

GREEN Industrialization Challenges: Setting a priority for Pakistan

Textile Sector

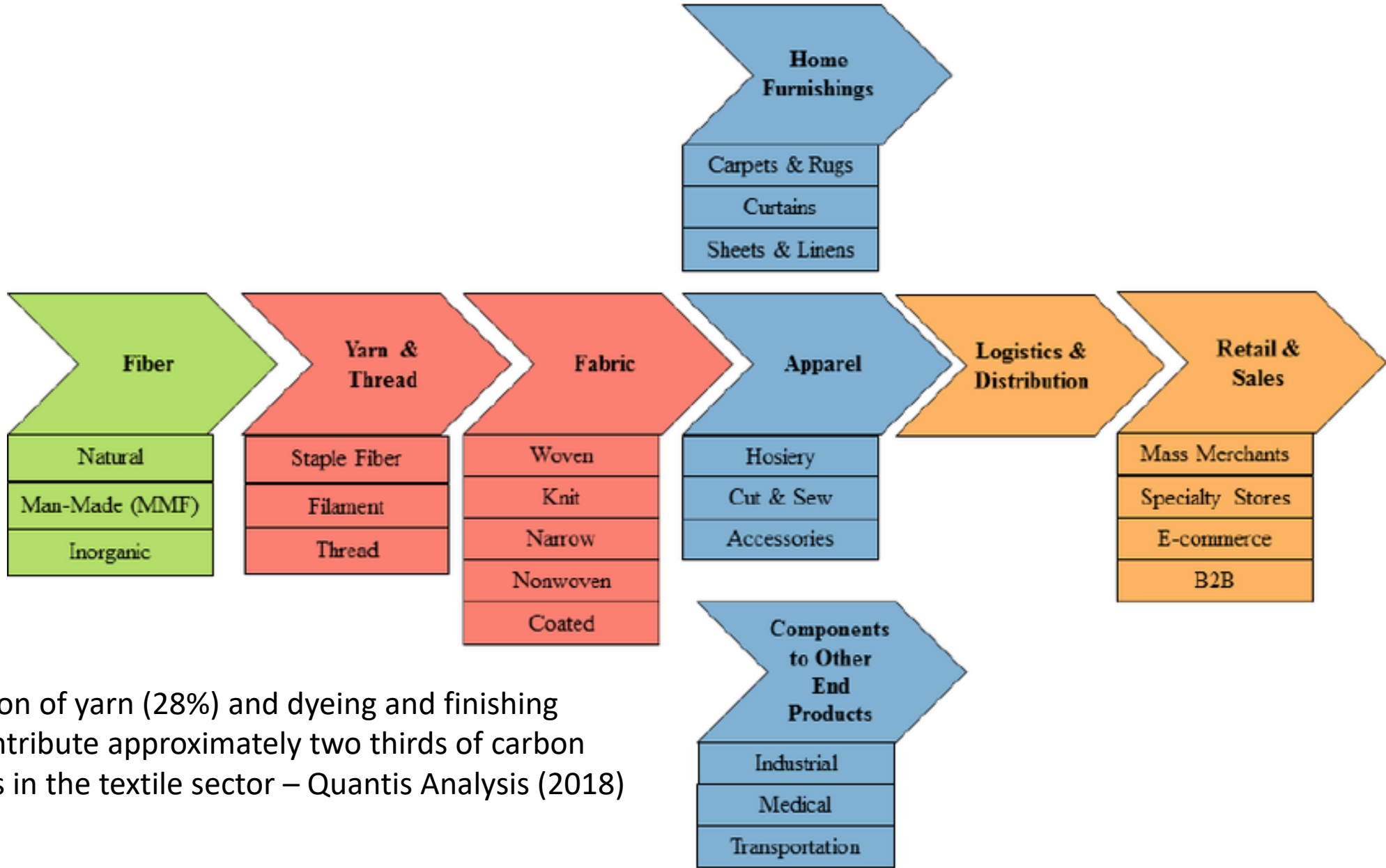
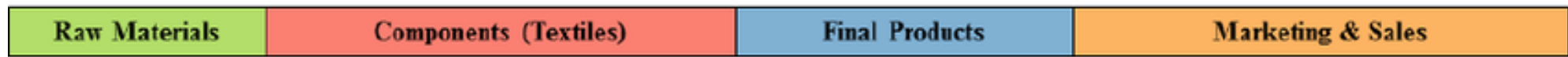
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Textile Sector - Global

