SUSTAINABLE TEXTILE AND CLOTHING INDUSTRY

MAIN CHALLENGES OF CIRCULARITY IN BRAZIL

cpap
CIRCULAR PLASTICS IN THE AMERICAS PROGRAM

Funded by the European Union

This project is implemented by
GFA CONSULTING GROUP
clean
NIRAS

This document was produced with the financial support of the Project "Reducing Plastic Waste in the Americas – Ensuring Sustainable Consumption and Production Patterns", financed by the Service for Foreign Policy Instruments-European Union and implemented by the international consortium formed by GFA Consulting GmbH, NIRAS, and CLEAN.

The project is implemented in Brazil and Colombia under the operational title: Circular Plastics in The Americas Programme (CPAP), covering the period of Jan 2021 to Jan 2024.

Project

Reducing plastic waste
in the Americas
Ensuring sustainable consumption and production patterns (EuropeAid/140603/DH/SER/Multi)

Programme Coordinator /Team Leader

Tathiana Colturato

Authors

Claudia Jeunon
Director of Operations at BVRio

Maria Accioly
Circular Economy Expert at BVRio

Pedro Succar
Circular Economy Expert at BVRio

Review

Ana Bárbara Zanella
Focal Point CPAP Brazil

Tathiana Colturato
Programme Coordinator

Maria Accioly
Circular Economy Expert at BVRio

Design

Bruno Ruscão

Address
GFA Consulting Group GmbH
Eulenkrugstrasse 82 | 22359 Hamburg
Germany
Phone: +49 (0) 40 60306 - 164
Fax: +49 (0) 40 60306 - 159
E-mail: Barbara.Kowalczyk-Hoyer@gfa-group.de
E-mail 2: Tathiana.Colturato@gfa-group.de

Funded by the
European Union

PREFACE

Considering the global relevance of promoting a circular plastics economy, the European Union launched in September 2021 the Circular Plastics in the Americas Program (CPAP). The focus of the program is to support the transition to a circular economy in Brazil, Canada, Chile, and Colombia, by enhancing the dialogue and cooperation on circular plastic solutions in line with the EU Plastic Strategy.

CPAP contributes with the strengthening of public policies and collaborative work with authorities, as well as promoting the sharing of knowledge and showcasing of technologies and innovations with actors in the plastics value chain through an innovative digital co-creation platform, pilot projects, and strategic awareness campaigns.

In Brazil, the CPAP Project was born with a strong focus on innovation and pilot testing of transformative solutions to promote and support measures and practices related to circular plastic, with particular attention to the textile, single-use-plastics (SUP), PET, and advanced equipment for mechanical recycling sectors.

The textile and clothing sector in Brazil is the fourth major textile sector in the world, producing 9.8 billion pieces/year, and has a total turnover of 48.9 billion USD distributed. The industry is distributed in 27 states with more than 32,000 companies, and it is the second biggest job creator in Brazil, with 1.479 million direct employees, and 8 million more if indirect employees are considered, most of which are women, according to TexBrazil. However, the textile/clothing sector generates a large amount of plastic pollution: it consumes annually 546,670 tons of polyester (that are mostly landfilled) with a very inefficient manufacturing process that produces 29% of cuttings and shreds that are currently not reused or recycled with the current technologies and structured of its value chain, and in addition textile is the most significant source of microplastic pollution in Brazil.

Considering the magnitude and complexity of the textiles value chain in Brazil, this study aims to support the textile sector by presenting an overview of the field, relevant information regarding production and consumption in the sector, waste generation and recycling, technology demand, as well as the sector challenges and opportunities towards a circular fashion textile industry.

This study was developed in partnership with the non-profit organization BVRio, which works at the intersection of economic, environmental, and social sustainability, and aims to design and promote innovative market-based solutions for the benefit of the economy, the environment, and people.

Funded by the
European Union

TABLE OF CONTENTS

CLICK TO BROWSE

Funded by the European Union

ABBREVIATIONS

ABRELPE	Brazilian Association of Public Cleaning and Special Waste Companies
ABIT	Brazilian Textile and Apparel Industry Association
ABR	Responsible Brazilian Cotton
ABRAFAS	Brazilian Association of Producers of Artificial and Synthetic Fibres
BNDES	National Development Bank
CEO	Chief Executive Officer
CPAP	Circular Plastics in the Americas Program
ETE	Effluent Treatment Station
EU	European Union
GRS	Global Recycle Standard
HDI	Human Development Index
IEMI	Market Intelligence (Research Foundation)
PES	Payments for Environmental Services
PET	Polyethylene terephthalate
RD&I	Research Development and Innovation
SEBRAE	Brazilian Support Service for Micro and Small Enterprises
SENAI	National Service for Industrial Learning
SENAI CETIQT	Chemical and Textile Industry Technology Centre of SENAI
USP	São Paulo University
WDF	Waste derived fuel

Funded by the European Union

1 INTRODUCTION

Although Brazil is one of the biggest producers and one of the biggest global consumers of textile products in general, there are no official numbers about waste textiles destinations in Brazil. This situation could be explained by the fact that no reverse logistics or recycling obligations are in place for textile waste so far, and also by the fact that Brazil still faces constraints related not only to sorting and selective collection, but also technological, logistical, and financial challenges regarding textile recycling. In this way, the present document aims to provide a pragmatic study, bringing a clear and actionable list of technical, policy-related, and business model-related challenges and opportunities to improve the circularity of the plastic in the value chain.

2 METHODOLOGY

The methodology used in this report comprised:

- Analysis of secondary data on textiles in Brazil (literature review), with a focus on the most recent and comprehensive official study available, "Brazil Textile 2021".
- Total of 13 semi-structured interviews with stakeholders from different links in the chain. Interviews were recorded with a commitment of internal use only, and all the relevant information was extracted in the form of highlights.

- Elaboration of a bullet point list with highlights from the interviews.
- Analysis of interviews focusing on positive (strengths/advantages/levers/opportunities) and negative (barriers/gaps/challenges) aspects regarding the sustainability/circularity of the Brazilian textiles industry.
- Elaboration of a list of technologies demanded by the stakeholders.
- Estimation of the volume of textile produced and recycled.

Table 1 – Interviews

Stakeholder type	Organization / Institution	Interviewed person / position	Interview date (month/day)
Industrial Association	ABIT (Brazilian Textile and Apparel Industry Association)	Fernando Pimentel (President)	06/09
	ABRAFAS (Brazilian Association of Producers of Artificial and Synthetic Fibres)	Eduardo Cintra (President)	06/13
P&D - Research / Innovation Institute (from Industrial Association)	SENAI CETIQT (Chemical and Textile Industry Technology Centre of the National Service for Industrial Learning)	Victoria Santos (competitive intelligence coordinator)	06/10
Fibres and Filaments Producer	Ecofabril (polyester) *	Thais Casselli (Commercial Manager) Edson Borges (Purchasing Manager)	06/20
	Rhodia (polyamide) *	Ronia Oisiovici (Sustainability and Innovation Manager) Eduardo Girote (Strategic Marketing Manager)	06/20
Filaments and Fabrics Producer	"Fabrics Producer" (confidential)	Confidential	07/12
Brand Owner / Retailer	Hering	Dalila Portela (Environment Specialist)	06/20
	SOMA Group	Taciana Abreu (Sustainability Head)	06/24
	Renner	Eduardo Moller Ferlauto (General Manager of Sustainability and Executive Director) Thays Rodrigues Rosini (Sustainability Manager) Renata Porfirio Marchetto (Communication Hub for Sustainability)	07/05
Textiles Treatment Organizations (sorting, shredding, reuse, recycling)	Eurofios (Mechanical Recycler textile-to-textile)	Paulo R Sensi Filho (Commercial Director) Adilson Moura (Industrial Director)	06/29
	Fibran (Mechanical Recycler textile-to-textile - synthetics)	Adriano Saez (CEO)	07/06
	JF Fibras (Mechanical Recycler-mainly cotton)	Carlos Roberto Novelini Junior (Commercial Director)	06/10
	Coopama (Waste Pickers	Luiz Fernandes (President) Luana Fernandez (Administrative	06/17

* These producers are also chemical recyclers

Obs: Rhodia, Ecofabril, and JF Fibras are the biggest companies in their respective sub sectors in the Brazilian internal market. Find in the Annex I a brief description of the interviewees.

