; GONZALEZ; KONNOLA, 2009; MAÇANEIRO; CUNHA; BALBINOT, 2013; MAZZANTI; ZOBOLI, 2006).

In a holistic perspective, we must stress the external factors that affect the development and adoption of eco-innovations. Beginning with the public policies, which

traditionally constitute the main means of conduction (when it is enabling and stimulating) or barrier (when it is inconsistent and indifferent) for eco-innovation. Its field of action includes elements of taxing, issuance of permissions and grants, fiscal incentives, and tools for mass education and information (citizens, consumers, companies) (CARRILLO-HERMOSILLA; GONZALEZ; KONNOLA, 2009; KEMP; HORBACH, 2008; KAMMERER, 2009; KNELLER; MANDERSON, 2012).

Likewise, the general situation of the economy: the monetization influence of the consumption and production before the sustainability criteria, effects at medium and long term, and impacts on the partial and full adoption of eco-innovative measures. The nonexistence of eco-innovative information for the solution of given cases also limits our ability to promote a proper flow for new diagnoses in the subject of sustainability (CARRILLO-HERMOSILLA; GONZALEZ; KONNOLA, 2009; PEREIRA, 2016).

Another point of potential limitation resides in the difficulty of aligning the manufacturers' and suppliers' interests regarding requirements of products, processes, and services for the supposed eco-efficiency adoption. There is also a limitation in the transfer and acquisition of technologies by subcontractors, generating additional impacts and costs to the process (CARRILLO-HERMOSILLA; GONZALEZ; KONNOLA, 2009; DOONAN; LANOIE; LAPLANTE, 2005; KING; LENOX, 2011).

The competition's behavior must be intently observed. In one hand, the competitors that do not adopt eco-efficient conditions, hinder, or delay the innovation processes. On the other hand, market offensive and defensive approaches create an environment of wide mobility. In this context, we must underscore the role of industrial associations, sectorial chambers, and class entities, which may or may not cooperate to spread an eco-efficient behavior, consolidate, and approach work and cooperation groups (CARRILLO-HERMOSILLA; GONZALEZ; KONNOLA, 2009; DEL RIO; MORÁN; ALBIÑANA, 2011; RABÊLO; MELO; AZUAGA, 2015; RAO; HOLT, 2005).

With or without the support of sectorial bodies, we recommend an approach with reference centers (universities, institutes, and companies) that enable research, development, innovation, and infrastructure for sustainability. Another desirable partner group to enable eco-innovation is financial institutions, which constitute a vital variable in the investment, supply, and access to financing and other encouraging sources, which are essential for technological sufficiency (CARRILLO-HERMOSILLA; GONZALEZ; KONNOLA, 2009; GALENDE; SUÁREZ, 1999; HOFMANN; THEYEL; WOOD, 2011).

## 2.1. Ecodesign

The ecodesign concept, also known as eco-drawing, ecological drawing, or environmental project, has as fundamental idea a product design that evaluates the effect thereof on the environment, from the raw material choice through production, transport and logistics, use and disposal. Kazazian (2005) defines Ecodesign as an approach that consists in reducing the environmental impacts of a product while it maintains its use performance to improve the current and future users' quality of life. For Miasaki and Pougy (2006), Ecodesign can even be used to generate consumption habit changes, since

it encourages the migration of a disposable product society to a behavior that adopts the use of reusable products.

Although we are dealing with a relatively new expression, since the early 90's, the interest in this subject has been growing, especially in companies that were already developing environmental programs and of pollution prevention (FIKSEL, 1996). Therefore, Ecodesign characterizes a specific set of project practices oriented to the creation of eco-efficient products and processes based on the observation of environmental, health, and safety requirements in the entire life cycle (DIAS, 2009).

According to Venzke (2002), Ecodesign's main goal is to create environmentally efficient products without compromising the costs, quality, and time restrictions for their manufacture. Therefore, to reach the goals related to the environmental commitments, we need to adopt projecting practices to recover materials and components, use non-contaminating materials, recover and reuse residues, reduce our energy consumption, create multifunctional items, among other measures (FIKSEL, 1996).

