



Textile and
Apparel Industry

TEXTILE AND APPAREL: INNOVATE, DEVELOP AND SUSTAIN

INDUSTRY MEETING FOR SUSTAINABILITY



CNI – NATIONAL CONFEDERATION OF INDUSTRY – BRAZIL

Robson Braga de Andrade
President

BOARD OF EDUCATION AND TECHNOLOGY – Directory

Rafael Lucchesi Esmeraldo Ramacciotti
Director of Education and Technology

BRAZILIAN TEXTILE AND APPAREL INDUSTRY ASSOCIATION – ABIT

Aguinaldo Diniz Filho
President

Fernando Valente Pimentel
Superintendent

Renato Leme
Superintendent of Administration and Finance

DEPARTMENT OF TRADE – ABIT

Domingos Mosca
Consultant

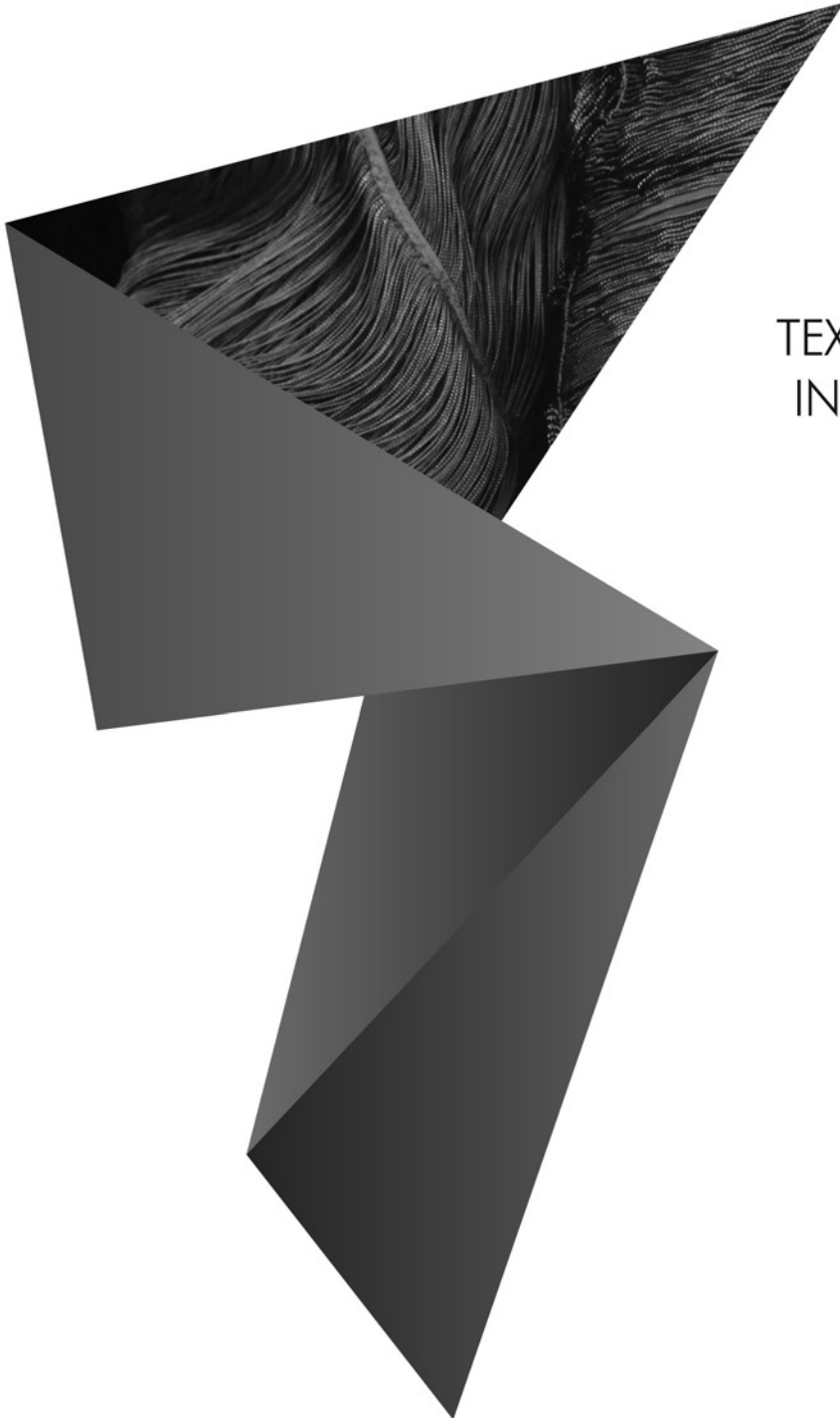
Renato Jardim
Manager

DEPARTMENT OF INFRASTRUCTURE AND TECHNOLOGY – ABIT

Sylvio Tobias Napoli Junior
Manager

DEPARTMENT COMMUNICATION – ABIT

Ligia Santos
Manager



Textile and
Apparel Industry

TEXTILE AND APPAREL: INNOVATE, DEVELOP AND SUSTAIN

INDUSTRY MEETING FOR SUSTAINABILITY

BRASÍLIA
2012

© 2012. CNI – National Confederation of Industry

Any part of this publication may be reproduced and the source cited.

C748t

National Confederation of Industry. Brazilian Textile and Apparel Industry Association.

Textile and Apparel: Innovate, Develop and Sustain / National Confederation of Industry Brazilian Textile and Apparel Industry Association. – Brasília: CNI / ABIT, 2012.

75 p. (Rio+20 Sectorial fascicle)

1. Sustainability 2. United Nations Conference on Sustainable Development I. Title II. Series

CDU: 502.14 (063)

CNI

National Confederation of Industry

Headquarters

Setor Bancário Norte
Quadra 1 – Bloco C
Edifício Roberto Simonsen
70040-903 – Brasília – DF
Phone: (61) 3317- 9000
Fax: (61) 3317- 9994
www.cni.org.br

ABIT

Brazilian Textile and
Apparel Industry Association

Headquarters

Rua Marquês de Itu, 968
01223-000 – São Paulo – SP Brasil
Phone: (11) 3823.6100
Fax: (11) 3823.6122
abit@abit.org.br



LIST OF FIGURES

Box 1.	Summary of potential environmental impacts	54
Box 2.	Environmental indicators for the textile sector	55
Box 3.	Summary of P+L opportunities in the textile sector	56
Box 4.	Seven vectors of future importance	61
Box 5.	Infrastructure and education for innovation	62
Chart 1.	Companies of the textile sector in 2010	19
Chart 2.	Jobs of the textile sector in 2010	19
Chart 3.	Production of the textile sector in 2010.....	19
Chart 4.	Average number of job per company of the textile chain in 2010.....	20
Chart 5.	Average production per company, in metric tones, in 2010.....	20
Chart 6.	Accumulated production of the textile and apparel sector (US\$ bi)	20
Chart 7.	Production of each segment, in 1,000 MT.....	21
Chart 8.	Direct jobs in the textile and apparel sector (in thousand)	22
Chart 9.	International sales of textile and apparel sectors (in US\$ bi)	25
Chart 10.	Size of textile companies	25
Chart 11.	Consumption of textile items per capita (kg)/year.....	26
Figure 1.	Relation between the main actors of the sector	18

Figure 2.	Selective waste collection in the district of Bom Retiro – São Paulo	30
Figure 3.	Selective waste collection in the district of Bom Retiro – São Paulo	30
Figure 4.	Qualitative evaluation of the impact of textile fibers on the environment .	31
Figure 5a.	Cotton	32
Figure 5b.	Wool	32
Figure 5c.	Viscose.....	32
Figure 5d.	Bamboo Viscose.....	33
Figure 5e.	Lyocell – Tencel.....	33
Figure 5f.	Polyamide (Nylon).....	33
Figure 5g.	Polyester.....	34
Table 1.	Production and employment in 2010.....	21
Table 2.	Exportation of the sector and participation in the total exportation.....	22
Table 3.	Importations of the sector and participation in the total amount imported by Brazil.....	23
Table 4.	World production of the textile segment (MT) in 2009.....	23
Table 5.	World production of the apparel segment (MT) in 2009.....	24
Table 6.	Technical notifications – United States	39
Table 7.	Technical notifications – Argentina.....	39
Table 8.	Companies that implemented innovation, by education level – Brazil – 2008	46
Table 9.	Costs incurred with innovative activities	46
Table 10.	Company in charge of product and/or process development in the companies that implemented innovations – Brazil (2006-2008)	46
Table 11.	Companies that implemented innovations, by impact importance level .	47



SUMMARY

CNI presentation

Sectorial presentation

1	Introduction	13
1.1	About ABIT	13
1.2	Objectives of this document	14
2	Socioeconomic and environmental characterization of the sector	17
2.1	Socioeconomic characterization.....	17
2.1.1	Description of the production chain.....	17
2.1.2	Domestic production of the sector.....	20
2.1.3	Growth of sector production	21
2.1.4	Participation of the sector in the Brazilian industry	21
2.1.5	Number of jobs generated by the sector	22
2.1.6	Exportation of the sector and participation in the total exportation.....	22
2.1.7	Importation of the sector and participation in the total importation .	23
2.1.8	Participation of Brazil in world production of the sector.....	23
2.1.9	Size of companies in operation in the Brazilian sector	25
2.1.10	Market dimension.....	25
2.2	Socio-environmental characterization.....	26
3	Economic and socio-environmental regulations that affect the sector	37
3.1	Main international agreements and regulatory aspects related to the sector: characterization of the international regulatory scenario for the sector.....	37

3.2	Main national (compulsory and voluntary) normative instruments that effect in the main external markets of the sector (consumer requirements, certificate requirements, etc.) with impacts on the sector	40
3.3	Main regulatory aspects (in legislation) and (compulsory or voluntary) normative instruments that impact the sector in Brazil	40
4	Corporate practices for sustainable development (1992 – 2011)	43
4.1	Main technological and management transformations/innovations incorporated into the production of the sector	43
4.2	Initiatives of information disclosure and transparency regarding the socio-environmental performance of the sector	48
4.3	Initiatives of certification and self-regulation developed by the sector	51
4.4	Initiatives coordinated by the trade association/institution	53
5	Challenges and opportunities for the sector on the way towards sustainability	59
6	Final considerations	65
	References	69



CNI PRESENTATION

The diversity of the national industry and the significant availability of natural resources reveal excellent opportunities for the sustainable development of Brazil, combining economic growth, social inclusion and environmental conservation. The materialization of concerns related to sustainability in the strategic agenda of enterprises and governments is a reality. Apart from isolated cases of success, the consequences of this attitude are felt in entire sectors of the economy. Further advances are still needed, but the path has already been identified and going back is impossible.

After coordinating an unprecedented critical thinking process on sustainability with 16 industry associations, the National Industry Confederation (CNI) delivers to the Brazilian society a wide range of information on progress, challenges and opportunities yet to come. The results presented here may not portray the significance of the discussion process experienced by the industry in preparing these documents. Developments on the process will be beyond the Rio +20 Conference, and are definitely incorporated on the daily lives of companies.

The subject of sustainability is inserted differently in each of the industrial sectors. However, some elements are common to all. The continuous pursuit for efficiency in use of resources and the need to increase industrial competitiveness are on the agenda of all the sectors. Encouraging innovation and scientific and technological development is strategic on the transition to more sustainable patterns of production.

Strategies to intensify actions coordinated internally in the industrial sectors and with governments and civil society organizations are no less important. The dissemination of sustainable practices by means of the supply chain and incentives for companies to undertake the role of integrated management of the territories are powerful tools.

The sectorial volumes developed by industry associations are valuable contributions to addressing subjects such as sustainability and competitiveness of domestic industry. One of the most representative results of this process will certainly be the strengthening of structured programs of action with a focus on promoting sustainability in the

production. These initiatives will act as raw materials so that the industries involved and CNI are able to systematically publish documents presenting the national industry's developments towards the goals of sustainable production.

The documents presented here are intended to be a valuable contribution to enhance the debate on sustainability. Each of the sectorial associations is to be congratulated for their efforts.

Robson Braga de Andrade

President of the National Confederation of Industry – Brazil



SECTORIAL PRESENTATION

COMMITMENT AND RESPONSIBILITY

The numbers related to companies, employments, investments, technology and profile of the textile and apparel industry in Brazil presented in this document show its importance in the context of the Rio+20 goals of promoting sustainable development, which reflect the concern of everyone and multilateral organizations about this important theme. However, the macroeconomic dimensions of a sector, regardless of their relevance, are not enough to align it with these goals and make it the main actor in the process to achieve a prosperous and environmentally healthy future. This is a challenge to be jointly addressed by governments, companies, non-governmental organizations, educational and research institutions, populations, well, all society.

First, commitment and responsibility are required to address the main challenge of sustainability, which is to conciliate economic growth, eradication of misery and preservation of the environment and natural resources. That is, it is essential that production activities keep adopting correct attitudes, in the socio-environmental perspective, supported by a favorable macroeconomic scenario with consistent and feasible regulations.

That's exactly the idea that guides the textile and apparel industry. We believe that human beings and their well-being should be duly understood as a primary objective of the democratic capitalism. For this reason, our trade association encourages and works to transform clean production, good work conditions and job offering with social vision, as well as fabric and clothing technologies that respect the ethical and ecological origin of raw materials and the user's health and comfort into recurrent practices of the sector.

Such values, which have to be global to establish competitive isonomy at the economic level and broad effects regarding the environmental sustainability, are geometrically disseminated in the sector, across the Brazilian territory. Our activities consolidate the awareness of the industry's role in the process of building a better society and the idea that human beings and their organizations are not the owners, but they're part, of the nature!

Aguinaldo Diniz Filho

President, Brazilian Textile and Apparel Industry Association (ABIT)



1 INTRODUCTION

1.1 About ABIT

The Brazilian Textile and Apparel Industry Association (ABIT), created in 1957, is one of the most important trade association in the corporate universe in Brazil. It represents a productive force of more than 30,000 companies, of different sizes, installed across the national territory, and which employ over 1.7 million direct workers and, together, correspond to annual turnover of US\$ 60 billion. ABIT has a physical and service structure to support and guide its member companies. All activities performed by the team of collaborators and consultants seek to support the sustainable development of the sector and defend its legitimate interests in all possible spheres, in public and private areas, nationwide and around the globe.

The Brazilian textile and apparel sector has achieved a notable position in the global scenario, not only due to its professionalism, creativity and technology, but also for its dimensions: it's the fifth largest textile industry and the fourth largest apparel industry in the world; the second largest producer of denim and the third largest producer of knitwear. Self-sufficient in cotton production, and with investments in the production of chemical fibers, Brazil produces 9.8 billion items a year (around 6.5 billion of them are clothing items), and the country is a world reference in beachwear, jeanswear and homewear. Other segments have also increased their participation in the international market, such as women's, men's and children's fashion, as well as fitness and underwear. The companies of the sector invested around US\$ 5 billion in 2010-2011.

In mid 2007, the Brazilian Agency for the Industrial Development (ABDI) requested the Center for Strategic Studies and Management in Science, Technology and Innovation (CGEE) to conduct a prospective study about six industrial sectors, including textile and apparel. The study had the direct participation of ABIT and its purpose was the creation of a plan for development actions in the sector until 2023. The Institute of Technology and Market Studies (IPTM), a division of Senai/CETIQT, with the cooperation of specialized consulting, analyzed the opinion and the view of the managing commit-

tee, composed of entrepreneurs from all sections of the value chain, academicians and representatives of governmental organizations. The resulting Prospective Study on the Textile and Apparel Sector (ABDI, 2009) produced strategic and technological pathways that will guide the sector until 2023. Based on a scenario that describes the current state considering the aspects of market, technology, talents, physical infrastructure, investments and political-institutional scenario, the following Vision of the Future of the sector was elaborated:

“Be recognized and admired due to the economic, political and social relevance of its activities, be globally competitive and a notable exporter in the world scenario, having the ethical and sustainable utilization of the diversity of natural resources and human competences as its differentiation, emphasizing the Brazilian identity with creativity, interacting with other production chains and constituting a network of fast and versatile value, of intensive knowledge and integrated from conception to the final disposal of its customized, functional and innovative products, which awake emotions and fulfill the needs of different consumption segments.”