Funded by the European Union

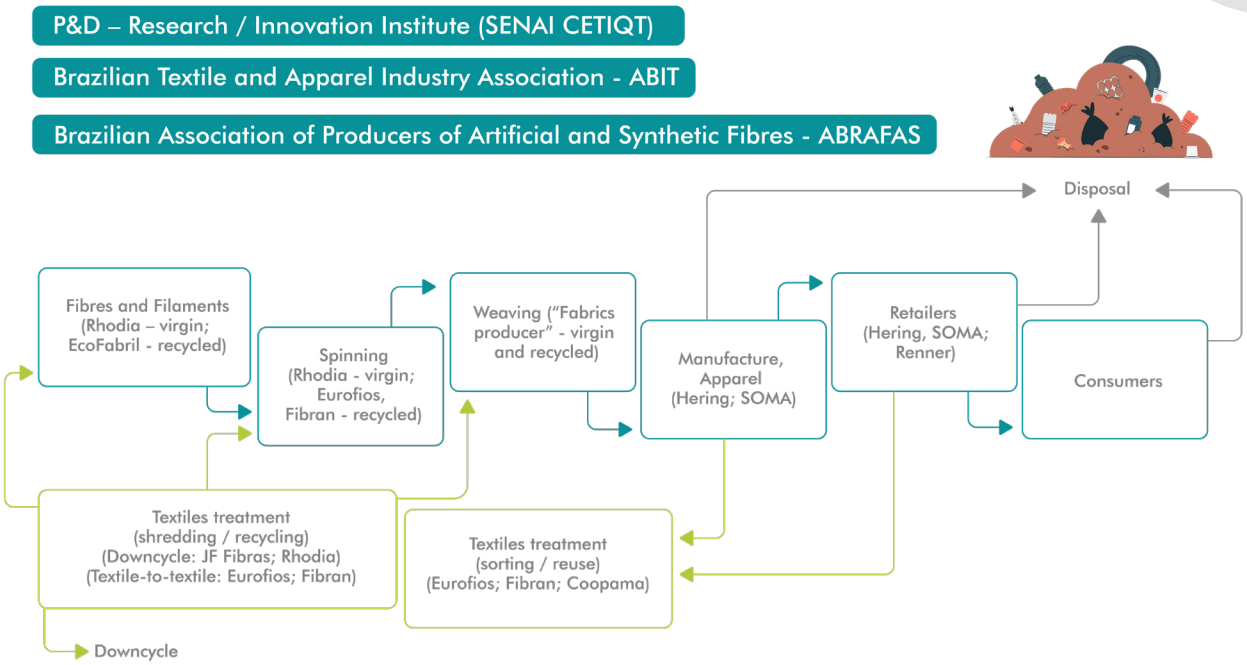

Figure 1 - Map of the interviewees in the Brazilian textile chain

3 FINDINGS

3.1 Literature review

Brazil has a well-developed and complete textiles industry, considered the largest integrated production chain in the western hemisphere (ABIT, 2017). The sector is very important in the country due to its capillarity - from large industries to many small companies (SENAI, interview). The country's textile industry is modern in most of its segments, especially cotton articles (Uniethos, 2013). It is self-sufficient in cotton production and regarded as a global reference in sportswear, jeans, and home textiles (Amaral et al., 2018). See in Figure 2 below, a map of the Brazilian textile chain.

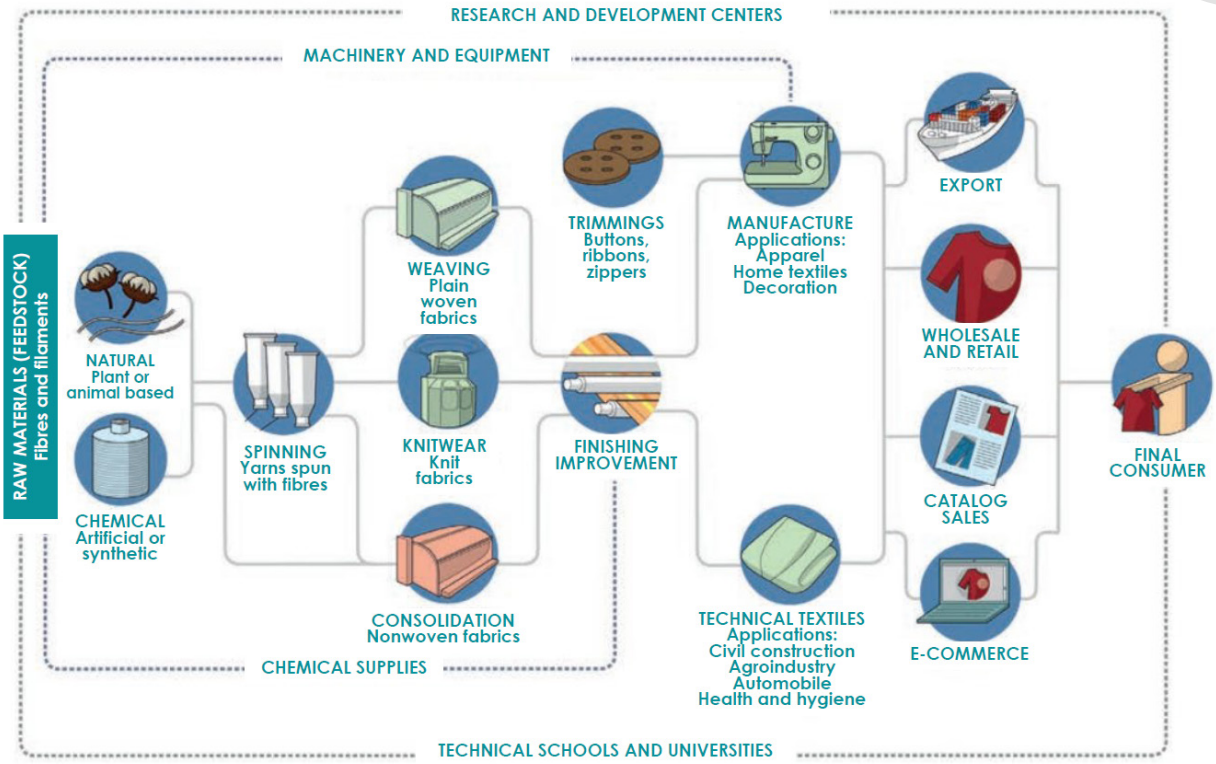

Figure 2 – Structure of the Brazilian textile and apparel production and distribution chain

Source: translated from ABIT 2017.

Although there is a predominance of cotton, the use of synthetics have been increasing in the last decade (ABIT, interview), as well as artificial fibres like viscose. Part of this tendency relates to prices, since cotton has now the highest prices in 10 years (ABIT, interview). Considering there is some difference in the classification of textiles, we present below a scheme as reference.

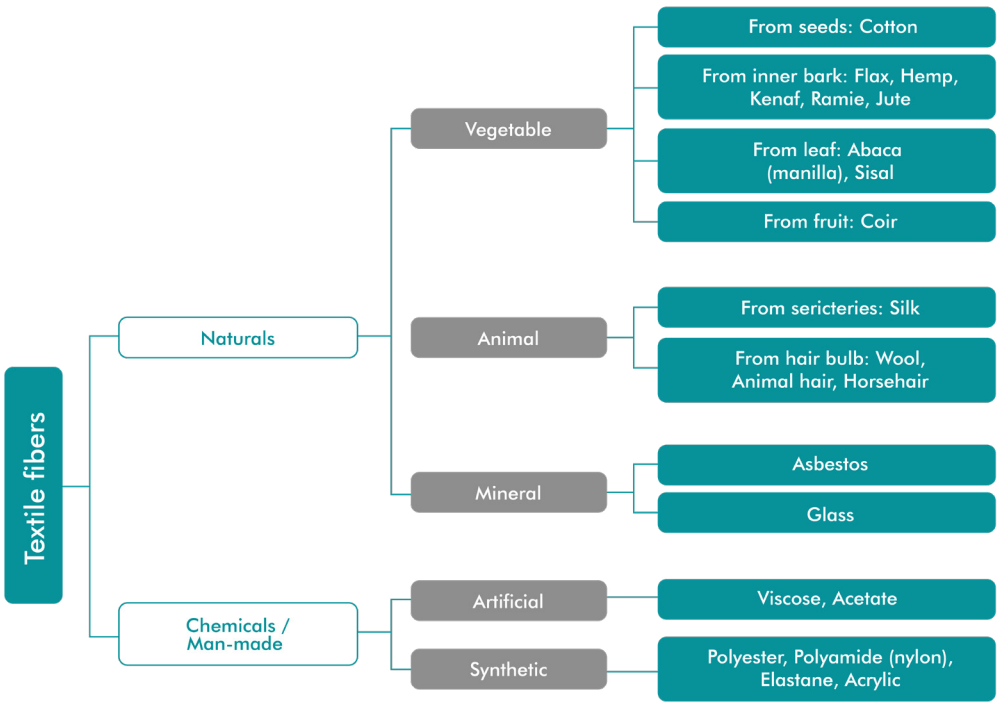

Figure 3 – Types of textiles

Source: adapted from ABIT, 2017, and Barbosa et al, 2004.