## 2.2. Green marketing

The discussion about ecology and environmental sustainability in the general media has been encouraging the offer of products that are suitable to the demand, and consequently it is reflected in the consumers' choice. According to Fürst (2009), although this reflection is clearer in developed countries and still shy in Brazil, it is an aspect that some companies have been considering in the development of their strategies. Consequently, the possibility of exploring the segment, under the market perspective, requires that the interested organizations actually present an environmentally responsible behavior.

In this marketing context, the products are evaluated not only based on performance or price, but also in the manufacturers' socio-environmental responsibility. The value perception includes the product's and its package's environmental salubrity, which will encompass more and more a product's long term impact on the society after its use. Therefore, the quality perception is established in association with the environmental performance (OTTMAN, 1994).

Under this orientation, the environmental marketing has two key goals: to develop products that balance the consumers' needs with variable prices and convenience to the environmental compatibility, exerting a minimal impact on the environment; and to project a high quality image, including environmental sensibility, both in a product's attributes and in its manufacturer's history (DIRYANA; KURIAWAN, 2015; OTTMAN, 1994).

## 3. Wood and furniture local productive arrangement of Alto Vale do Rio Negro

The establishment of Wood and Furniture LPA of Alto Vale do Rio Negro was driven by the necessity of searching for consolidated actions before the market adversities faced by the region's manufacturers. According to Mello (2009), the great motivation was generated by some of the entrepreneurial entities of the region: SINDUSMOBIL (Syndicate of the Construction and Furniture Industries of São Bento do Sul), SINDI-

COM (Syndicate of the Furniture and Civil Construction Industries of Rio Negrinho), and ARPEM (Regional Association of Furniture-Related Small Companies).

For Santos, Diniz, and Barbosa (2004, p. 155),

the action of a development pole, while attracting investments for a local data, usually create or reinforce company conglomerates, which, as they export to other regions, reinforce their own development pole: they increase the income, attract people, and encourage public investments in infrastructure. Consequently, they attract more companies, especially of the service sector, to satisfy the increasing productive, private, and public demands of the local and attached regions. In this sense, the company conglomerate subject is a very important topic for regional development studies.

The official establishment of Wood and Furniture LPA of Alto Vale do Rio Negro set the beginning of its activities in March, 2007, counting with a total of 43 companies of the cities of São Bento do Sul, Rio Negrinho, and Campo Alegre. According to Fürst (2009), the main goal related to the formalization of the conglomerate is to search for joint solutions to improve the results and strengthen the region's furniture sector.

The establishment of Wood and Furniture LPA and its productive chain has the purpose of developing actions that allow the companies to improve the organizational management, qualification of the technical labor, productivity and quality, innovation and aggregation of technological value to the processes and products, associations and cooperatives, environmental efficiency, access to markets, institution of policies and public incentives, access to financial resources to make the territory known as an entrepreneurial pole of high added value furniture, and consequently generating labor positions and permanent income (FÜRST, 2009).

The furniture cluster of the Alto Vale do Rio Negro region is a consolidated local industrial system, with a sufficient company conglomeration and a consistent history-cultural evolution. According to Denk (2008), some positive characteristics of this conglomeration can be mentioned, which include: the availability and proximity of raw materials; the presence of manufacturers and representatives of machines and pieces of equipment; the availability of experienced and expert labor; good quality products, recognized in the world market; the presence of companies specialized in the rendering of services; the existence of support institutions; the presence of technical and superior teaching institutions; the presence of a technological research center; the technological update in machines, equipment and inputs; the participation in fairs and events.

On the other hand, the author also points to negative characteristic thereof: the excessive productive diversification and elevated level of productive verticalization; insufficient level of association; weak intertwining with supplying companies; failing cooperation relations with the competition; low market knowledge and client orientation; dependency of the external design; emergency articulations between companies and support institutions; lack of long term strategy; passive and dependent integration in the international market; distancing from the internal concurrence standard.

Generally, the cluster explores the competitiveness improvement of its companies through initiatives oriented to the internationalization, learning and professional qualification, and to technological and organizational innovation to deal with the cooperative relations' fragilities, which when overcome, could result in an even greater development (DENK; CÁRIO, 2003; FÜRST, 2009).

