The Indian Firefighting Protective Clothing Export Market: ASWOT Analysis

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Abstract: Occupational hazards and fatalities of industrial developments are increasing, which requires to be diminished with good work practices, good engineering design of the process or machine design and whenever necessary as a last resort personal protective equipment can be used. The intensification of industrial activity with the evolving workplace regulatory requirements has contributed to an increasing demand for personal protective equipment and protective clothing. In India, the protective clothing market is also expanding, but due to inadequate legislation, the use of protective clothing remains low. As many researchers and studies have suggested, India should diversify its export basket, particularly in higher-Unit-Value Realisation (UVR). As India is growing in technical textiles, protective clothing (protech), a type of technical textile, can be a good product category for product diversification in the export market. The Personal Protective Clothing (PPC) market is growing at a 2% CAGR, and India has the potential to increase exports in this higher-Unit-Value Realization (UVR) category. India should target the higher-end UVR segment of protective clothing to increase its presence in the international market, which will also eventually help the domestic market by providing quality products with technical know-how. The main objectives of the research are to conduct a SWOT analysis of the Indian protective clothing market, evaluating its internal strengths and weaknesses and identifying opportunities and threats, with specific reference to flame-retardant and flame-resistant protective clothing. This study adopts a mixed-methods research design that integrates secondary quantitative market data with primary qualitative insights obtained through semi-structured expert consultations. The research design is both exploratory and descriptive in nature. Through this approach, the study offers an in-depth and comprehensive analysis of the Indian protective clothing export industry by systematically examining its internal strengths and weaknesses, while also identifying key opportunities and threats shaping its external environment.

Key Words: Indian Protective Clothing Export Market, SWOT Analysis, Firefighting Protective Clothing (FFPC).

Introduction

The manufacturing sector occupies an unequivocally pivotal position in the Indian economy, with its contributions being profound and indisputable. The Indian Textile and Apparel Industry has a significant contribution to the country's overall exports, Industrial production, and employment generation. According to the Annual Report of the Ministry of Textiles (MoT, 2024-2025), India occupies the position of the sixth-largest manufacturer and exporter globally, while simultaneously emerging as the second-largest producer of man-made fibres (MMF). The share of textiles and clothing in India's total exports stands at a significant 8.21% (2023-2024) for textile and apparel products, including handicrafts. India has a 3.8% share of global trade in textiles and apparel. As per the Indian Brand Equity Foundation report, "The textiles and apparel industry now contributes approximately 2% of India's GDP and about 11% of manufacturing GVA (Gross Value Added) as of August 2025.As documented in the MOT Annual Report (2024-2025), the textile industry constitutes one of the most consequential sources of employment in India, directly engaging approximately 45 million individuals and sustaining the livelihoods of over 100 million people indirectly through allied sectors, with substantial participation from women and rural communities.

Overview of the Technical Textile, Protective Clothing Market in India

The industry of technical textiles is a sunrise industry in India. According to the report of the Indian Brand Equity Foundation, "The Indian technical textiles market is the fifth largest globally. Technical textile industry was worth US$29 billion in 2024 and is expected to reach US$45 billion by 2026, US$123 billion by 2035, and US$309 billion by 2047."According to J.E. McIntyre (1994), technical textiles are 'textile materials and products whose primary purpose is technical and performance characteristics, rather than their aesthetic or decorative ones'. As per Rasheed (2020), "Technical textile products are applied in functions. Usually, technical textile products are divided into 12 groups: Mobiltech, Indutech, Medtech, Hometech, Clothtech, Agrotech, Buildtech, Sportech, Packtech, Geotech, Protech, and Oekotech. This categorization of technical textile products depends on their area of application."Protech is one of the largest segments of the above 12 technical textile products. The category of products used for the protection or defence of individuals or their assets is known as Protech.