Funded by the European Union

Brazil is one of the biggest producers and one of the biggest global consumers of textile products in general. In the literature from the last few years, the country's position varies from 4th-6th in rankings for textiles and apparel producers (ABIT 2015 and IEMI 2015, apud Amaral et al 2018; FIEG 2018, apud Cavalcanti, 2020; ABIT, interview). Numbers from 2020 about the dimensions of the whole chain in Brazil are: 1.9 million tons produced, R$ 161 billion of production value (US$31.24 billions), 24.6 thousand companies (productive units), 1.36 million employees, and US$4 Billion in exports (Brazil Textile 2021). This represents 5% of the total value of the Brazilian processing industry (excluding mineral extraction and civil construction industries), and 1% of the Brazilian GDP.

For numeric analysis, it is necessary to consider that 2020 was an atypical year due to the Covid-19 pandemic: there was a retraction of 12.48% in the textile sector's world trade, and a retraction of volumes produced in Brazil of 5.1% for fibres/filaments, 6.9% for textiles, and 11.3% for manufactured articles (see Table 2). Before the pandemic, from 2016 to 2019 the production in the country was gradually increasing, despite a decrease of 16.7% in the number of companies in the sector. Regarding clothes (apparel) alone, the volume produced in Brazil in 2020 was 879 thousand tons – while before the pandemic (2019) it was about 1.051 million tons (Brazil Textile 2021).

Table 2 - Production by sector

Production by segment in volume (tons)

Segmentos / *Segments*	2016	2017	2018	2019	2020
Fibras e filamentos / *Fibers and filaments*	**231.959**	**233.507**	**235.198**	**237.539**	**225.449**
Têxtil [1] / *Textiles* [1]	**1.901.101**	**2.011.254**	**2.031.334**	**2.047.600**	**1.905.400**
Fios / *Yarns*	1.170.216	1.211.834	1.220.386	1.222.920	1.161.812
Tecidos / *Fabrics*	1.241.037	1.269.416	1.267.040	1.264.871	1.162.157
Malhas / *Knits*	471.646	477.806	487.381	510.067	481.064
Näotecidos / *Nonwovens*	271.682	288.205	294.681	307.846	318.709
Confeccionados [2] / *Made up Articles* [2]	**1.588.834**	**1.605.716**	**1.599.678**	**1.630.452**	**1.444.666**
Vestuário / *Apparel*	1.010.877	1.035.868	1.031.003	1.051.839	879.253
Meias e acessórios / *Socks and acessories*	23.383	24.468	24.507	24.665	21.327
Linha lar / *Home textiles*	309.049	296.984	289.747	293.853	305.028
Outros / *Others*	245.526	248.397	254.421	260.095	239.058

Fontes: IEMI / ABRAFAS. Sources: IEMI / ABRAFAS
Notas: [1] A produção têxtil total, por critério, é medida pelo consumo aparente de fibras adicionado ao consumo interno de filamentos, mais a importação de fios e de tecidos planos em cru. Inclui polipropileno (filamento e ráfia).
[2] Calculado a partir do consumo de suas matérias-primas básicas (tecidos, planos, malhas, etc.)

Notes: [1] By criteria, total textille production is measured by the production of spun yarn plus the domestic consumption of filaments, more imports of wires and woven fabrics in raw, includes polypropylene (filament and raffia)
[2] Calculated from the consumption of its basic materials (fabrics, knit, etc.

Source: Brazil Textile 2021 (Port. / Eng.).

Funded by the European Union

As we can see in the above figure, the report Brazil Textile 2021 divides/ groups the Brazilian textile chain in three general, most relevant productive links/sub-sectors:

1. Production of chemical fibres and filaments,
2. Production of basic textile products (including textile yarns, woven fabrics, knitted fabrics and nonwoven fabrics) - made from natural and chemical fibres and filaments, and
3. Production of manufactured articles (including clothing, home-line articles and technical-industrial articles).[1]

The market structure of the sector is more concentrated in the links of the chain that precede the manufacturing (spinning, knitting, weaving and finishing) – that is, companies are medium or large, and capital intensive. In turn, especially in the clothing industry, which operates between the textile industry and retail, companies are mostly small and labour-intensive (Uniethos, 2013)[2]. In Table 3 below, there is a profile of these three big segments.

Table 3 – Totals by productive segment

Segments total - 2020

Fibres and Filaments [1] [2]	Textiles	Made up articles
16 units	2,582 units	22,020 units
4.7 thousand employees	240 thousand employees	1 million employees
225 thousand tons/year	2 million tons/year	1.4 million tons/year

Sources: IEMI / ABRAFAS
Notes: [1] Includes only chemical industries, suppliers of fibres and filaments for the textile industry
[2] Does not include olefin fibres

Source: adapted and translated from Brazil Textile 2021.

The reason is the proximity to the largest consumer centre in the country and distribution centres, wholesale and retail. In 2020, it is estimated that the Southeast region was responsible for 47.3% of the national production of the sector, followed by the South region with 28%. While the North, Northeast, and Midwest regions participate with 1%, 20.3% and 3.4%, respectively (Brazil Textile 2021). This has important implications on logistics for recycling.

[1] This division excludes natural fibres production since it has specificities for having agricultural origin.
[2] Although this data is relatively old, the pattern remains valid, as confirmed in the interview with ABIT.

Funded by the European Union

In 2020, the Brazilian textile production was estimated at 9.1 kg per inhabitant, a 7% growth compared to the previous year (according to IEMI criterion that adds internal consumption of filaments to the annual production of yarns). On the other hand, the consumption per inhabitant was 11.7 kg, a 9% fall compared to 2019. Such a difference between production and consumption indicates that part of the internal consumption was supplied by importations. Indeed, Brazil is considered to have a "producer-consumer" profile, that is, it produces enough for itself, with relatively small portions destined for export and without a large volume of imports. It ranks 24th among textile importing countries, 43rd among apparel importers, 12th among textile exporters, and 81st among apparel exporters (Brazil Textile 2021). Brazilian external trade of textile and apparel products presented growth in 2020 both in volume and in values, and, nevertheless, the textile chain trade balance presented a deficit in 2020 (US$263 million), but this deficit was reduced compared to 2019 (US$1.7 billion).