Noticing the need to bring the same eagerness back to the region and to reestablish the image of the city of São Bento do Sul as the greatest furniture exporter of the country, through Wood and Furniture LPA's own initiative, the idea of an ecologically friendly portfolio was generated, and more than that, a Certification Seal that were exclusive for the region's companies. It is not just about a crisis overcoming factor. The proposal of the Biomóvel Seal is founded on rigorous principles, focusing in actions with sustainable appeal.

### 3.1. Biomóvel seal

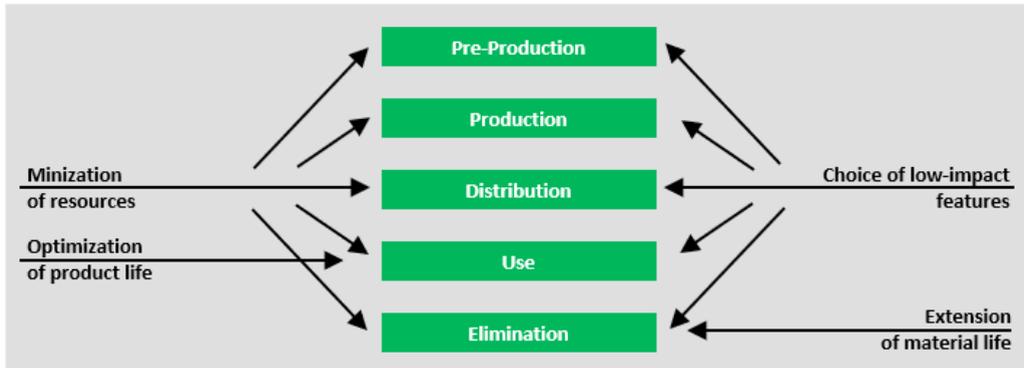
The Biomóvel seal was officially presented to the market in November, 2008, in an event of ABIMÓVEL (Brazilian Association of the Furniture Industries). It is the result of a partnership between SINDUSMOBIL, SINDICOM, ARPEM, and Wood and Furniture Local Productive Arrangement of Alto Vale do Rio Negro, with the support of SEBRAE (Brazilian Micro and Small Business Support Service). The concept begun to be developed in 2007, and since then, it was elaborated for insertion in the Brazilian market (AMBROSINI, 2009).

In the action's initial phase, 26 companies adopted the Biomóvel seal. The entrance in the program consists in an accreditation process through which the company can acquire only the product certificate, as well as of the product and company certificate. The main requirement to gain the Biomóvel seal is that the company must be local and it must participate in the Local Productive Arrangement. After this, the company must satisfy the criteria to obtain the seal. According to SINDUSMOBIL and CEM (2008), the seal follows the sustainability principles. This concept's creation is the result of deep researches on processes already used by manufacturers of other countries and sectors. Its approach explores the processes that constitute the entire life cycle of the product, comprising several phases, as shown in Figure 1.

As characterized by SINDUSMOBIL and CEM (2008), the Preproduction phase encompasses the manufacture of the materials and semi-finished goods that are used in the production. As for the Production phase, it is understood as material transformation, assembling, and finishing. The Distribution includes the packaging, transportation, and storage processes. And the Disposal foresees a series of final disposal options, such as reutilization and recycling.

Therefore, the development of sustainable products is based on a cycle that comprises every phase of the product, implying the transition of a product design to the design of an entire system. Consequently, it establishes an intervention methodology that allows us to know and manage the set of consequences linked to the development and production, and to new industrial items.

Figure 1 - Biomóvel's Processes



Source: SINDUSMOBIL and CEM (2008, p. 7)

#### 4. Methodology

The study's purpose was to evaluate the adherence to the Biomóvel Seal in Wood and Furniture LPA of Alto Vale do Rio Negro's certified companies, identifying the structural and cultural changes occurred along the certification process. Therefore, under its goals' perspective, the research is characterized as descriptive and has the purpose of characterizing the population and establishing relations between the variables of its insertion context (GIL, 2002).