As clearly demonstrated in the vision above, sustainability is a critical factor for the competitive differentiation of the sector in the global environment. For this reason, great challenges should be assumed. Only after the consolidation of methods applicable to the sector, with the support of specialized services and proper qualification, the dissemination of information will be enabled, for integrated sustainable actions of the various actors in the chain, such as agriculturists, manufacturers, workers and designers. With integrated information, everyone will be able to consciously contribute to the minimization of undesirable impacts on the environment, promoting considerable changers in the aspect of sustainability.

ABIT recognizes that it is necessary to expand the sustainable development across the country and worldwide, according to the principle of common responsibilities and absolute right of States to their natural resources. The association's commitment to the textile and apparel sector is to provide grounds for the sustainable development through actions that fill gaps and promote integration of the three supporters of the sustainable development: the economic, social and environmental pillars.

1.2 Objectives of this document

The purpose of this document is to offer feasible alternatives of contributions to the Brazilian textile and apparel sector towards sustainable development. Based on its socioeconomic characterization and legal and regulatory contextualization, the main action lines are analyzed, which should be emphasized by public policies and corporate initiatives to enhance competitiveness, based on sustainable differentiation and social responsibility.

It is important to make and disseminate every effort to speed up the process to achieve the development goals internationally agreed within the context of Rio+20 Conference,

reinforcing the cooperation of the textile and apparel sector regarding the approach to emerging issues, while maintaining the economic stability and sustainable growth that benefit everyone. Thus, it is pertinent to express our determination to keep expanding the green economy within the context of development and eradication of poverty, and our wish to reinforce the institutional group towards the development firmly grounded on correct social, environmental and economic terms.



2 SOCIOECONOMIC AND ENVIRONMENTAL CHARACTERIZATION OF THE SECTOR

This section analyzes the social, economic and environmental impacts of the sector.

2.1 Socioeconomic characterization

2.1.1 Description of the production chain

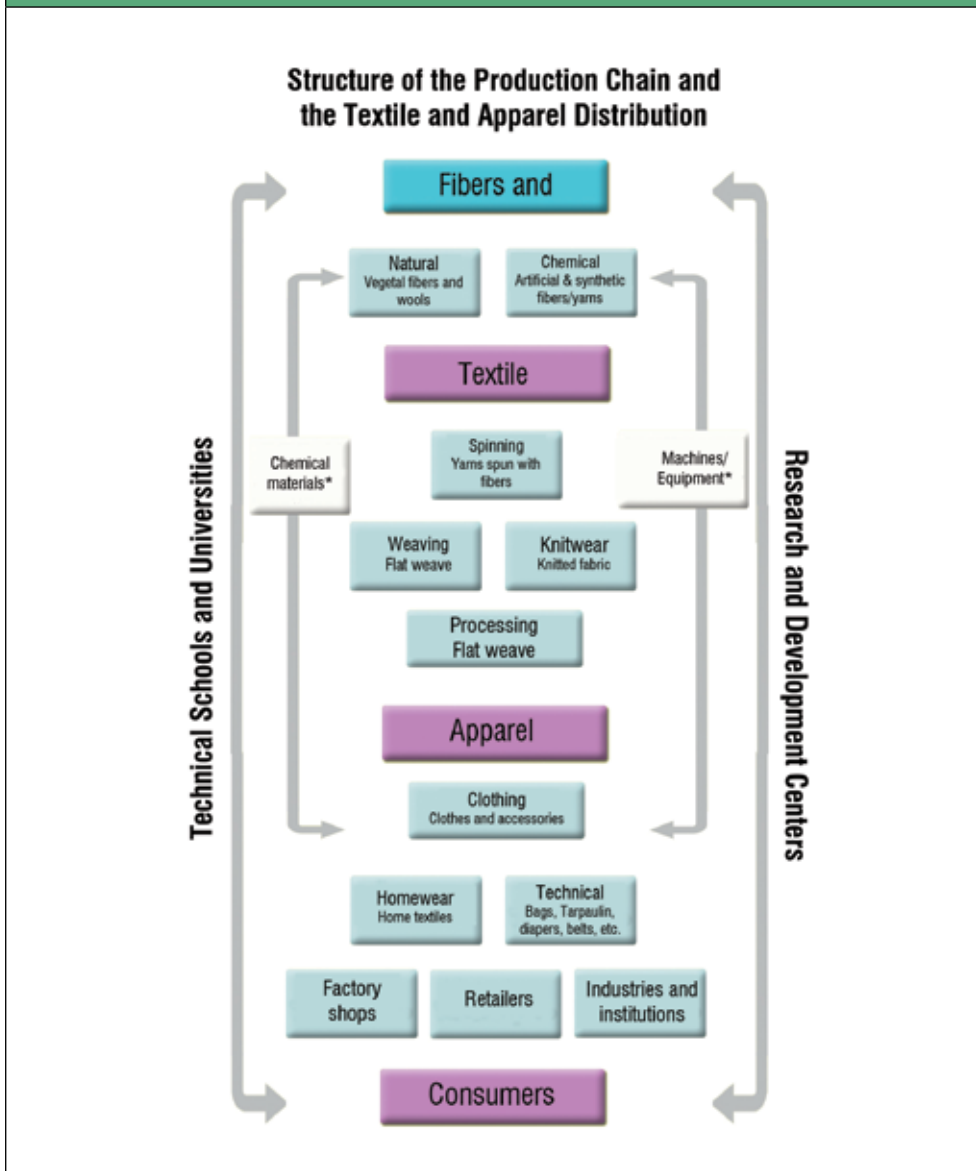
The history of national industry is due in large measure to the textile and apparel sector. Its amplitude, density and complexity reflect the power of its socioeconomic structure. And this structure will be the base for even greater internationalization and new entrepreneurs.

The competitive environment among the textile and apparel companies in Brazil has expanded, a singular and local effect of what has occurred in other sectors and around the world, as a result of the globalization process. This expansion gradually introduces new organizational methods, with more diversification and better adapted to the conditions of the new economic order.

The competition for more demanding markets qualifies companies to offer better products. Facing challenging situations enhances the level of entrepreneurial intelligence, replicates and multiplies the operations and productions, and finally, involves other production chains, which ends up generating more and better jobs.

Figure 1 shows the networking structure that represents the relation between the main activities developed in the sector.

FIGURE 1. RELATION BETWEEN THE MAIN ACTORS OF THE SECTOR

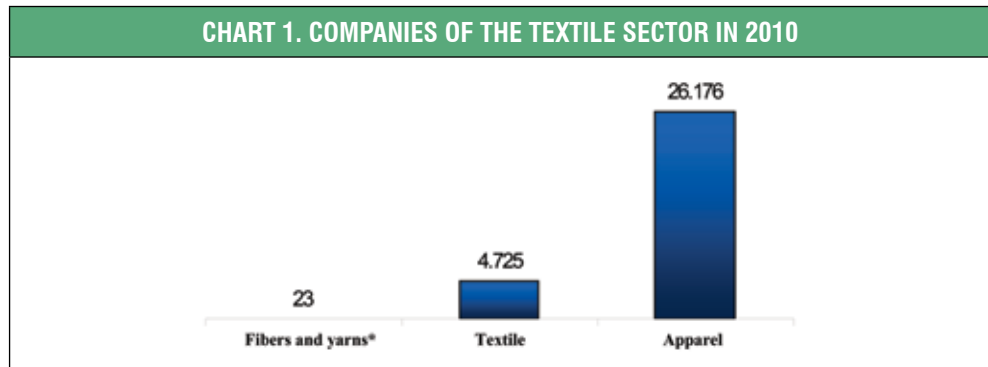


Note: (*) Segments of suppliers.

Source: Elaborated by ABIT/IEMI – Instituto de Estudos e Marketing Industrial.

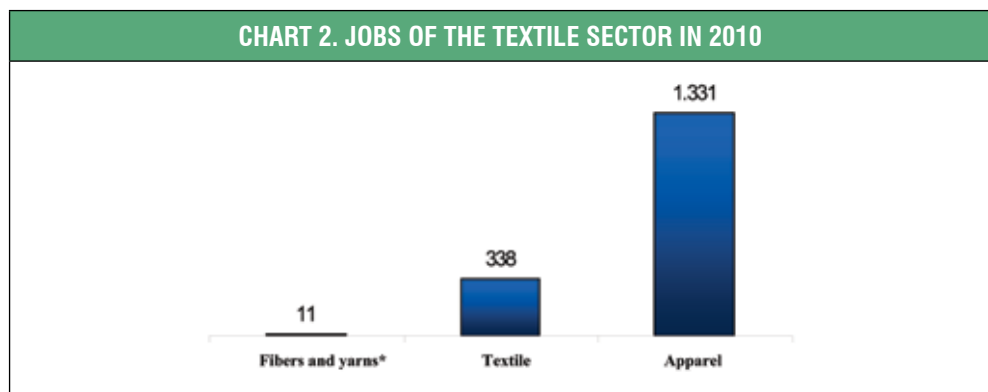
The charts below show the general numbers of the sector.

TOTAL NUMBERS OF THE SEGMENTS:



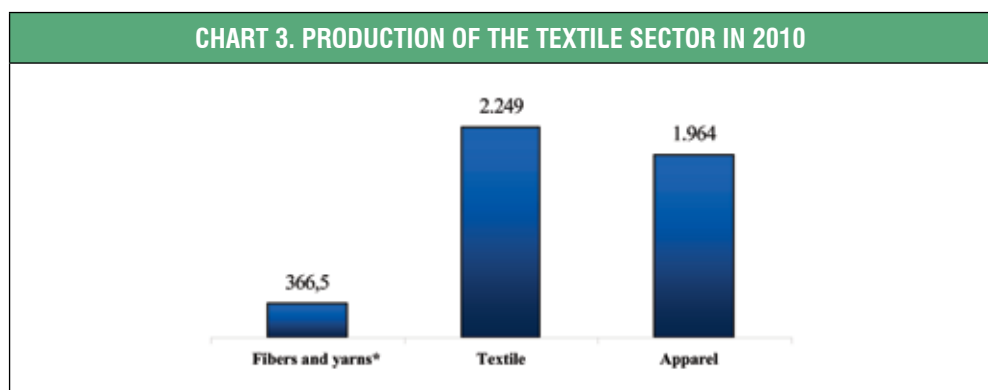
*Not including cotton production.

Source: Elaborated with data from IEMI – Instituto de Estudos e Marketing Industrial (2011).



*Not including cotton production. Source:

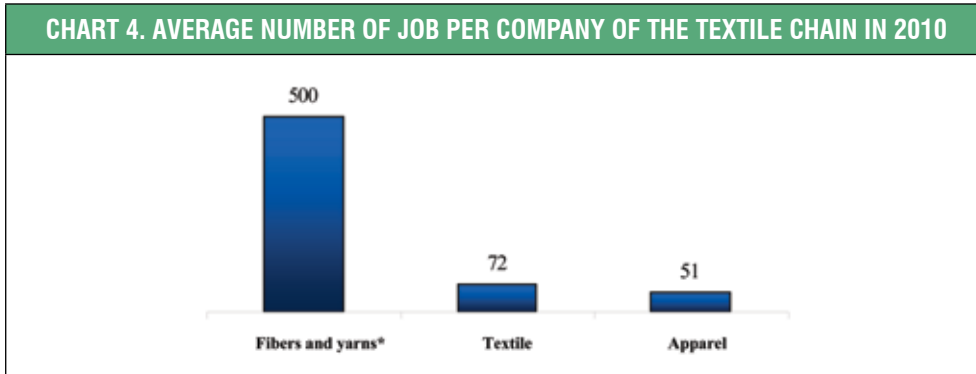
Elaborated with data from IEMI – Instituto de Estudos e Marketing Industrial (2011).



*Not including cotton production.

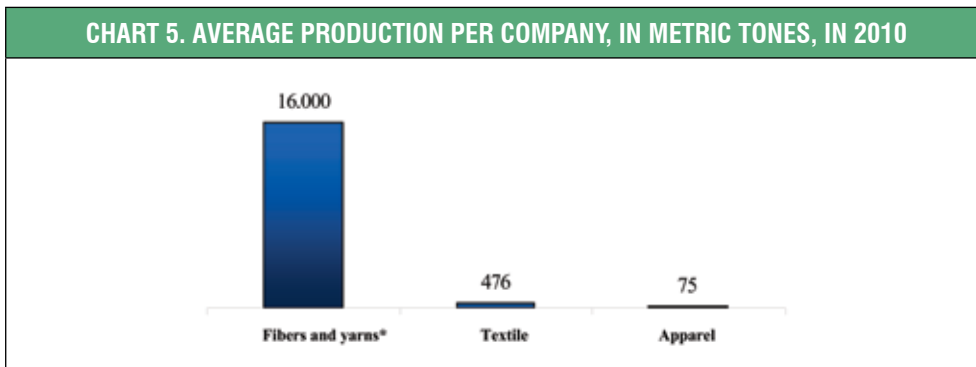
Source: Elaborated with data from IEMI – Instituto de Estudos e Marketing Industrial (2011).

Average numbers per company in the segments:



*Not including cotton production.

Source: Elaborated with data from IEMI – Instituto de Estudos e Marketing Industrial (2011).

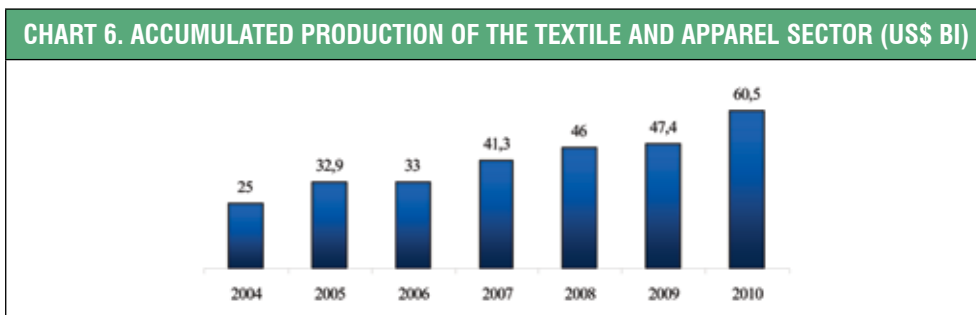


*Not including cotton production.

Source: Elaborated with data from IEMI – Instituto de Estudos e Marketing Industrial (2011).

2.1.2 Domestic production of the sector

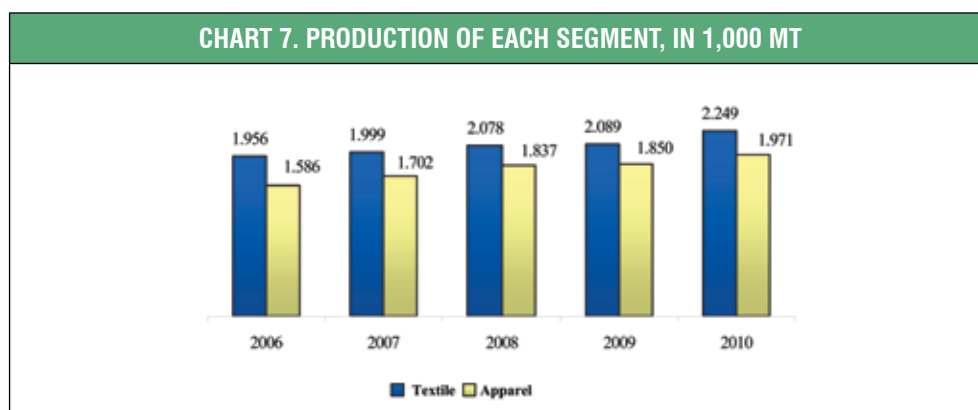
When measured in dollars, the domestic production showed an important increase of 27.6% between 2009 and 2010.



Source: Elaborated with data from IEMI – Instituto de Estudos e Marketing Industrial (2011).

2.1.3 Growth of sector production

Chart 7 shows the increase in the production of the sector. However, it should be noted that the industrial physical production felt impacts resulting from the world crisis of 2009. In 2010, it increased again, with considerable growth, and in 2011, new reductions, especially in the textile sector. The fact that the Brazilian industry has changed to a competitive profile, differentiating it from cost competition countries may also impact the production, with reduced growth rate.



Source: Elaborated with data from IEMI – Instituto de Estudos e Marketing Industrial (2011).