Functional Clothing and Protective Clothing

Protective clothing encompasses garments and related textile-based products specifically engineered to shield the wearer from adverse environmental conditions that may otherwise lead to injury or fatality (Adanur, 1995). In contemporary textile classification, protective clothing constitutes a critical segment of technical or industrial textiles,

reflecting its functional orientation and growing strategic importance within advanced textile applications. As per(Gupta, 2011), functional Clothing is defined as "All clothing is known to perform multiple functions from aesthetic to basic protection from the elements. 'Functional clothing' can therefore be defined as a generic term that includes all such types of clothing or assemblies that are specifically engineered to deliver a pre-defined performance or functionality to the user, over and above its normal functions. Such clothing would normally be made from a mix of innovative materials, and functionality in this case would imply the added value or function that a garment is expected to perform." Some relevant products include Cut/stab-resistant clothing, Firefighter clothing, Antimicrobial clothing, Waterproof clothing, High-visibility clothing, NBC (nuclear, biological, and chemical) protective clothing, high-altitude clothing, bulletproof vests, UV-protective clothing, and cleanroom clothing. As all of these products require protection, synthetic or high-performance fibres are most often used. Aramids are used for protection against fire (firefighter clothing), impact (bulletproof vest), cut (butcher's gloves), and abrasion (biker's clothing). Other fibres may include carbon, glass, steel, etc. Protective textiles are manufactured using specialised fibres, including high-tenacity polyethylene terephthalate (PET) and polypropylene (PP), aramids, and ultra-high-molecular-weight polyethylene (UHMWPE) which impart enhanced strength, durability and protective performance.

Firefighting Protective Clothing

According to (Zhou, Reddy and Yang, 2005), the primary function of fire-protective clothing is to slow the rate of heat transfer to human skin by providing the wearer with critical time to respond and escape from hazardous conditions. Protective clothing intended for flame protection must fulfil two essential functions: it must exhibit inherent flame resistance and simultaneously act as an effective thermal barrier against heat exposure. Such protective and firefighting clothing are designed to safeguard individuals from risks associated with fire, flames, extreme heat, molten metal splashes, and electrical hazards. Consequently, firefighting and flame-protective clothing is widely utilised across multiple high-risk occupations, including structural and wild land firefighting, airline, foundry, the oil and gas and LPG sectors, electrical and welding.

According to multiple market research estimates, the global protective clothing is projected to grow ata compound annual growth rate (CAGR) of 6.6% to reachUS$12.3 billion by 2026. Further projections by the market research firm Market and Markets TM (Market and Market, 2025) indicates, the protective clothing market is estimated to grow from US$ 10.99 billion in 2024 to US$ 15.06 billion by 2030, at a CAGR of 5.48%. This sustained growth trajectory is underpinned by government-led initiatives aimed to enhance personnel safety in developed economies, alongside increasing awareness and

growing concern among employers and employees regarding workplace safety both of which continue to drive the protective clothing market.

Objectives:

The primary objective of this research is to examine the Indian firefighting protective clothing market through a structured SWOT analysis of the industry. The study offers a comprehensive assessment of the Indian protective clothing export sector by systematically evaluating its internal strengths and weaknesses and identifying the key opportunities and threats shaping its competitive and strategic landscape.

Research Design & Methods:

The study adopts a mixed-methods research design to conduct a systematic SWOT analysis of the Indian firefighting protective clothing industry, situating the assessment within the context of a highly specialized and niche product segment. The mixed-methods approach integrates quantitative secondary data with primary qualitative insights. Secondary data were obtained from peer-reviewed journals, industry reports, international safety standards, publications of the Ministry of Textiles, Government of India and trade statistics on protective clothing manufacturing and exports. Qualitative primary data were collected through semi-structured expert consultations involving manufacturers and Industry Association representatives. The design is both exploratory and descriptive, as it investigates an under-researched niche segment of protective clothing to identify key internal and external factors influencing industry competitiveness and systematically describes and categorizes these factors using a structured SWOT framework. The SWOT framework is used to identify and evaluate internal factors, such as strengths and weaknesses, and external factors, such as opportunities and threats, faced by the industry in operating in this niche product segment. This approach facilitates the systematic identification of internal factors, namely the industry's strengths and weaknesses as well as external factors, including opportunities and threats that collectively influence the competitiveness of the firefighting protective clothing industry.

SWOT analysis, for decades has been extensively employed as a core strategic framework for evaluating the competitive and strategic standing of industries, projects, and policy domains. SWOT analysis is an analytical framework that systematically examines an industry's strengths, weaknesses, opportunities and threats. As per (Puyt, Richard W.; Lie, Finn B.; de Graaf, 2020), SWOT was introduced by Robert Franklin Stewart, originally as SOFT – Satisfactory, Opportunity, Fault and Threats. As per(Philip and Armstrong (2011),"Strengths include internal capabilities, resources and positive situational factors that may assist the company serve its customers and achieve its objectives. Weaknesses represent internal constraints and negative situational factors that may affect the

company's performance. Opportunities are favourable factors or trends in the external environment that the company can exploit to its advantage. Moreover, threats are unfavourable external factors or trends that may present challenges to performance. There is no doubt that even SWOT analysis is criticised for its weaknesses, due to various reasons, including alackof empirical evidence; still, this tool has been used by many researchers for industry analysis and government projects.