Associated with the increasing production, it is relevant to mention that the textile sector as a whole made a total investment of R$4.52 billion in 2020, of which 91% was in machinery, as Figure 4 illustrates below. Since 2016, there has been an increasing investment in general, and an increasing proportion in machinery. [3]

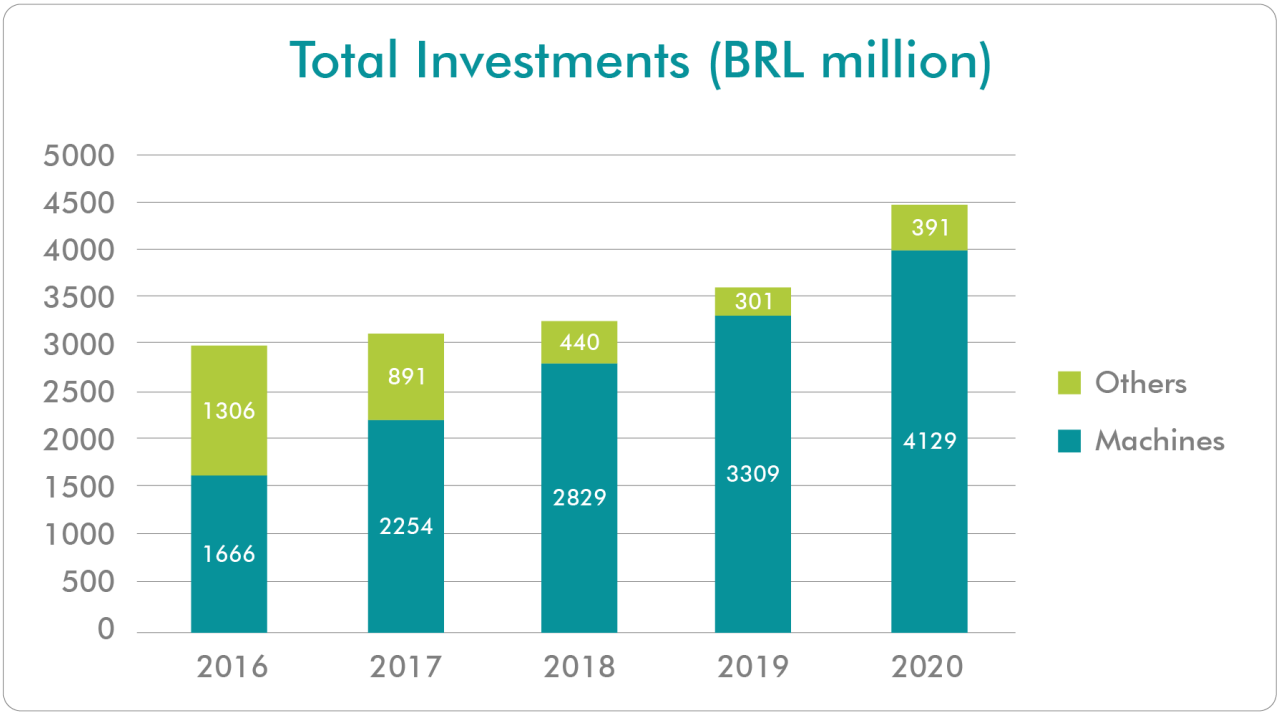

Figure 4 - Totals invested (million R$)

Source: adapted from Brazil Textile 2021.

[3] Note that, in Figure 4, the amounts are in Brazilian currency (R$), so absolute values should not be converted to Dollars without considering exchange rate variations among the years.

Funded by the
European Union

3.1.1 Recycling volumes

There are no official numbers about waste textiles destinations in Brazil, which is probably related, at least partially, to the fact that no reverse logistics or recycling obligations are in place for textile waste so far. Thus, all we have are some partial estimates.

Regarding post-consume (and part of post-industry), as the textiles selective collection and recycling in Brazil is quite incipient, it is well-known that the vast majority of waste textiles end up in landfills. There are some gravimetric analyses that usually do not separate textiles - they are included in the label "others". In 2020, ABRELPE (Brazilian Association of Public Cleaning and Special Waste Companies), estimated a percentage of 5.6% for "textiles + leather + rubber" (ABRELPE, 2020). Since the total landfill volume in the same year was 79.6 million tons, the total volume for this label was 4.4 million tons/year landfilled. However, it is hard to estimate the percentage of textiles alone.

In 2014, the total textile production was 2,092 thousand tons (ABIT, 2017). According to estimates from SEBRAE, in the same year, 170 thousand tons of textile waste was generated[4], which means that 8.12% of the industrial production becomes waste. From this, 80% was destined for dumps and landfills (Amaral et al., 2018). Corroborating the above data, ABIT cites an estimated volume of scraps in textiles of circa 8%. Considering 1.9 million tons of textiles were produced in 2020, it would correspond to 152.4 thousand tons of waste textiles in that year.

JF Fibras, which is the major mechanical recycler, processing approximately 24 thousand tons/year, estimates (by summing up the production of Brazilian defibering players) that approximately 60 thousand tons of textile waste are recycled per year. If this amount is correct, it would represent that approximately 40% of post-industrial textile waste is recycled, showing an improvement compared to 2014.

Regarding clothing alone, in Brazil there is a strong culture of donating used clothing, increasing their lifespan. However, when their life cycle ends, post-consumer textile recycling is negligible – if, even with mandatory reverse logistics of post-consumer packaging, recycling of common recyclable materials such as plastics and paper is low (around 5.3%[5]), textiles undoubtedly tend to zero. Except for a few initiatives to collect used clothing in retailers and handcrafted remanufacturing initiatives, the vast majority of textile waste is landfilled or used as WDF (Waste Derived Fuel). Actually, contradicting the donation culture, according to Gesner Oliveira[6], half of discarded cloth pieces in landfills have less than 1 year of use (Brazil Textile, 2021).

Besides the constraints related to sorting and selective collection, textile recycling also faces technological, logistical, and financial challenges (see next section).

[4] Although this is not explicit, being an estimate from SEBRAE we assume it refers to post-industry waste only.
[5] SNIS, 2020.
[6] In his book "Nem negacionismo, nem apocalypse".

Funded by the European Union

3.2 Analysis of the interviews

3.2.1 Interview highlights

In the following section, the most important points mentioned in the 13 interviews are presented, already in an analytical form, separated in positive and negative aspects.

POSITIVE ASPECTS

- Predominance of cotton (which has competitiveness and quality) (ABIT), so that synthetic material is still secondary (JF Fibras).
- Recycling of cotton is already well developed and will increase since the virgin material is at the highest price in the last 10 years (ABIT)[7].
- There is a Draft Bill (270/22) for the implementation of mandatory reverse logistics in the textile industry (ABIT, SENAI).
- Companies have been internalising concerns about circularity (ABRAFAS, SENAI)[8].

> **Our great challenge is how to produce without withdrawing overdraft from the environment.**
>
> *(Representative of Industry Association)*

- There is feedstock (raw materials) on the market (PET bottles and recycled PET flakes) to expand production of products made from recycled PET bottles (Ecofabril).
- Growing second-hand market, turning into business - estimated R$ 25 billion in the coming years (ABIT).
- Great demand for disposal (both scraps and clothes) by brands and public institutions (e.g. civil police, municipal guard) (Coopama).
- There is a lot of labour in the textile sector (clothing) available to work in sorting and shredding in cooperatives (Coopama).
- In the past, technologies took 10 years to arrive from Europe in Brazil, today this time is much shorter, around 6 months (Fibran).

[7] However it probably also incentivizes the use of synthetics.
[8] See examples in the interviewees' descriptions in Annex I

Funded by the European Union

- Development of new technologies by SENAI CETIQT (e.g. yarn with 50% dog hair, clothing with banana fibre) and several projects with companies (SENAI).
- Brazil has great potential to produce fibres from cellulose, eucalyptus (ABIT) and agricultural by-products (waste) - (e.g. jute, pineapple, banana, macaúba, etc. (SENAI).

> **The sky is the limit for fibres made from agro-industry residues and products from Brazilian biodiversity.**
>
> *(Representative of Industry Association)*

- Natural fibres may have better performance for certain applications than synthetic fibres (SENAI).
- Consumers in general do not throw clothes away (or send them for recycling); they donate it to needy communities (culture of reuse) (JF Fibras, ABIT).

NEGATIVE ASPECTS

GENERAL

- The [textile] sector depends heavily on the country's economic stability (ABIT).
- Great fragmentation of the sector and pulverisation especially of manufacturers [factions] (ABIT, SENAI), which generates a large amount of small scraps, difficult to separate and therefore with low market value (ABIT), and makes integration difficult (SENAI).
- Lack of tax incentives for recycling (in general, including textiles), whether for manufacturers or consumers (ABIT, JF Fibras, ABRAFAS, Rhodia, Ecofabril, SOMA, Eurofios, Fibran).
- There are no laws that oblige/encourage the use of recycled material (e.g. ethanol in gasoline) (JF Fibras).
- Lack of confluence of state (and federal) laws: "The entrepreneur does not know who to assist." (ABIT).
- Lack of knowledge (about circularity, recycling, textiles) on the part of governments, which generates a lack of adequate public policies (ABRAFAS, Rhodia).
- There is a lack of data to assist in assertiveness in production, so that

there is not much left over of ready-made clothing, which ends up going to liquidation (ABIT).

