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Textile waste mapping in Egypt

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UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION



1. Introduction and methodology

3 ≡ Introduction

This document is the final version of the mapping study of the textile waste value chain (post-industrial and pre-consumption) in Egypt, conducted by Blumine and Reverse Resources within the framework of the SwitchMed/MedTest III initiative launched by UNIDO.

The study includes:

- an estimate of the volumes of waste generated by the textile and clothing industry in Egypt by fiber, quality sector and region
- an assessment of the current and potential destinations of textile waste
- a description of the current and potential waste management and recycling value chain
- an analysis of the international scenario in the field of textile waste management
- an analysis of the evolution of textile recycling technologies and current developments
- finally, an elaboration on the more suitable business models from which to select potential pilot cases for the country

4 ≡ Methodology

The methodology for the quantitative estimation of waste, the assessment of waste destinations and the description of the current and potential waste management and recycling value chain, is based on two main pillars:

1. A survey of a large sample of enterprises, for the collection and analysis of the ratio of waste to materials processed in production in the different sectors of the textile-clothing sector and other qualitative information useful for better understanding the waste management methods of textile and clothing enterprises
2. The creation of an accounting model of physical production flows in the textile-clothing supply chains : from the availability and import of raw materials, yarns and fabrics, to the production of clothing.

ESTIMATION OF THE WASTE/MATERIAL RATIO

The parameter of the waste/material ratio is estimated by subsector: spinning, weaving, cutting fabrics, manufacture of garments using the information collected from the 46 companies involved in the mapping survey, supplemented by information acquired in other countries.

Given the objective is to estimate an average annual production of waste over the years, changes in the volumes of material stocks are not taken into account and are set at zero in the model.

The waste/material ratio is applied to the volume of fibers processed and the amount of waste generated is calculated at each stage of the supply chain.

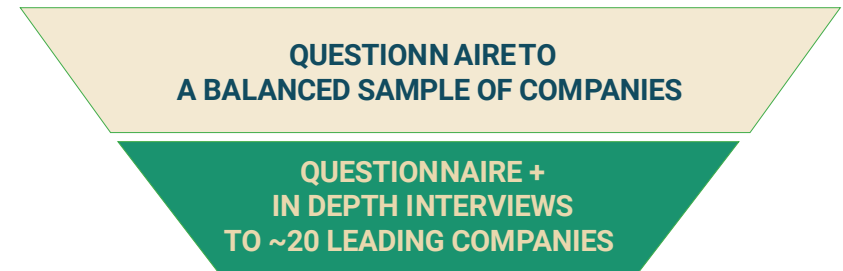
Waste/material ratio and waste management information

THE PRIMARY DATA COLLECTION CAMPAIGN

1 **Target:** a balanced sample by sector and size
Objective: to collect richer information, to add qualitative information,
Method: detailed questionnaire in the form of an interview

2 **Target:** 20 leading companies
Objective: to understand the practices, the challenges and the opportunities
Method: in-depth interview with the participation of the team of international experts. Quantitative data collection + qualitative information, views and perspectives

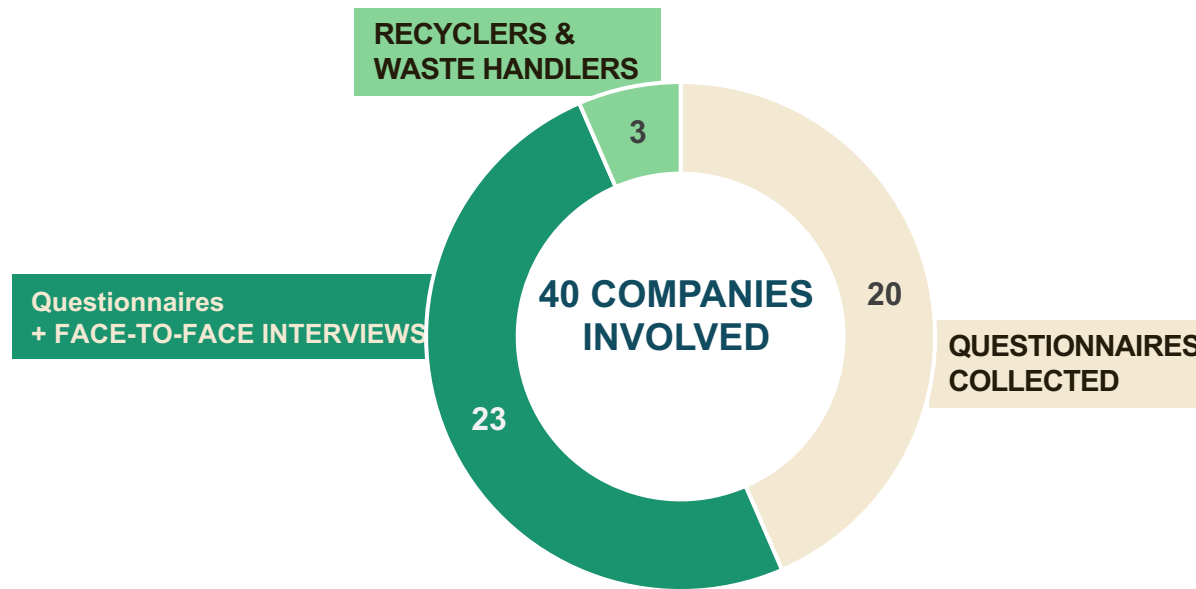
A TWO-LEVEL FUNNEL STRUCTURE



Source: Blumine and Reverse Resources

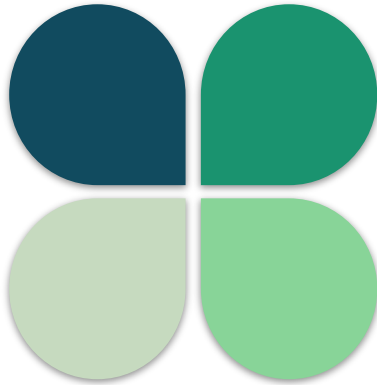
7 ≡ Methodology

A total of 46 companies were involved in the study, including 3 recyclers or waste handlers.



Source: Blumine and Reverse Resources

THE PRIMARY DATA COLLECTION CAMPAIGN



The primary data collection campaign was lead with the help of the following local partners, thanks to whom we established a sample of the industry, disseminated the questionnaire and organized numerous meetings with companies:

- *Industrial Modernization Center (IMC);*
- *Apparel Export Council of Egypt (AECE);*
- *Textiles & Home Textiles Export Council (THTEC);*
- *Federation of Egyptian Industries (FEI):*
 - *Egyptian Chamber of Apparel & Home Textile Industries (ECAHT);*
 - *Egyptian Chamber of Textile Industries (ECTI);*

COOPERATION OF NATIONAL FEDERATIONS OF THE TEXTILE AND CLOTHING INDUSTRY

The Blumine / Reverse Resources team acknowledge the support from all the partners in their help with the primary data collection campaign, access to existing data and resources and assistance in the organization of multilateral meetings with companies and local actors.

The findings of the mapping remain an independent estimate and by the Blumine/Reverse Resources team.

9 ≡ Waste Ratio Methodology

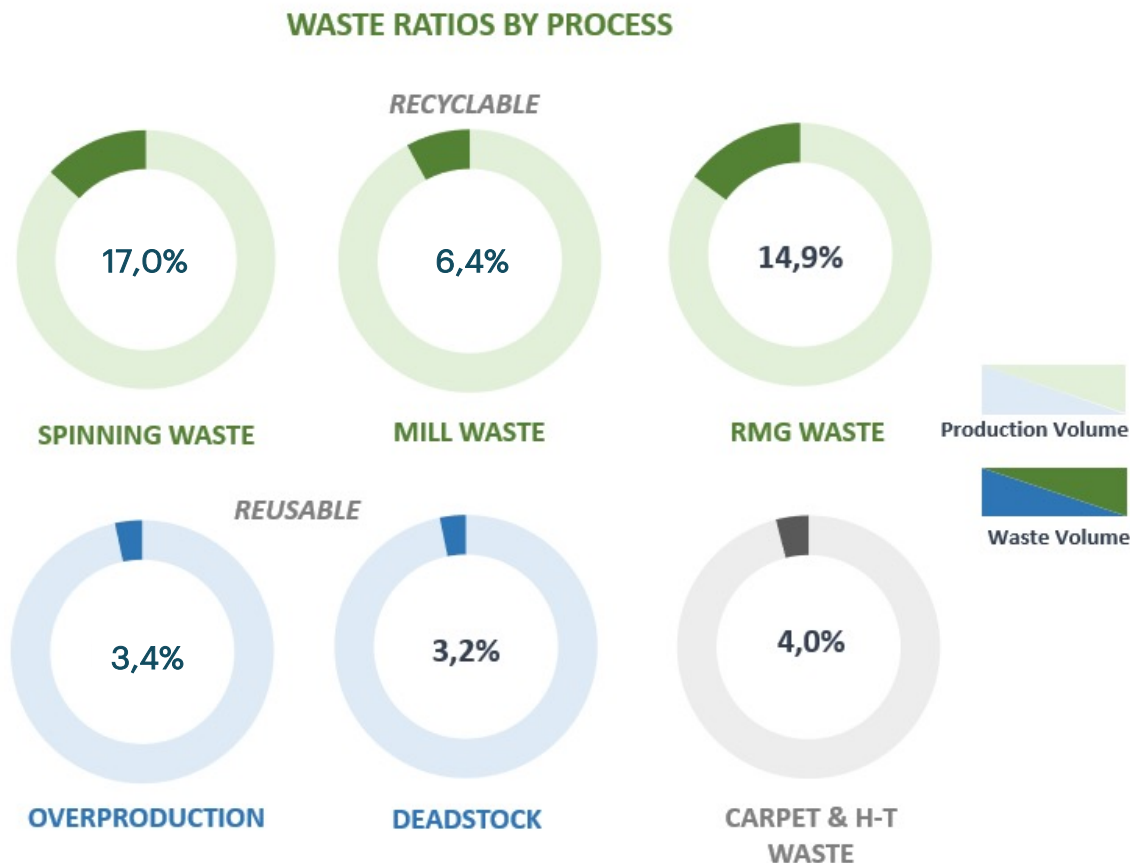
THE WASTE/MATERIAL RATIO BY SECTOR

The RMG waste represents the biggest volume of available waste in Egypt. The mill waste volume is more important than the spinning waste due to Egypt's high imports of already finished yarns.