2.1.4 Participation of the sector in the Brazilian industry

Table shows the real importance of the Brazilian textile production chain, when compared to overall manufacturing industries in the country. It shows the textile sector had 5.5% participation in the net revenue of the manufacturing industries in 2010. In terms of employees, its participation was even more significant, i.e., 16.4% of the total employees of the national manufacturing industries, according to data from the *Instituto de Estudo e Marketing Industrial (IEMI) for 2010*.

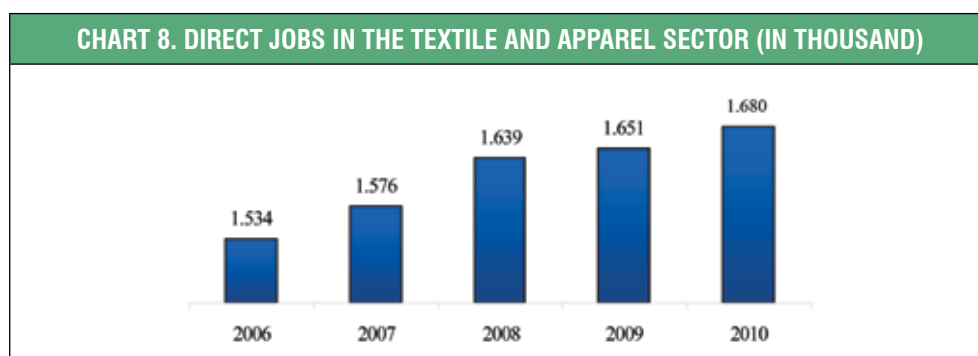
TABLE 1. PRODUCTION AND EMPLOYMENT IN 2010

	Production (US\$ bi)	Employees (thousand)
Textile sector	60.5	1,680.0
Manufacturing industries	1,101.8	10,192.6
Participation (%)	5.5%	16.4%

Source: Elaborated with data from IEMI/IBGE (2011).

2.1.5 Number of jobs generated by the sector

The textile and apparel sector is one of the best job generators in the manufacturing industries. Chart 8 illustrates the increase in the number of jobs in the sector.



Source: Elaborated with data from IEMI (2011).

2.1.6 Exportation of the sector and participation in the total exportation

In 2010, the exportation of the sector increased 20.8%, with stabilization in 2011. However, such growth was much lower than the increase in importation in the sector, as indicated in the tables below:

TABLE 2. EXPORTATION OF THE SECTOR AND PARTICIPATION IN THE TOTAL EXPORTATION

Period	Exportation*, in US\$ FOB	Participation in total exportation
2006	1.8 bi	1.3 %
2007	1.9 bi	1.2 %
2008	1.7 bi	0.9 %
2009	1.2 bi	0.8 %
2010	1.45 bi	0.7%
2011	1.42 bi	0.5%

*Not including cotton fibers.

Source: Elaborated with data from AliceWeb¹/MDIC² (2011).

1 The Foreign Trade Information Analysis System via Internet.

2 Ministry of Development, Industry and Trade.

2.1.7 Importation of the sector and participation in the total importation

The growing importation of the national industry shows participation of the sector in total importation at least twice the amount of exportation in the periods analyzed below.

TABLE 3. IMPORTATIONS OF THE SECTOR AND PARTICIPATION IN THE TOTAL AMOUNT IMPORTED BY BRAZIL		
Period	Importation*, in US\$ FOB	Participation in total importation
2006	2.2 bi	2.4 %
2007	2.9 bi	2.4 %
2008	3.7 bi	2.1 %
2009	3.5 bi	2.7 %
2010	4.9 bi	2.7 %
2011	6.1 bi	2.7 %

*Not including cotton fibers.

Source: Elaborated with data from AliceWeb/MDIC (2011).

2.1.8 Participation of Brazil in world production of the sector

Brazil is one of the greatest textile and apparel producers in the world (Tables 4 and 5), the fifth in the textile segment and the fourth in the apparel segment. The national industry has the largest integrated manufacturing complex in the Western Hemisphere, producing from fibers to end products.

TABLE 4. WORLD PRODUCTION OF THE TEXTILE SEGMENT (MT) IN 2009		
	Textile sector	Participation (%)
China	33,231,000	48.78
India	5,500,000	8.07
United States	3,620,000	5.31
Pakistan	2,660,000	3.90
Brazil	2,089,000	3.07
Indonesia	1,853,000	2.72
Taiwan	1,682,000	2.47
South Korea	1,327,000	1.95
Turkey	1,283,000	1.88
Thailand	874,000	1.28

TABLE 4. WORLD PRODUCTION OF THE TEXTILE SEGMENT (MT) IN 2009		
Mexico	739,000	1.08
Italy	732,000	1.07
Bangladesh	618,000	0.91
Russia	475,000	0.70
Germany	466,000	0.68
Others	10,979,000	16.12
Total	68,128,000	100.00

Source: Elaborated with data from IEMI (2011).

TABLE 5. WORLD PRODUCTION OF THE APPAREL SEGMENT (MT) IN 2009		
	Apparel sector	Participation (%)
China	19,709,000	48.96
India	2,819,000	7.00
Pakistan	1,535,000	3.81
Brazil	1,169,000	2.90
Turkey	1,070,000	2.66
South Korea	968,000	2.40
Italy	968,000	2.40
Mexico	951,000	2.36
Malaysia	651,000	1.62
Poland	622,000	1.55
Taiwan	578,000	1.44
Romania	518,000	1.29
Thailand	453,000	1.13
Sri Lanka	450,000	1.12
Indonesia	445,000	1.11
Others	32,906,000	81.74
Total	40,258,000	100.00

Source: Elaborated with data from IEMI (2011).

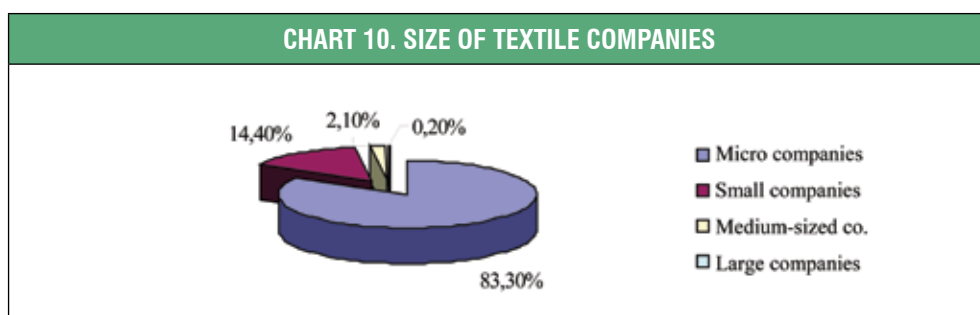
Chart 9 shows the progress in international sales of the textile and apparel sectors, with reduction in 2009, due to the world economic crisis.



Source: WTO – World Trade Organization.

2.1.9 Size of companies in operation in the Brazilian sector

Chart 10 shows the importance of small companies in the structure of the sector.



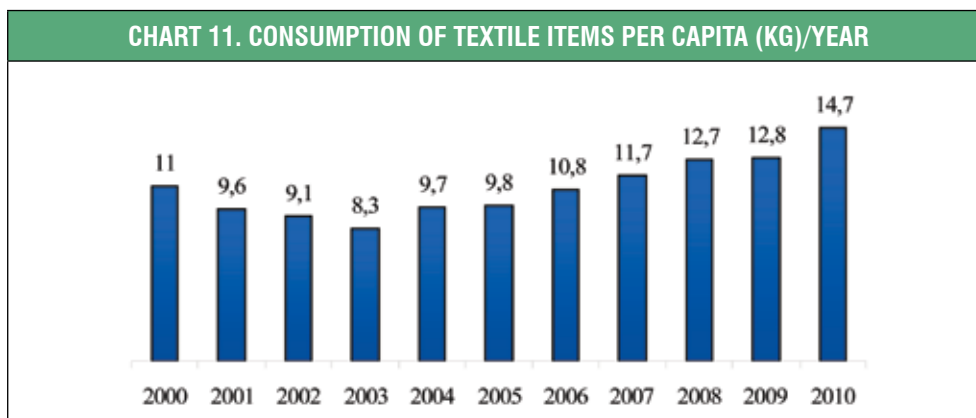
Source: Elaborated with data from IEMI and MTE³/RAIS⁴ (2011).

2.1.10 Market dimension

The consumption of textile and apparel items in Brazil has presented considerable growth due to increased number of jobs and better income distribution in the country in the last decade. An even greater increase in consumption in capita is estimated for the next years.

³ Ministry of Labor and Employment.

⁴ Annual Social Information Report



Source: Elaborated with data from IEMI (2011).

According to the IEMI (2011), in 2010, the Brazilian textile production was 11.6 kilos per capita, measured with the IEMI criterion, which adds the internal consumption of fibers to the annual production of yarns. In 2010, the consumption reached 14.7 kilos per capita (Chart 11), indicating that part of the internal consumption was supplied by imported production.

2.2 Socio-environmental characterization

INITIATIVES OF SOCIAL RESPONSIBILITY

Social responsibility has introduced new solutions for the sustainable development in the country. The textile and apparel chain reinforces its commitment to ethics and transparency and makes every effort to improve its relations with the various interested stakeholders, considering the new business scenario and the idea that we are part of a whole. In other words, social responsibility can be defined as a group of initiatives:

- that prioritize the development of sustainable businesses, in both economic and socio-environmental perspectives;
- of voluntary and/or regulatory character;
- directed to their different audiences or “interested stakeholders”;
- focused on the ethical dimension of their relations with such audiences, and on the quality of the company’s impacts on the society and the environment.

Reinforcing this tendency and developing the culture of social responsibility is one of the initiatives we consider essential for the economy growth and improved life of population. Based on this view, ABIT has strengthened partnerships along the years with key institutions for the national industry development, such as the Brazilian Association of Cotton Producers (Abrapa) and the Brazilian Association of Artificial and Synthetic Fiber Producers (Abrafas).

Abrafas is the association for the Brazilian manufacturers of chemical fibers and it attentively follows the research, development and innovation activities of its members. Producing artificial and synthetic fibers through processes that do not harm the environment is the premise to these companies, and several examples are mentioned in this study. Absolute control over production processes and correct administration of their effluents are part of a practice that has been constantly improved.



Polyester yarn. Photo: Abrafas.

The members that constitute its Board are fully involved in the sustainability questions around the products. The respect for the environment has been considered by its members for a long time and the improvement programs to production processes are known to local communities, state and municipal governments, always with goals selected to fulfill the demands of all these entities.

With the purpose of improving and supporting the development of Brazilian cotton production, the Brazilian Association of Cotton Producers (Abrapa) was created in 1999, through the organization of producers, aiming at the strategic sustainability, acting on the three main pillars – politically, socially and economically –, with public and private entities, to encourage improvements in production through sustainable practices.

Abrapa has today more than 1,600 members, which together, represent 96% of the whole cotton area and 100% of the exported cotton in Brazil. It has nine members that hear the needs of producers from each Brazilian state. Its main actions are presented below:

BETTER COTTON INITIATIVE – BCI

BCI is a global and inclusive non-profit association that aims to promote sustainability of the cotton chain through continuous improvements in production practices, decent work, transparency and traceability. In 2006, the association discussed with Abrapa the possibility to produce BC (better cotton) in Brazil.



Photo: Carlos Rudiney/Abrapa.

Its main long-term objectives are: (i) demonstrate the inherent benefits of Better Cotton production, particularly the financial profitability for farmers; (ii) reduce the impact of water and pesticide use on the environment; (iii) improve soil health and biodiversity; (iv) promote Decent Work for farming communities and cotton farm workers; (v) facilitate global knowledge exchange on more sustainable cotton production; and (vi) increase the traceability along the cotton supply chain.

The first harvest of BC, in 2010/2011, was from pilot farms of small and large producers, where the Abrapa Identification System (SAI) was also introduced, which enables the cotton to be traced from the farm to the plant. The SAI code, when entered in the BCI website, receives a UBIC code, which allows all BCI members to access the information about the BCI bales.

SOCIO-ENVIRONMENTAL PROGRAM OF COTTON PRODUCTION – PSOAL



Photo: Carlos Rudiney/Abrapa.

The purpose of this program is to provide guidance and awareness to cotton producers regarding the necessity and advantages of adopting socially correct field cultivation practices, with adherence to socio-environmental legislations, aiming at the environmental preservation, good labor practices and, in particular, the prohibition of child labor, or degrading or inadequate labor conditions, as well as recommendations on pesticide storage and handling, package disposal and adoption of personal protection equipment.

SOCIAL COTTON INSTITUTE – IAS

ABIT participated in development of the guarantee stamp of social responsibility produced by the Social Cotton Institute of Mato Grosso cotton producers. The Social Cotton Institute (IAS) was created in 2005 after an spontaneous initiative of the members of Mato Grosso Association of Cotton Producers (AMPA), and its objective is to promote the awareness and practice of social responsibility among cotton producers of Mato Grosso and the preparation for social certification.

It's an institution focused on mobilization, awareness and guidance to cotton producers towards the development of corporate social responsibility principles, preparing the producers to common objectives, such as compliance with labor regulations, workplace safety management and environmental preservation, adding values of profit sharing, social inclusion and promotion of citizenship, and, based on that, elevating the competitiveness conditions of the cotton produced in Mato Grosso in the international market, by attesting the good social origin of their product.



Photo: Carlos Rudiney/Abrapa.

Positive results of IAS actions in the cotton sector of Mato Grosso:

- increased level of legal compliance regarding practices of labor routines and workplace safety at the farms;
- increased level of knowledge of producers and their farm administrators and technical staff;
- social quality certification of the cotton produced in Mato Grosso;
- entrepreneurs with social responsibility.

Due to the importance of this initiative and through discussions of the Technical Group for Sustainability about the convergence of principals, conceptual and methodological aspect directed to sustainability in cotton cultivation, a new challenge and development were proposed at the entity: the unification of IAS and PSOAL, which will become the Responsible Brazilian Cotton (RBC), for exportation purposes, and which may be launched for the 2012/2013 harvest.

FASHION RAGS: SOCIAL INCLUSION AND ENVIRONMENTAL PRESERVATION THROUGH TEXTILE WASTE RECYCLING

Sinditêxtil/SP, with the support of ABIT, established a committee to coordinate projects related to social responsibility in the textile industry in the State of São Paulo. The committee is coordinated by managing members and collaborators of Sinditêxtil/SP and from partner institutions, such as the Sindinvest (Union of Clothing Industries of the State of São Paulo), the City Administration of São Paulo, the Council of Bom Retiro Shopkeepers (CDL) and educational and development institutions, such as Senai Têxtil de São Paulo and Universidade Presbiteriana Mackenzie.

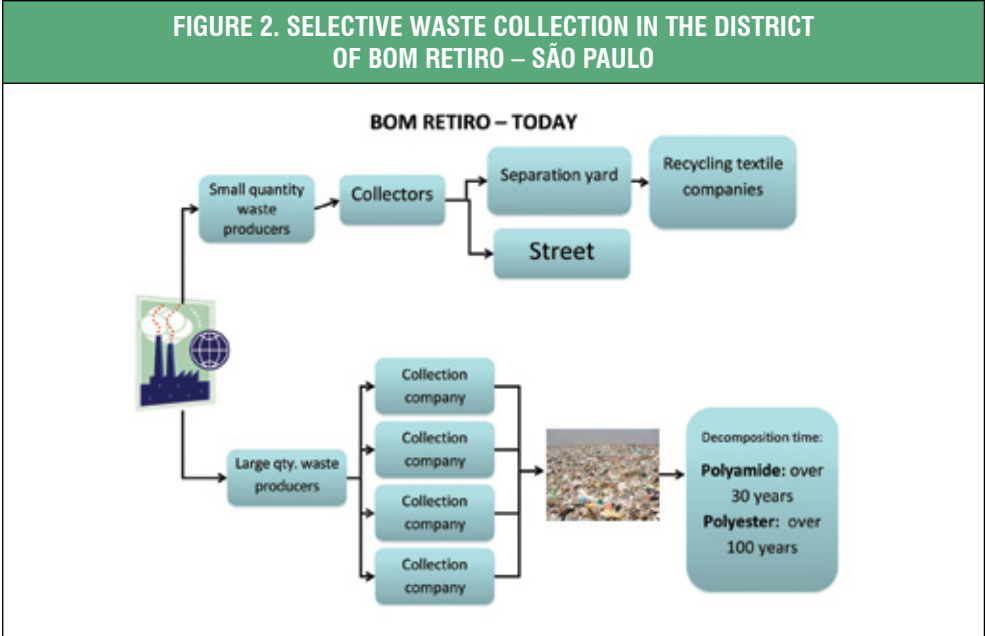
The project is founded on four pillars:

- environmental responsibility;
- social responsibility;
- value addition to the textile and apparel industry;
- National Policy of Solid Waste (Law 12.305, of Aug. 2nd, 2010).