- Lack of indicators that can generate an assessment of the evolution or stagnation of the sector, such as electricity consumption and production, number of labour processes, use of water, waste, and raw materials (ABIT).
- Lack of sources of information (studies) on production from recycled textiles (Eurofios).
- Despite the advantages of the donation culture, the problem arises that the final destination is out of control when the part's life cycle ends (Rhodia, Renner).

WORKFORCE

- Difficulty in obtaining qualified labour for recycling plants, as young people have been preferring computer work (JF Fibras, Fibran), and also due to the unsanitary environment (dust and heat due to the machinery, despite all the care/protocols followed) (JF Fibras).
- Lack of technical courses aimed at textile and nonwoven recycling (the existing ones are aimed at the production of yarn, fabric, homeware, and loom) (JF Fibras).
- Lack of training in sustainability for engineers and technicians (SENAI).
- Lack of knowledge and technical capacity on the part of cooperatives that could receive and sort materials (Coopama).
- Training faction personnel is expensive and inefficient (Eurofios).
- Lack of training and encouragement for fashion designers to use more sustainable/circular materials (SENAI, Rhodia, Hering, SOMA). Stylists and designers of brands in general do not have a sustainable "footprint"; they are used to a more traditional business model (SOMA).

Funded by the European Union

RECYCLING TECHNOLOGIES

- Evolution of the Brazilian market has taken place with blends of cotton and synthetic fibres (ABIT) - e.g. 80% of the polyamide sold is blended with elastane -, and fibre blends always make recycling difficult (Rhodia, SENAI, JF Fibras, Renner, Eurofios, SOMA, "Fabrics Producer").

> **European Union money would be well spent on research aimed at making fibre separation viable.**
>
> *(Representative of Fabrics Producer)*

- For each type of yarn, production and recycling are different processes and the equipment needs to adapt to each one of them (SENAI).
- The cost of the recycled fibre production process is higher than that of virgin resin due to necessary cleaning (it could be equivalent if there were incentives or better sorting) (Rhodia).
- Production of polyamide from recycled PET bottles has about 30% loss due to different materials of caps and labels, as well as contaminants (Ecofabril).
- Recycled PET fabric does not become fibre to fabric again as recycled polyester chemically loses properties (viscosity) - only downcycling is possible for now (Ecofabril).
- PET oil is less recycled because it causes problems in treatment plants (Ecofabril).
- Mechanical textile recycling for textiles needs at least 70% cellulosic fibres (Eurofios) or even 80% cotton (Ecofabril).
- The informality of recyclable suppliers makes business difficult (Ecofabril) and causes insecurity for deferring taxes on the distribution/sale of recycled fibres (ABRAFAS).
- Post-consumer mechanical recycling (complete garments) is more complex, more work, and requires pre-sorting / pre-treatment: removing buttons, zippers, etc. (JF Fibras, Eurofios).

- There is a demand for recycled yarns, but mainly for fine yarns, and for this, only the purest recycled material is used (Eurofios).
- The problem with defibration is that it breaks the fibre and loses quality (Renner).
- Mechanical recycling of synthetics is more complex because of the machinery (JF Fibras) - it is necessary to work with fewer drums, lower speed, the scale is smaller (Fibran).
- Mechanical recycling of synthetics is not yet possible in scale, and chemical recycling has a lot of water consumption, application of chemicals, and requires treatments, including in the new confection; therefore, a better way would be to develop synthetic fibres that are easier to be physically recycled (Eurofios).
- Power generation is the fastest solution for synthetics, but not the best - by-product does not have much value (ABIT).
- Difficulty of noble destination adding value to waste that cannot be recycled thread by thread (Eurofios).

> **There is [still] no project robust enough for scrap recycling in the country.**
>
> *(Representative of Industry Association)*

MARKET / BUSINESS MODEL / LOGISTICS

- The textile industry in Rio de Janeiro was reduced; many clothing [factions] closed (economic decline, concentration in SP) (Coopama).
- Large distances between producers and recyclers generate more costs (ABIT).
- Difficulty in obtaining good quality raw material for recycling (labels, dirt) (ABRAFAS). Brazil imports a lot of textile waste for recycling because the internal scenario is unfavourable (many small manufacturers, no colour standardisation), so it may be more worthwhile to import from Central America (e.g. from Gildan) to the northeast than from the south of Brazil, due to better colour standardisation and separation process (Pantone Colour System) (JF Fibras).

- Seasonality/volatility in raw material availability and prices (ABRAFAS, Ecofabril, JF Fibras, Renner); in winter there is less raw material on the market, requiring planning and storage by recyclers (Ecofabril); small shredders vary their purchase prices a lot (from the big supplier), it is better to pay less, but regularly (Renner).
- In the production of natural alternative fibres there are logistical and scale difficulties (SENAI).
- Business models such as second hand, exchange, repair, resale, rent, and "subscription" have been and are being tested, but they are a lot of work and not profitable; difficult to scale and to be profitable (it's more a question of ethics and more for sustainable marketing) (SOMA).

> **I don't believe in a solution that is not economically viable.**
>
> *(Representative of Fabrics Producer)*

> **As long as it's not scalable and profitable, it's not business, it's marketing.**
>
> *(Representative of Retailers)*

- Difficult competition with China and India (for export) due to cheap labour (JF Fibras).
- Imports of polyester fibres from China are a major competitor for the national industry (Fibran, Renner) - it reaches 50% of the market share of recycled synthetic fibres (Ecofabril).
- Financial difficulty of cooperatives to obtain machinery for shredding (Coopama).
- Difficulties with deadlines for arrival of equipment from outside Brazil - dependence on customs demand (Ecofabril).
- "There is no ability to buy modern equipment in Brazil". Despite the technologies being able to reach the country more quickly today, the financing of equipment is still a problem (it takes 20 years to pay abroad) (Fibran).
- Lack of design for sustainability/circularity (SENAI, Rhodia, Hering, SOMA). Design for circularity is more labour-intensive and costly - manufacturing from scraps requires more work (SOMA).

> **The definition of the business model and product strategy is what should define the investment in the process. It is not the process that should drive the product or the investments!**
>
> *(Representative of Industry Association)*

> **To lead the transition to sustainable fashion is to have a hybrid vision of the short and medium term, because later on these will be relevant.**
>
> *(Representative of Retailers)*

- Fast-fashion growth (ABIT, Rhodia, SOMA, Eurofios) - due to its speed, the challenge for recycling increases (Rhodia).
- Research (e.g. at USP) on improvements in washing machine filters is still in its infancy (ABRAFAS).
- Post-consumer waste collection (ABRAFAS) / selective collection is still incipient (Rhodia).

CULTURE / CONSUMERS / RESPONSIBILITY

- Culture of innovation in Brazil is more incremental and less radical and disruptive (SENAI).
- Lack of a culture of sustainability/circularity on the cutting tables – material comes out very contaminated (JF Fibras, ABRAFAS).
- Lack of appreciation of entrepreneurship and innovation in new materials, as well as investment (SENAI).

Funded by the European Union

> **Today the financial sector begins to put this agenda [of sustainability/circularity] for investments.**
>
> *(Representative of Retailers)*

- Lack of consumer knowledge about proper disposal (Rhodia).
- Low perception of value by the end customer - although surveys indicate greater consumer concern, no predisposition to pay more is identified (ABRAFAS, SENAI). Consumer perception is that recycled products have inferior quality and therefore should be cheaper (ABRAFAS).

> **The vision must also change: recycling may not generate a product with the same characteristics, but it has to stop seeing a defect and see a new effect, as long as it has value.**
>
> *(Representative of Industry Association)*

- Lack of planning and structure to recover post-consumer textiles (e.g. PEVs) by brands (Hering). However, there is no point in the consumer returning in droves and the company not having a good destination guaranteed (Renner).
- Lack of integration/collaboration/engagement in the chain (SENAI, Renner, SOMA, Eurofios) to reach agreements on logistics and prices (Renner), find intersectoral solutions, and create networks (through catalytic entities) (SOMA).