Cotton waste generated in spinning is often reused in other industries. Waste from combed cotton spinning can be reused in carded cotton, or mostly in wadding and padding. We are considering here all the waste generated, regardless it is used in other production or industries

The waste rates calculated here are the average for the different fibers.

It should be noted that although deadstock should be treated as a reusable product and not a waste (according to the waste hierarchy) it can be shredded and recycled as cutting RMG waste



MATERIAL FLOWS ANALYSIS

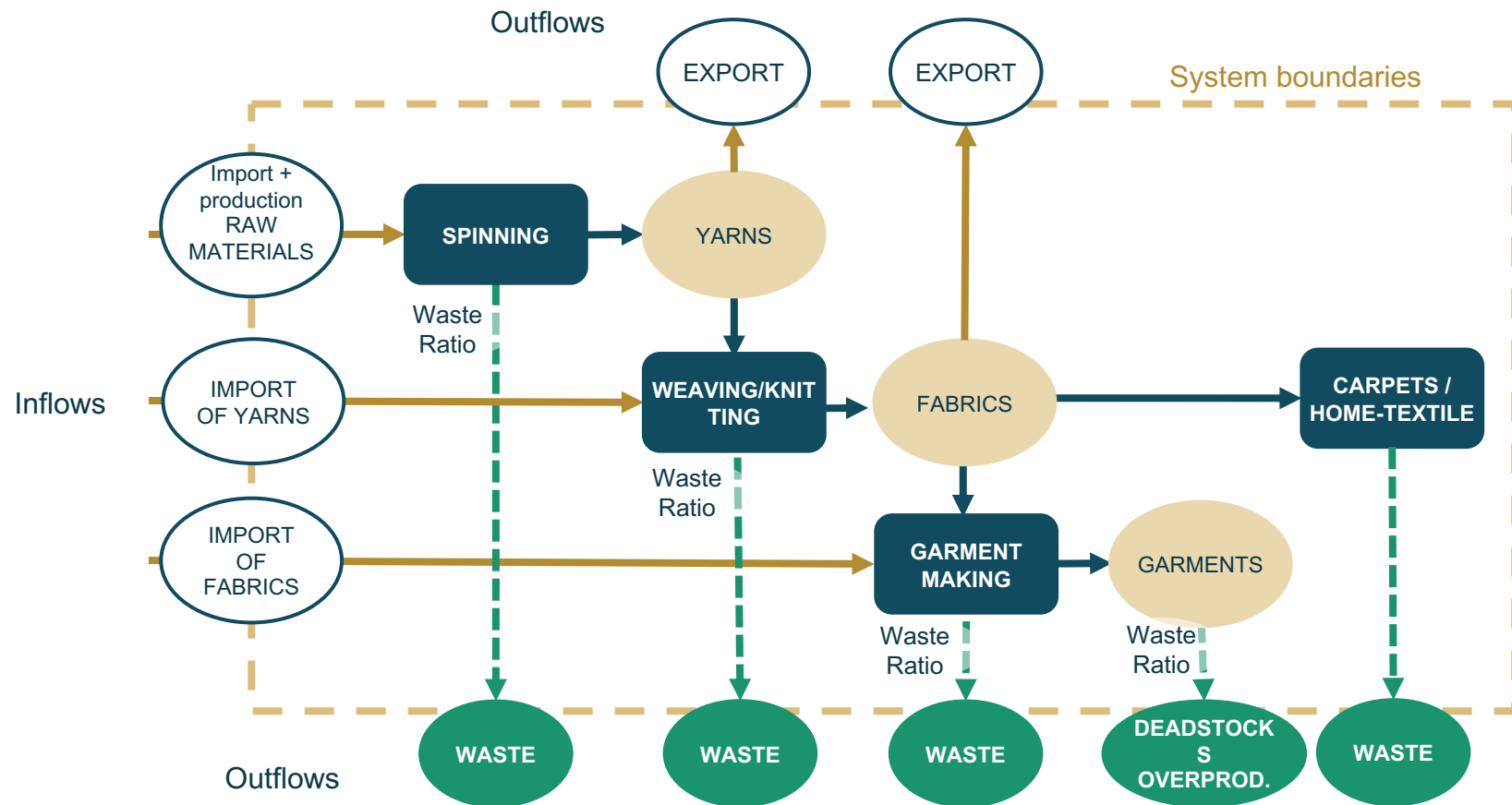
The method of material flow analysis is an accounting technique to track the physical in/out flows of material into and from the reference system and on the principles of mass conservation(*) (see diagram on the next page)

- The boundaries of the system in question are the national textile and clothing supply chain and the Carpets/home textile industries in Egypt.
- At each stage of the supply chain, imports of raw materials and semi-products are the flows into the system.
- At each stage of the supply chain, exports, waste of the chain, retail sales on the domestic market and exits to other industrial sectors are the outflow from the system.
- The materials that remain inside the system are transformed and used in the next stage in the chain.

() The accounting of physical flows, is based on the work carried out by the World Resource Institute at the end of the 1990s and subsequently adapted for European countries by Eurostat through the methodology "Economy-Wide Material Flows Accounts"*

MATERIAL FLOWS ANALYSIS

A HIGH-LEVEL VIEW OF THE WASTE ESTIMATION MODEL



THE WASTE HIERARCHY

The concept of waste hierarchy indicates an order of preference for actions aimed at reducing and managing waste and at maximizing the practical benefits - ecologically and economically - of products.

Waste prevention is the preferred option for waste hierarchy models adopted around the world (*).

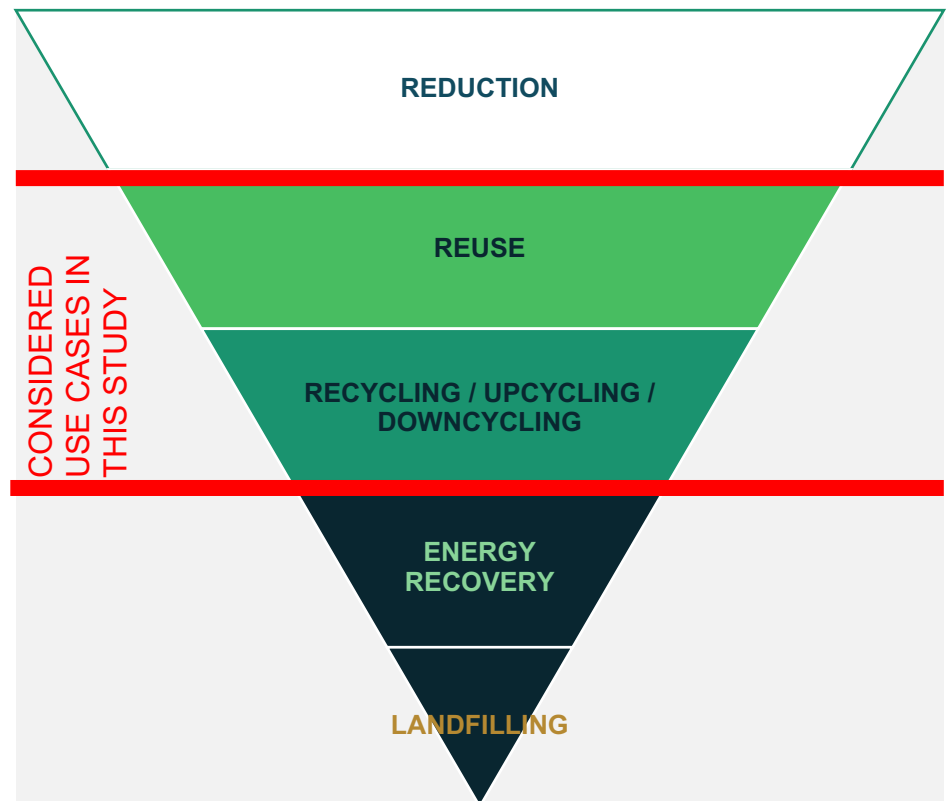
However, as part of this waste mapping study, we are considering the best management of waste already generated.

When the waste is already generated, the most preferred option is re-use, followed by recycling (upcycling or downcycling).

Another dimension of the waste hierarchy adopted in the study is THE economic potential.

An assessment of the higher or lower value of the fibres produced with the recyclable waste has been implemented.

(*) see, for example, Directive 2008/98/EC of the European Parliament and of the Council or the waste management hierarchy of the United States Environmental Protection Agency.