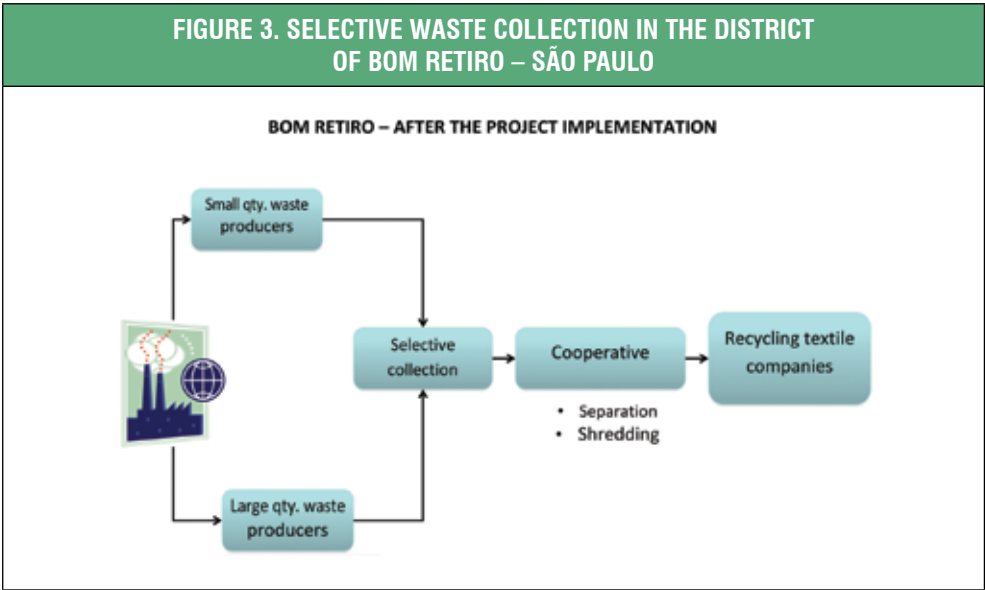
Today, the collection of textile waste in the district of Bom Retiro is poorly structured. The area has 1,200 apparel companies, and it is estimated to generate 12 tons of textile waste a day, according to the CDL.

As stipulated in Law 13.478/02, large quantity waste producers, estimated to be 60% of the companies in the area, should hire a waste collection company for correct disposal. However, evidences indicated that these collection companies were taking the textile waste to landfills.

With the implementation of this project, the intention is to formalize the waste collectors and send the waste collected by these collectors and the large quantities collected by collection companies, to a cooperative in charge of managing collectors, separating wastes and preparing the raw material to be sold to recycling companies, preventing the disposal of tons of textile waste in landfills or on streets, as well as social and environmental impacts resulting from irregular disposal.



Source: Elaborated by Sinditêxtil/SP 2011.



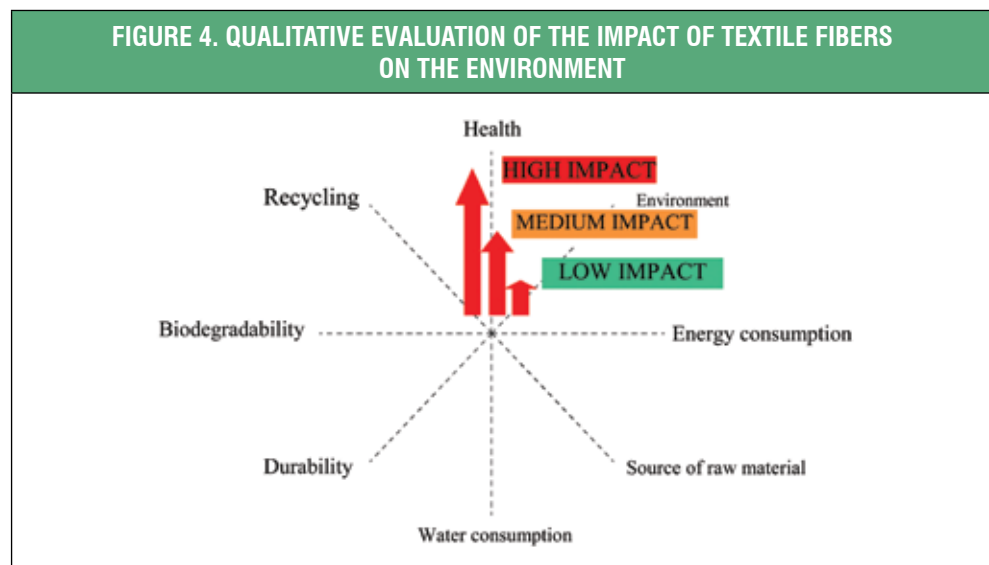
Source: Elaborated by Sinditêxtil/SP 2011.

The committee responsible for the 'Fashion Rags' project intends to implement and conclude all phases until the end of 2013.

This is another initiative of the textile and apparel sector that can be reproduced in other textile regions of the country, for environmental preservation and revenue generation with qualified occupation, creating socially decent work conditions for the citizen-workers who need this activity to survive; reestablishing the maintenance of hygiene and socio-environmental conditions of the regions involved, and managing waste marketing, so as to contribute to textile companies that use this waste as raw material.

ENVIRONMENTAL RESPONSIBILITY – ENVIRONMENTAL COMPARISON OF TEXTILE FIBERS

Based on selected literature⁵, Fernando Barros de Vasconcelos, consultant and professor of the Textile Engineering course at the Centro Universitário da FEI, conducted an interesting comparative study on the environmental characteristics of the main textile fibers that we will present. The fibers were selected according to their importance in the national textile market. The main environmental aspects analyzed were: impacts on health and environment, energy and water consumption, utilization of renewable resources, durability, biodegradability and recycling. For each textile fiber, Vasconcelos produced the qualitative evaluation illustrated in Figure 4.

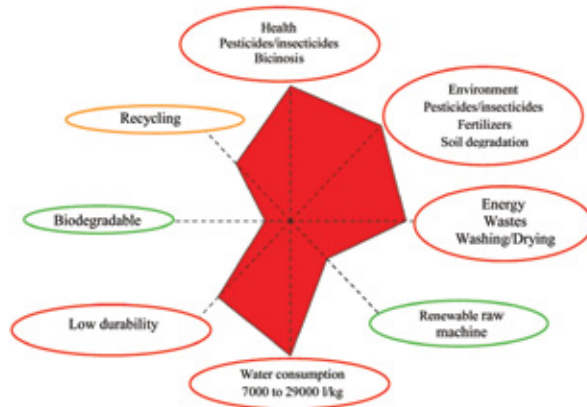


Source: Vasconcelos, F.B. (2008).

Figures 5 a, b, c, d, e, f summarize the behavior of the various fibers in the eight qualitative dimensions.

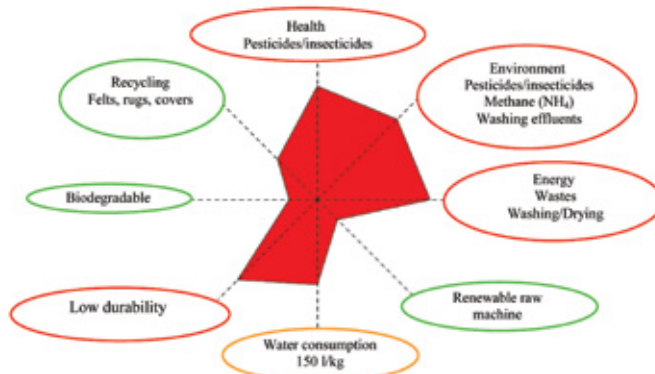
⁵ The author lists the bibliography used to produce his synthesis, from which the following studies are highlighted: Brunekreef & Harssema, 1990; Blackburn, 2005; Kalliala & Nousiainen, 1999; WORLD HEALTH ORGANIZATION, 1979; LAURSEN et al., 1997, and reproduced in the references of this document.

FIGURE 5A. COTTON



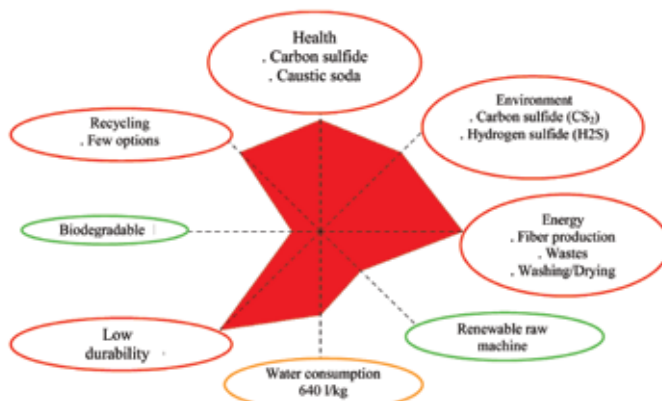
Source: Vasconcelos, F.B. (2008).

FIGURE 5B. WOOL



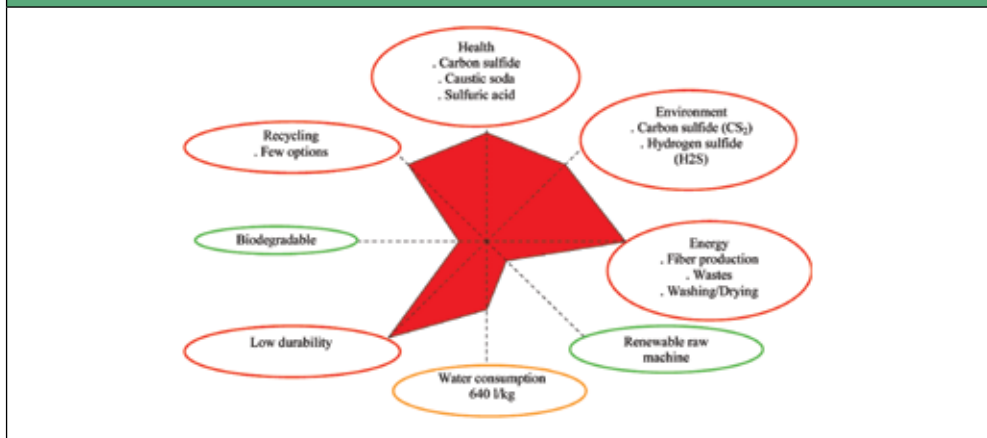
Source: Vasconcelos, F.B. (2008).

FIGURE 5C. VISCOSE



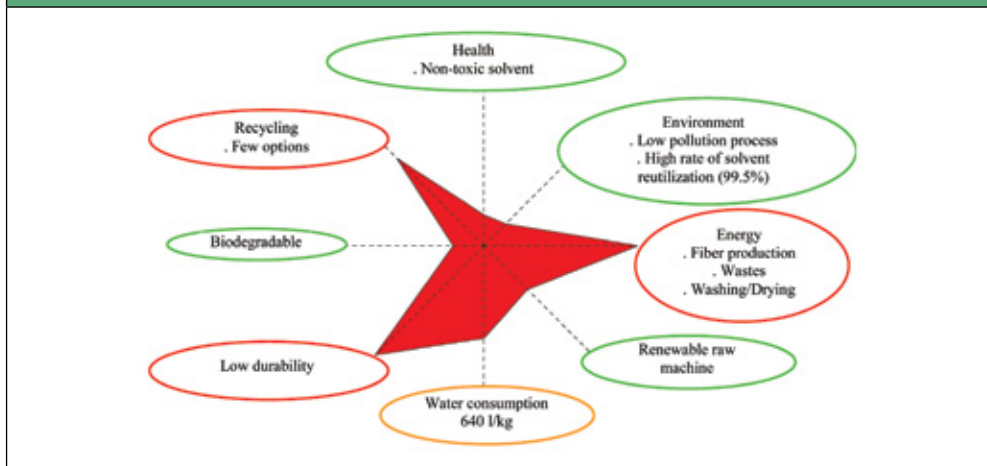
Source: Vasconcelos, F.B. (2008).

FIGURE 5D. BAMBOO VISCOSE



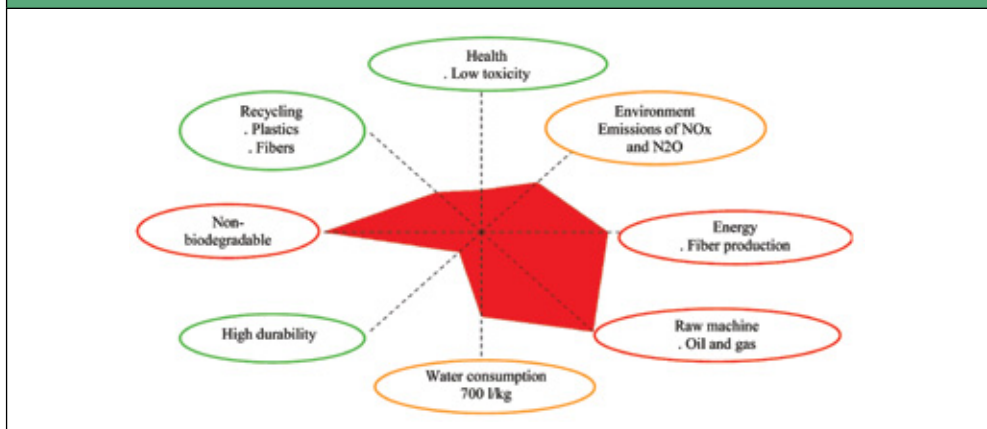
Source: Vasconcelos, F.B. (2008).

FIGURE 5E. LYOCELL – TENCEL



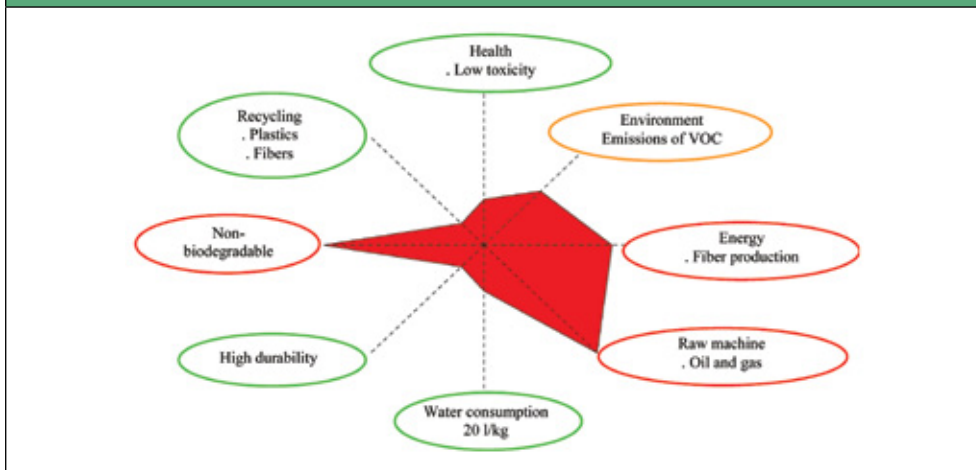
Source: Vasconcelos, F.B. (2008).

FIGURE 5F. POLYAMIDE (NYLON)



Source: Vasconcelos, F.B. (2008).

FIGURE 5G. POLYESTER



Source: Vasconcelos, F.B. (2008).

The analytical conclusions of Vasconcelos are presented as follows. The author points out that each fiber analyzed has its own characteristics and properties that define specific markets, so they cannot be evaluated separately from their lifecycle. Indeed, other studies emphasize that, in the textile and apparel sector, the utilization phase may be the period of most environmental impacts due to successive washing and drying of clothes along their life (for a magazine on the Lifecycle Evaluation in the textile sector, for example, BRUNO, 2009). Vasconcelos analyzes that, in case of natural fibers, such as cotton, the focus should be on the minimized use of pesticides, herbicides, defoliants or synthetic manures, as these agents cause the worst environmental impacts of the entire chain.