> **Taking a leading role in sustainability issues in the textile industry comes from business ethics, and not from the consumer.**
>
> *(Representative of Retailers)*

3.2.2 Microplastics

The interviewed recyclers JF Fibras, Eurofios and Fibran do not use water in their processes, so there are no concerns about microplastics (less than 5mm). Rhodia uses water, so microplastics can be dragged during the polyamide production process. To avoid this, they have filters at the exit and cooling of the polymerizations, decantation treatment, and agitation in the ETE (Effluent Treatment Station), which is stated to be sufficient to retain this type of particle. Similarly, Ecofabril declares that their process includes screens in the effluent treatment plant that block the passage of microplastics. The "Fabrics Producer" does not have microplastics filtering processes, but it has processes and equipment that reduce the consumption of water, chemicals, and CO_2 emissions.

While in the production of fibres and filaments the processes are more easily controlled (a few big companies), in the manufacturing sector the control is probably much weaker (many small, scattered units). And, ahead in the chain, in the post-consumption phase there is no control at all, as the laundry machines still don't filter microplastics, and the degradation of the textiles increases over time.

Our interviewed **"Fabrics Producer"** states that the initiatives related to microplastics have been done by the chemical industry, not the textiles, and that they are spending billions on research.

Funded by the European Union

3.2.3 Technology demand

In general, the interviewees did not show a need for innovative technologies. Some declare that they always invest in new technologies with companies' own resources. ABRAFAS "don't believe there is a specific type of equipment or technology that we do not have access to [in Brazil]. For our associates with headquarters outside the country, there is knowledge and broad access to the most modern in the world. In Brazil, they make use of houses that distribute knowledge such as SENAI CETIQT, Fundação CERTI, Mackenzie University, and USP, for example, or even internal research. These institutes are well equipped and have high-quality teaching staff. There is not a very fluid dialogue, and costs are not always cheap, but it has improved a lot in recent years."

On the other hand, some interviewees did mention some technology needs (without citing specific models or brands), which we ordered approximately by these themes below:

- Technology/equipment capable of automatically selecting textile waste (fabric scraps from the cut of the garment) – "Probable characteristic of innovation because this process is currently performed manually". (Eurofios).
- Technology for automatizing the process of trimmings (buttons, zippers, etc.) take-off (JF Fibras).
- Technology to sorting waste textiles by colour identification (JF Fibras).
- Equipment for material identification (sorting) to avoid mixing of materials during the recycling process (Rhodia).
- Recycling equipment that allows receiving textile waste without the need for prior preparation (Rhodia).
- Defibering machinery for cooperatives to be able to benefit textiles (Coopama) - not necessarily innovative in this case, it is more a matter of financial support.
- Defibering machinery with more stages, in order to preserve fibre strength (Renner) - in this case the company was talking generally, not for itself, as it is just a retailer.
- Technology of impurity filtration systems that can allow the spinning process of post-consumer material (Rhodia).

Funded by the European Union

- Machines capable of shredding synthetic fabrics on a large scale. Currently, the shredding machines (JF Fibras and Eurofios) need to have a predominance (more than 70%) of natural fibres, because the high speed with which the current machines work generates heating by friction, which causes the synthetic material to melt undesirably.
- Technology for separation of different materials, for example polyamide and elastane (Rhodia).
- Technology for processes (physical, chemical, and/or biological) that make it possible to separate synthetic fibres from cellulosic or of cellulosic origin that are economically viable ("Fabrics Producer").
- Large-scale technology for recycling elastane (SENAI) - SENAI developed a technology but it lacks economic viability for scaling up.
- Automated fabric cutting technology accessible to small confections, reducing waste generation from cutting (large manufacturing companies do have automated processes, but the Brazilian market is predominantly composed of small manufacturing companies) (observation of the authors).

Funded by the European Union

3.2.4 Challenges and opportunities

A Matrix of challenges and opportunities is presented below, in which were summarised and grouped the main positive (Strengths/Advantages/ Levers) and negative (Barriers/Gaps) aspects regarding the sustainability/ circularity of the Brazilian textiles industry, based on the interviews made.

Figure 5 - Matrix of Challenges and Opportunities

OPPORTUNITIES (Strengths / Advantages / Levers)	CHALLENGES (Barriers / Gaps)
Thriving textile market - intense domestic production and demand	Lack of tax incentives for recycled/sustainable products Scattered market of manufacturers, generating a lack of integration and standardisation of processes and inefficiency in the reuse of cutting leftovers Competition from Chinese recycled products (cheaper) and scraps from Central America (better standardisation /sorting quality) Lack of data to generate production and consumption indicators for the sector
Companies have internalised concerns about circularity (e.g., search for more sustainable raw materials, development of sustainable products, high demand for sustainable disposal)	Lack of systematic and scaled processes for circularity in the links of textile production and marketing Higher cost of existing sustainable models/technologies/materials Difficulties with business model transition (linear to circular) Lack of dialogue for intra- and intersectoral solutions in the chain
Large companies with the ability to innovate	Lack of investment in innovation and design for circularity Lack of funding and incentives for machinery/equipment Time-consuming machinery import Alternative models not yet scalable/profitable (cashback, repair/customising, resale, rent, subscription)
Incentive to sustainability / circularity by industrial associations and SENAI CETIQT	Lack of culture for circularity by companies and employees Lack of training of stylists for the use of sustainable materials

OPPORTUNITIES (Strengths / Advantages / Levers)	CHALLENGES (Barriers / Gaps)
New Draft Bill (270/22) to implement mandatory reverse logistics in the textile industry	Lack of mandatory textile reverse logistics infrastructure (post-consumer) Lack of culture for circularity in general
Availability of manufacturing labour for the sorting/shredding sector	Informality of the manufacturing workforce Lack of skilled labour for the textile recycling industry
Predominance of natural fibres (cotton), with relatively developed mechanical recycling	Mechanical recycling at scale with predominant application for downcycling High degree of blending of fibres (natural and synthetic, in various combinations) in fabrics, making recycling difficult Post-consumer mechanical recycling (complete clothes) very labour intensive
Abundant feedstock (PET) for the production of recycled synthetic fibres (polyester)	Seasonality in supply and poor quality (contamination) of available recyclable materials Informality, including tax-related issues, of the chain links related to collection/sorting/shredding The cost of the fibre production process from recyclables is higher than using virgin resin, due to the necessary cleaning
Chemical recycling of 100% polyamide fabrics for noble applications (e.g. engineering plastics), and under development to have textile-to-textile applicability	Chemical recycling still without available technology (or at an affordable cost and feasible at scale) so that synthetic textiles (polyamide and polyester) can be recycled textile-to-textile Very limited mechanical recycling of synthetics
Great potential to produce fibres from cellulose and agricultural by-products	Difficulty of scaling the production of natural alternative fibres

OPPORTUNITIES (Strengths / Advantages / Levers)	CHALLENGES (Barriers / Gaps)
The chemical industry is investing substantially in research to minimise microplastics pollution	Lack of control of microplastics generation, especially in the clothes manufacturing sector, as well as in post-consumer context, where the textiles degrade over time and there is no filter technology in common laundry machines
Consumer accustomed to reuse of clothing Growing second hand market	Consumer unwillingness to pay more for more sustainable apparel products Lack of incentive to consumers for recycling waste textiles

4 MAIN CONCLUSIONS

Regarding process improvement, capacity building for recycling is much needed, from the upstream (design for circularity) to the downstream (workforce for the recycling plants, improvement of selective collection, and sorting models). At the very end of the chain, it is necessary to communicate better to consumers, incentivising (e.g. through cashback) adequate destinations for clothes that cannot be donated/reused. However, recycling of post-consumer textiles (especially clothes) also involves technological and logistical challenges.

In terms of technology, textile-to-textile recycling technologies (mechanical or chemical) are still in a initial stage in Brazil. For synthetics, there are no mechanical possibilities yet, and chemical recycling has a high water demanding and chemicals-dependent (although water demand has been significantly reduced in the last decades). Possible paths would be research for more biodegradable synthetics, mechanical recycling possibilities for synthetics, and more eco-friendly technologies for chemical recycling.

One particular example is: there is still no industrial-scale to recycle polyester fibres. The recycled polyester from PET bottles is already widely used in industrial-scale, but this addresses more of a recycling problem from the packaging sector than the circularity of the textiles industry.

Both for chemical and mechanical recycling, the mix of materials in textile pieces is one of the greatest challenges. However, this is something difficult to change, since the mixtures are made both due to price issues and to properties of the materials (strength, elasticity, drop/fall, etc.). Moreover, the blend of materials can be done both in the yarn itself (yarns with mixtures of different fibres - also called “intimate mix”) and in the fabric (woven fabrics /knitted fabrics with a mixture of different yarns), which turns the scenario more complex. Therefore, technologies to separate blends would be of great relevance.