- Globally, textile sector is responsible for 1.7 million tons of Carbon Dioxide emissions, which is 7% - 10% of global greenhouse gas emissions annually. (various sources)
- Responsible for 20% of industrial wastewater pollution (Morlet et. al. 2017)
- Projected to account for 25% of World Carbon Budget by 2050 (Ellen Mac Arthur Foundation, 2017).
- Uses include clothing and home textiles, industrial textiles, hygiene products, etc.
- Over 60% fiber manufacturing is for clothing (Niimikaki et. al. 2020)
- Clothing production has doubled between 2000 and 2020. (Filho et. al. 2020)
- Demand is witnessing an increasing trend ... 62 million tons (2015), 111 million tons (2019) to 142 million tons (2030) – (WWF Suisse projections)

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 (PES, 2023)
 - Average share of approx. 60% in national exports.
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- Accordingly, Pakistan Textile sector's contribution to GHG emissions is significant



Preparation of yarn (28%) and dyeing and finishing (36%) contribute approximately two thirds of carbon emissions in the textile sector – Quantis Analysis (2018)

Structure of Pakistan Textile Industry

COTTON SPINNING

- Large Scale organized sector AND cottage/small scale sector.
- For 2022 - 2023,
 - 517 textile units (40 composite and 477 spinning units)
 - 28,500 shuttle-less looms and 375,000 conventional looms

SYNTHETIC TEXTILE FIBRES

- Five major producers
 - Total capacity of 636,000 tons per annum.

WEAVING

- Primarily producing low value grey cloth
- For 2022-23,
 - Looms installed in cotton textile mills - 9084

Structure of Pakistan Textile Industry ... contd.

- Woolen industry – Primarily deals in rugs and carpets
- Jute industry – sacks and hessian cloth, primarily used for grain storage