Indian Firefighting Protective Clothing SWOT Analysis Strength

The Indian firefighting protective clothing industry despite facing multiple weaknesses and operational challenges, possesses certain inherent strengths that can support its growth in India within the domestic and exports market. India continues to be regarded as a relatively low-cost manufacturing destination when compared with other developing economies, even though the production of firefighting protective clothing demands a highly skilled workforce. As highlighted in the India Education & Labour Report (2025), comparatively low wage costs remain a significant attraction for business operations in India, particularly in labour-intensive sectors. The absence of a uniform nationwide mandatory minimum wage allows individual states to determine their own wage structures, enabling firms to strategically select operational locations based on cost considerations.

One of the significant strength of the industry is the firm policy support extended by the Government of India (GOI) for the technical textiles sector, as per(Ministry of Textile, 2025), GOI's mission NTTM – National Technical Textile Mission (NTTM) with Rs.1480 Cr fund, has been established to accelerate research, development, innovation, and capacity building in technical textiles, including Protechsuch as firefighting protective clothing. While small and medium-sized companies dominate the Indian industry, a few large companies with economies of scale can compete with global players. For FFPC and other protective and technical textiles, GOI, under the NTTM, has appointed national research and development institutes as Centres of Excellence (COEs), and these labs have provided good testing facilities for FFPC. This COE also works with national standard development bodies, such as the Bureau of Indian Standards (BIS), to develop standards fora wide range of protective and technical textiles. The Bureau of Indian Standards (BIS) actively works with industry, R&D institutes, and the Indian Technical Textiles Association to develop new standards in line with industry and other stakeholders' requirements. For the Protec product segment, GOI has appointed NITRA(North India Textile Research Association) as a Centre of Excellence (COE).There are also sufficient testing laboratory facilities available, including Ahmedabad Textile Industry's Research Association (ATIRA), The Bombay Textile Research Association (BTRA), South India Textile Research Association(SITRA), Wool Research Association(WRA), as well as private labs such as

SGS and Intertek laboratory to name a few for firefighting protective clothing, which are capable of undertaking all basic high-performance textile testing required by national and international standards under BIS, NFPA, ISO and EN standards.

India's overall political stability serves as an important factor for the growth of industry across sectors. The country is supported by a good infrastructure base encompassing railways, road networks, ports, electricity, internet connectivity and broader communication systems. In recent years, sustained government efforts have been directed toward further strengthening this infrastructure, not only to improve the quality of life of citizens but also to facilitate industrial expansion and competitiveness. In addition, a range of policy schemes aimed at machinery modernisation and export promotion have been introduced, providing tangible support to industrial upgrading and enhancing the sector's growth prospects.

The convergence of cost competitiveness, the availability of a relatively low-cost operational workforce, improving testing infrastructure and evolving trade opportunities places the Indian firefighting protective clothing (FFPC) industry in a favourable position within the global market, endowing it with multiple competitive strengths.

Weaknesses

Despite several competitive advantages, India still has weaknesses that prevent the FFPC and the protective clothing industry from growing and reaching their full potential. According to the (IIT (New Delhi)and Ministry of Textile, 2020),India's major weakness/challenge is India's dependency on imported basic raw materials used in protective clothing in terms of protective textiles and specialised chemicals, which are also patented. Protective clothing manufacturers often face challenges in raw material sourcing. India has a limited number of specialised yarn and fabric manufacturers in this segment. Additionally, a few new entrants in the market have issues with quality and technical know-how in fabric finishing, resulting in inconsistent performance parameters and, in some cases, the inability to meet international quality standards. India also lacks domestic manufacturing capabilities for FR finishing chemicals.