Regarding the artificial fibers, except for Lyocell and Tencel, the problem is in the emissions of CS_2 and H_2S , due to the cost of filtration facilities. Regarding the viscose fiber, the author analyzes that the production displacement to developing countries, which do not adopt the same rigorous standards as the developed countries in terms of compliance with environmental regulations, postpones the mitigation of its effects at global level. But attention should be dedicated to the analysis related to bamboo viscose fiber. In fact, its true environmental contribution is related to the advantages of bamboo cultivation in comparison to other vegetal fibers used to produce viscose. It should be noted that the bacteriostatic and bactericidal characteristics commonly attributed to bamboo fiber have not been scientifically demonstrated.

Regarding synthetic fibers, the author mentions the disadvantage that they are produced from a non-renewable source. Besides that, the utilization of oil by-products releases in the air amounts of CO_2 , contributing to increased amount of this gas, which causes the greenhouse gas effect in the atmosphere. Polyester and polyamide have had their pollutant emissions minimized with the use of filtration systems. Regarding energy consumption, according to the author:

(...) several studies show that the synthetic fibers, when compared to other fibers, especially the natural ones, if we consider the entire life of a textile product until its final disposal, consume more energy in the initial phase of fiber production, while the natural fibers consume more in the utilization and maintenance phase, a fact that, at the end, favors the synthetic fibers, in a proportion that depends on the product durability and type of washing and drying system used. Data from the Electrical Energy Research Center of the Eletrobrás Group show that 11% of the electrical energy consumed in residences in Brazil are used in washing machines, drying machines and iron.



3 ECONOMIC AND SOCIO-ENVIRONMENTAL REGULATIONS THAT AFFECT THE SECTOR

3.1 Main international agreements and regulatory aspects related to the sector: characterization of the international regulatory scenario for the sector

A number of initiatives promoted by supporting institutions to mobilize governmental actors to the required creation of regulations that bring isonomy to competitive relations with foreign products has encouraged entrepreneurs of the sector.

One of the most important international regulations that affect the textile and apparel sector is REACH (Regulation n° 1907/2006, of the European Parliament and of the Council). This is the European regulation concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH). It was approved on December 18, 2006 and came in to effect on June 1st, 2007.

This regulation is a regulatory milestone for chemicals within the European Union. Its main objective is to ensure a higher level of protection to human health and environment. For this purpose, it requires a registration of all chemical substances marketed in the European Union territory.

REACH places responsibility on the industry for controlling the risks associated with chemicals. It is based on the principle that the manufacturers, importers and intermediate users should ensure that they will manufacture, market or use only substances that do not impact negatively the human health or the environment. This regulation will increase the knowledge about chemical substances and their associated risks, and will enable the transmission of such information to users and consumers.

The most relevant objective of REACH is to ensure the safe use of chemicals. Thus, a large amount of information will have to be generated. For this reason, while REACH

implementation is taking place, substantial changes are observed in the evaluation and management of risks of chemicals to workers, consumers and the environment.

In this sense, ABIT is aligned with the Chemical Industry Association (Abiquim) and Inmetro for the provision of guidance to the entire textile and apparel chain about how to prepare a plan to comply with the requirements of this regulation, eliminating possible obstacles to Brazilian exportations to the European Union.

Notification to the WTO

The application of mechanisms such as standards, technical regulations and voluntary or compulsory measures, such as socio-environmental certifications, impact studies, regulatory milestones and other initiatives adopted by the sectors have converged to highlight the concerns of organizations about the environment and human health. Such mechanisms have progressed and are now important instruments of the market, focused on increasing the participation and maintenance of industries that comply with these requirements in the world scenario.

With the recognition of the relevance of such mechanisms to the foreign trade flow, an agreement was established, named Standards Code, during the Tokyo Round held between 1973 and 1979. Based on the Standards Code, a new agreement, named Agreement on Technical Barriers to Trade (TBT Agreement), was completely reformulated and incorporated by the World Trade Organization (WTO) in 1995.

The TBT Agreement defines the responsibility that each member country should have for the maintenance of an information center to notify the proposals of technical regulations and procedures of compliance assessment, and establish methods to disseminate information on documents notified to the WTO.

Since 1995, the functions of these centers, called Focal Points, have been developed and have become important instruments of support to companies with international operations. The Focal Points started to supply information to help production sectors adapt to the technical requirements of destination countries, avoiding the refusal of goods at the arrival of products.

In the national scenario, in 2002, Inmetro started to act as a Focal Point and perform other activities to support Brazilian exporters. Within the WTO sphere, a Committee of Technical Barriers to Trade, with the purpose of supervising the operation and implementation of the TBT Agreement, started to act in a broader context of environment policies of high impact to international trade. In addition, around 200 other agreements were created, outside the WTO sphere, regarding the environmental issues, considered Multilateral Environmental Agreements (MEA).

Using the Inmetro notification search tool related to technical regulations, a search was made especially regarding the textile and apparel sector, where the following product notifications to such markets were identified:

TABLE 6. TECHNICAL NOTIFICATIONS – UNITED STATES		
Notification Number	WTO Publication Date	Notification summary
BT/N/ USA/656	Nov. 21, 2011	Project of official document of the Federal Trade Commission of the United States proposing a Technical Regulation that addresses rules and regulations under the Legal Act on textile fiber products.
G/TBT/N/ USA/567	Aug. 27, 2010	Project of official document of the Consumer Product Safety Commission (CPSC) proposing a Technical Regulation that establishes requirements and provides criteria for the accreditation process of third party as a compliance assessment organ to perform the tests using the models specified in the CPSC regulation for inflammable fabrics, concerning children's textile products.
G/TBT/N/ USA/567/ add.1	May 3, 2011	Addendum to the project of official document of the Consumer Product Safety Commission (CPSC) whose purpose is to inform the effective date – April 22, 2011.
G/TBT/N/ USA/567/ corr.1	Jan. 25, 2011	Correction to project of official document of the Consumer Product Safety Commission (CPSC) of the United States, whose purpose is to inform that the document notified as G/TBT/N/USA/567, concerning the Technical Regulation that establishes requirements and provides criteria for the accreditation process of third party as a compliance assessment organ to perform the tests using the models specified in the CPSC regulation for inflammable fabrics, concerning children's textile products, should have the article number corrected and altered to "other".

Source: Focal Point – INMETRO, 2011.

TABLE 7. TECHNICAL NOTIFICATIONS – ARGENTINA		
Notification Number	WTO Publication Date	Notification summary
G/TBT/N/ARG/222	39342	Project of official document of the Work Subgroup n° 3, "Mercosur Technical Regulation and Compliance Assessment", which proposes the regulation on textile product labeling.
G/TBT/N/ARG/115	37791	Project of official document that establishes requirements for the compliance assessment.
G/TBT/N/ARG/64	37609	Project of official document that establishes the label with the quantitative indication of the content of pre-measured products.

Source: Focal Point – INMETRO, 2011.

3.2 Main national (compulsory and voluntary) normative instruments that effect in the main external markets of the sector (consumer requirements, certificate requirements, etc.) with impacts on the sector

The reference point is the introduction of OEKO-TEX program that was disseminated around the globe, compulsorily or as a suggestion of good environmental practices. The program limits the use of certain chemicals, according to four product classes:

- Class 1 – baby products (up to age 3, or 36 months old);
- Class 2 – products with major skin contact;
- Class 3 – products with minor skin contact;
- Class 4 – furnishings (decoration and technical textile products)

The main harmful products are: formaldehydes; phenols; heavy metals; flame retardants; organic compounds; phthalates; carcinogenic aromatic amines and pesticides. In a second analysis, other products may be added from the list of restricted products of AAFA (American Apparel & Footwear Association).

In tests performed with textile products, 22 carcinogenic amines were detected. Thus, ABIT is establishing partnerships to detect and prevent these products to be traded in the country. Since 2003, the companies of coloring materials associated with Abiquim have assumed, through an official document sent to ABIT, that they will not produce or import azoic dyes that product carcinogenic aromatic amines (CETESB, 2009).

3.3 Main regulatory aspects (in legislation) and (compulsory or voluntary) normative instruments that impact the sector in Brazil

The national textile and apparel industry is subjected to seven Federal Laws and Resolutions related to environmental practices, which are presented below:

- 1. Conama Resolution nº 357/2005 – Classification of water bodies; conditions and standards of effluent discharge**

Addresses the classification of water bodies and environmental guidelines related to such classification, and establishes the conditions and standards of effluent discharge.

2. Law nº 6.938/1981 – National Policy for the Environment, its purposes and mechanisms of formulation and application

Its purpose is the preservation, improvement and recovery of the environmental quality suitable to life, to ensure in the country conditions for socioeconomic development, interests of national security and protection of human life dignity.

This law defines the textile and apparel chain as a potentially pollutant activity of medium level, and its purpose is to reduce the environmental impact within max. 10 years, with investments in modern and clean technology to the sector.

3. Law nº 10.165/2000 – Implementation of fees related to the National Policy for the Environment

The textile and apparel chain is subjected to the application of fees of average index according to the potentially pollutant activity. The company subjected to the TCFA (Environmental Control and Supervision Fee) has to submit, until March 31 every year, a report of the activities performed in the previous year, to collaborate to control and supervision procedures. “Non-compliance with such requirement corresponds to the application of a fine to the violating party in the amount of twenty per cent of the due TCFA, without exempting the violating party from the payment of such fee” (NR).

4. Conama Resolution nº 313/2002 – Disposal of industrial solid waste

This resolution regulates waste recycling and presents a very positive perspective concerning the correct disposal of the sludge, and there are practical projects in this sense, as well as for the textile waste from apparel companies.

5. Law nº 9.984/2000 – National Policy for Water Resources and Management System

This law represents to the textile chain the beginning of ANA activities and its relation with the Ministry for the Environment (MMA), with direct consequences to the textile and apparel sector, such as, the determination of water consumption indicators in the various production areas of the sector and the constant reevaluation of such indicators, aiming at the reduction and reuse of water resources.

6. Law nº 4.771/65 – Forest Code

A new law is under discussion today at the National Congress and it affects the textile and apparel sector especially regarding the possible supply of firewood and the location of new companies in terms of presence of water bodies.

In 2010, the textile industry consumed 300,000 MT of firewood. Firewood from planted and certified forests is still considered an important source of energy to supply boilers and represents 7% of the consumption of energy sources for the textile sector (BEN, 2010).

7. **Conama Resolution nº 237/1997** – Environmental licensing incorporated into the environmental management instruments

The activities or developments subjected to environmental licensing and that directly or indirectly impact the textile chain include the following:

- **Chemical industry:** manufacture of resins and fibers and artificial and synthetic yarns.
- **Textile, apparel, shoe and fabric goods industry:** processing of textile fibers, vegetal, animal and synthetic fibers; manufacture and finish of yarns and fabrics; dyeing and printing.



4 CORPORATE PRACTICES FOR SUSTAINABLE DEVELOPMENT (1992 – 2011)

4.1 Main technological and management transformations/innovations incorporated into the production of the sector

A recent study on the actions of national small, medium-sized and large textile companies was conducted by the Institute of Technology and Market Studies (IPTM) of Senai/CETIQT⁶. The companies were selected from three Brazilian regions. The preliminary results, briefly discussed below, show different behavior patterns when comparing small, medium-sized and large companies.

In large companies

The study observed predominance of incremental improvements (innovative activities based on the acquisition of new machines and construction of new facilities) in processes related to impacts of measures, compliance with international regulations and execution of environmental programs for the community. Such predominance of innovative activities in processes, in most cases, reflects the investment pattern of large companies, as indicated by a prospective study performed for ABDI by the IPTM of Senai/CETIQT (ABDI, 2009), based on the analysis of data from the Technological Innovation Study (IBGE, 2005). However, the study highlights the product innovation of a large company that replicated an European innovation to produce oxo biodegradable bags. The company in question has tradition in effective commitment to environmental preservation in Brazil.

⁶ Technology Center of Textile and Chemical Industry.

Most investigated companies comply with the international regulation, also observing certain practices required by their clients. All large companies presented some kind of educational initiative or environmental improvement project for their local communities.

In small companies

The innovative activities identified in small companies tend to focus the development of new products with sustainable features. These products use recycled raw materials, products from sustainable forests or dyes and pigments extracted from the Brazilian flora. The changes observed in small companies related to innovative activities focus the incorporation of products with ecological appeal.

The companies that invested in innovative process activities can be divided in two groups:

- companies with the main objective of complying with the legislation and minimum regulation required by the markets where they operate;
- companies that gradually invested in continuous improvement of their systems to reduce harmful impacts of their production processes.

The scarcity of resources of small companies seems to be the reason of this tendency towards product innovation, while the traditional culture of investments of large companies and the nature of their industrial structure, directed to mass production (therefore, inadequate to small scale production of almost crafted items), seems to make them select innovative activities concentrated on process improvements.

Industrial sustainability has been the focus of discussions on themes that involve not only environmental issues, but also questions regarding profit generation or favorable conditions to industries.

The most frequent method of making the sector a sustainable industry is the adoption of clean and renewable energy projects, as well as measures of social and environmental requirements that may bring benefits, such as the attitudes that enable the generation of sustainable jobs in the community and adjacent areas to where the company operates, improving the levels of human development in the region.

The adoption of sustainable actions in the industry is an ethical and productive measure and is increasingly gaining ground in terms of acceptability of consumers.

CARBON FOOTPRINT

A Brazilian fashion company is developing, with an international organization and supported by the IPTM of Senai/CETIQT, a project to measure social impacts and quantify carbon footprint across the entire chain of some of its main exportation products. The project is now at the end of the first phase and the preliminary results show the impor-

tance of developing special services to integrate all information about socio-environmental impacts in chains that gather small and medium-sized companies that are at different levels of qualification, technology and management. The need to implement environmental management in the company's value system is emphasized by the great difficulty found in continuous information recording as products are manufactured and transported within the supply chain.

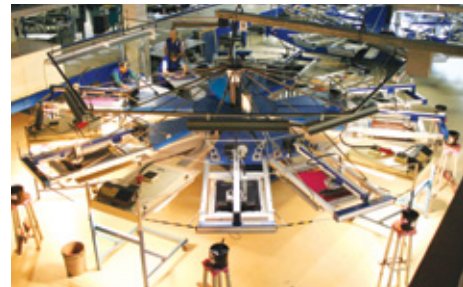
TECHNOLOGICAL INNOVATION STUDY

The Technological Innovation Study (Pintec) is conducted by the Brazilian Institute of Geography and Statistics (IBGE), supported by the Financing Program of Studies and Projects (Finep), of the Ministry of Science and Technology. The purpose of Pintec is to elaborate national sectorial indicators and, in the case of the industry, also regional indicators, of the technological innovation activities performed by Brazilian companies, comparable to information from other countries. This study is focused on factors that influence the companies' innovative behavior, the strategies adopted, the efforts made, incentives, obstacles and results.

The results of this study allow the companies to evaluate their performance in relation to the sectorial average results; allow the trade associations to analyze the technological conduct of the sectors; and allow the government to develop and evaluate national and regional policies. The tables below show the most relevant numbers of technological implementations in the Brazilian textile and apparel sector.



Knitwear process. Photo: Marisol/Promotion material.



Printing process. Photo: Marisol/Promotion material.



Weaving process. Photo: Neotêxtil/Promotion material.

TABLE 8. COMPANIES THAT IMPLEMENTED INNOVATION, BY EDUCATION LEVEL – BRAZIL – 2008

Atividades selecionadas	People involved in internal R&D activities of companies that implemented innovations, by qualification level				
	Higher level			High level	Others
	Total	Postgraduate	Higher Level		
Processing industries	29,058	4,340	24,719	12,987	5,191
Manufacture of textile products	350	24	326	161	83
Manufacture of clothing items and accessories	308	5	303	252	199

Source: IBGE, Research Area, Industry Coordination, Industrial Research of Technological Innovation, 2008.

TABLE 9. COSTS INCURRED WITH INNOVATIVE ACTIVITIES

Atividades selecionadas	Atividades internas de P&D		Aquisição externa de P&D		Treinamento		Introdução das inovações tecnológicas no mercado	
	Nº of companies	Value (R\$ thousand)	Nº of companies	Value (R\$ thousand)	Nº of companies	Value (R\$ thousand)	Nº of companies	Value (R\$ thousand)
Processing industries	4,168	10,634,632	1,404	1,751,469	11,704	917,613	9,597	2,504,255
Manufacture of textile products	63	49,765	23	770	297	33,465	285	18,271
Manufacture of clothing items and accessories	102	27,092	66	8,635	1,027	12,904	862	37,332

Source: IBGE, Research Area, Industry Coordination, Industrial Research of Technological Innovation, 2008.