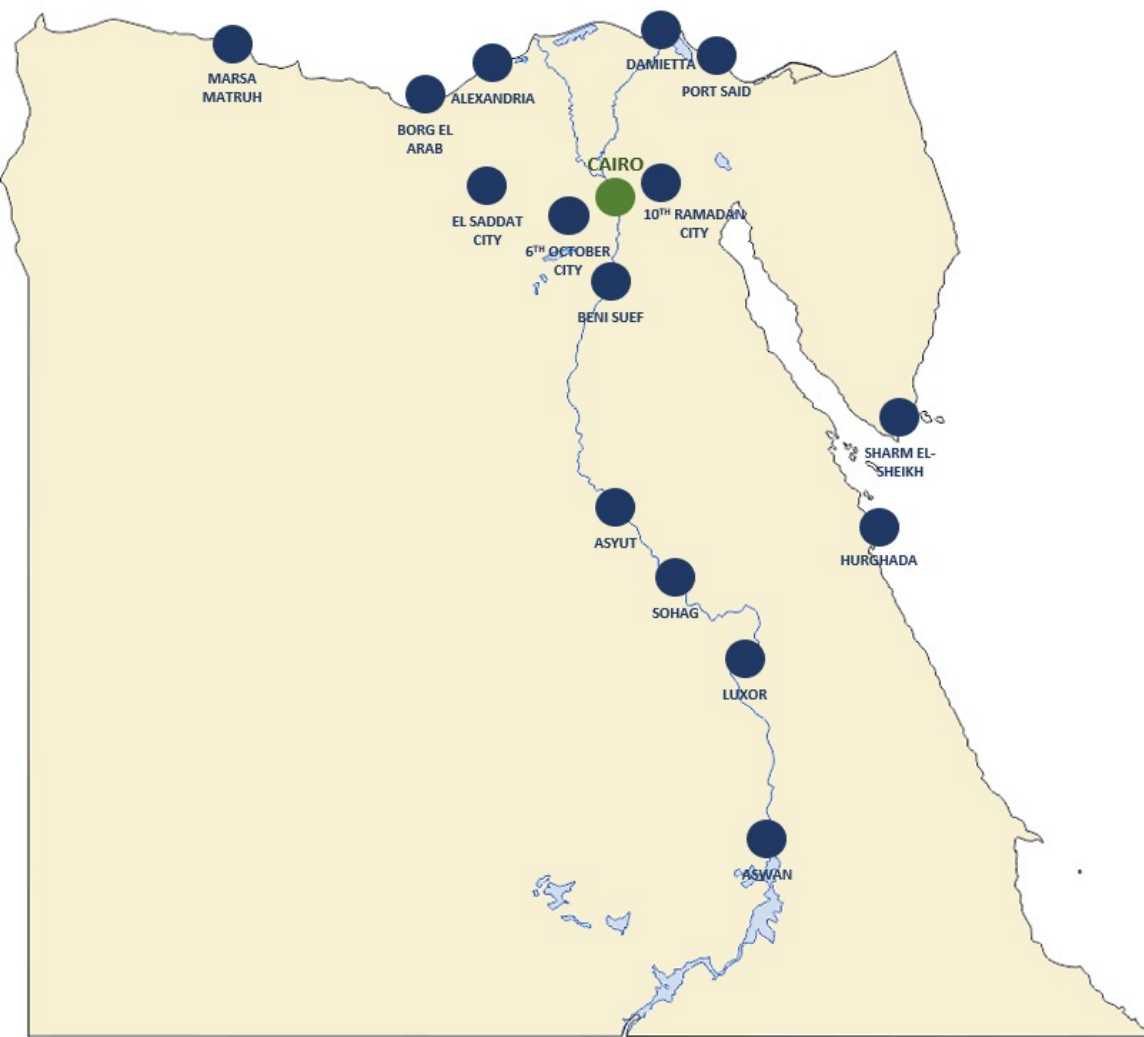


The top level of the waste hierarchy is reuse and includes dead stocks and overproduction of clothing.

The second level is recycling which, in turn, can be divided into two components:

- higher-value recycling: textile to textile recycling with different technologies, candidate for the closed-loop project by brands.
- lower-value recycling: candidate for downcycling in upholstery and mattresses or industrial symbiosis projects that target sectors such as nonwovens, automotive, furniture, construction and others





2.

Waste mapping in Egypt

15 ≡ The T&C Industry in Egypt

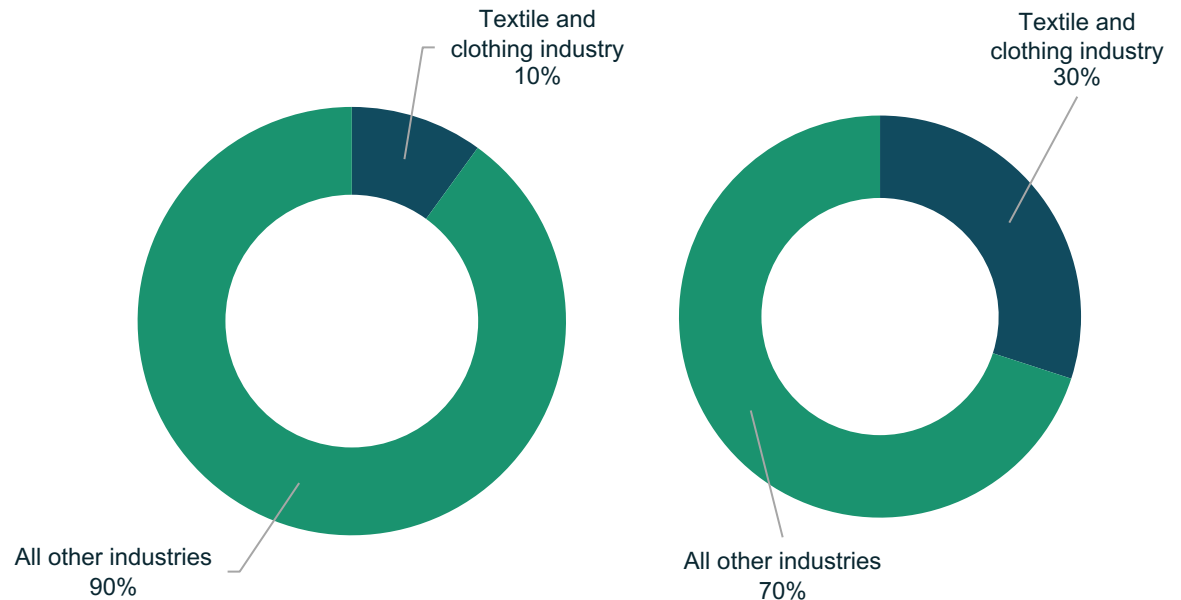
THE EGYPTIAN T&C INDUSTRY

According to the Industrial Modernization Centre, there are more than **3,600 companies** registered at the textile chamber.

The T&C industries represent **4% of the country's GDP** (TDMEP, 2018). The particularity of Egypt is its fully integrated supply chain, with an important culture of cotton.

In 2018 however, the trade balance of Egypt's T&C industries were negative, which means that there were more imports than exports.

EXPORT AND EMPLOYMENT IN THE T&C INDUSTRIES IN EGYPT (2019)



Source: IMC, TDMEP

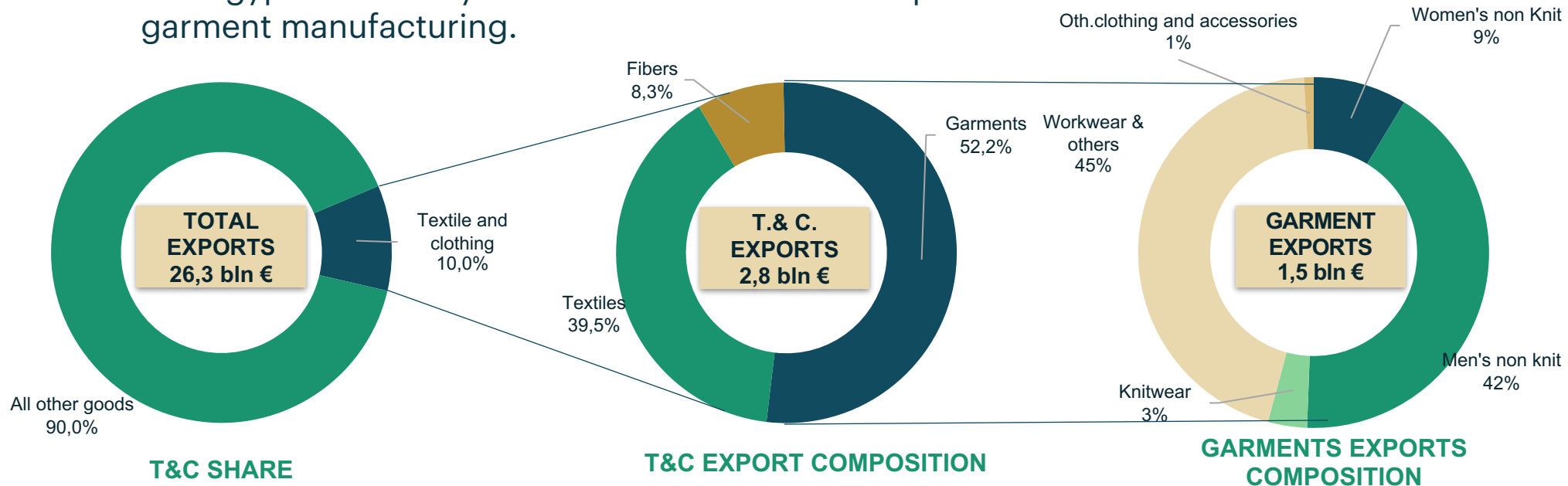
16 ≡ The T&C Industry in Egypt

EXPORTS

In 2019, Egypt exported **2,8 billion €** worth of fibers, textile and garments, amounting to **10%** of the country's exports.