Under this perspective, we investigated the companies certified with the Biomóvel seal, members of the Wood and Furniture Local Productive Arrangement of Alto Vale do Rio Negro, through a structured questionnaire. The answers were attributed through two question blocks based on the literature. In the first set of points to be examined, we questioned the impact of contextual variables to the eco-development, which was verified through a 5 (five) point semantic scale, of the Likert type, where the respondents would indicate their impact (I) in the organizational behavior (MALHOTRA, 2001). The complementary block was composed of multiple choice questions to confirm the opinions indicated at the initial block. We consulted industrial managers and area coordinators with a wide knowledge on insertion processes and certification progress in their link organization.

The population of interest in this study encompass the 14 (fourteen) companies certified with the Biomóvel Seal and members of the Wood and Furniture LPA of Alto Vale do Rio Negro. We chose this population based on the criterion that only organizations that have the Biomóvel Seal should be evaluated, with the purpose of analyzing their adherence parameters to the seal. The data collection tool was digitally sent (e-mail) to said manufacturers. In spite of several sending attempts and repetitions, finally, we got 8 (eight) fully answered questionnaires.

## 5. Results and discussion

From the 8 (eight) companies that answered the questionnaire, 7 (seven) could be classified in the category of medium company (from 100 to 499 employees) and 1 (one) in the category of small company (from 29 to 99 employees). As for the kind of certification received, 2 (two) stated that they had the company certificate, while 6 (six) stated that they had the company and product certificate. Therefore, we may notice that most adhesions comprise the company's global context and are not segmented on the product; consequently, the effects tend to last more and represent a structuring potential of multidisciplinary actions, which consequently generate greater benefits.

Analyzing the reasons that lead to the adhesion, the greatest mean was attributed to the tendency of assuming sustainable practices to achieve an environmental regulation ( $I = 5.000$ ). This aspect resulted in greater adherence among those that manifested themselves in that sense, and it can be interpreted as a reflex of the maturation and conscientiousness process established in the productive cluster, and of the acknowledgment from the organizational agents of the importance of establishing directives that manage this condition. From this perspective, it becomes evident that in spite of the encouragement of the LPA initiative to propose and mobilize local companies to adhere to the Biomóvel seal's certification, we also identify a close relation of the conduct adopted by the companies with the traditionalist perspective announced by Barbieri (2007), Carrillo-Hermosilla, Gonzalez and Konnola (2009), Hart (1997), Maçaneiro, Cunha, Kuhl and Cunha (2015), and Winter (1988). Since the tendency of adopting sustainable practices express a compulsory emphasis towards environmental regulation, these companies' behavior is initially characterized by the adoption of defensive strategies, a movement that, in spite of the investments, may result in an adverse impact to competitiveness.

This prerogative speaks directly with other two well-ranked mapping parameters. The first one is related to the market tendency ( $I = 4.250$ ), converging to the concept that the products with the Biomóvel Seal represent a latent market demand, with a great increasing potential. The second one is related to the competitive differential ( $I = 4.125$ ), indicating that it is viable to have the Biomóvel Seal certificate because it supposedly adds value to the product while it simultaneously is sustainable.

In spite of the program's strong participation in the product development stages, the motivation of consolidating a different design through Biomóvel presented the lower mean among the factors scored by the participants ( $I = 3.375$ ). This is probably the result of the current product concept's maintenance as configuration, prioritizing the implications within the scope of process and system engineering.

Based on these statements, regarding structural and cultural changes in the seal adhering companies, we noticed that the energy consumption in the productive process is one of the companies' main concerns. From the companies that answered the questionnaire, 2 (two) stated that they managed to reduce their electrical energy consumption, but they believe they can improve their result. 3 (three) other companies stated that they managed to reduce this consumption. All others did not achieve conclusive numbers on this subject, requiring a new data collection therefor. However, all of them admitted that

this feature is one of the most difficult to contemplate, considering the type of machinery and infrastructure used by the manufacturing plants. In other words, significant reductions in energy consumption will be achieved only through interventions that are still too complex to be managed.

The resulting referential agree with the previously announced perception, implying that the evaluated companies' performance in their organizational conduct converge with the adoption of defensive strategies, displaying a management behavior that is more oriented to the prevention and correction of environmental passives generated in the productive process as stated by the authors. One of the unanimous points, regarding the adhesion, is related to the use of recyclable packages for the product disposal to the market. Although this requirement lies in the common sense in the subject of strengthening oneself for the exterior market, it still finds resistance in some fields of the internal market. Firstly, the clients approved the idea (5 registrations), but some configuration and visual communication cares are necessary if this measure will not change the value perception related to the product. For 2 (two) of the evaluated companies, the clients adapted themselves over time. In 1 (one) of the registrations, the clients still did not question the kind of packages employed.