TABLE 10. COMPANY IN CHARGE OF PRODUCT AND/OR PROCESS DEVELOPMENT IN THE COMPANIES THAT IMPLEMENTED INNOVATIONS – BRAZIL (2006-2008)

Activities selected	Product			
	The company	Another company of the group	The company in cooperation with other companies or institutes	Other companies or institutes
Processing industries	19,122	381	1,781	1,465
Manufacture of textile products	727	5	25	32
Manufacture of clothing items and accessories	2,245	13	285	320
Atividades selecionadas	Process			
	The company	Another company of the group	The company in cooperation with other companies or institutes	Other companies or institutes
Processing industries	3,846	338	1,040	26,570
Manufacture of textile products	134	5	32	889
Manufacture of clothing items and accessories	299	4	83	4,539

Source: IBGE, Research Area, Industry Coordination, Industrial Research of Technological Innovation, 2006-2008.

TABLE 11. COMPANIES THAT IMPLEMENTED INNOVATIONS, BY IMPACT IMPORTANCE LEVEL			
Compliance with regulations and standards	High	Medium	Low and not relevant
Processing industries	9,616	98	264
Manufacture of clothing items and accessories	1,038	29	102
Manufacture of textile products	128	110	440
Product quality improvement	High	Medium	Low and not relevant
Processing industries	20,753	152	164
Manufacture of clothing items and accessories	2,590	75	92
Manufacture of textile products	454	545	447
Production capacity increase	High	Medium	Low and not relevant
Processing industries	15,985	9,721	12,,102
Manufacture of clothing items and accessories	1,863	1,645	1,911
Manufacture of textile products	596	208	461
Production cost reduction	High	Medium	Low and not relevant
Processing industries	8,675	9,761	19,371
Manufacture of clothing items and accessories	972	1,266	3,181
Manufacture of textile products	260	382	623
Reduction in energy consumption	High	Medium	Low and not relevant
Processing industries	3,936	5,152	28,720
Manufacture of clothing items and accessories	501	523	4.395
Manufacture of textile products	63	204	999
Reduction in water consumption	High	Medium	Low and not relevant
Processing industries	1,872	2,744	33,192
Manufacture of clothing items and accessories	157	209	5,053
Manufacture of textile products	59	90	1,117
Environmental impact reduction	High	Medium	Low and not relevant
Processing industries	7,517	18	253
Manufacture of clothing items and accessories	665	1	4
Manufacture of textile products	143	183	1,447

Source: IBGE, Research Area, Industry Coordination, Industrial Research of Technological Innovation, 2008.

4.2 Initiatives of information disclosure and transparency regarding the socio-environmental performance of the sector

Supported by ABIT, the Union of Spinning and Weaving Industries of the State of São Paulo created in 2011 the Sinditêxtil-SP Environmental Management Award. The purpose is to award the companies that present positive results in the development of environmental projects.

The Sinditêxtil-SP Environmental Management Award has the objective of showing the appreciating initiatives of environmental management, through the presentation of cases, that contribute to continuous improvement of the production processes and environmental preservation in the textile chain.

In 2011, the awarded company invested in research and equipment and, some years later, the company was able to neutralize 100% of its effluents, replacing sulfuric acid with CO₂ produced by its own boilers, avoiding the emission of around 3,000 tons of CO₂ a year. This is one of the most successful initiatives in the environmental area in the textile sector.

This company, world leader in the production of differentiated fabrics, increments its offering with a new product in its collection with the concept of wellness, which combines well-being and health. The first item of this collection has a bioceramic complex created with the combination of various metallic oxides, which produce a number of physiological advantages. The product absorbs the infrared rays of the sun and returns the radiations issued by our own body.

In the line of sustainable launches, the company has the first denim that incorporates nanotechnology in an emulsion that contains aloe vera. This nanoemulsion promotes the strong fixation of the active agent of aloe vera, without losing its properties, increasing smoothness and well-being resulting from the product use.



Extract of aloe vera.
Photo: Tavex/Promotion material.

Aloe vera usually does not get fixed to the textile fibers and, no matter how the active agent is applied, when the product is subject to home laundering, it loses its properties. With the revolutionary utilization of this nanopolymer, the material resists to home washes or the inevitable process of jeans laundry preparation to obtain the proper aspect according to fashion tendencies.

This new product developed by the company is a solid commitment to the development of textile products that enable well-being. With this innovation, the company not only offers technical denims of high versatility and performance, but also jeans with healthy attributions.

Another notable project presented new techniques for digital textile printing with pigments of excellent ink utilization, causing no damages to the environment, no vaporization and wash processes, i.e., an ecologically correct and sustainable process.

An important initiative was the project of apparel waste collection (pieces of fabric after cutting the clothing items). These pieces are later sent to families registered in the company's program. They weigh, separate and catalog the pieces by color. The pieces separated by color go to the spinning area, where they are stored following the production plan. After the plan is defined, the pieces are placed into a shredding machine, where they are torn until they return to their original form: cotton fibers.

The amount of 15% (fifteen per cent) of PET bottle fibers is added to the recipe in an intimate blend, ensuring greater resistance to the fiber. With its production model that combines socio-environmental concepts with quality and high technology, the company contributes to reduced disposal of textile waste in the environment and increases the income of many needy families.

Other companies have used this technique in their production. In 2010, a large manufacturing company concluded a study on Brazilian industries with technology to transform PET bottles into polyester fibers. The study analyzed certified companies that could attest the origin of the materials reused in the fiber manufacture process coming from cooperatives, NGOs and community associations.



Bales of recycled fibers (cotton and polyester).
Photo: Simpletex/Promotion material.

Besides the final objective of preventing the disposal of PET bottles and reduce the utilization of natural resources in the production, it is important to emphasize that this project has a high social character, as it involves directly thousands of people linked with the cooperatives and the community associations who live with the income from recycling.

With the sample of yarns produced, the company started internal tests of production system and final quality of product to define the utilization of yarns produced from PET bottles, in the composition of fabric made by the company and consequently the production of clothes for its own collections. Considering the year of studies, the development of certified partners, introduction of new technologies and production processes to absorb the PET yarn in the composition of fabric produced in 2010 and that the project effectively started operating in 2011, the company registered, from January to December 2011, 2.4 million units of 2-liter PET bottles absorbed. This amount is the total volume that the company did not discharge in the environment and Brazilian landfills.

More than this is the amount collected by communities, cooperatives and associations that find in recycling their main source of income. For 2012, the company's goal is to use yarns that consume three million PET bottles in their collections, with the introduction in two other lines.

A traditional Brazilian clothing company that has operated for more than 45 years, whose head office is in Santa Catarina, and recognized as a successful manager of brands, has daily actions of environmental management, including process monitoring and measures, proper waste disposal and evaluation of machines, materials and processes.



Effluent treatment stations. Photos: Marisol/Promotion material.

The company's Integrated Management System (IMS) is founded on the Integrated Policy for Environmental Quality. It means that, besides ensuring its clients' satisfaction, providing products and services of high quality standard, at fair prices, the company is concerned and committed to the rational utilization of natural resources and the neutralization of environmental impacts caused by its processes.

Traditionally, the company develops projects associated with reduced energy consumption, invests in more efficient machines, redesigns production processes, promotes trainings and awareness of employees. With the actions to rationalize the energy consumption, the company achieved the reduction of 90,000 kWh.

Other examples of development of processes and sustainability are produced by weaving companies for thermal energy recovery, through:

- recovery of latent heat from re-evaporation, reusing this thermal energy to heat the water that will be used in the process and reducing the fuel consumption;
- thermal reutilization to dry the sludge generated in the effluent treatment station, and this heat is captured from the chimney of one of the boilers. Sludge drying is very important, as the industrial sludge goes to landfills.

These processes aim at providing environmental benefits in a sustainable manner, through improved energy efficiency, as these implementations result in reduced fuel consumption, and promoting a more efficient consumption at water and effluent treatment and collection and reduced amount of an environmental liability, i.e., industrial sludge.

A large weaving company associated with ABIT received the Environmental Management Award of Minas Gerais 2007 – PMGA, organized by the Brazilian Union for Quality (UBQ). The PMGA is a model of environmental management evaluation for organizations, whose purpose is to promote the search for good environmental performance to achieve environmental sustainability.

The award represents an environmental quality reference and the ceremony gathered the awarded companies, collaborators and representatives, as well as political authorities, such as vice governor of the State of Minas Gerais. The good environmental practices and the responsible corporate attitude are the principles of this weaving company; it has treated its liquid effluents for more than 20 years and started doing it in a period when the idea of sustainable development was still embryonic to most companies.



Effluent treatment system. Photo: Cedro Cachoeira/Promotion material.



Industrial complex. Photo: Cedro Cachoeira/Promotion material.

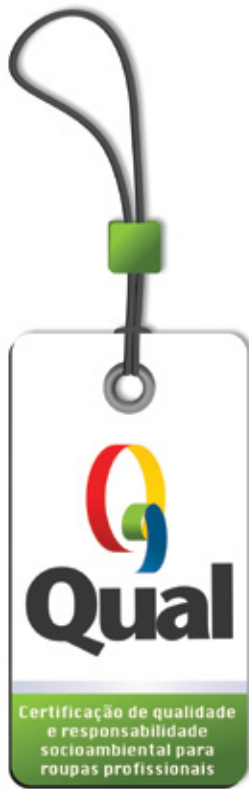
4.3 Initiatives of certification and self-regulation developed by the sector

QUAL SEAL (Quality and Sustainability of the Brazilian Textile and Apparel Industry)

In June 2006, ABIT (Brazilian Textile and Apparel Industry Association) established an association with ABDI (Brazilian Agency for the Industrial Development) for the creation, standardization and implementation of the professional clothing certification in the country, which originated the Brazilian Program for Self-Regulation of Professional, Military, and School Apparel and Clothing (QUAL SEAL). The initiative was proposed by the sector after detecting the need to achieve excellence and increase the participation of the Brazilian textile and apparel sector in the global market.

This association was an old desire of entrepreneurs who had discussed for years, within the sphere of the Committee of Professional Apparel of ABIT, the need to establish a quality control for the production, to strengthen the Brazilian apparel for international competition. The creation of levels of environmental quality and management by the national industry aligns the competition in the domestic market and shows respect and concern about the client/consumer satisfaction.

Voluntary certification is a world tendency in production sectors. The company's high level of organization enhances process efficiency and adds more value to products, resulting in improved competitiveness. With the implementation of technical requirements of quality, safety, environment and social responsibility, the Brazilian apparel industry is better prepared to address the challenges of a globalized market, where quality and efficiency are essential requirements.



Quality and socio-environmental responsibility certification for professional clothing

In the QUAL SEAL Program, the certification is made by compliance assessment organizations accredited by the National Institute of Metrology, Quality and Technology (Inmetro) after the evaluation of specific items, with periodical execution of tests in samples, and the management system in terms of quality, environment and social responsibility.

The QUAL SEAL attests, among other aspects, that the product manufacturer does not employ informal labor at the company, that the company complies with the requirements of environmental standards, not discarding waste that pollute the environment, and that it is socially responsible. There are three certification levels: Bronze, Silver and Gold, with an evolutionary character. The company is certified at the level for which it is prepared and later it may progress to other stages, which are cumulative.

Thus, the QUAL SEAS is a differentiation in the market, enabling the certified companies to have competitive advantages offered to those with good practices of social, environmental and labor governance, and it is a powerful tool to promote the Brazilian industrial development, encouraging the continuous improvement of quality, increased exports, strengthening of domestic market and consumer protection. It is expected to become soon a prerequisite for purchases of public and private companies, identifying socially and environmental responsible companies and products committed to quality.

CASES RELATED TO QUAL SEAL

A company with QUAL SEAL – Bronze Level developed several environmental and social actions. For instance, it recycles from production waste to serigraph water. Only in 2010 and 2011, the company collected more than 310 m³ of liquid effluent; besides, the profit resulting from the sale of production waste and paper is used in actions to employees. One of the specific actions to employees is the event held twice a year in which the employees are submitted to a checkup, when measurements of weight, height, blood sugar, pressure are performed and vaccines are provided.

Another company with QUAL SEAL, at the Silver Level, is providing benefits to the neighboring community with social actions; one of these actions is the 'Tomorrow's Workshop' project, which keeps 16 needy children between de 4 and 5 years old at the 'Knowledge Academy', a day-care center where they stay from 7 am to 5 pm. There, the children receive primary education and have English and computer classes, sports activities and pedagogical guidance. The company pays all costs of the students, which include monthly fees, uniform, school and hygiene supplies, among others.

"That was an old project, which became reality after the acquisition of knowledge during the QUAL SEAL certification process", says the company's managing partner. According

to her, the work is coordinated by the Social Responsibility Committee, implemented in the company. The children were selected from the districts near the plant, which have many social problems. “The idea is to include new groups of children each year and monitor the previous groups, until they enter the university”, says the manager.

In parallel, the company develops a waste recycling project, whose profits from waste sale pays part of the costs with the children. One of the companies of the group produces leather seats to automobile manufactures. Wastes of leather, foam and original covers removed from the cars are converted into bags, a solution to preserve the environment while contributing to the maintenance of the ‘Knowledge Workshop’.

4.4 Initiatives coordinated by the trade association/institution

ABIT and Sinditêxtil-SP, supported by the Company of Environmental Sanitation Technology (Cetesb) and specialized collaborators, created the Environmental Chamber of the Textile Industry of São Paulo, producing the “Technical Environmental Guide of the Textile Industry – P+L Series”. This is a publication that brings clean production measures for textile industrial processes, whose purpose is to provide entrepreneurs of the sector with guidance on the adoption of practices and measures for improved productivity and rationalized use of raw material natural resources, ensuring reduced generation of organic and inorganic load, toxic metals in the final effluent, thus reducing the risks affecting the human health and the environment.

Initiatives of P+L may bring important environmental results, if continuously and systematic adopted, unlike the adoption of punctual corrective actions. In most cases, these initiatives bring increased productivity, reduced use of raw material and natural resources, elimination of toxic substances, reduced waste generation and reduced environmental liabilities, cooperating to reduced risks that affect the human health and the environment. In general, P+L enhances competitiveness and reinforces the corporate responsibility image.

Besides the actions in São Paulo, ABIT has the following functions:

- participate actively at the Environmental Chambers of the Textile Industry from the various Brazilian states, as it performs with Cetesb, in the State of São Paulo;
- represent the sector at state and federal bodies, searching for solutions to environmental problems;
- update the Environmental Inventory of the Textile Sector;
- organize technical meetings with those in charge of the environment areas of industries, to address aspects related to the environmental legislation, management of solid waste, treatment of liquid effluent, pollution prevention, clean production and sludge management;
- participate in meetings of the Environment Council of CNI and the National Council of Water Resources;

- firmly analyze law projects related to the environment;
- continue discussions with the environmental bodies and other institutions about the control of toxicity and mutagenicity in liquid effluent and sludge from treatment systems;
- encourage programs of waste recycling and water reuse;
- support the National Industry Confederation with proposals to improve environmental procedures, reflecting the economic reality, technology gap and current conditions of the National Environment Policy.

The authors of the P+L Guide consider that the increasing restrictions imposed by governments and markets will make the industrial sectors reduce, more and more, their consumption of materials and generation of pollutants. To identify the environmental aspects of the industrial activities that cause undesirable impacts on the environment, the guide presents the relation between inputs and outputs of each process. Such synthesis may allow to evaluate the clean production actions that can contribute to compliance with laws, standards and improved environmental performance of the main textile production processes.