The exports of cotton fiber alone reached almost **169 million US \$** in 2019. Egyptian cotton is a trademark fiber and widely regarded as one of the highest quality of cotton in the world.

The Egyptian industry is however reliant on the import of shorter cotton fibers for garment manufacturing.



Source: Blumine & Reverse Resources calc. on UN Comtrade database

17 ≡ The T&C Industry in Egypt

TRADE BALANCE

Egypt features a **negative T&C trade balance** meaning that there are more imports than exports (both in value and volume).

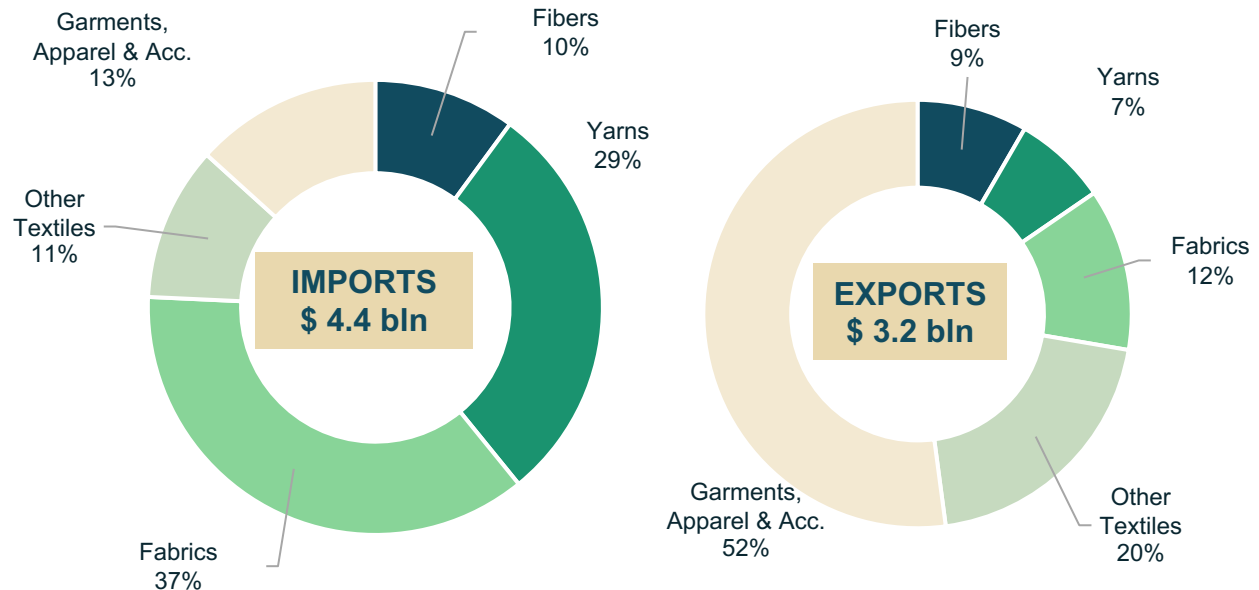
In order to calculate the material flows within the Egyptian textile industry, the physical volumes of textile imports and exports in 2019 were considered, which amounted to:

1,331 Ktons of textile materials imported into the country:

- 186 Ktons of textile fibers which were transformed in yarn & fabrics (in addition to the 78+ Ktons of domestic production).
- 797 Ktons of textile yarns
- 348 Ktons of textile fabrics and other textile articles

283 Ktons of yarns & fabrics and \$ 1.7 billion exported out of the country.

TRADE IN TEXTILES AND CLOTHING. 2019

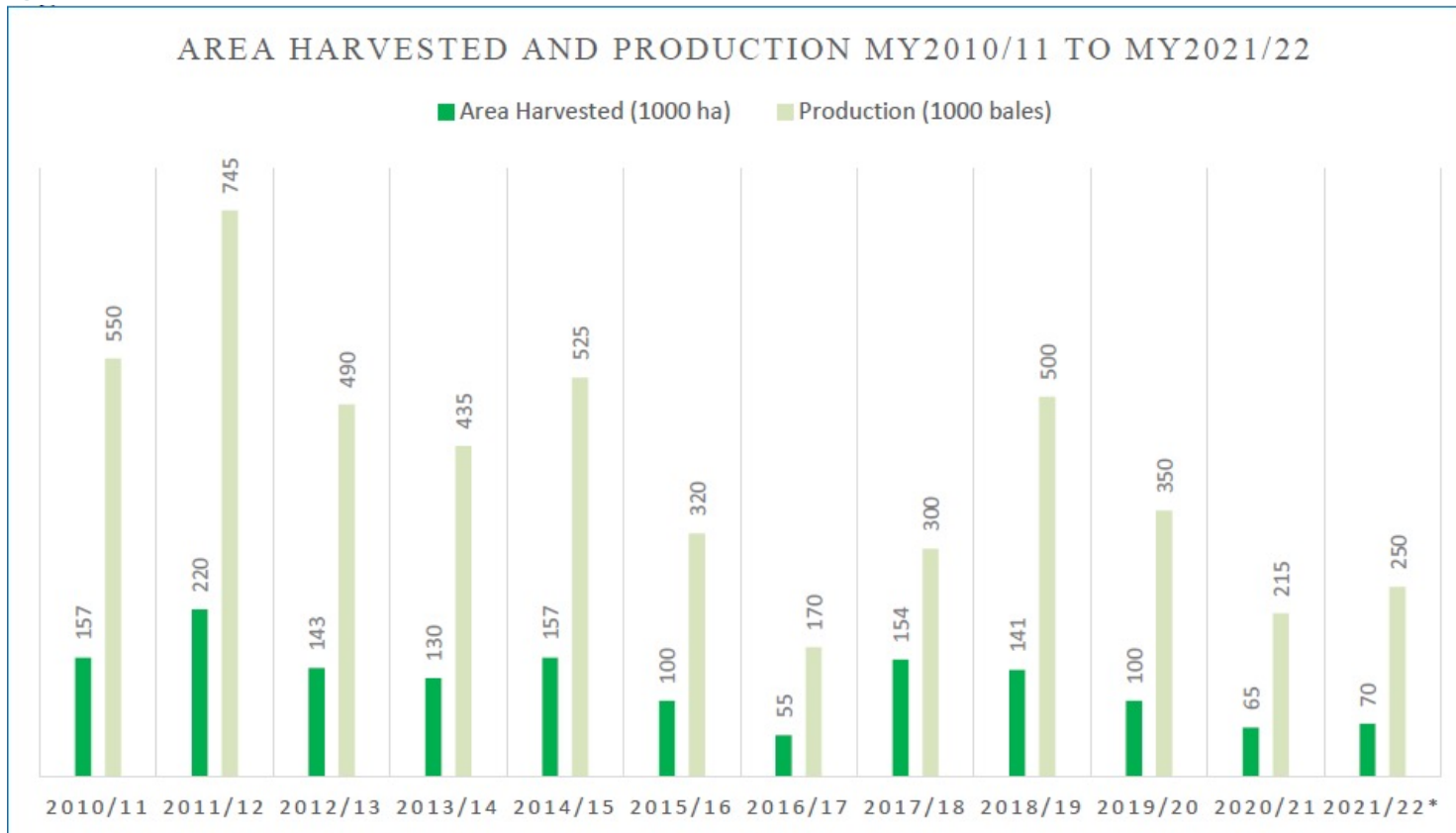


Source: Blumine & Reverse Resources calc. on UN Comtrade database

18 ≡ The Egyptian cotton industry

THE PRODUCTION

The production as well as the area of harvest of Egyptian cotton has been decreasing in the last few years. Better crops have nonetheless featured higher yields.



Source: FAS/PSD, *FAS forecast

19 ≡ The Egyptian cotton industry

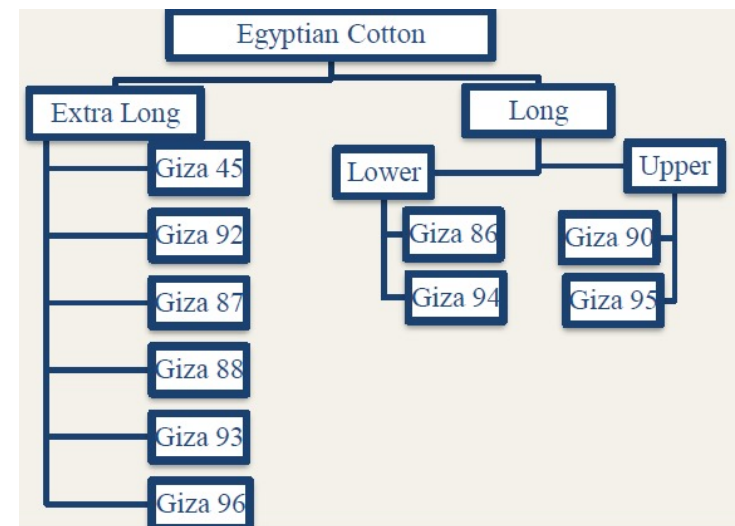
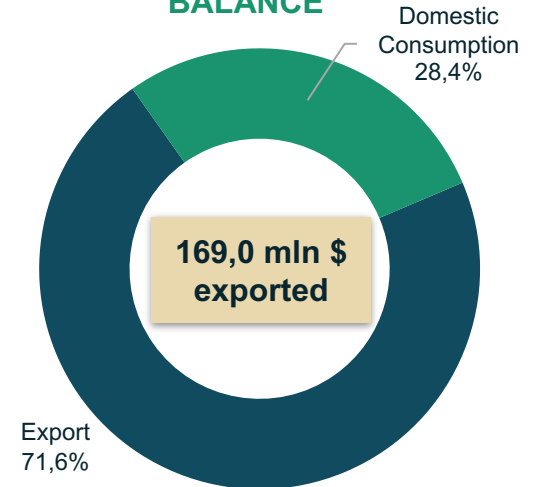
THE CONSUMPTION

More than **70%** of the Egyptian cotton produced every year is exported. The rest is mostly consumed by the Egyptian home-textile industry.