One of the goals in Biomóvel's production phase is a material consumption reduction. From the evaluated companies, 5 (five) stated that they had a material consumption reduction. One of the manufacturers stated that it did not manage to reduce its material consumption. All others indicated some reduction, but it was not expressive in terms of results on the operation.

Another evaluated feature is related to the reduction of material variety in the productive process with the purpose of simplifying its handling and application. In this scope, 5 (five) participants said that they were doing this through the revaluation of the component maps and wide artifact standardization, allowing the interchangeability between product and reposition lines. 3 (three) other companies pointed to the option of subcontracting in more specialized processes as an option to minimize its internal handling and improve the processes' efficiency.

While considering these questions' references, we can infer that there is a gradual advancement regarding the adoption of a more dynamic behavior in the sustainability-competitiveness relation, linking the companies' actions to a transaction level according to the revisionist perspective proposed by Bernauer, Engels, Kammerer, and Seijas (2006), Carrillo-Hermosilla, Gonzalez, and Konnola (2009); Hart (1997), Maçaneiro, Cunha, Kuhl, and Cunha, (2015) and Winter (1988). This perspective begins to spread the improvements in the environmental performance, resulting in cost reduction and productive efficiency increase.

As for the knowledge level evaluation of the companies' employees about Biomóvel and their acceptance regarding changes in the productive process, we identified that this is an important parameter that should be an object of further work ( $I = 4.250$ ), directly and widely reflecting in the progress and conditioning of eco-efficient actions.

In this dimension, the companies were questioned as for the importance of their employees' training regarding the Biomóvel Seal's process and demand. In the evalu-

ated group, 3 (three) companies support the importance of training for the certification process' viability and stated that their employees are trained being therefor; 5 (five) companies agree on the importance of training, but said that they do not give any training therefor. These responses point to a concern related to the adhesion in the several hierarchic levels and to the understanding that there are responsibilities shared by all organizational strata, which may be vital for the action's success and continuity. This bias confirms the previously pointed perspective attached to a more dynamic behavior in the sustainability-competitiveness relation, positioning the companies that are migrating to the revisionist strategy, investing in new behaviors and systemically reshaping their culture and managerial processes.

Besides the knowledge about the Biomóvel Seal and the changes in the productive process after the certification, the companies were also questioned about the repercussion among the employees regarding such changes. In this point, 4 (four) companies stated that there was an acceptance without further ado; 2 (two) companies said that no significant differences were noticed in the productive process with the progress of the certification routines, implying in a low correlation between the continuous implanted improvements and the eco-efficient approach.

Finally, we ponder on the seal's recognition and expansion, identifying search patterns. Tracking the buyer profile by social class, we noticed that the greatest scale of commercialized items was requested by high-medium class consumers (about 60% of the businesses). The remaining of the operations was oriented for medium class consumers (contributing with 40% of the acquisitions). This composition indicates that the offer of eco-efficient products still do not find enough arguments among less monetized publics. At the same time, it shows that, in spite of the intensive advertising actions of the products in fairs, events, and in the Web, the acceptance of this kind of product in different user social profiles do not represent an effective intent of purchase. Although it characterizes a desirable aspect in the disposal to the public, it requires the composition with other technical advantages and of purchase to generate an increase in the consumption scale.

Therefore, the technological and organizational changes have a decisive participation in the conditioning of the structures to achieve sustainability. Under this perspective, sustainability represents a subject in progress in the organizations evaluated by the study, mostly encouraged by the interest of the consuming markets in assuming sustainable practices through daily habit changes and mostly during the product purchasing, ratifying the conditions observed by Cuperschild and Tavares (2002), Diryana and Kurniawan (2015), and Yun-Shan (2008).