In respect to business models, the more sustainable/circular models known and tested in Brazil – second hand, exchanges, repairs, resale, rent, "subscription" – as well as the production with alternative natural fibres and the textile-to-textile recycling itself, are still not scalable or rentable.

Even the more basic mechanical recycling for downcycling is still limited. The selling prices of the recycling products are low, and the market, small. Thus, anything that increases the cost, such as logistics factors (e.g. long distances, low quantities), intense sorting processes or need to remove the trimmings (buttons, zippers, ribbons) from clothes, decrease the feasibility of textiles recycling.

The highest impact of investments would probably be on the production and recycling link chains. In terms of production, design for circularity could strongly influence the whole chain, increasing recyclability by developing new synthetic materials that can be recycled more easily, using more monofibres, favouring the use of natural fibres, besides facilitating for small and medium-sized manufacturing companies to purchase automated cutting equipment that optimise cuts by avoiding waste.

In recycling, automated processes of sorting (colour and/or materials) and removal of trimmings could boost post-consumer textile recycling. Development of new technologies for fibre separation will be fundamental to ensure the viability of textile recycling, as well as new, eco-friendly technologies for chemical recycling of synthetics.

Increasing awareness for control of microplastics pollution in the industry could be impactful especially for the manufacturing sector (consisting of many small companies with low technology), but this would be more related to improvements on cutting processes, not washing. The issue of pollution by microplastics is very relevant for the post-consumer context, as the clothes degrade over time and no filters for laundry machines are developed so far. In this case it involves other industries though – the white goods producers, financed by the chemical, plastic producers' industry.

Repair, reuse, and take-back-systems are not profitable or scalable yet. Public/tax incentives that make it rentable would be one way to lever it.

Funded by the European Union

5 RECOMMENDATIONS AND SUGGESTIONS FOR FUTURE FOLLOW-UP

1 PUBLIC POLICIES

- Create an inter- and intrasectoral group to analyse and propose, together with the actors in the chain, a win-win proposal for the Draft Bill 270 that institutes the obligation of reverse logistics for textiles.
- Create/incentivize PES (Payments for Environmental Services) Systems (e.g. Circular Credits), since the market prices of textile waste are low and the logistics for the recyclers are expensive.
- Advocate for tax incentives for recycled textile products (currently the taxes are the same as for textiles made of virgin materials).

2 COMMUNICATION

- Create discussion forums/seminars about textiles circularity, including the whole chain as well as European peers, with a special session on circular design for stylists.
- Elaborate a Guideline on Best Practices for Textiles Circularity, directed to the industrial chain, fashion designers, and fashion college students.

- Create an educational campaign directed to consumers about slow fashion.
- Develop a recycling stamp for textile and create a communication strategy to disclose it for consumers.

3 FUNDING

- Create/facilitate cheap and long-term credit lines for equipment purchase (e.g. with BNDES - National Development Bank).
- Finance research and development of more eco-friendly, scalable, and economically viable technologies to separate fibres, and innovative mechanical/chemical recycling of textiles. It could be done through supporting projects or awards within the Academy or R&D Institutions.
- Support a pilot to implement advanced collection point(s) for receiving, sorting, removing trimmings, shredding and baling, and storing waste textiles materials, increasing the volumes recycled and optimising logistics costs (both for post-industrial and post-consumer).

Funded by the
European Union

6 REFERENCES

ABIT - Brazilian Association of Textile Industry and Manufacturing – Brasilia; CNI - National Industry Confederation,, 2017. The textile and manufacture sector and the challenges of sustainability. Brasilia, 2017. 102 p. (Portuguese)

ABRELPE (Brazilian Association of Special Waste and Public Cleaning Companies), 2020. Solid Waste Landscape in Brazil (Portuguese)

Amaral, M. C.; Zonatti, W. F.; Silva, K. L.; Karam Junior, D.; Amato Neto, J.; Baruque-Ramos, J. 2018. Industrial textile recycling and reuse in Brazil: case study and considerations concerning the circular economy. Management & Production 25, n. 3, p. 431-443.

Cavalcanti, A. M., & Santos, G. F. (2022, July/September.).The textile industry in Brazil: an analysis of the importance of competitiveness in the global context. Revista Exacta. 20(3), 706-726. https://doi.org/10.5585/exactaep.2021.17784. (Portuguese)

IEMI - Market Intelligence, 2021. Brazil Textile 2021 – Sectoral Report of Brazilian Textile Industry. V.21, n. 21. São Paulo, IEMI.

SNIS - National Information System about Sanitation, 2021. Ministry of Regional Development, National Sanitation Secretary – SNS. Thematic Diagnosis Urban Solid Waste Management; National Sanitation Information System – Overview, 2020. (Portuguese).

Sustainability and Circular Economy Core, SENAI CETIQT. The sustainability and circular economy in the textile and manufacturing industry. Brazil, 2021. (Portuguese)

UNIETHOS, Sustainability and Competitiveness in the Fashion Industry. São Paulo: Uniethos, 2013 (Portuguese)

Funded by the
European Union

ANNEXES

Annex I - Description of the interviewees

Industrial Associations

ABIT

The Brazilian Textile and Apparel Industry Association (ABIT), founded in 1957, represents 24.6 million companies of all sizes installed in the national territory, which employ more than 1.3 million workers and generate an annual turnover of R$161.4 billion (2020 data). In 2022, ABIT has about 600 direct and six thousand indirect members (through the unions), and develops a series of partnerships - among others, with SENAI CETIQT. In convergence with the Global Fashion Agenda, ABIT valorises aspects of traceability of the supply chain, sustainable composition of materials, and circular fashion system. Its vision of the future for 2030 includes sustainability and circular economy as strategic dimensions, and for this it plans to develop a verticalised and technologically integrated value chain.

ABRAFAS

ABRAFAS - Brazilian Association of Producers of Artificial and Synthetic Fibres is a class entity founded in 1968 with the purpose of bringing together, within the country, companies dedicated to the production, transformation, and commercialization of manufactured or chemical fibres (which may be artificial or synthetic). Within its basic principles and objectives, it has sought to represent, coordinate, and defend the interests of chemical fibre industries before national or international public and private entities, seeking to reconcile the interests of its associates. As of 2022, there are 13 associated companies.

SENAI CETIQT

Created in 1943, SENAI CETIQT – the Chemical and Textile Industry Technology Centre of the National Service for Industrial Learning, is one of the largest Latin American centres for the production of knowledge applied to the production chain of these sectors, offering to the industry and the market a range of transversal services. Through the SENAI Technology Institute of Textile and Apparel, it provides specialised services in metrology (tests for conformity assessment and calibration), consulting (creation, production, and quality) and applied research (creation or improvement of new materials, products, processes, and systems). The SENAI Institute for Innovation in Biosynthetics was created to develop solutions in sustainable chemistry through biotechnology and new renewable resources for the establishment of products and processes, thus meeting the RD&I demand

of the Brazilian chemical industry. Some technologies developed by SENAI CETIQT are mechanical recycling of elastane, dog hair fibre (50%), banana stem fibre, recycled fibres from PPE fabric (flame retardant properties), fabric with baru dye (UV property), PE fibre with graphene, recycled fibres from residue of jute fibre, pineapple fibre, macúba fibre.

Fibres and filaments producers

ECOFABRIL

Founded in 1994, Ecofabril is one of the pioneers in recycling PET bottles in Brazil, transforming them into polyester fibres. It has around 20-25% of market share, being the largest in Brazil in its segment, as its competition is mainly from China and from domestic producers that use virgin resin. As of 2022, the company has an installed capacity of 36 thousand tons per year, which represents approximately 1 billion recycled PET bottles. It has an industrial park with the most advanced lines for recycling PET and manufacturing of polyester fibres in operation in Latin America. Its polyester fibres are made with 100% recycled raw material (60% recycled PET flakes and 40% bottles), with 3.5% going to spinning, and the rest to industrial applications. Its production uses 70% crystal, 22% green, 5% blue, and 1% each for amber, orange, and pet oil PET packaging. Polyester has applications in car roof coverings, trunk and luggage compartment lining, automobile and domestic carpets, shoe lining, felts, cleaning cloths, surgical masks, blankets, interlinings, filters, abrasive materials, stuffed animals, cushions, pillows, comforters, and furniture.