India possesses a reasonably established base of testing laboratory facilities for fundamental high-performance textile evaluations but it continues to lack the requisite capabilities for conducting advanced testing and validation essential for specialised FFPC applications. Several of the country's leading national and private laboratories do not provide certain critical, highly specialised test. Consequently, manufacturers are compelled to outsource specialised testing to laboratories in Europe or the United States. Such a practice that significantly escalates both testing costs and lead times by undermining overall industrial competitiveness.

According to the India Opportunities and Challenges: Baseline Study (2020) conducted by Indian Institute of Technology Delhi in collaboration with the Ministry of Textiles, there exists a notable gap in adequate legislation mandating the use of protective clothing across industries. The report highlights the absence of uniform and enforceable mandatory standards across several high-risk industrial sectors and government departments, including the firefighting workforce, the Indian Armed Forces (Army, Navy and Air Force), the oil and gas sector, forging and industrial welding industries, the petrochemical sector and the electricity and power transmission industry. Many industry experts believe that mandatory protective clothing regulations would substantially increase demand, thereby improving capacity utilisation and driving growth in the FFPC industry.

Access to affordable finance remains a detrimental constraint for the industry. Although financial resources are available through both nationalised and private banking institutions, prevailing interest rates are comparatively high rendering bank finance less accessible for industrial expansion in India. As reported by Forbes India, average lending rates across public and private banks are approximately 11.81 per cent, a level that significantly elevates the cost of capital. Such high financing costs adversely affect capital investment decisions, weaken competitiveness and pose particular challenges for export-oriented manufacturers, thereby underscoring the affordability of finance as a critical concern for the industry.

As per the Technical Textiles Industry in India Opportunities and Challenges: Baseline Study(2020) report by IIT (New Delhi) and the Ministry of Textiles, the report further identifies the lack of specialized courses in protective and other technical textiles. There is a shortage of a scientifically trained workforce which is capable to support industry-level research and development, drive innovation in raw materials and can advance sophisticated product development initiatives. Basic product standard and specification knowledge is also limited, which compels the industry to train the workforce through on-the-job training. There are very few courses or training programmes in FFPC and universities at the diploma or degree level offer no specialized courses on FFPC.

For export markets, FFPC manufacturers are required to absorb substantial costs associated with factory compliance and specialised testing of raw materials, including fabrics, trims and finished garments. These mandatory compliance and testing requirements significantly increase the overall cost burden particularly for firms engaged in export-oriented production.

Opportunities

The Indian Firefighting Protective Clothing (FFPC) and protective clothing industry, which is a rising sector in India offers significant growth opportunities which is driven by

both domestic and international market dynamics. Heightened global awareness of workforce safety, coupled with increasingly stringent compliance norms, particularly across the United States and Europe, is driving a sustained rise in international demand for high-quality firefighting protective clothing (FFPC).As per multiple market research assessments, global demand for protective clothing has experienced sustained growth and is expected to continue expanding in the coming years. According to Markets and Markets TM (2020), the following are the major market dynamics driving growth in the PPE market worldwide. The major global growth drivers in the PPE market include accelerating economic development, rising workplace accidents in the manufacturing and construction sectors, which may require companies to pay higher compensation, and continuous improvements in PPE manufacturing technologies. In addition to international demand, domestic demand is also increasing, as several public industries, especially oil and gas public-sector undertakings (PSUs) and private enterprises, have voluntarily implemented mandatory protective clothing policies for specific hazardous tasks. Increased safety awareness across Indian engineering, petrochemical, and energy sectors is further fuelling the demand for FFPC and other categories of protective clothing. Protective clothing manufacturing activities in the clothing sector are increasingly being outsourced from developed to developing economies which prompts governments in developing countries to actively encourage domestic entrepreneurs to capitalise on this shift by entering the manufacture of firefighting protective clothing and other technical textile products in India.

At present, the Indian Protective textile and clothing industry is still ata nascent stage in terms of its technical capability, even though some textile and clothing enterprises have begun independent product development, developing and strengthening their highly skilled technical workforce and implementing other required efforts to build the technical capability for the production of Firefighting Protective Clothing. The FFPC segment currently comprises a relatively limited number of industry participants. This low level of market saturation, in turn, creates a favourable growth opportunity for both new entrants and existing high-performance fabric manufacturers seeking to expand into the FFPC segment.

