

Sectoral Studies

Textile dyeing & Finishing, Detergents

Abid Raza Khan

Textile Sector - Global

- Responsible for 1.7 million tons of Carbon Dioxide emissions, which is 7% - 10% of global greenhouse gas emissions annually.
- Responsible for 20% of industrial wastewater pollution
- Projected to account for 25% of World Carbon Budget by 2050
- Over 60% fiber manufacturing is for clothing
- Clothing production has doubled between 2000 and 2020.
- Demand is witnessing an increasing trend ... 62 million tons (2015), 111 million tons (2019) to 142 million tons (2030) –

Trends

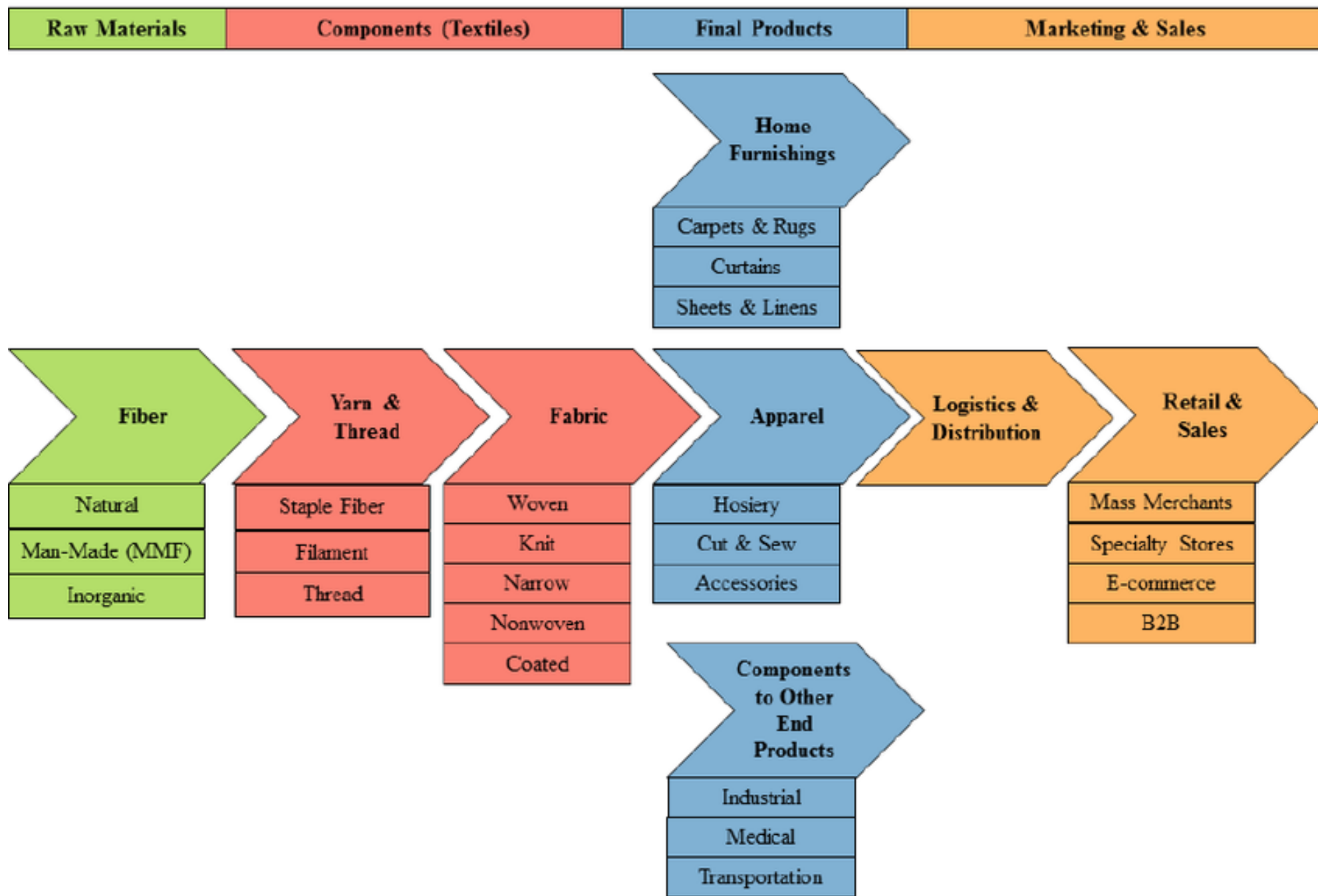
- Fast fashion increases turn over, leading to increased production as well as increased landfills.
- Over 85% of consumer discarded waste ends in landfills.
- Less than 1% is recycled into new fiber.
- Use of synthetic fiber is increasing compared to cotton.
 - One polyester t-shirt – 5.5 kg CO₂e
 - One cotton t-shirt – 2.1 kg CO₂e