Rhodia

Rhodia is part of the Solvay Group (headquartered in Brussels), which in 2022 has around 24,000 employees in 64 countries, and only in Brazil does the group have textile products. The company has a 70% share of the polyamide market in Brazil and sells to integrated companies (from yarn to clothing), and to spinning. Its products are mainly used for beachwear, sportswear and underwear. Since 2007, the group has had a systematic sustainability program, now called "Solvay One Planet", with 10 goals for 2030, including increasing products based on renewable or recycled sources to 15% of sales - whereas in Brazil today there are already 30%, with a goal of reaching 50%. Since 2013, Rhodia Brazil has been developing more sustainable products, such as Amni Soul Eco - a polyamide that is biodegradable in three years (instead of 100 years) -, Amni Colours - which already comes out with pigment in the spinning process (avoiding dyeing by the buyer) -, and Bio Amni - a textile yarn that is 47% renewable (sugar fermentation). The company also chemically recycles 100% of all its production waste, which is later used in noble applications such as "plastic engineering", and has been investing in ways to start using it back for spinning, as well as 100% polyamide clothing from its customers (project with uniforms).

"Fabrics Producer" – no description due to confidentiality.

Manufacturers / retailers

GRUPO SOMA

The group was established in 2010 by the merger of the Farm and Animale brands, and later the Fábula, Foxton, Cris Barros, Off Premium, Animale Jeans, Animale Oro, Maria Filó, NV, Hering, and Dzarm brands were added. In 2020, Grupo Soma was the 4th largest in fashion retail in Brazil (income of R$ 2.317 billion in 2020). There are more than 250 stores and 5300 employees. Its production is 70% to 80% outsourced (factions); the rest is purchased as finished products. There are brands, such as Farm, with their own cutting line. In terms of raw material, they use more than 95% of natural fibres/ cellulose, being about 60% viscose, 20% cotton, 10% linen, and percentages close to 1% of polyamide, acetate, polyester, and others. The group takes great care when choosing its suppliers: it buys products with the Better Cotton Initiative Certificate, CANOPY and ECOLABEL certification from the EU, the polyamide Amni Soul Eco from Rhodia, yarns recycled by Eurofios (to which it sends its cuttings), and also from suppliers such as LENZING, which has several technologies for a less impacting viscose production. To different degrees, the group's brands have been developing projects for resale, rental, subscription, repair, in addition to tests such as chemical recycling of viscose (e.g., generating fertiliser and glucose), and the first fully circular product, made of scrap recycling, is about to be launched (2022).

Hering

In 2021, the Co. Hering, founded 140 years ago, became part of the SOMA Group. With a presence throughout Brazil and revenue of R$1.074 billion in 2020, it is also present in Latin America. According to company data, 50% of Brazilians use or have used Hering. In 2022, the brand has an 80% share of knitted yarn in Brazil and uses more than 70% cotton in its clothes. Its production is vertical – from yarn to clothes –, with production centres between the south, southeast and centre west. In 2012, the Sustainable Fashion program was created, with the objective of continuously developing social and environmental issues with suppliers that are part of its production model, whether owned, outsourced or sourcing. Sustainable Fashion monitors and identifies challenges and opportunities in the relationship with the supplier network, in addition to encouraging these partners to build and share the same values and commitments as the company. The brand has several initiatives related to sustainability/waste circularity: waste separation in the cutting line, use of software that allows the calculation of fabric waste in the process, restoration of pieces, booklet on sustainable raw materials for stylists, development of upcycling technologies through investments in the Fashion Hub, partnership with Eurofios for spinning textile waste, body size design without side seam (facilitates recycling), studies and pilot use of natural dyes, among others. Its business model is focused on products

with a lower impact (recycled, certified, and renewable), with a goal of "zero landfill" in 2030 for waste from factories.

Renner

Leader in fashion retail in Brazil (2020 revenue of R$6.66 billion), in 2022 the Renner Group has digital channels and more than 600 stores in Brazil (in all states), Argentina, and Uruguay. Its first store dates from 1922, but in 1965 the company Lojas Renner S.A., the chain as it is known today, was created. In 1967, it became a publicly traded company, and was the first Brazilian corporation to have 100% of its shares traded on the stock exchange and listed on the Novo Mercado - an important level in B3's corporate governance levels. The group has the businesses Renner, Camicado, Youcom, Ashua, Realize, Repassa, and Uello. The production is 100% from third parties, with 70% of sales coming from domestic production. In 2022, the company's material share is 43% cotton (it was 60% two years ago, there was a drop due to price and availability), 30% polyester, 14% viscose, 8% polyamide and 6% lyocell, elastane, and others. Since 2011, the brand has Voluntary Delivery Points for used clothes, which are mostly donated, and has been developing some projects to increase the life cycle and upcycling. The company reports that it has already achieved 80% less impactful products and 100% certified cotton. For its new cycle, it is focusing on the traceability of processes and products from its suppliers, and has a goal of increasing the use of recycled materials by 20%.

Waste textiles treatment

Eurofios (Ecofibras Indústria Têxtil)

Group founded in 2004; has 100% recycled yarn production. It has two units in Blumenau and Ascurra (state of Santa Catarina), with a total of 16 thousand m2, with more than 300 direct employees and 60 sales representatives. In 2022, it processes 12 thousand tons of textile waste per year, of which 6 thousand are transformed into recycled textile yarns, and the rest for the automotive and civil construction sectors. For the recycling process they need 70% cellulosic fibres (cotton, viscose). Eurofios estimate their market share at around 12-18%, but they are the largest in their segment because they are fully verticalised (they collect and deliver back to the market). They recycle 7% of the post-industrial waste textiles generated in Brazil and they are certified by the Global Recycled Standard (GRS), which verifies products that contain recycled material, with monitoring from their origin to the final product.

Fibran

The Fibran do Brasil group has been operating for more than three decades in the market of blankets, shreds and textile fibres, with products made from recycled synthetic textile waste (polyester, polypropylene, nylon, acrylic). They receive waste mainly from spinning and weaving, and transform them into blankets and felt for the furniture, mattress, and automobile industries.

They have been working on a project with Puket for nine years, collecting used socks and producing blankets to donate. They have a processing capacity of 4-5 tons/day and are operating at full capacity, currently producing 2-3 thousand blankets/day. They are not the biggest in their niche market, but there are only two other manufacturers of recycled blankets in Brazil. There is no competition from imports, and today they are unable to export, despite the demand. The company has greater demand than it can meet, and could increase its capacity if financing for new production lines is facilitated.

JF Fibras

Founded in 2004, it is one of the largest mechanical recyclers of textile waste in the country, a leader in the supply of defibered jeans, knit, acrylic, and synthetic products for the national and international automotive sector. The factory in Suzano (SP) has an area of 12 thousand m² and receives postindustrial waste (shavings) mainly from the Brás hub, but also from the South and Southeast regions as a whole. 70% of what it processes is textile scraps with 80-90% cotton. In 2022, the company is the largest in its segment in Brazil, processing 2,000 tons per month, and production is being expanded by over 500 tons per month. The main destination of its fibres is acoustic coating in the automotive sector (today around 40-50%), but due to the downturn in the automotive sector, it has diversified into fillers, recycled yarns, and handicrafts. The company has developed entrepreneurs to set up advanced collection points. No water is used in its production process, and the energy is 100% renewable. Waste that cannot be shredded is sold to power generation companies.

Coopama

Coopama is a well-developed waste pickers cooperative founded in 2004 in Rio de Janeiro, with circa 65 associates. The cooperative performs a massive solid waste recovery (collection, sorting, adequate destination) in many contexts - official municipal collection, big waste generators, urban areas (events), eco barriers in rivers. They work with almost all kinds of non-dangerous residues, including e-waste, vegetable oil, and wood, and developed a carpentry program to build and reform used furniture. They also built and maintain a solid waste museum open to visitors where they receive schools for environmental education activities.

CIRCULAR PLASTICS
IN THE AMERICAS PROGRAM

Funded by the
European Union

This project is implemented by

GFA
CONSULTING GROUP

clean

NIRAS