Renowned for the extra long and long fibres the most commonly produced varieties of Egyptian Cotton are **Giza 94** and **Giza 96**.

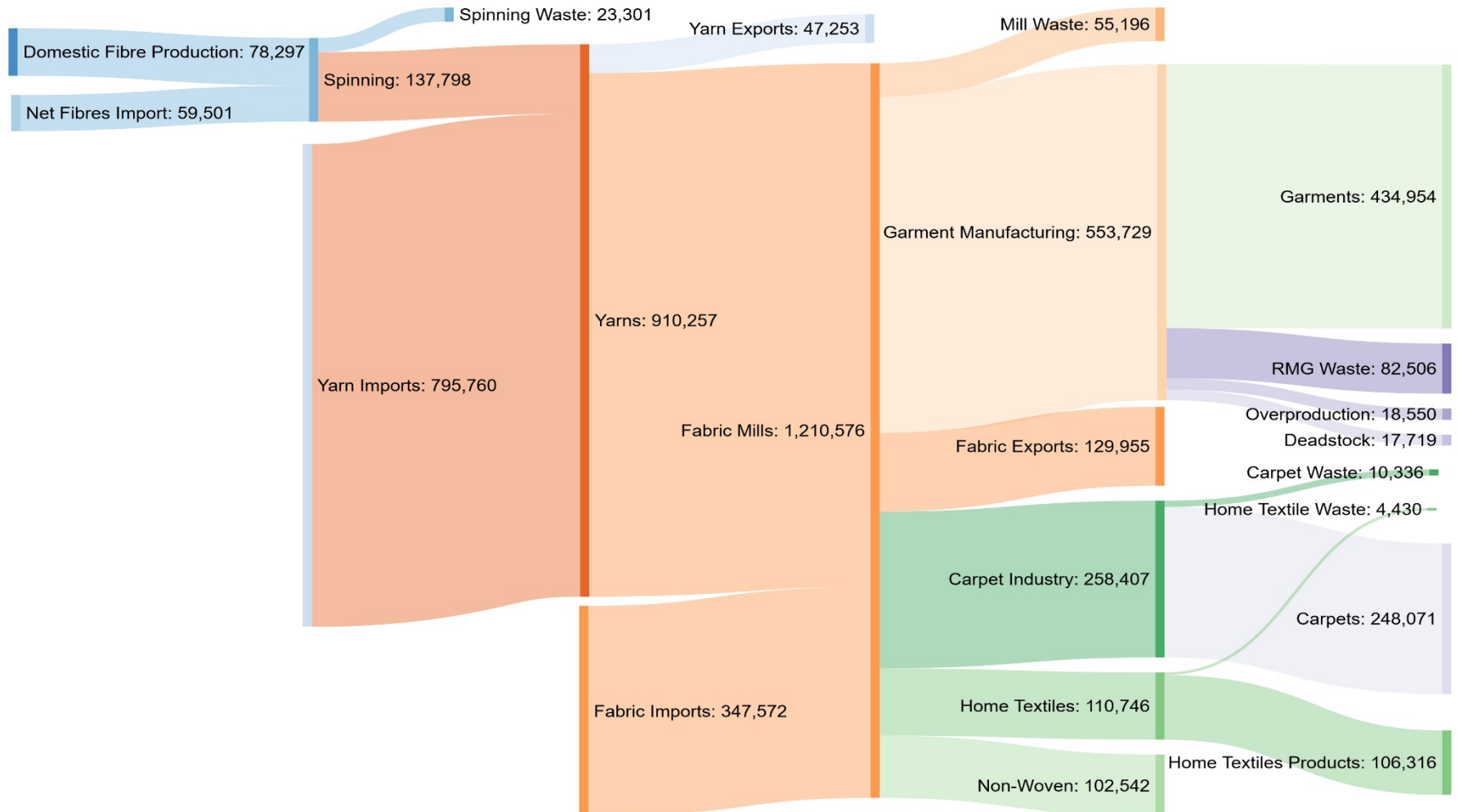
The RMG sector is however reliant on shorter fibre, cheaper and more appropriate to large scale garment production. This means that the RMG waste in the Egyptian industry is expected to be a **lower-quality cotton waste**.

EGYPTIAN COTTON TRADE BALANCE



20 ≡ Material Flow Analysis

TEXTILE MATERIAL FLOWS IN THE EGYPTIAN TEXTILE AND CLOTHING INDUSTRY – 2019 Tons



TEXTILE MATERIAL FLOWS IN THE EGYPTIAN TEXTILE AND CLOTHING INDUSTRY – 2019

Ktons = thousands of tonnes

FIBRES

186 Ktons of textile fibres were imported in Egypt in 2019. Approximately 78 Ktons were produced domestically and 126 Ktons were exported.

YARNS

114 Ktons of yarn was spun by the domestic spinning sector, to which were added 796 Ktons of imported yarns. 47 Ktons of those yarns were exported.

FABRICS

808 Ktons of fabrics were produced, to which were added 348 Ktons of imported fabrics and 130 Ktons were exported. This amounts to 1,025 Ktons of fabrics available domestically. 553 Ktons were directed to the RMG industry, 258 Ktons to the carpet industry, 111 Ktons to Home Textiles and 103 Ktons to Non-Woven.

GARMENTS

435 Ktons of garments were manufactured from this material, while 83 Ktons of RMG waste, 19 Ktons of overproduction and 18 Ktons of deadstock were generated in the process.

NOTE

In spinning the productivity per installed spindle is lower in Egypt than in Morocco and Tunisia, the other two Countries in the project.

An increase in the active / installed spindles ratio or a growth in per-active spindle productivity can increase remarkably the volumes of fibre transformed and, all other things being equal the volume of waste generated in the whole textile value chain. Especially in the public sector that represents around 50% of the Country's spinning capacity.

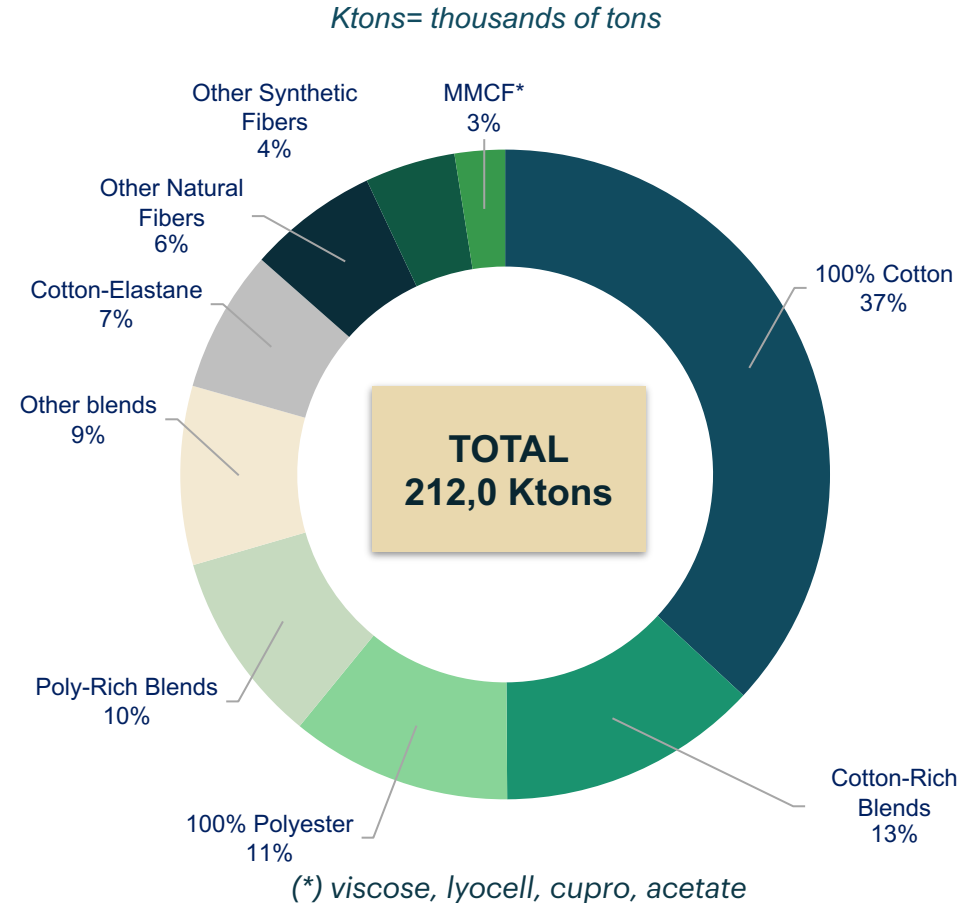
The major modernization program supported by the Egyptian government, that aims to upgrade Egypt's upstream textile industry to boost its competitiveness will play a key role in the next years supporting the growth of production volumes and of textile waste as a valuable source of materials for the industry.