The authors summarize the potential environmental impacts along the whole process in the box below (Box 1):

BOX 1. SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS						
Production process	Air	Soil	Water	Noise	Vibration	Disturbance caused to population
Natural fibers	X	X				X
Artificial/synthetic fibers	X	X			X	X
Warping	X	X				
Sizing	X	X	X			
Weaving (fabric)	X	X	X	X	X	X
Knitting	X	X		X	X	X
Blowing	X	X	X			
Desizing (flat fabrics)	X	X	X			
Purge/cleaning	X	X	X			
Dry cleaning	X	X				
Bleaching	X	X	X			
Mercerization and causticizing	X	X	X			X
Silk effect	X		X			
Dyeing	X	X	X			
Printing	X	X	X			
Drying	X					
Pressing and sanforization	X		X			
Calendering	X	X		X		

BOX 1. SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS						
Production process	Air	Soil	Water	Noise	Vibration	Disturbance caused to population
Raising	x		x	x	x	x
Shearing	x	x		x	x	
Grinding	x	x				x
Smoothing	x	x	x			
Water/oil repellence		x	x			
Anti-wrinkle finish		x	x			
Fulling		x	x			
Anti-flame finish		x	x			
Steam generator (boiler)	x	x	x	x		x
Heat exchange with thermal fluid	x	x				
Air compressors	x	x	x	x		x
LGP storage	x					
Acclimatization system	x	x	x	x		x
Color or chemical kitchen	x	x	x			
Water treatment station	x	x	x			
Waste water treatment system (STAR)	x	x	x	x		x
Storage of harmful products	x	x	x			
Administrative activities	x	x	x			

Source: Bastian; Rocco (2009).

The guide also analyzes in details the environmental impacts of generation of effluent and color, lubricating oil odor, waste generation, noise and vibration.

Promoting the practice of indicator measurements, the guide presents some of the main environmental for the sector (Box 2):

BOX 2. ENVIRONMENTAL INDICATORS FOR THE TEXTILE SECTOR	
Environmental Indicator	Unit/measurement method
Water consumption	m ³ /processed product
Water reuse	percentage
Total consumption of energy	kWh/processed product
Specific organic load/specific flow in printing (gross discharge), desizing, dyeing, printing, bleaching, mercerization	kg DBO5.20 or m ³ /t of processed product
Total generation of waste	kg/processed product
Total generation of waste – Class I – harmful	kg/processed product
Total generation of waste – Class II – non-harmful	kg/processed product
Recyclable waste	kg/processed product

Source: Padilha, M. L. M. L., 2009 (apud BASTIAN; ROCCO, 2009).

Regarding clean production, the authors highlight that, for the implementation of P+L measures in the sector, it is necessary to analyze the technical and economic feasibility and study the environmental legislation in effect. Box 3 shows a number of P+L opportunities that have been identified.

BOX 3. SUMMARY OF P+L OPPORTUNITIES IN THE TEXTILE SECTOR						
P+L Opportunity	Elements					
	Water	Dyeing	Air (emissions)	Soil and waste	Noise and vibration	Chemicals
Water use reduction, recovery and reuse						
Reduction of water consumption in washing operations (production process and at the water treatment station)	x					
Reduction of water consumption in cooling operations	x					
Reduction of water consumption in dyeing operations						
Reduction of water consumption in hydraulic installations	x					
Utilization of rainwater (in the production process and for internal convenience)	x					
Reutilization of treated effluent from public systems in dyeing and bleaching processes	x					
Reutilization of treated industrial effluents (in steam generation with boilers and STAR)	x					
Power reduction/conservation						
Steam generation facilities		x				
Reutilization of heat generated (preheated bath water)		x				
Reduction of energy consumption (operational procedures)		x				
In inspection in equipment and engines		x				
In compressed air equipment		x				
In lighting system		x				
Other recommendable measures		x				
Dry wash						x
Reduction of odoriferous substance emissions			x			
Reduction of noise and vibration emissions					x	
Recovery of materials						

BOX 3. SUMMARY OF P+L OPPORTUNITIES IN THE TEXTILE SECTOR						
P+L Opportunity	Elements					
	Water	Dyeing	Air (emissions)	Soil and waste	Noise and vibration	Chemicals
Gum						X
Caustic soda						X
Reduction, reutilization and recycling of waste generated						
Reduction of packaging waste generation				X		
Reutilization of waste				X		
Chemicals						
Control at the receipt of raw materials and auxiliary products						X
Replacement of manual with automated color kitchen						X
Reutilization of bath water (in finish and dyeing processes)						X
Equipment alterations (in production processes)	X	X				X
Reduction of atmospheric pollutant generation						
Measurements in steam generation equipment			X			
Change of fuel used in boilers		X	X	X		
Change of fuel in steam generation and thermal fluid heater	X			X		
Storage of harmful products in proper conditions	X			X		
Administrative facilities and activities		X	X	X		
Other measures				X	X	

Source: Bastian; Rocco (2009).

Flavia Faria & Elen Pacheco (2011) analyzed studies involving P+L in Brazil. Discussing Brazilian examples, the authors noticed the importance of reducing solid waste in apparel companies, where pieces of fabric, dust and products with printing or cutting defects are found. They also point out the importance of disseminating the P+L concept in corporate and academic spheres, emphasizing the solution of economic and environmental problems of small and medium-sized companies.

As in any management action, when planning and implementing P+L measures, a good diagnosis is fundamental. Knowing what and how much is consumed and emitted in each process stage facilitates the identification of opportunities and the definition of environmental management priorities. In many cases, the simple fact of developing proper measures is enough to enable several possibilities of action. In this sense, a

“culture of indicator measurements” has been developed, which is essential for the international competitiveness of our industry.

With the participation of FIEMG (Federation of Industries in the State of Minas Gerais), through its Department of Environment, they had access to the approaches adopted by knitwear companies regarding the compliance with environmental standards, and these examples can be replicated in the other states of Brazil.

Organic cotton

This is the cotton obtained from sustainable systems, with natural resource handling and protection, and no agrochemicals, chemical manure or other harmful materials to the human health and the environment, keeping and recovering fertility and life of soils and diversity of living beings. It is also an initiative directed to market niches that demand products with characteristics that meet the environmental requirements with social character.

Regarding the organic cotton production, the initiatives of the sector are still in low number, but safe, i.e., every product has a certain destination and assured quality, all of them are certified by the IBD (Institute of Biodynamics), accredited by Inmetro. In 2010, 100 tons of cotton lint were produced. The system is absolutely sustainable, as it is executed in small properties, with fixed farmer, well remuneration and following all practices recommended by the Ministry of Agriculture, Cattle Raising and Supply.

Color cotton

In the 1990s, the Brazilian Company of Farming Studies (Embrapa) started to promote studies for the development of cotton cultivations adaptable to the Brazilian *cerrado* conditions. Developed and produced in the Northeastern region of Brazil, color cotton has already been cultivated in 5 colors. All colors were obtained through methods of conventional genetic improvement and the demand for its link has grown in the market. Besides the adaptation to modern spinning, color cotton cultivation reduces production cost to the textile industry and chemical and toxic effluent, as they do not use pigments.

ABIT participates in the Management Committee, which is coordinated by Embrapa, and has the support of Sebrae, Senai, Banco do Brasil and the state governments of the Northeast Region and provides technological support to textile and apparel processes aiming at market niches and improved production.



5 CHALLENGES AND OPPORTUNITIES FOR THE SECTOR ON THE WAY TOWARDS SUSTAINABILITY

When the Multifibras⁷ Agreement ended in 2005, the Brazilian textile and apparel industry underwent a reorganization process to face the competition with global producers. Two predominant situations consolidated in the process of changing the industrial structures of the sector. First, changes in the control of governance of production chains. Searching for scale and scope economies, the largest companies got involved in a number of mergers and acquisitions, increasing the sector consolidation, a phenomenon also observed in other parts of the world. At the same time, an unprecedented interest in genuinely Brazilian brands and designs, both in the country and abroad, was observed. The companies, many of them small and medium-sized organizations, developed strategies to gain new markets using the cultural diversity of the country and ecological symbols and values. However, their future is not guaranteed, as they depend on their capabilities to comply with the high and every-growing levels of requirements of this new business environment.

To adapt to this new reality of world economy, the textile and apparel sector should incorporate and consolidate some world tendencies of production and business management, with the focus always on sustainability. The challenge to be assumed is related to the creation of alternatives that encourage new methods to obtain positive results in a scenario of resource restriction and population growth.

Sustainability promotes new and promising opportunities to develop, in a creative manner, new concepts for the culture of consumption, introducing the reevaluation of the method to design products and on how the needs are met, incorporating into the concept of efficiency – access and own the same assets and services using less materials – the concept of sufficiency – have the same satisfaction and well-being with less assets and services (MARCHAND; WALKER, 2008; DAVIS; POPOVIC; CROWTHER, 2007).

⁷ The Multifibras Agreement (AMF), formally the Arrangement Regarding International Trade in Textiles, was the foundation for bilateral agreements or unilateral actions that established quotas that limited the importation in countries with serious problems due to fast increase in importation (Icône – Institute of International Trade and Business Studies). <http://www.iconebrasil.org.br>.

SUSTAINABILITY AS COST REDUCTION

The importance of the Life-Cycle Assessment (LCA) in the sector qualification for sustainable competitiveness

The LCA methodology was originated in studies of energy consumption analysis in the 1970s and was developed by the Setac – Society of Toxicology and Environmental Chemistry and later by the ISO – International Organization for Standardization in the 1990s (AZAPAGIC, 1999). This methodology enables to quantify the environmental impacts, such as consumption of water and energy, during the entire product lifecycle.

The reduced consumption of water in washing systems and of electrical energy in drying systems during the phase of product utilization is identified as a decisive aspect in the selection of fiber materials used in the textile products. There is a consensus among the authors on the fact that the intense and extended use of a product has favorable impacts on the environment, as it delays the manufacture of new products from virgin materials.

CONSCIENTIOUS CONSUMPTION AND INNOVATIVE STRATEGIES

Innovations with sustainable character, which some authors call eco-innovation, is one of the various approaches of sustainable development of new products, i.e., of development that meets the current needs of consumption without affecting the fulfillment of needs of future generations. Designing sustainable products requires a balance of economic, environmental, ethical and social aspects (WCED, 1987; JONES, 2001).

Gaining competitive advantages in new markets that are characterized by requirements of unprecedented corporate performance standards is closely related to the launch of new products with environmental features. The green image of a proactive company assumes an increasing value while the company benefits from financial advantages obtained with process optimization, reduced utilization of materials and energy and reduced effluent generation (AZZONE; NOCI, 1998; JONES, 2001). The challenges faced for the environment will only be overcome with changes in the behaviors that associate quality of life with consumerism.

ISONOMIC COMPETITION IN INTERNATIONAL MARKETS

The Brazilian industry is constantly exposed to increasing pressures of low costs of external producers, which end up introducing uncertainties in long-term planning and affecting returns on investments. For a wide variety of imported products, low prices are applied due to differences in the Brazilian legislation when compared to laws of other countries, especially in labor and environment aspects and the absence of fiscal benefits on basic production materials.

ABIT, along with unions of the sector, is working towards the creation of an environmental regulatory instrument (environmental isonomy) to reduce the gap in the competition with imported products, whose origin is not submitted to the same socio-environmental requirements as the national producer.

Another challenge of economic aspect is the continuous appreciation of the exchange rate, which ends up affecting the exportation initiatives and favoring importation even in strategic areas, just as it occurs with the textile and apparel sector, due to the high number of people employed.

Micro and small companies have an important role in employment generation, regional development and technological innovation. As addressed before, the number of apparel companies in Brazil is very high and most of them are micro and small companies, which requires to understand the particularities of these companies that demand specific supporting policies regarding the creation of exclusive credit lines, with fewer guarantee requirements, promoting international insertion, innovation, design and entrepreneurship, reduced bureaucracy, as well as managerial and employee qualification and tax simplification.

INTEGRATION OF COMPANIES AND UNIVERSITIES, GENERATING BENEFITS TO THE SOCIETY

The discussion on the importance of integration of companies and universities for innovation and qualification of specialized labor is old, but not fully explored by the textile and apparel sector. The key for placing education institutions and companies closer is sharing information, considering that universities are an adequate place for developing new products/processes and searching for the best method to make them viable in economic and socio-environmental aspects.

When a company develops a project alone, it takes a long time and requires high investments in labor and equipment. The challenge for the sector and one of the operation lines of ABIT is to place companies closer to large education and research institutes. With the partnership, the company uses the university's facilities and the students' studies to develop innovation and sustainability projects. For the institute, the advantage is to obtain funds to support research and researchers, and elevate the university image.

Box 4 presents a summary of the most important vectors for the future of the textile and apparel chain.

BOX 4. SEVEN VECTORS OF FUTURE IMPORTANCE	
New materials	New fibers, functionalities, sustainability
Information integration	Radiofrequency systems, integrated systems of consumer data into project
New technologies of project and production	New fibers, functionalities, sustainability
Life-cycle management	Qualification to serve more demanding consumers regarding impacts on nature
Integrated management of supply chains	Shared projects and product life-cycle engineering
Design leadership	Design assumes a strategic role in value creation opportunities
Integration with other chains	Increasing appreciation of the use of technical textile products in other industries

Source: Sectorial Prospective Study – Textile and Apparel, ABDI, 2010.

ANALYSIS OF BRAZILIAN INITIATIVES IN SUSTAINABLE INNOVATION

New competences towards innovation

The strategic dimension that has been present in all analyses of sustainable development always make references to innovation. The public power, along with the textile and apparel sector, can adopt a number of initiatives to reduce the time to return on investments in innovation, as described in Box 5 below:

BOX 5. INFRASTRUCTURE AND EDUCATION FOR INNOVATION	
Infrastructure for innovation	Facilitate the access of innovative products in markets, including shorter regulatory processes
	Encourage markets and the society as a whole, through incentives, to have greater receptivity to innovative products
	Fast, transparent and non-bureaucratic procedures to create and establish innovative companies
	Create greater protection of intellectual property related to innovation and enforcement of the applicable legislation to reduce illegal copy and falsification
	Reduce costs to bring innovative products to market by reducing bureaucracy associated with approval procedures
	Create markets for Brazilian innovative products
Education for innovation	Promote graduate and postgraduate programs that produce high-level professionals, with knowledge and expertise to fulfill the needs of research and innovation from the textile and apparel sector
	Encourage collaboration and facilitate exchanges between the industry and educational institutes
	Promote continuing professional development programs to professionals of the sector
	Offer financial support for the development of flexible learning materials

Source: Sectorial Prospective Study – Textile and Apparel, ABDI, 2010.

The studies analyzed in this document enable to identify the emergence of new and several corporate competences that emphasize differentiation strategies based on sustainability concepts. New fibers and new technologies are in the base of a sustainable production of the sector, which means that new knowledge is included in these two dimensions, appearing as scarce assets in the near future, and those with such knowledge will be the leaders. In addition, the integration of consumer and production system requires mutual understanding, based on shared codes of identification of features and environmental impacts.

The Integrated System of Industrial Property (Sinpi), of the INPI – National Institute of Intellectual Property, conducted a study in January 2012, considering all submission for patents made in Brazil between 2007 and 2010, covering both invention privileges (IP) and utility models (UM).

The results are presented by year of submission, with total submissions (TPD) and among these the number of submissions that still in secrecy (S) phase, i.e., those whose technical details have not been published so far. In total, there were 1,095 submissions for patents in the textile and apparel sector in Brazil (2007-2010). This number shows the strong tendency of the textile and apparel sector to constantly improve and innovate its products and processes.

The world patterns show that the industry structure of a sector develops when:

- it has access to a large consumer market;
- it is fueled by leading companies of knowledge innovation;
- it undergoes a gradual learning process;
- it is willing to understand and serve demanding consumers.

Brazil fulfills these patterns and has excellence research, development and innovation centers, a complex and robust economy, modern and multicultural cities. In this context, the textile and apparel sector presents a large growth margin, considering that in from 2000 to 2010, the Brazilian average income per capita increased 27.6%, while the population grew 11.4% (IEMI, 2011), increasing also the consumption of textile and apparel products.

The Brazilian textile and apparel chain is on the right track to become increasingly sustainable, fulfilling the needs of its demanding consumers and improving its competitive capabilities, which are: innovate, develop, produce and deliver more quickly; offer superior quality; reduce wastes; have identity design; offer reliable information and accurate data; and perform all these actions with socio-environmental responsibility.



6 FINAL CONSIDERATIONS

The scientific panel produced by the United Nations Environment Programme (UNEP) elaborated a study that ended up ranking the main environmental challenges of this century – “21 Issues for the 21st Century”.