As reported by Markets and Markets TM, North America represents the leading global market for firefighting protective clothing, followed by Europe and the Asia–Pacific (APAC) region. The Markets and Markets TM report (2020) further identifies and categorises the principal factors driving the growth of the firefighting protective clothing market across different contexts, as outlined below:

North America: Highly Stringent regulatory norms and rising workplace safety concerns.
Europe: Strong certifications ensure high product quality by reducing the risk of duplicate products entering the market.

The strengthening of occupational health and safety regulations with the rising awareness of worker protection, presents a significant growth opportunity for the firefighting protective clothing (FFPC) industry. This regulatory evolution when combined with advancing industrial awareness, has contributed to a steady expansion in demand for FFPC, particularly across developing economies. As observed by Richard Horrocks (2000), the adoption of personal protective equipment (PPE) and protective clothing has historically been driven by legislative mandates in developed countries, where stringent regulations have been imposed on employers through formal safety legislation. In contrast, while many developing countries previously lacked comparable regulatory frameworks, Horrocks (2000) notes that this situation is undergoing rapid transformation. This shift, together with heightened industry awareness, is contributing to a growing demand for FFPC in emerging markets.

Market research further substantiates this trend. According to Markets and Markets TM (2020), increasing concerns regarding worker health and safety, coupled with stricter government compliance requirements are compelling industries in developing countries to mandate the use of protective clothing for personnel operating in hazardous environments. Regulatory mandates in developed economies have also played a critical role in shaping global demand patterns. For instance, under the guidelines of Occupational Safety and Health Administration in the United States, companies operating in the oil and gas sector are required to provide heat- and flame-resistant clothing to workers exposed to fire-related risks. Such regulatory requirements have significantly stimulated demand for protective clothing.

A similar regulatory momentum is evident in India. Guidelines issued by the Oil Industry Safety Directorate (OISD STD 155, 2025) provide comprehensive directions for the selection, use and maintenance of PPE within the oil and gas sector, recommending the use of boiler suits, fire-retardant suits and electrical flash fire–retardant garments based on task-specific risk assessments. With increasing awareness within the Indian oil and gas industry and clearer government guidance, demand for firefighting protective clothing has continued to rise. Industry experts further indicate that the growing presence of multinational corporations in India is reinforcing this trend, as domestic firms are increasingly required to align their industrial safety practices with global standards.

Another important driver of demand for firefighting protective clothing as well as outsourcing from the Indian apparel manufacturing sector, is the global reconfiguration of production base away from China. There exists considerable scope for India to expand its manufacturing footprint in FFPC, particularly as China currently holds the largest share of the global personal protective equipment market at approximately 17 per cent, including protective clothing, as reported by Statista (2025). The growing “China-plus-one” sourcing sentiment among developed economies has further encouraged a shift

toward alternative Asian manufacturing hubs, positioning India as a one of the viable and competitive destination for FFPC production. Evolving trade agreements are expected to strengthen India's position in technical textiles. As highlighted in the Indian Brand Equity Foundation's textile sector reports, the India–UK Comprehensive Economic Trade Agreement (CETA) is anticipated to enhance market access, promote technology collaboration, and strengthen export potential for India's technical textiles industry. Similarly, the India–European Union Free Trade Agreement is expected to exert a significant positive influence on the sector by improving competitiveness for one of the major export markets and facilitating deeper integration into global value chains.

Threats

The Indian Firefighting Protective Clothing (FFPC) industry faces numerous threats that undermine its global competitiveness. Firefighting Protective Clothing (FFPC) requires flame-retardant (FR) fabrics that depend heavily on specialized high-performance fibres and FR-treated cotton or cotton–polyester blends. The raw materials supply and price for textiles and clothing have greatly influenced the international competitiveness as India is mainly dependent on these specialized high-performance fibre's imports, as they are no high performance fibre manufacturing plants or patented technologies exist in the India, even the high fabric manufacturers, they are mainly dependent on imported aramid and other high performance fibre as India do not have any patented technology for developing for these fibre nor India has the presence of foreign companies producing in India.