BY FIBRE

More than a **1/3** of the total waste generated in Egypt is composed of 100% Cotton (which is aligned with the cotton-centric T&C industry).

Another **20%** of the waste is composed of cotton-rich blends (with elastane or other fibers).

There is however close to **20%** of blends rich in polyester and other fabrics which will prove much harder to recycle.



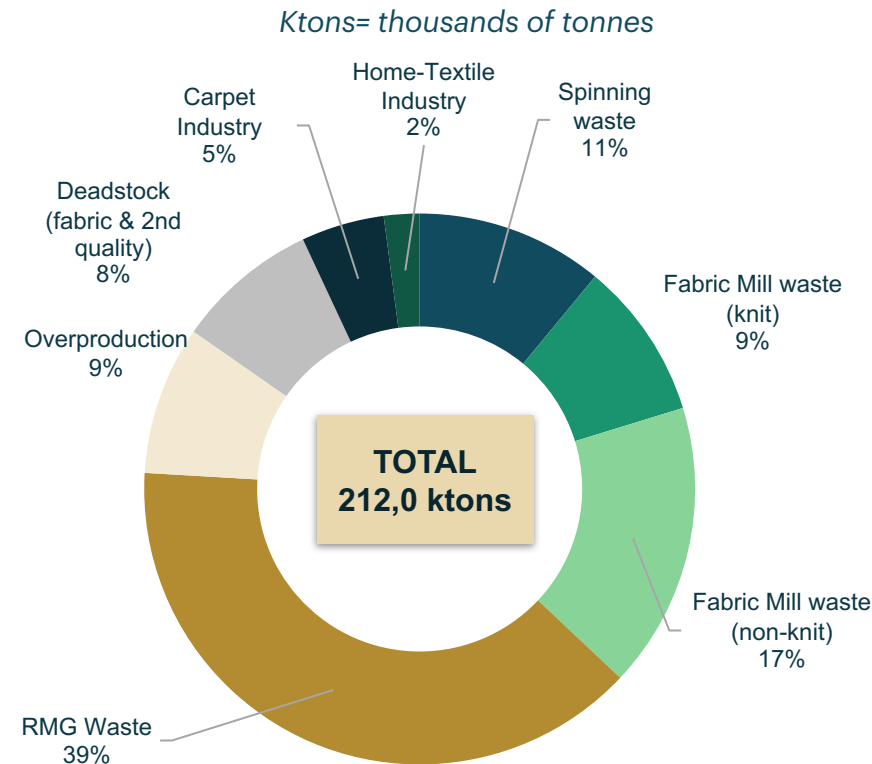
Source: Blumine & Reverse Resource estimates

BY PROCESS

The largest source of waste is the RMG sector with **39%** of the total waste volume.

Based on the industry split between weaving and knitting mills, we estimate that every year **20 Ktons** of knit waste and **36 Ktons** of weaving waste are generated, together amounting to **26%** of the total waste mix.

It should be noted that spinning waste (11%) is more important in Egypt due to the omnipresence of cotton at the spinning stage, which is more waste-intensive than other fibers (i.e. synthetics). A significant part of this waste is already re-introduced in the spinning production process.



Source: Blumine & Reverse Resources estimate

25 ≡ Generation of Textile Waste

In clothing activities, each year are generated:

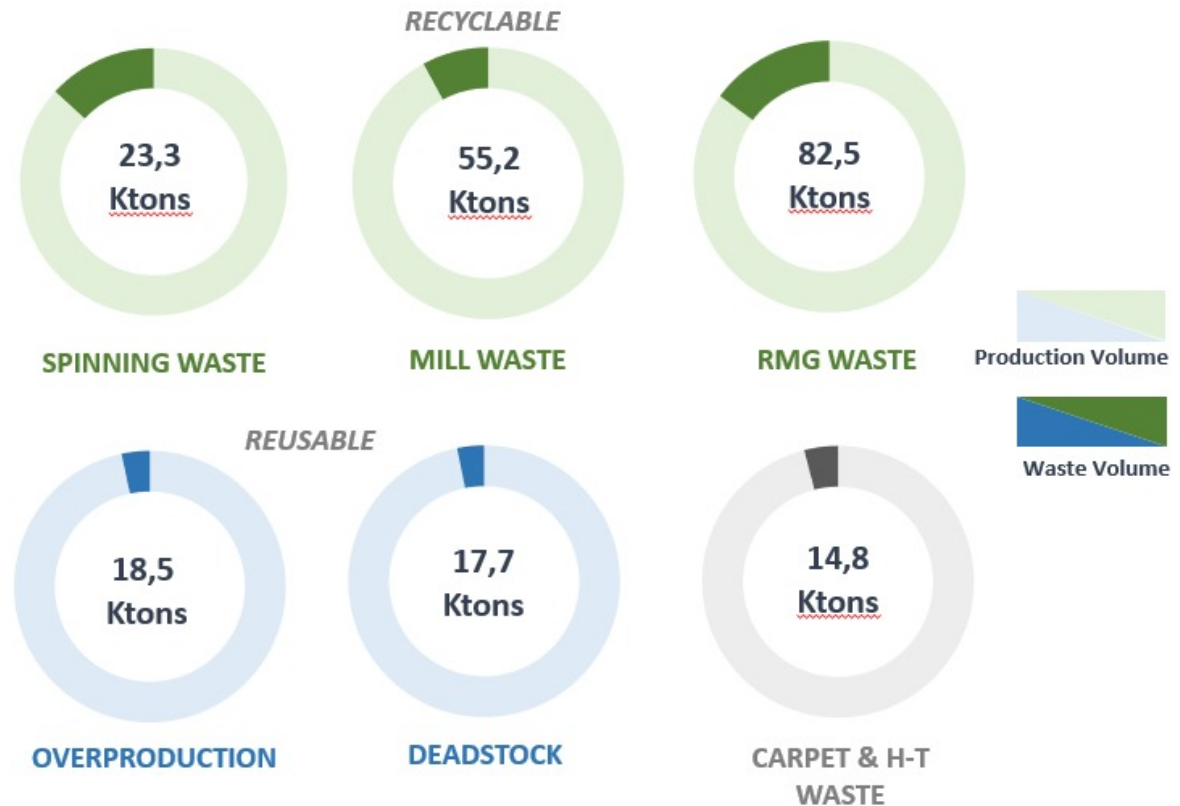
82,5 Ktons of RMG waste

18,5 Ktons of overproduction

17,7 Ktons the deadstock (fabric & 2nd quality garments)

EGYPT WASTE VOLUME BY PROCESS

Ktons= thousand tons

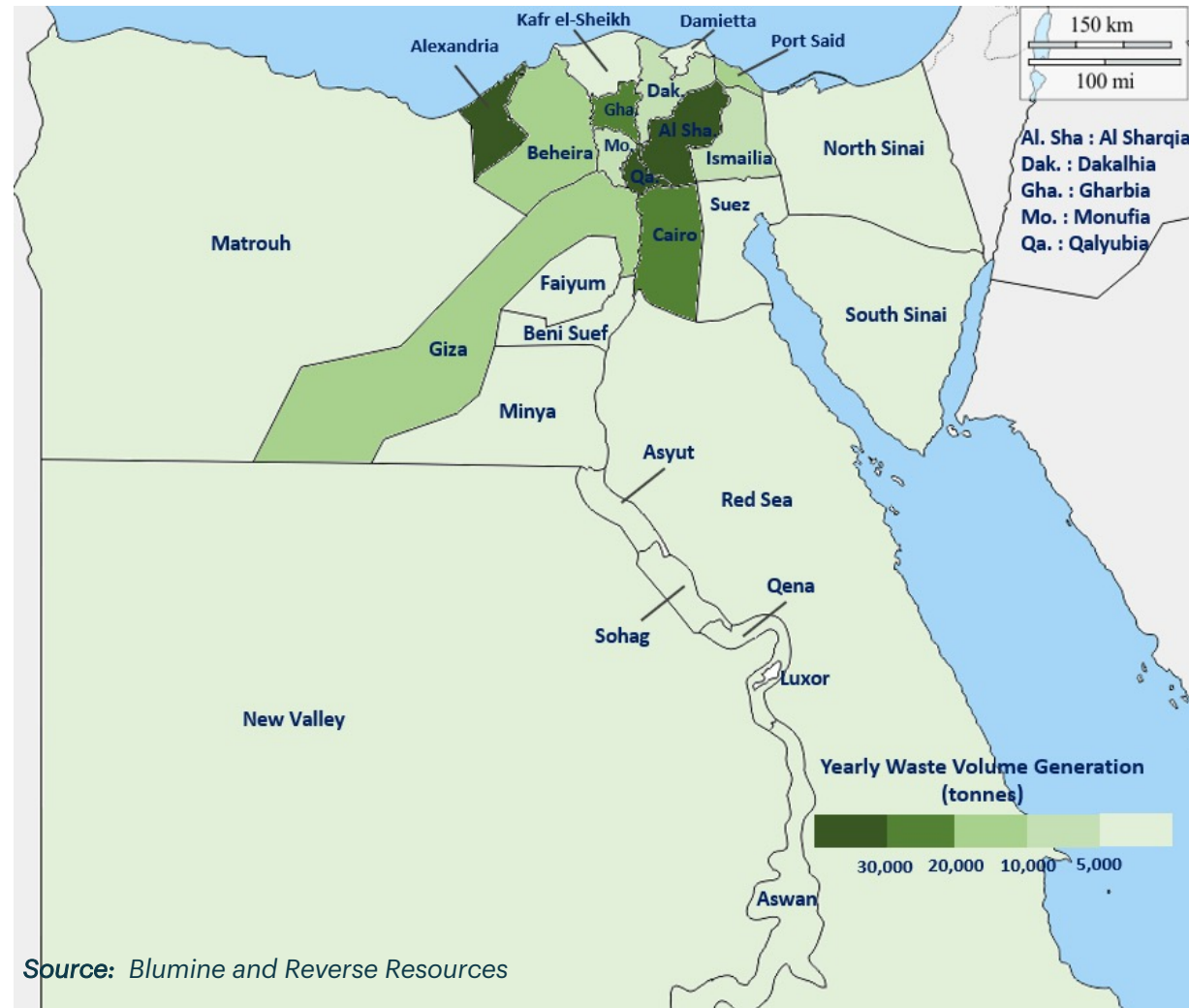


Source: Blumine & Reverse Resources estimates

KEY REGIONS OF THE T&C INDUSTRY IN EGYPT

The Egyptian T&C industry is concentrated around most of the Centre-North region.