As described in SINDUSMOBIL and CEM (2008), the formatted seal represents a local culture, and only the companies that are part of the Wood and Furniture Local Productive Arrangement of Alto Vale do Rio Negro can be apply themselves as candidates to the seal. Since most furniture companies of this region are used to the external market, the reconquering process of the internal market has been gradually developed, considering that the Biomóvel products still are not nationally recognized. Partially, it happens due to the little diversification of the seal's advertising in the media.

As to which regions of the country registered more search for the seal, we noticed that the regions of South and Southeast of Brazil represent almost the total of the commercialized amount (around 80%). The remaining of the distributed production is destined to other states of the federation. Generally, the products linked to the seal have a low participation in the companies' incoming. It happens due to the predominance of exportation and distribution businesses to national and external retailers that have their own visual and socio-environmental communication means. Consequently, due to contractual issues, the Biomóvel seal cannot keep up with the company's products and packages, even in cases that present the program's concepts. In every case, the participating companies understand that, regardless of the business volume applied at the intended portfolio, the program's continuity allows a more assertive behavior and builds important competences for the business' development.

Due to the great number of companies with an exporting profile on the region, we think that the Biomóvel seal also has a great potential with foreign clients, especially due to the fact that the seal's implantation reflect important measures of sustainable order to the products and processes. The collected data indicate that 2 (two) companies are selling the Biomóvel products also for the external market. All others indicate that there was an interest, through a presentation of the intended catalog, but that still did not generate businesses. Therefore, we stress the average profile of the exporting operations, where the manufacturers are subcontracted to offer concepts that were already established by middle men, distributors, and retailers. In this sense, any change in these items, according to the program's prerogative, will not converge to the seal's demarcation, since the buyers understand this action as an engineering effort and not as a strategic decision of the industrial supplier. Therefore, most participants follow the train of thought of the seal's creation, betting in its recognition in the national market.

Under this indication, we can admit that the environmentally friendly product market establishes a new offer portfolio and new opportunities. Therefore, besides of acting in the configuration of products and services, this approach constitutes a new brand, recurrently indicated through the prefixes "eco" and "bio," in the composition of supposed neologisms to this demarcation (CHEN, 2010; DIRYANA; KURNIAWAN, 2015; PEATTIE, 1995; POTOSKI; PRAKASH, 2003). Segmenting the attention for the internal market and for the distribution channel, we notice that 2 (two) companies use their own stores to present and sell Biomóvel products. 6 (six) other companies indicate that the products are sold through specialized stores: both in physical points as through e-commerce advertising. These elements ratify that the commercialization process continues to strongly depend on intermediation mechanisms, reinforcing the need to establish sectorial agreements that allow the adoption of environmental measures that are corroborated by the entire productive chain of the segment.

## 6. Final considerations

The companies that are part of the Furniture Pole of Alto Vale do Rio Negro still reflect an exploring profile, to which they got acclimatized in the last decades and from

which the current adaptation hindrances emerge in the internal opportunity scenario. However, the resumption process in the national market has been characterized by important adjustment measures that constitute important steps in the composition of strategies that are able to promote a differentiated value offer.

In this sense, one of the initiatives that were adopted in this business transformation period explores the concept of environmentally friendly furniture. However, this offer structure, in spite of its great potential, still possess external and internal blanks to the organizations.

The clients' acceptance to pay more for environmentally friendly furniture, that does not harm the environment, is a subject of constant speculation. We must establish and communicate the relation between cost and benefit in this portfolio to better understand the sustainable actions and their contributions at user and environment level.

Analyzing the type of predominant certification, we underscore the certification as a whole, demonstrating that the organizations are holistically involved in the project. As for the seal adherence reasons, the search for a sustainable company image prevails with great emphasis, which leads us to the Biomóvel Seal's goal of designing products and product systems to minimize environmental impacts in every life cycle phase (SINDUSMOBIL; CEM, 2008).

Naturally, the adhesion of the companies implied in important structural and cultural changes of the seal's members. However, this action was proven incremental to the values already assumed of quality and performance of these manufacturers that, already acclimatized to the international market's demands, were partially structured to design sustainable products and reduce their operations' environmental impacts.