Textile Sector - Pakistan

- Contribution to GDP – approx. 8.5% (SBP)
- Employment – approx. 38% of national work force (SBP)
- Contributes approx. 25% of industrial value addition
- Average share of approx. 60% in national exports.
 - 75% - 80% of these exports (by value) is of textile made-up.
- Contributes approx. 6% - 9% of Pakistan's GHG
 - Dyeing and Finishing alone is responsible for over a third of total textile national carbon emissions

Dyeing & Finishing Industry in Pakistan

- Large number of small and medium (SMEs) sized companies, few large composite units.
- Significant quantity of undocumented production.
- Has been the backbone of the national industrial policy, receiving the largest amount of government subsidies since 1970s.



Dyeing Process

- Cleaning
 - De-sizing process (polyvinyl alcohol)
 - Bleaching (sodium hypochlorite vs. hydrogen peroxide)
- Dyeing
 - Dyes and pigments used depending upon type of fibre
 - Mordants (for chemical binding) use heavy metals like chromium (highly toxic)

Dyeing Process ... contd.

- Azo dyes (colorant) release aromatic amines (carcinogenic)
 - Banned in EU and some states in USA, but continue to be used in Pakistan
- Growing use of Iron easy / wrinkle free fabrics
 - Use of formaldehyde in finishing (volatile organic compound)

Green revolution

- Air dyeing
- Use of beeswax
- Use of aloe Vera in finishing

Water

- Mainly at the dyeing and finishing stages.
- Responsible for approx. 20% of clean water pollution
- Global textile industry use ~ 80 billion cubic meters
- World Resources Institute estimates 2700 liters of water use one cotton t-shirt (equivalent to 2.5 years of individual water consumption)
- Pakistan textile industry uses 49% of total industrial water use.
- Less than one 1% of industrial water is treated in Pakistan
- Textile industry in Northern Pakistan pumps underground water and pumps *back* chemically polluted water (estimate not possible)

Table 1: Renewable Water Resources Per Capita in Pakistan, Bangladesh and India (m³/inhabitant/year)

| Year | Pakistan | Bangladesh | India |
|------|----------|------------|-------|
| 1962 | 5,238 | 24,045 | 4,085 |
| 1967 | 4,605 | 20,580 | 3,683 |
| 1972 | 4,024 | 18,152 | 3,298 |
| 1977 | 3,479 | 16,376 | 2,938 |
| 1982 | 2,958 | 14,266 | 2,618 |
| 1987 | 2,509 | 12,477 | 2,340 |
| 1992 | 2,170 | 11,032 | 2,109 |
| 1997 | 1,912 | 9,907 | 1,916 |
| 2002 | 1,706 | 8,982 | 1,754 |
| 2007 | 1,539 | 8,339 | 1,620 |
| 2012 | 1,387 | 7,879 | 1,513 |
| 2017 | 1,253 | 7,451 | 1,427 |

Source: [Worldometer](#)