At the heart of this region, the Greater Cairo region represents on its own more than **50%** of the country's yearly waste generation (accessible within a radius of 150 km).



27 ≡ Simulation of shredding potential by governorate: Sharkia

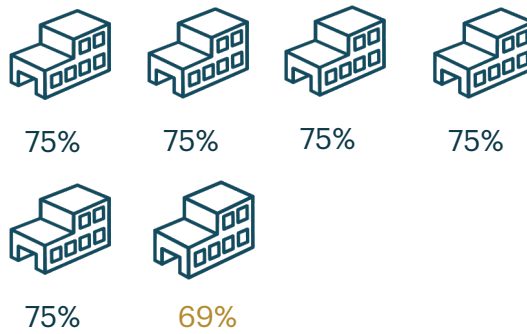
What is the potential economic impact of developing a recycling value chain?

If we consider only the higher value textile waste available in the Sharkia governorate (100% cotton and cotton-rich waste) which accounts for about half of the total textile waste created in the region, there is about **16,7 Ktons** of waste per year.

Considering a segregation rate of 80% and a shredding facility capacity utilization of 75%, there is potential room for **6 shredding lines with modern and state-of-art technology: 5 operating at 75% capacity utilization, and one at 69%.**

SHARKIA GOVERNORATE

**SIMULATION
100% COTTON +
COTTON-RICH**



Scenario

- ✓ 80% of waste is sorted and recycled
- ✓ Modern shredding line with a capacity of 250 t/month (600-2,500 kg/h x 8 hours/day and 20 days/month)
- ✓ Maximum capacity utilization of 75%.

28 ≡ Simulation of shredding potential by governorate: Alexandria

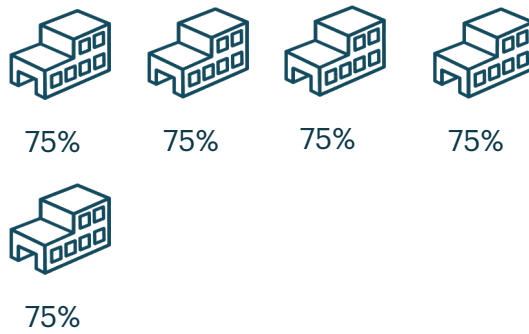
What is the potential economic impact of developing a recycling value chain?

If we consider only the higher value textile waste available in the Alexandria governorate (100% cotton and cotton-rich waste) which accounts for about half of the total textile waste created in the region, there is about **13,3 Ktons** of waste per year.

Considering a segregation rate of 80% and a shredding facility capacity utilization of 75%, there is potential room for **5 shredding lines with modern and state-of-art technology operating at 75% capacity utilization.**

ALEXANDIRA GOVERNORATE

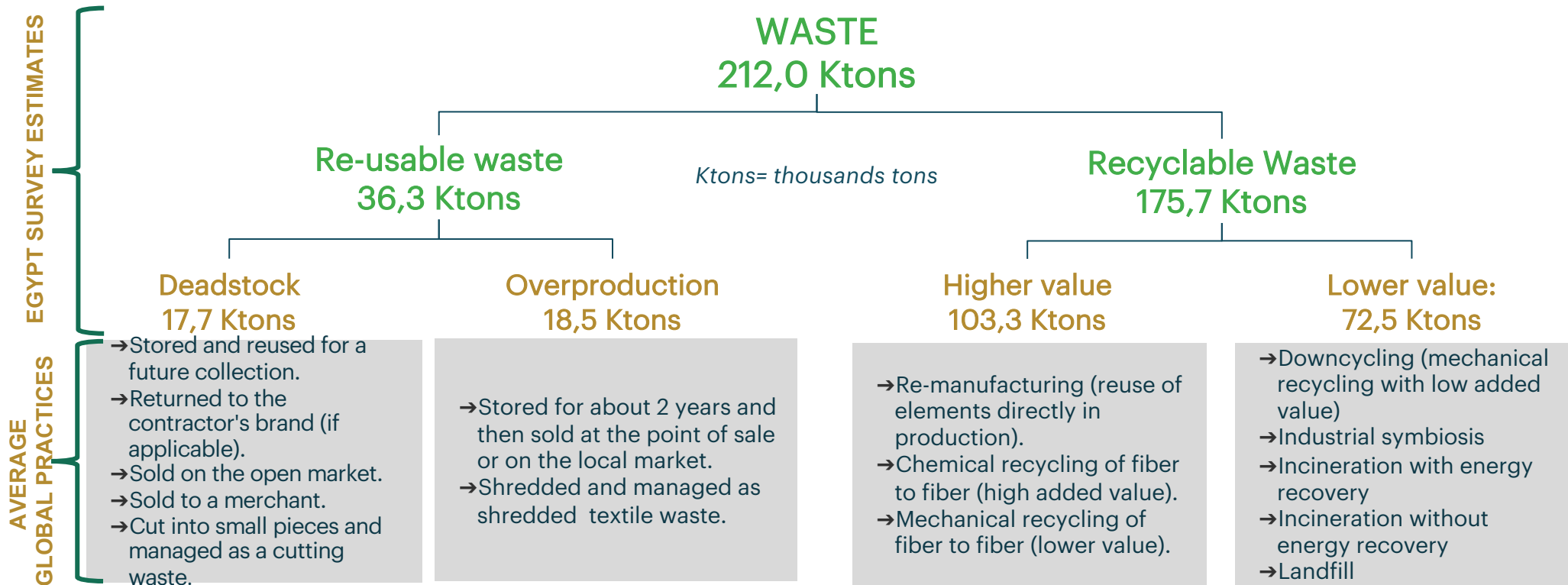
**SIMULATION
100% COTTON +
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Scenario

- ✓ 80% of waste is sorted and recycled
- ✓ Modern shredding line with a capacity of 250 t/month (600-2,500 kg/h x 8 hours/day and 20 days/month)
- ✓ Maximum capacity utilization of 75%.

Waste hierarchy in Egypt, and waste use and destination. Survey estimates & global practices

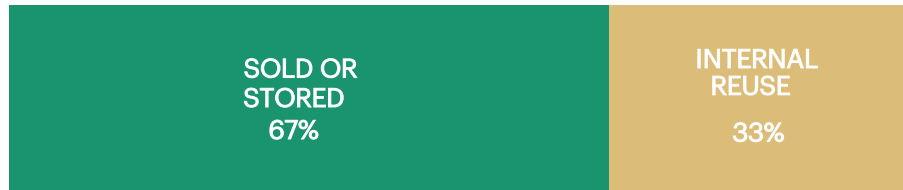


Source: Blumine & Reverse Resources estimates

- We separate textile waste from production into 2 main categories: reusable waste (surplus production, find of rolls ...) and recyclable waste (cutting scrap, filaments ...).
- The latter category is itself separated into two types of high and low value waste according to their composition and demand on the current market.