According to the UNEP, the scientific community is ahead of the evaluations of emerging threats and search for innovative solutions for environmental challenges. The report shows that a greater international political support is required to researches and distribution structures to achieve real progress and enable a sustainable century. A preliminary list of 21 challenges was selected after the first cycle of debates on more than 90 issues. These issues were submitted to consultation and feedback of more than 400 worldwide leading scientists and researchers.

The study was presented during the World Forum of Administrative Council Ministers of the UNEP, whose general intention is to renovate how the environmental issues of the planet are managed. We reproduce below ten of the 21 main challenges the planet faces now:

1. Aligning Governance to the Challenges of Global Sustainability.
2. Transforming Human Capabilities for the 21st Century: Meeting Global Environmental Challenges and Moving Towards a Green Economy.
3. Ensuring Food Safety and Food Security for 9 Billion People.
4. Reconnecting Science and Policy.
5. Catalyzing Rapid and Transformative Changes in Human Behaviour towards the Environment.
6. New Insights on Water-Land Interactions: Shift in the Management Paradigm.
7. Accelerating the Implementation of Environmentally-Friendly Renewable Energy Systems.

8. Integrating Biodiversity across the Environmental and Economic Agendas.
9. New Challenges for Climate Change Mitigation and Adaptation: Managing the Unintended Consequences.
10. Greater Risk than Necessary? The Need for a New Approach for Minimizing Risks of Novel Technologies and Chemicals.

The current international environmental governance system, considered the #1 problem, is seen by most scientific community as non-sustainable and poorly-equipped to address the risks and responses to the opportunities of the 21st century. Governance can be seen as the practice of economic, political and administrative authority to manage the issues of a country at all levels. It includes mechanisms, processes and institutions through which citizens and groups articulate their interests, practice their legal rights, perform their obligations and discuss their differences. Good governance is, among other things, participative, transparent and responsible, and it ensures that political, social and economic priorities are based on a broad consensus in the society and decision making about the resource allocation to development issues.

Good governance is founded on three pillars: economy, politics and administration. Covering all these aspects, good governance defines the processes and structures that guide the political and socioeconomic relations, including the private sector and civil society organizations.

The second challenge in the environment sphere is the lack of qualified professionals for sustainable development, which requires a broad update of skills and education of global labor to seize the green economy opportunities. We believe that the estimates made in the UNEP study can guide the next steps towards the beginning of an international management of sustainability. It involves many challenges and the recommendations include the following:

- use of accurate and updated data to inform decision makers;
- replace policies that generate non-sustainable results;
- create incentives to sustainable practices;
- implement urgent, ambitious and cooperative actions of governments to establish international agreements;
- strengthen the access to information;
- engage the civil society, the private sector and other relevant actors in processes of policy elaboration.

According to the study, the synthesis for decision makers defines a number of priority areas for action and includes examples of promising and functional policies that can be extended to all regions to help countries establish international agreements.

In short, renovations are necessary in the international environmental governance to face the main emerging challenges of the 21st century and conciliate the economic growth, eradication of misery and environmental preservation of natural resources, and it is essential that the production activities and consumers keep assuming increasingly correct attitudes, in the socio-environmental perspective, that governments promote healthy macroeconomic scenarios and pro-innovation and sustainability and that regulatory milestones are consistent, feasible and built in a participative manner.

Our activities consolidate that awareness of the industry role in building a better and more decent society, and the concept that man and his organizations are not the owner, but part of the nature, and for the nature man should promote its preservation, to leave a more promising future to next generations. The Rio+20 Conference should reinforce and make sustainable development the focus of the global economic agenda, generating correct foundations for the 21st century growth model.



REFERENCES

ASSOCIAÇÃO BRASILEIRA DA INDÚSTRIA TÊXTIL E DE CONFECÇÃO. Institutional website. Available at: <http://www.abit.org.br>. Accessed on Dec. 14, 2011.

AGÊNCIA BRASILEIRA DE DESENVOLVIMENTO INDUSTRIAL. **Estudo prospectivo setorial têxtil e confecção**. Brasília, DF, 2009.

ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS. **NBR ISO 14040**: gestão ambiental – avaliação do ciclo de vida – princípios e estrutura. Rio de Janeiro, 2001.

AZAPAGIC, Adisa. Life cycle assessment and its application to process selection, design and optimization. **Chemical Engineering Journal**, v. 73, n. 1, p. 1-21, abr. 1999.

AZZONE, Giovanni; NOCI, Giuliano. Seeing ecology and “green” innovation as a source of change. **Journal of Organizational Change Management**, v. 11, n. 2, p. 94-11, 1998.

BALANÇO ENERGÉTICO NACIONAL, 2010: Ano-base 2009/Empresa de Pesquisa Energética. – Rio de Janeiro: EPE, 2010.

BASTIAN, Elza Y. Onishi; ROCCO, Jorge Luiz Silva. **Guia técnico ambiental da indústria têxtil**. São Paulo: Cetesb; Sinditêxtil, 2009. (Série P + L) Available at: http://www.cetesb.sp.gov.br/Tecnologia/producao_limpa/documentos/textil.pdf. Accessed on Dec. 14, 2011.

BASTOS, André Luis Almeida; POSSAMAI, Osmar. Modelo de apoio à decisão para fabricação baseado na avaliação da performance ambiental de produtos e dos objetivos estratégicos da organização. XXII Encontro Nacional de Engenharia de Produção. **Anais**. Curitiba, 23 – 25 out. 2002, p. 1-8.

Blackburn, Richard S. **Biodegradable and sustainable fibers**. Cambridge, UK: Woodhead Publishing Limited; The Textile Institute, 2005.

BLACKBURN, Richard S.; PAYNE, John D. Life cycle analysis of cotton towels: impact of domestic laundering and recommendations for extending periods between washing. **Green Chemistry**, n. 6, p. 59-61, 2004.

BRASIL. Ministério do Trabalho e Emprego. Secretaria de Políticas Públicas de Emprego. **Relação anual de informações sociais: RAIS**: ano-base 2010. Brasília, DF: 2010. 1 CD-ROM.

Brunekreef, B.; Harssema, H. Viscose odors in ambient air: a study of the relationship between the detectability of viscose odors and concentrations of H₂ and CS₂ in ambient air. **Water, air and soil pollution**, v. 13, p. 439-446, 1980.

BRUNO, Flavio S.; PURCIDÔNIO, Paula M.; VILELA, Viviane A.; VIANA, Ingrid D.; VALLE, Rogério A. B. Aquisição de competências ambientais na indústria têxtil: oportunidades para a diferenciação competitiva a partir do emprego de metodologias de avaliação de impactos ambientais. In: XXIX Encontro Nacional de Engenharia de Produção. **Anais**. Salvador, out. 2009.

CETESB (São Paulo). **Manual para implementação de um programa de prevenção à poluição**. 4. ed. São Paulo, 2002. (Environmental reports). Available at: http://www.cetesb.sp.gov.br/Tecnologia/producao_limpa/documentos/manual_implem.pdf. Accessed in Feb. 2009.

DAVIS, Rebekah; POPVIC, Vesna; CROWTHER, Philip. **Advancing design activity: catalysts for sustained innovation**. In: POGGENSPOHL, Sraron, Eds. Proceedings The International Association of Societies of Design Research. Hong Kong Polytechnic University, 2007, p. 1-13.

EISENHARDT, K. M., MARTIN, J. Dynamic capabilities: what are they? **Strategic Management Journal**, n. 21, p. 1105-1121, 2000.

ENVIRONMENTAL JUSTICE FOUNDATION (EJF). **The deadly chemicals in cotton**. EJF in collaboration with Pesticide Action Network. London. 2007.

ENVIRONMENTAL PROTECTION AGENCY (EPA). **State of the art of textile waste treatment**. Study conducted for the Water Quality Office by the Department of Textiles of Clemson University. Clemson/NC, feb. 1971.

FARIA, Flavia P.; PACHECO, Elen B. A. V. Experiências com produção mais limpa no setor têxtil. **Revista de Design, Inovação e Gestão Estratégica**, v. 2, n. 1, p. 63-82, jan.-abr. 2011.

FLETCHER, Kate. **Sustainable fashion and textiles: design journeys**. London: Earthscan, 2008.

GLOBAL REPORTING INITIATIVE (GRI). **Data sheet**, 2009.

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA. **Pesquisa de inovação tecnológica 2005**. Rio de Janeiro: IBGE, 2005.

INTERNATIONAL TEXTILE MANUFACTURERS FEDERATION. **International production cost comparison**. Zurich: ITMF, 2008.

INSTITUTO DE ESTUDOS E MARKETING INDUSTRIAL. **Relatório setorial da indústria têxtil brasileira: Brasil têxtil 2011**. São Paulo: IEMI, 2011.

JONES, E.; STANTON, N. A.; HARRISON, D. Applying structured methods to eco-innovation: an evaluation of the Product Ideas Tree Diagram. **Design Studies**, v. 22, n. 6, p. 519-542, nov. 2001.

KALIALLA, Elija M.; NOUSIAINEN, Pertti. Environmental profile of cotton and polyester-cotton fabrics. **Autex Research Journal**, v. 1, n. 1, 1999.

LAURSEN, Soren Ellebaek. **EDIPTEX: Environmental Assessment of Textiles**. Copenhagen: Danish Environmental Protection Agency, 2007.

LAURSEN, S. E., HANSEN, J., BAGH, J., JENSEN, O. E.; WERTHER, I. **Environmental assessment of textiles: life cycle screening of textiles containing cotton, wool, viscose, polyester or acrylic fibers**. Copenhagen: Danish Environmental Protection Agency, Denmark, 1997.

LAROCHE, Michel; BERGERON, Jasmin; BARBARO-FORLEO, Guido. Targeting consumers who are willing to pay more for environmentally friendly products. **Journal of Consumer Marketing**, v. 18, n. 6, p. 503-520, 2001.

MARCHAND, Anne; STUART, Walker. Product development and responsible consumption: designing alternatives for sustainable lifestyles. **Journal of Cleaner Production**, v. 16, p. 1163-1169, 2008.

MICHAELIS, L. The role of business in sustainable consumption. **Journal of Cleaner Production**, n. 11, p. 915-21, 2003.

NIEMINEM, Eija; LINKE, Michael; TOBLER, Marion; BEKE, Bob Vander. EU COST Action 628: life-cycle assessment (LCA) of textile products, eco-efficiency and definition of best available technology (BAT) of textile processing. **Journal of Cleaner Production**, n. 15, p. 1259-70, 2007.

PADILHA, M. L. M. L. **Indicadores de desenvolvimento sustentável para o setor têxtil**. 2008. Tese (Doutorado) – Faculdade de Saúde Pública, Universidade de São Paulo, São Paulo, 2009.

PROGRAMA DAS NAÇÕES UNIDAS PARA O MEIO AMBIENTE (PNUMA) Available at: <http://www.pnuma.org.br>. Accessed on Feb. 24, 2012.

SONDERGARD, Bent; HANSEN, Ole Erik; HOLM, Jesper. Ecological modernization and institutional transformations in the Danish textile industry. **Journal of Cleaner Production**, n. 12, p. 337-52, 2004.

SCHOR, Juliet. **Prices and quantities: unsustainable consumption and the global economy**. Ecological Economics, n. 55, p. 309-320, 2005.

THRONE-HOLST, Harald; STO, Eivind; STRANDBAKKEN, Pal. The role of consumption and consumers in zero emission strategies. **Journal of Cleaner Production**, n. 15, p. 1328-36, 2007.

TOBLER-ROHR, Marion I. **Life Cycle Assessment of a cotton fabric in textile finishing**. Spring 2000. Meeting Program of Fiber Society for the Advancement for Scientific Knowledge of Fibers, Fiber Based Products and Fibrous Materials. Guimarães, 17-19 maio 2000.

TUCKKER, Arnold et al. Fostering change to sustainable consumption and production: an evidence based view. **Journal of Cleaner Production**, n. 16, 2008, p. 1218-25.

UNCTAD. **UNCTADstat**. Geneva, 2011. Available at: http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx?sCS_referer=&sCS_ChosenLang=en. Accessed on Dec. 14, 2011.

UNIDO. **Water conservation in the textile industry**. Textile Monographs. UF/GLO/78/115. Based on the work of G. J. Parish, Shirley Institute, Manchester, United Kingdom. 1979.

UNIDO. **Handy manual on textile industry: output of a seminar on energy conservation in textile industry**. June 1992.

VALOR ECONÔMICO, 24/02/2012 p. A9 – Internacional – **Estudo lista os desafios ambientais deste século**.

VASCONCELOS, F. B. **Estudo comparativo das características ambientais das principais fibras têxteis**. [S. l.: s. n., 2008?] Not published.

VITALIS, Vangelis. **Private voluntary eco-labels**: trade distorting, discriminatory and environmentally disappointing. Background paper for the “Round Table on Sustainable Development Meeting” which has as its theme “Eco-labelling and Sustainable Development”. OECD, 2002.

WAGNER, M., LLERENA, P. Drivers for sustainability-related innovation: a qualitative analysis of renewable resources, industrial products and travel services. **Working Paper of BETA**. Bureau d'économie théorique et appliqué. Strasbourg, n. 2008-22, Sept. 2008. Available at: <http://ideas.repec.org/p/ulp/sbbeta/2008-22.html>. Accessed in July 2010.

WANG, Youjiang (Ed.). **Recycling in textiles**. Cambridge: CRC Press, 2006.

WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT. **Our common future**. Transmitted to the General Assembly as an Annex to document A/42/427 – Development and International Co-operation: Environment. 1987.

WOOLRIDGE, Anne C. et al. Simon. Life cycle assessment for reuse/recycling of donated waste textiles compared to use of virgin material: an UK energy saving perspective. **Resources Conservation and Recycling**, n. 46, p. 94-103, 2006.

CNI – NATIONAL CONFEDERATION OF INDUSTRY – BRAZIL

DIRECTORY OF INSTITUTIONAL RELATIONS – DRI

Mônica Messenberg Guimarães
Director of Institutional Relations

ENVIRONMENT AND SUSTAINABILITY UNIT – GEMAS

Shelley de Souza Carneiro
Executive Manager – Environment and Sustainability Unit

Technical Support
José Quadrelli Neto (Environment and Sustainability Unit – CNI)
Luciano Emmert (Environment and Sustainability Unit – CNI)
Alexandre Vianna (Fundação Dom Cabral)

Editorial Support
Priscila Maria Wanderley Pereira (Environment and Sustainability Unit – CNI)

COMMUNICATION BOARD – DIRCOM

Carlos Alberto Barreiros (Director of Communication)

PUBLICITY & ADVERTISING EXECUTIVE MANAGEMENT – GEXPP

Carla Cristine Gonçalves de Souza (Executive Manager)
Armando Uema (Editorial Production)

Alfredo Emilio Bonduki (President of Sinditêxtil – SP and Councilor Vice-President ABIT)
Rafael Cervone Netto (Director of TexBrasil and Chairman Emeritus Sinditêxtil – SP)
José Eduardo Cintra de Oliveira (Executive Director – ABRAFAS)
Frederico Bernardo (Technical Director of TexBrasil)
Mariana Correa do Amaral (Industrial Projects Analyst – ABIT)
Beatriz Moreira (Economist – ABIT)
Ana Paula Jardim Ciuffa (Executive Advisor – ABRAFAS)

Flavio da Silveira Bruno
José Maria Simas de Miranda
Carla Bretas Noronha
Énio Soares Junior
Technological Forecasting and Marketing Institute SENAI/Cetiqt

George Tomic (CEO Stenville Textiles)
Marco Antônio Eid (Journalist/Director of Operations & RV Communication)

Associação Brasileira dos Produtores de Algodão – Abrapa
Instituto do Algodão Social – IAS
Altenburg Indústria Têxtil Ltda.
Cativa Têxtil Indústria e Comércio Ltda.
CIA de Fiação e Tecidos Cedro e Cachoeira
CIA. Hering
Dalila Têxtil Ltda.
Malwee Malhas Ltda.
Marisol S.A.
Simpletex Indústria Têxtil Ltda.
Rhodia Poliamida e Especialidades Ltda.
Tavex Brasil S.A.

Cover photo: The stylist Marcia Ganem's article is made of recycled tide – a contemporary Brazilians lace result of the design and innovation work of the Saubara lacers (BA), made of polyamide fiber. Credit: *Roberta Braga*.

Aline Santos Jacob
Normalization

Grifo Design
Graphic design and layout



CNI
SESI
SENAI
IEL

— CNI —