Therefore, one of the deficient points to attack, is related to the knowledge level optimization of the companies' employees regarding the Biomóvel Seal, as well as to the acceptance regarding the changes occurred in the productive process. We analyzed points regarding the employees' training on Biomóvel's certification, production, and commercialization process, as well as the repercussion related to the changes of said productive process, which gradually happened in the organizations by their own initiative or were incorporated from the industrial cluster's consolidated actions.

As for the Biomóvel Seal's expansion, the search for social classes, geographic regions, and external market demand, we infer that the program is in its expansion phase, trying to enter in some consumption segments and intensifying its presence in others. Generally, this insertion reaches more qualified consuming groups, which consider sustainability and eco-innovation as a desirable brand.

One of the research's limitations was the industries' adhesion difficulty in the tool's filling. Internal policies restrained the research participation and a low effectiveness in the questions' appreciation resulted in difficulties to fulfill its potential sampling, the program-related group. In a way, this position is unfolded into a growth barrier for the seal's visibility, since the recurrence in this conduct might represent apathy on the conscientiousness process of the public that is exogenous to the company.

Finally, as a suggestion for other works, a benchmarking may be performed with other regions that use environmentally friendly seals, comparing their difficulties and

competitive advantages. In this sense, an institutional intent protocol may improve the relation between the information exchange and participation between academies and companies, creating a fertile environment for a technical-scientific projection of the region and its products.

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Original Article



# ECODESIGN IN THE FURNITURE INDUSTRY: OPPORTUNITIES AND CHALLENGES FOR ORGANIZATIONAL INSERTION

**Abstract:** The purpose hereof was to analyze cultural and organizational changes in the furniture industry, beginning with the adherence to an environmental certification program called “Biomóvel.” The study, whose research instrument was a questionnaire answered by industrial managers, was performed in the Alto Vale do Rio Negro Pole (north of Santa Catarina, southern Brazil). A descriptive analysis of data was performed in order to assess the impact and relevance of the action in the organizational environment. The results point to the minimization of the resources used in several planning and production stages, and to the intensification of the selection and use of low environmental impact materials. We noticed that the surveyed companies have taken significant steps to strengthen its ecodesign as a development strategy, but they still do not execute this decision in integration with other stages of processing, trading, and industry progression.

**Keywords:** Ecodesign, Furniture Industry, Sustainability.

**Resumo:** O objetivo deste trabalho foi analisar mudanças culturais e organizacionais em empresas industriais moveleiras a partir da adesão a um programa de certificação ambiental denominado Biomóvel. O estudo foi realizado no Polo do Alto Vale do Rio Negro (norte de Santa Catarina, sul do Brasil), tendo por instrumento de pesquisa um questionário respondido por gestores industriais. Realizou-se análise descritiva dos dados a fim de avaliar o impacto e relevância da ação no ambiente organizacional. Os resultados obtidos apontam para a minimização dos recursos empregados nas diversas fases de planejamento e produção, e para a intensificação da seleção e uso de materiais de baixo impacto ambiental. Constatou-se que as empresas pesquisadas têm tomado importantes medidas para o fortalecimento do *ecodesign*, enquanto estratégia de desenvolvimento, mas ainda não dirigem esta decisão de forma integrada com outras etapas da industrialização, comercialização e progressão setorial.

**Palavras-chave:** Ecodesign, Indústria Moveleira, Sustentabilidade.

**Resumen:** El objetivo del trabajo fue analizar cambios culturales y organizacionales en empresas industriales muebleras a partir de la adhesión al programa de certificación ambiental, Biomóvel. El estudio se realizó en el Polo del Alto Valle del Río Negro (norte de Santa Catarina, sur de Brasil), teniendo como instrumento de investigación un cuestionario respondido por gestores industriales. Se realizó un análisis descriptivo de los datos para

evaluar el impacto y relevancia de la acción en ambiente organizacional. Estos apuntan a la minimización de los recursos empleados en diferentes fases de la planificación y producción, y para intensificación de la selección de materiales de bajo impacto ambiental. Se constató que las empresas encuestadas han adoptado importantes medidas para el fortalecimiento del ecodesign, como estrategia de desarrollo, pero aun no dirigen esa decisión de manera integrada con otras etapas de industrialización, comercialización y evolución sectorial.

*Palabras clave:* Ecodesign, Industria Mueblera, Sustentabilidad.

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