Hurdles to green Industrialization

- Lack of domestic customer interest
- High implementation costs
- Lack of access to credit
- Complexity of green dyeing and finishing processes
- Gaps / loopholes in laws and regulations
- Lack of guidance
- Insufficient deterrence
- Political clout

Support

- Incentives (financial support, supportive taxation, policies)
- Regulations
- Customer Awareness campaigns
 - Increasing volume of customers have been found to be cognizant of environmental impact of their buying behavior, but are unaware of how to act effectively. (source: various regional studies).
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Regulations

- EU and North America are the major markets for Pakistan Textile Exports.
- Most of the technological advancements are in export oriented firms.
- Various regulations are coming in effect:
 - EU Strategy for sustainable and circular textiles
 - Climate and Resilience Law (environmental labeling)
 - Anti-Waste for a Circular Economy Law (French law)

Policy Landscape

- Updated Nationally Determined Contributions 2021
 - 60% renewable energy by 2030
 - Complete ban on imported coal by 2030
 - 500 MT CO₂e by 2040 (2018 - 489.87 MT CO₂e)
- Net Zero Pakistan Initiative (second after Japan)
 - Committed to net zero targets, measure and disclose sources of GHG emissions, decarbonize value chains, advocate for climate action
 - 22 out of 23 signatories are firms from Textile Industry
- WWF-Pakistan project, approved in 2022, titled “Decarbonizing Textile Manufacturing” estimates to mitigate 345,000 tons of CO₂e over five years.

Way Forward

| | SME units | Large Industrial units |
|--|--|------------------------|
| Economic Incentives | | |
| - Lack of Customer interest | Advocacy | |
| - High implementation cost | Targeted financial instruments, directed subsidies | |
| - Lack of access to capital / credit | Special credit lines | |
| - Complexity of green industrial processes | Training | R&D |
| Enforcement | | |
| - Loopholes in laws / regulations | Cyclical law-making process | |
| - Lack of guidance for the firm | Advocacy | Reinforcement |
| - Insufficient deterrence | Effective penalties, advocacy | |

Detergents

- Covers major product groups including washing powders, dishwashing detergents, cleaners, etc.
- High volume in use implies significant impact

Kinds of emissions

- Direct emissions (due to the manufacturing process)
- Indirect emissions (generated to produce inputs of the detergent industry)
- Upstream and downstream emissions (broader supply chain)

Growth in Detergents sector in Pakistan

- Incentivized growth through
 - Tax exemptions
 - Grants
 - Attractive tariff rates
 - Increasing trend towards use of chemical detergents
 - Shift towards automated laundry systems

Use of Hazardous Chemicals

- Per- and polyfluoroalkyl substances (PFAS)
 - Used due to resistance to water, heat, and oil
 - Linked to cause cancer, thyroid problems, liver disease, and reduced fertility
 - Stockholm Convention on Persistent Organic Pollutants (POPs)
- phosphates, bleach, formaldehyde, and dioxane
 - Known to effect quality of water

Lack of Implementation

- Lack of enforcement infrastructure and insufficient public awareness (UNEP)
- 70% of imported raw materials for detergents do not comply with international environmental standards (EPA)

| Government Agency | Regulatory Role | Actions | Regulation of Detergent industry | Weakness |
|--|---|--|---|--|
| Pakistan Standards and Quality Control Authority (PSQCA) | Safety, Quality and Environmental standards assurance | Develop Guidelines and Standards Technical Quality control Regulation and tests | Covered in the regulation of chemicals | Limited in implementation to mandatory item list |
| Environmental Protection Agencies (EPA) | Enforce environmental laws related to pollution | Development of policies, regulations and standards | Manage pollution from detergent manufacturing | Lack of cohesiveness amongst provinces |
| Ministry of Commerce | Oversees regulation of raw materials and chemicals used in the production of detergents | Formulates the Import Policy Order | Controls import of hazardous material | Lack of regulations that promote sustainable manufacturing processes |