According to the (IIT (New Delhi)and Ministry of Textile, 2020),India's dependency on imported basic raw materials used in protective textiles particularly inherent flame-retardant (IFR) fibres and other specialised high-performance fibres, like Aramid (Kevlar® and Nomex®) and other specialised fibres and FR finishing chemicals like Proban® and Pyrotex® both are proprietary items which are governed by patents. Since these chemicals are also patented and a limited number of traders control their supply, manufacturers often face sourcing challenges, price volatility, and supply constraints. The import price of high-performance fibres is also increasing and is a significant concern. This sole dependence on imported fibre and fabric manufacturing is bringing a serious challenge to the industry, and its effects on the competitiveness of the Firefighting Protective Clothing industry are thus decreasing. Consequently, most critical fibres continue to be sourced from overseas. The steady rise in global prices of high-performance fibres has increased input costs for Indian FFPC manufacturers and weakened their cost competitiveness. This continued reliance on expensive imported raw materials therefore poses a serious challenge to the industry's ability to sustain growth and remain competitive over the long term.

India's dependence on imported fibres and specialized finishing chemicals makes the sector highly vulnerable to external disruptions. Any unforeseen event or situation, such as pandemic disruptions or geopolitical issues, disrupts the supply of these specialized fibre imports and thus impacts the industry significantly at the beginning of the pandemic and during the Russia-Ukraine War. Many Indian manufacturers had to wait for a few months to get the fibres, which delayed their commitments to their buyers. Similarly, India is dependent on specialized chemicals for FR finishing, as two major chemical finishing companies have patented their own finishes, leaving Indian firefighting clothing manufacturers with limited alternatives and high procurement risks. Another major issue in sourcing raw materials for special trims is that major exporters must import these trims from countries such as China, the USA, Vietnam and South Korea.

The trade in imported fibres and chemicals is largely controlled by a limited number of domestic traders, creating additional barriers for new entrants to the FFPC industry. These intermediaries often command premium prices for specialised fibres and chemicals, further increasing input costs and constraining market access for emerging manufacturers.

Neighbouring countries have preferential status under Free Trade Agreements (FTAs) or Preferential Trade Agreements (PTAs) with Europe and the USA, giving them a cost advantage over Indian manufacturers. A significant setback for the industry recently is the USA's increase in tariffs, which has affected many companies ability to maintain product cost competitiveness and has also compelled them to explore new export markets and low-tariff regions for the manufacturing of FFPC.

Results & Discussion

The significant challenges that are faced by the industry, as discussed in the SWOT analysis identified through the study of various reports, industry analysis, and the expert's interview, highlight several critical challenges currently faced by the sector, which collectively constrain the competitiveness and growth of the firefighting protective clothing (FFPC) industry.

- One of the key constraints in the industry is the unavailability and high cost of key raw materials, leading to higher production costs and reduced competitiveness. This shows manufacturers' high dependence on imported key raw materials and specialised inputs, exposing them to supply chain volatility and global price fluctuations.
- Another significant weakness is a shortage of skilled and technical workforce, which is adversely affecting the FFPC's productivity, process efficiency, and quality. As the firefighting protective clothing is a technically demanding product, this skill gap

affects the manufacturer's ability to meet the stringent standards. It further constrains the industry's capacity and scalability.

- The lack of adequately equipped testing laboratories is a critical constraint in India. Currently, the country lacks testing facilities with the capability to perform several advanced and mandatory specialised tests essential for protective clothing.Due to this critical weakness, many manufacturers have to rely on foreign testing laboratories, resulting in very high testing costs and long lead times that reduce their flexibility.
- High compliance and renewal costs are also among the most significant burdens on FFPC manufacturers for export orders, which MSMEs must bear every year, reducing manufacturers' flexibility and sometimes leaving exporters without benefits for domestic orders.
- The absence of a mandatory regulation for firefighting protective clothing is significantly impacting domestic demand, resulting in underutilisation of manufacturing capacity and increased dependence on export markets. This regulatory gap and the absence of domestic demand discourage new investment in FFPC manufacturers' manufacturing capabilities, and it is also challenging for existing players to operate with limited order sizes and underutilisation.
- The major trade-relatedthreat, particularly the imposition of high tariffsby the USA, poses a significant risk to export manufacturers who are exploring shifting to low-tariff country operations or other alternative arrangements as short-term relief.
- These challenges indicate a misalignment among internal capabilities, supporting infrastructure, and the external policy and trade environment. The findings suggest that without coordinated interventions in skill development initiatives, domestic testing infrastructure for specialised tests, regulatory mandates for protective clothing, and trade policy support, the firefighting protective clothing industry will not be able to achieve sustainable growth, and global competitiveness will remain constrained.