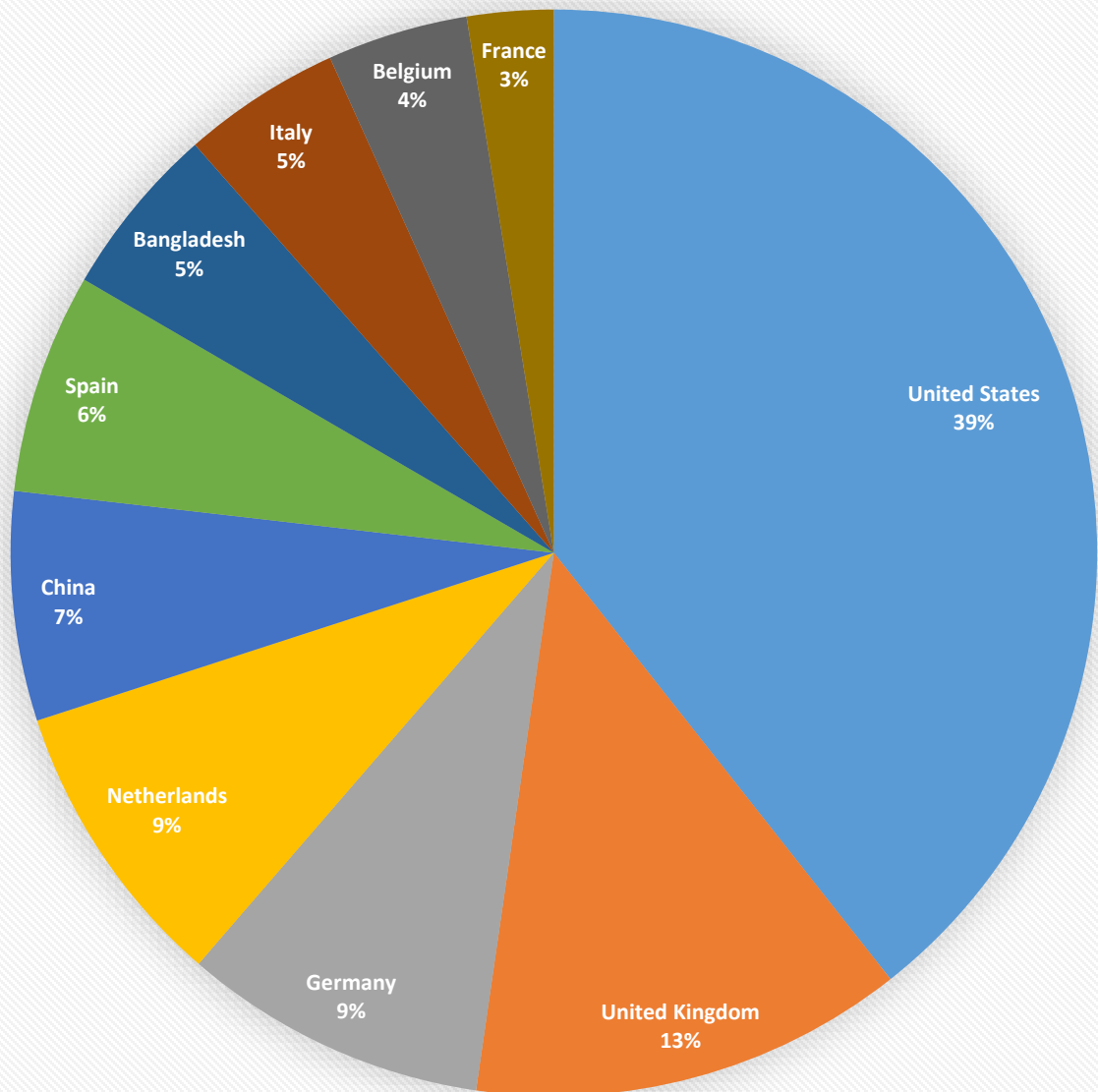
TEXTILE MADE-UP SECTOR

- Hosiery & Knitwear – Export oriented, medium –high quality
- Readymade garments – small-scale industry, significant
- Towels -
- Tents / Canvas
- Bed Wears

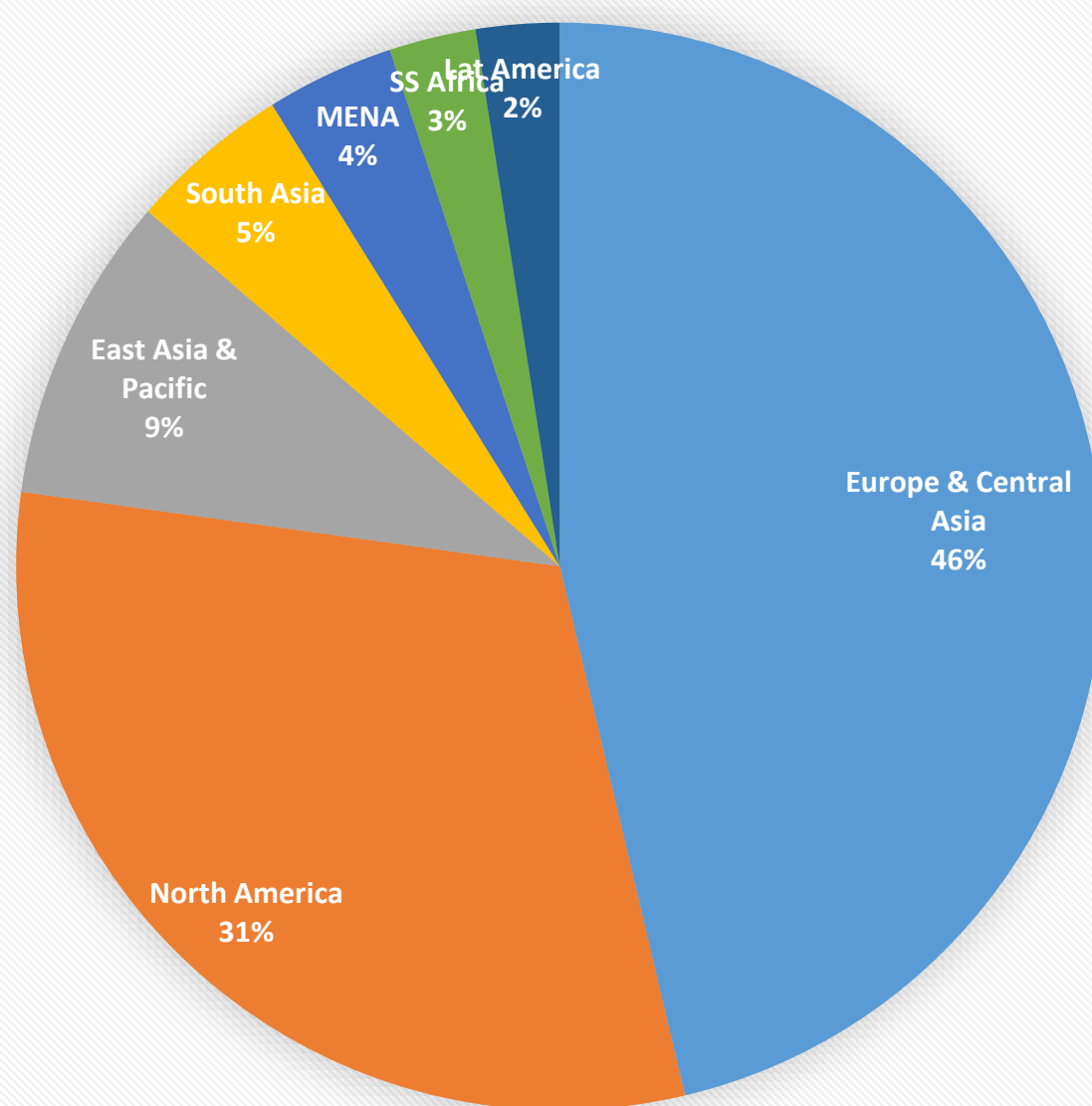
Country	Export value (US\$ billion) in 2020	% Of global textile exports in 2020
China	276.0	35.6
Vietnam	38.9	5.03
Bangladesh	37.3	4.82
India	29.7	3.84
Turkey	28.5	3.69
Pakistan	14.9	1.93
Cambodia	12.4	1.60
Indonesia	11.9	1.54
South Korea	10.8	1.40
Chinese Taipei	8.17	1.06