Re-usable waste: 36,3 Ktons

DEADSTOCK



AVERAGE INTERNATIONAL STANDARDS

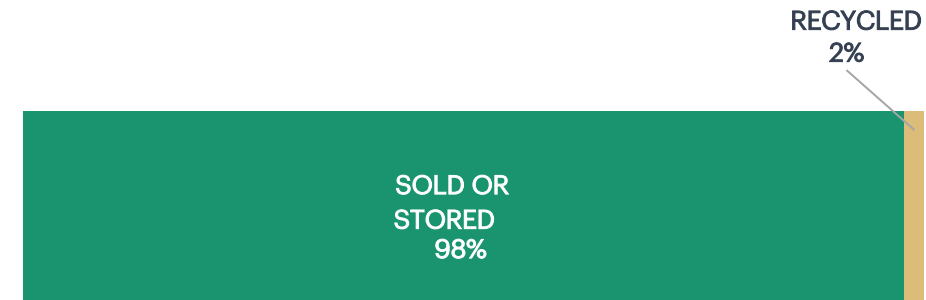


BEST INTERNATIONAL STANDARDS

OVERPRODUCTION

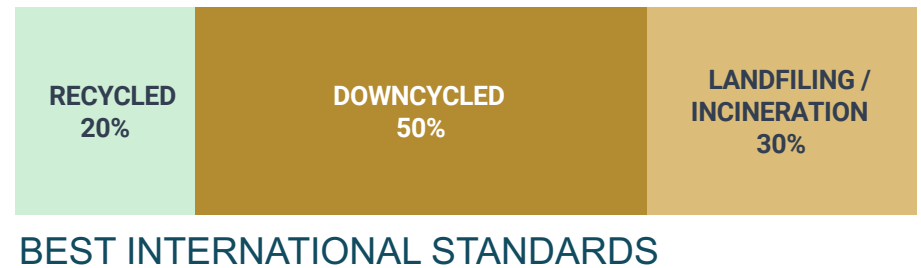
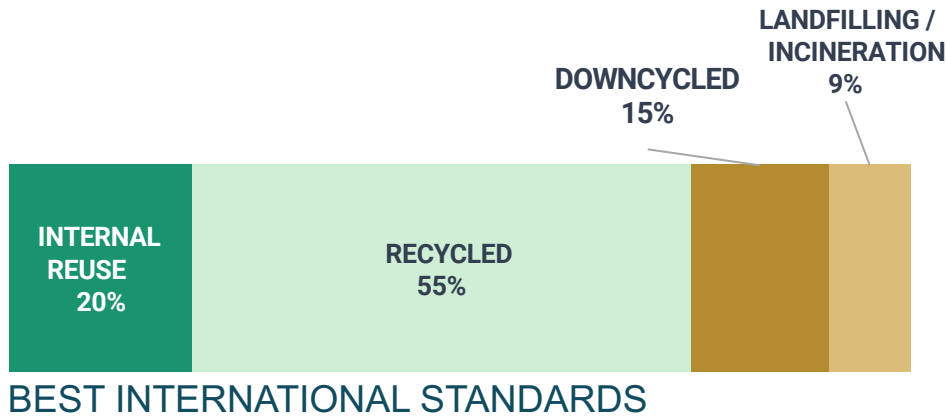
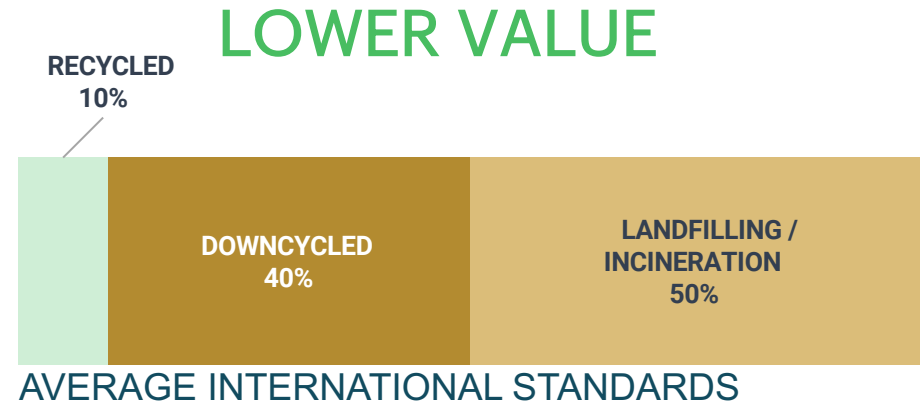
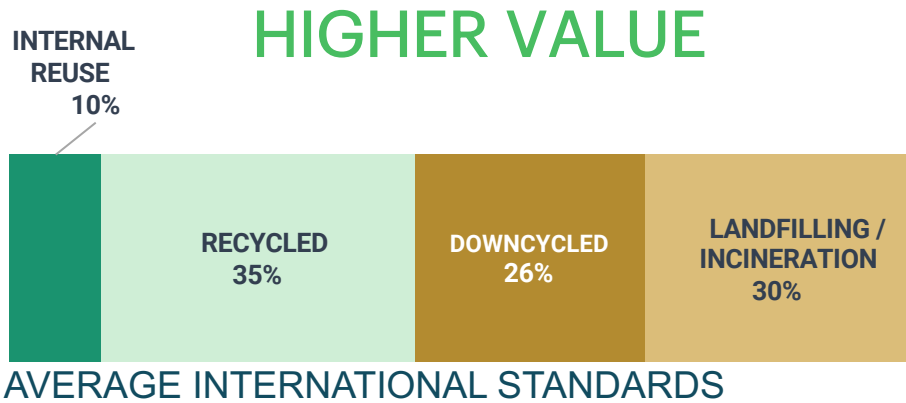


AVERAGE INTERNATIONAL STANDARDS



BEST INTERNATIONAL STANDARDS

Recyclable waste: 175,7 Ktons



32 ≡ The textile waste market

There is a more structured textile waste market in Egypt than Tunisia or Morocco. The trading network is less informal, more active and more lucrative. There is some textile-to-textile recycling, but it often relies on spinning waste or on waste imported from other countries because of quality issues with local feedstock.

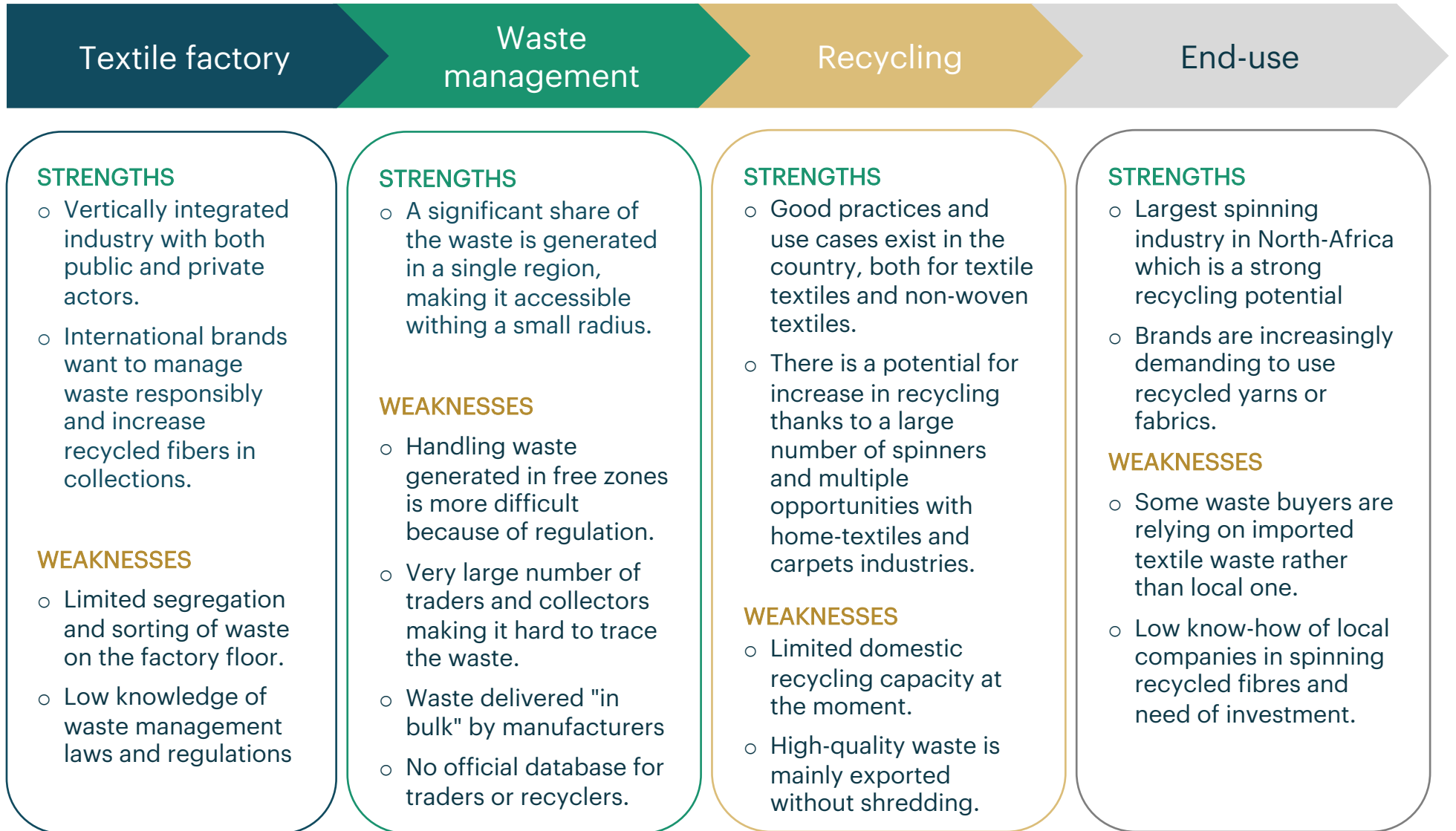
According to the Observatory of Economic Complexity, Egypt imported 653,000 USD worth of textile scraps in 2019 (from several countries including Morocco, China or Turkey).

The trade classification does not distinguish between “shredded” and “non-shredded” wastes. Nevertheless, this data provides an upper limit for an estimate of domestic recycling capacity.

A common obstacle found during the study is the difficulty to handle textile waste in Free Zones, where the waste generated in textile & garment factories has to be cleared by the customs office to be transported outside of the zone, creating several administrative and bureaucratic layers to the waste management.

33 ≡ Overview of textile waste destinations in Egypt

- ✓ There is an important textile-to-textile recycling potential in Egypt's spinning industry, which has the opportunity to produce from locally sourced waste but requires more investment and a better waste segregation of the at its source.
- ✓ The carpet sector is relying more on synthetic fibers with some existing recycling cases, making it a good potential destination for synthetic textile waste in Egypt.
- ✓ The high-quality waste (100% cotton or cotton-rich) is either exported or downcycled into other industries such as automotive, mattress or pillow filling. There is still some cases of incineration or landfilling for lower-quality/mixed waste.





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