Recommendations

Based on insights derived from industry experts, industry and government reports, several strategic interventions are recommended to strengthen the protective clothing exports:

- **Development of High-Performance Fibres:** Establish a comprehensive national research and development laboratory dedicated to high-performance fibres, in collaboration with leading textile, chemistry, and materials science research institutions and chemical companies' advanced research facility. Such a facility would support the development of the raw material for fibre innovation, a key constraint for the industry.

- **Establishment of Mandatory Standards:** Introducing mandates for protective clothing, especially firefighting and industrial safety clothing, would enhance worker safety, stimulate domestic demand, and catalyse technological advancement. Such mandates will help the industry improve capacity utilisation and increase technical know-how, enabling the domestic industry to engage more confidently and competitively in the export market.
- **Integrating Global Market Shifts:** With China scaling down certain manufacturing operations and ongoing China–US trade tensions, Indian manufacturers have an opportunity to capture emerging global market space. Policy support and strategic positioning could help maximize these gains.
- **Incentives for International Compliance:** Although international compliance certifications are not compulsory for domestic production, units that adhere to these standards should be offered incentives such as tax benefits and priority procurement status for domestic orders. This would encourage higher manufacturing standards and increase export readiness.
- **Financial and Capital Support:** Government-backed financial schemes that includes subsidized interest rates to improve the affordability of finance for industry, improved credit access, and support for capital expenditure are essential to enable manufacturers to upgrade facilities, adopt compliant processes, and invest in advanced technologies.
- **Reduction in Import Duties:** Lowering tariffs and duties on high-performance fibres, textiles and specialised chemicals would help reduce production costs, facilitate innovation, and enhance competitiveness in both domestic and export markets.
- **Development of Domestic Testing Infrastructure:** Establishing a comprehensive national testing laboratory for specialised protective textiles and clothing, in collaboration with key industry stakeholders, would significantly reduce reliance on foreign labs and shorten certification timelines for specialised tests.

Skill Development Initiatives: Introducing specialized training programs and academic courses focused on protective textile engineering, product standard, specification and testing methodologies and manufacturing practices would help build a skilled workforce capable of supporting industry modernization.

The effective implementation of these strategic interventions can significantly transform the Indian protective clothing export industry from a cost-driven manufacturing base into a technologically advanced and globally competitive sector. A concerted strengthening of domestic capabilities in high-performance fibre development, testing infrastructure, skills and regulatory oversight would allow India to mitigate structural constraints and enhance product quality, reliability and compliance with global standards. Simultaneously, supportive trade, financial and tariff policies can reduce production costs and improve

export competitiveness. Indian manufacturers can further consolidate their position as credible, long-term partners within the global protective clothing market by capitalising on global supply-chain realignments and incentivising adherence to international compliance frameworks. Thus, these measures can augment capacity utilisation, stimulate innovation, enhance worker safety and enable sustainable export-led growth, thereby reinforcing India's strategic role in the global technical textiles and firefighting protective clothing value chain.

Conclusion:

This study provides a comprehensive and systematic examination of the Indian firefighting protective clothing (FFPC) industry through a structured SWOT framework by highlighting its strategic importance within the broader technical textiles ecosystem. The analysis demonstrates that India possesses several inherent strengths, including cost competitiveness, a growing base of skilled labour, strong government policy support through initiatives such as the National Technical Textile Mission and the availability of testing and standard-development institutions. These strengths in conjunction with heightened global and domestic awareness of occupational safety, position the industry with significant growth prospects.

In contrast, the study also identifies persistent structural weaknesses that constrain the competitiveness. Heavy dependence on imported high-performance fibres and proprietary finishing chemicals, limited advanced testing infrastructure, skill gaps in specialised technical textiles, high compliance and financing costs, and the absence of mandatory domestic regulations restrict the capacity utilisation and innovation. From an external perspective, rising global demand, China-plus-one sourcing strategies and more stringent international safety norms present notable opportunities. However, persistent challenges such as trade barriers, tariff disadvantages, supply-chain disruptions and geopolitical uncertainties pose substantial risks.

The findings indicate that sustainable growth of the Indian FFPC industry is contingent upon coordinated interventions by policymakers, industry stakeholders and supporting institutions. Persistent entrenchment on raw materials, suboptimal domestic testing and skill systems, restricted regulatory enforcement and inadequate financial and trade support constrain the industry's transition from cost-based competition to a globally competitive and technology-driven manufacturing sector.

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