(Source: OEC).

Pakistan's Exports by Country (Top 10)

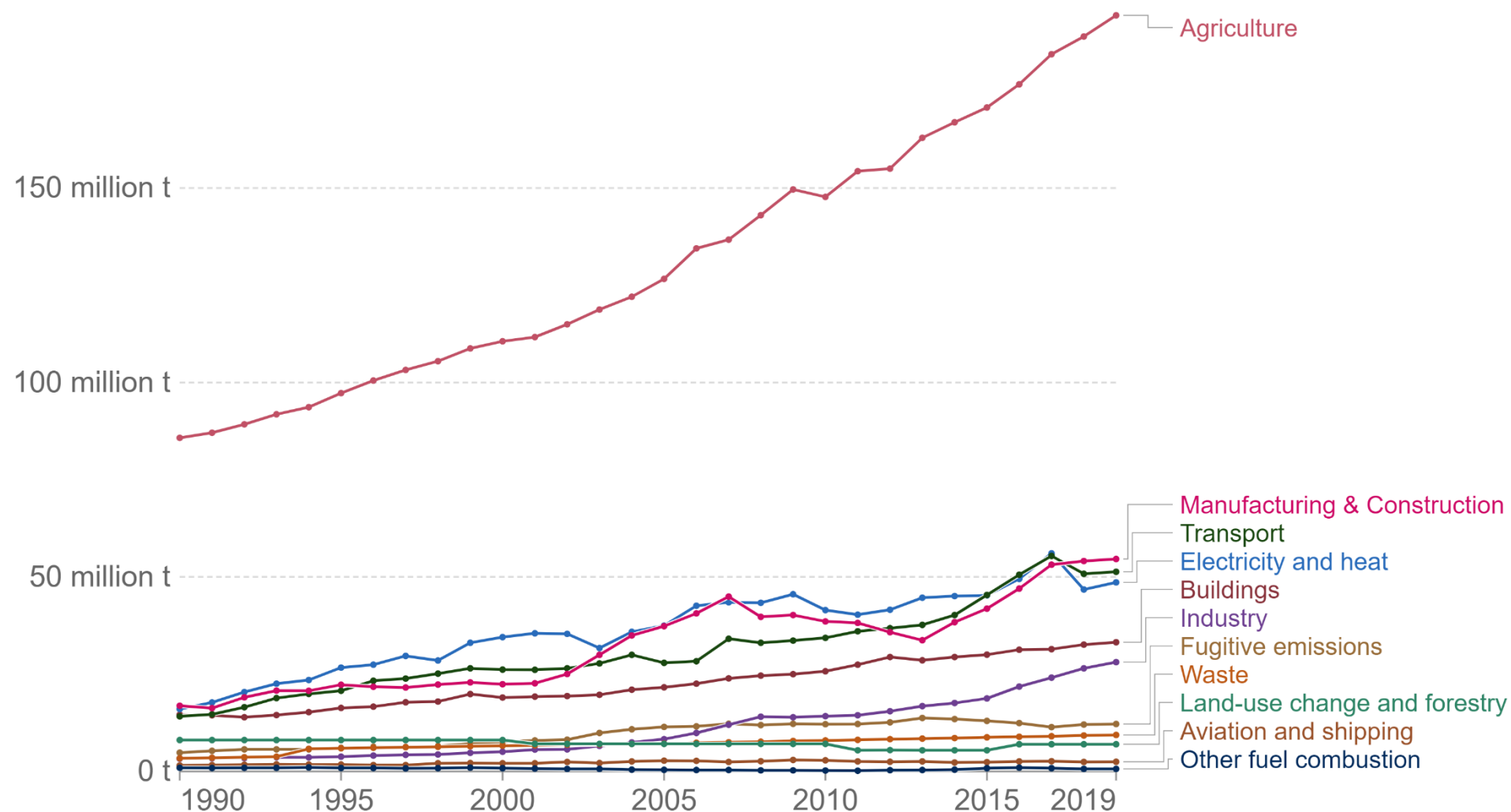


Pakistan's Exports by Region



Greenhouse gas emissions by sector, Pakistan

Emissions are measured in carbon dioxide equivalents (CO₂eq). This means non-CO₂ gases are weighted by the amount of warming they cause over a 100-year timescale.



Source: Our World in Data based on Climate Analysis Indicators Tool (CAIT).
OurWorldInData.org/co2-and-greenhouse-gas-emissions • CC BY

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 (Kirchin et. al. 2015)

Major Environmental Impacts of Textile

- Energy – GHG
 - Most significant in yarn and fabric production
 - Major textile producers (China, India, Bangladesh, Pakistan) have heavily fossil fuel (coal and gas) based power mix.
 - Transportation heavy sector due to globalized and complex value chain.
 - Over 45% of emissions, attributed to the textile sector, are due to energy

Potential for Green Energy

- Solar: Annual horizontal irradiance in Himalayas and Karakoram is 2300 kWh/m² (greatest compared to any other region in the world)
- Wind Energy: Estimated potential 43,000 MW
- Hydropower (cheapest source): 60GW
- Biomass (various estimates)

(International Renewable Energy Agency estimates)

Water

- Mainly at the dyeing and finishing stages.
- Responsible for approx. 20% of clean water pollution globally.
- Global textile industry use ~ 80 billion cubic meters (approximately 30% of total EU water use in 2017)
- 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 (source: aptma)
- 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](#)

Land use

- Less than 50% of clothes are reused or recycled.
- 17 million tons of textile ended in landfills (2018)
- Over 80% of clothes ended up in landfills in 2018
- In Pakistan, 15% of cultivated area is used for cotton production (0.38% of global land use for cotton production) – AARI, 2022
- 25% of pesticides used globally are used for cotton crop.
- Deforestation
 - Clearing for Agriculture
 - Wood pulp in input to Rayon, Viscose, etc.
 - Over 30% of wood pulp used in textile sector come from historical forests.

Chemicals

- Especially at the dyeing and finishing stages.
- Over 80,000 types of chemicals are used in various processes, over 20,000 are commonly used, some are VOCs (volatile organic compounds) that evaporate in the air.
- Some inks and dyes use toxic heavy chemicals (e.g. cadmium).
- Microfibres and microplastics are used in chemicals, which ultimately end in various water reservoirs.
- Some examples of hazardous chemicals:
 - Formaldehyde – linked to leukemia, lung cancer, various skin and eye diseases, etc.
 - Fixatives (e.g. ammonia) – cause damage to plants and animals, especially fish.
 - Polybrominated Diphenyl Ether – linked to liver diseases and thyroid malfunction

Issues for Greening

- Emission reduction requires structural changes, incurring costs as well as labor displacement.
- Lack of micro-level objective standards
- Lack of full enforcement
- Lack of peer pressure as well as understanding
- Political clout

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)

Support

- Incentives (financial support, supportive taxation, policies)
- Regulations
- Advocacy and Education
- 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).

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
- “Decarbonizing Textile Manufacturing” project
 - Ministry of Climate Change, Ministry of Commerce, WWF-Pakistan project.
 - Approved in 2022, titled “Decarbonizing Textile Manufacturing” estimates to mitigate 345,000 tons of CO₂e over five years.

Labor Force

- The female Labor Force Participation Rate (LFPR) is low in Pakistan, averaging at approx. 20%.
- Female LFPR in textile sector 20%-30%
- Female employment varies dramatically based on trade
 - High in stitching and quality assurance, low in weaving and spinning
- Primary reason for low female LFPR:
 - Social norms
 - Perception of workplace harassment
 - Transportation
 - Lack of separate facilities (e.g. toilets, etc.)
 - Education and skill development

Solutions

- Advocacy
- Technical advancements
- Recycling innovations
- RRR (reduce, resale, recycle)
- Renewable energy mix
- Shorter supply chain (reshoring / nearshoring)
- Regenerative agriculture