

**Financial challenges on application of ESG in production of handloom products**

Jhuma Choudhury 1\*, Dr Payal Thakur 2\*

Research Scholar, Department of Management and Commerce, Nims University Rajasthan, Jaipur, jbhatt31@gmail.com

Assistant Professor, Department of Management and Commerce, Nims University Rajasthan, Jaipur, payal.thakur@gmail.com

**Abstract**

The blending of Environmental, Social and Governance principles within the handloom industry faces unique challenges and issues, as this sector blends traditional craftsmanship with modern sustainability expectations. Handloom products often crafted by artisans in rural and marginalized communities offer significant social benefits, but their widespread adoption within ESG frameworks is hindered by several factors including inconsistent sustainability standards, limited access to technology for tracking environmental and social impacts and the vulnerability of handloom producers to exploitation and labor abuses in certain regions. Additionally, the lack of clear, globally accepted metrics for measuring the environmental impact of handloom production-such as water usage, energy consumption and waste management poses difficulties in assessing their true sustainability. There is also the risk of greenwashing, where companies may make unsubstantiated claims about the environmental or social benefits of handloom products without ensuring substantial improvements. Balancing traditional handloom practices with modern governance standards, including fair wages, working conditions and intellectual property protection presents significant obstacles. Addressing these issues requires a holistic approach that includes stronger regulatory frameworks, better access to sustainable technologies, improved transparency and stronger support for artisan communities to ensure both the economic and environmental sustainability of the handloom sector.

**Keywords:** -Sustainability standards, Greenwashing, ethical sourcing, cultural preservation

**1. Introduction**

**1.1 Overview of ESG Principles:** ESG (Environmental, Social, and Governance) principles have become an access to assess the sustainability and societal impact of a business or industry. Collectively, the ESG criteria are used to assess a company or sector in three areas these areas being Environmental Conservation, Social Responsibility and Corporate Governance (Kumar, et al., 2024). Globally, ESG adaptation is being embraced with rapid expansion, and organizations are realizing that financial performance must be reconciled with both social and environmental considerations. This change, which is largely motivated by pressure from regulatory frameworks, consumer tastes, and investor expectations, is specifically emphasized in the United Nations Sustainable Development Goals (SDGs) designed to tackle major global issues such as climate change, poverty, and inequality. Investors, consumers, and policymakers are increasingly utilizing these principles to inform decision-making as they tend to complement the larger overall frameworks of sustainable development and long-term value creation.



**Figure 1** Environmental, Social, and Governance

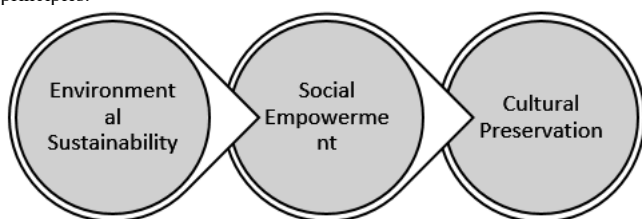
(Source: Kumar, et al., 2024)

- **Environmental:** This pillar concerns its impact on the natural environment, including carbon footprint, natural resource depletion, waste, and possible climate change influence. For industries, it denotes sustainable practices, emission reductions, and conservation of the natural ecosystem.
- **Social:** This dimension focuses on a company’s fulfillment of its stakeholders' expectations and desires, including employees, suppliers, customers, and the communities in which it operates. Such as sustainable labor practices, diversity and inclusion, community commitment, and maintaining safe working conditions.
- **Governance:** Governance relates to the internal systems and processes that direct a company's decision-making, accountability and transparency. That includes board diversity, shareholder rights, anti-corruption, etc.

ESG is rapidly being embraced, for companies understand that profitability has to be put alongside sustainability. As regulation opens up, industries are implementing ESG concepts in order to be decent and garner investment, as well as to respond to consumer demand for ethical products. The SDGs of the United Nations reinforce the importance of ESG, tackling global issues such as poverty, inequality, and climate change through a global framework.

**1.2 The Handloom Sector: A Sustainable Legacy**

Handloom is a significant part of Indian heritage, which also attests to the traditional sustainable practices of the country. Though handloom weaving is an age-old economic activity, handloom weaving itself has been an art, interwoven with culture passed on from generation to generation. Since the sector relies on natural fibers, operates on manual labor, and employs traditional techniques, it is inherently aligned with ESG (Environmental, Social, and Governance) principles.



**Figure 2** Sustainable Legacy

- **Environmental Sustainability:** The nature of handloom weaving itself is environmentally friendly. The use of natural fibres like cotton, silk and wool, which biodegrades and thus has much less effect on the environment in opposition to synthetic materials. Workers carry out the entire production process, which requires low energy input and leads to minimal waste production. Thus, handloom becomes an eco-friendly option in contrast to the mill-made textiles, which usually needs high energy consumption, high chemicals and huge carbon emission.
- **Social Empowerment:** The handloom industry is an important part of empowering the rural people, and especially women. It supports millions of weavers and artisans who belong to marginal and economically backward sections of the population. Handloom provides social inclusion and economic development by conserving traditional skill and promoting fair trade practices.
- **Cultural Preservation:** Handloom weaving is one of the important significant aspects that is established with the identity of India. The variations in weaving techniques, patterns, and designs from one region to another showcase the diversity of the country's rich heritage. Supporting the handloom craft sector is thus a way not only for India to preserve its cultural heritage but also to favour the kind of fashion that puts quality, craftsmanship and heritage before mass production

### 1.3 Rationale for Integrating ESG in Handloom Production

The integration of ESG principles into the handloom sector is both a necessity and an opportunity. With raising concerns over the ecological and societal effects of the products they buy; global consumers are seeking a greener and fairer alternative. Low carbon footprint and positive social impact handloom products are best placed to accomplish this demand. But aligning old methods to new ESG frameworks brings challenges to the sector.

#### Growing Consumer Demand for Sustainable Products

Consumer preferences are changing rapidly over the last few years where organic, eco-friendly, and quake products are given preference. A Nielsen report from 2020 identifies that globally, 73% of consumers are willing to change their consumption habits to reduce their environmental impact. This has especially been seen in the fashion and textile industry where many consumers are looking for sustainable options to fast fashion.



**Figure 3** Growing Consumer Demand for Sustainable Products

The global demand for these sustainable products is well aligned with the offering of handloom products which are often rooted in natural material supply chains, artisanal skills, and fair-trade practices. Adopting ESG practices can make handloom production more attractive to consumers both domestically and overseas that are now driven by their impact on the environment and society, not just their wallets.

#### Potential for Handloom Products to Meet ESG Criteria

The handloom sector in a way already truly lives many of the principles in ESG but much more can be done to also align it. For example, handloom weavers can use sustainable practices when sourcing raw materials like organic cotton or natural dyes. They can also enhance their social impact through fair wages, workplace safety, and gender equality in their employees.

Additionally, governance is an aspect of ESG that can be bolstered through greater transparency and accountability in the supply chain (Nagraj and Devi, 2014). This encompasses raw material traceability, ethical sourcing practices, and labor law compliance. If these practices can be formalised, the handloom sector can become a flag bearer for sustainable and ethical production.

#### Challenges in Aligning Traditional Practices with Modern ESG Frameworks

The handloom sector itself is sustainable by nature, but there are challenges surrounding the adoption of ESG. The complex part is majority of the weavers and artisans, especially in rural India, do not know what is ESG. These enterprises conduct businesses largely informally and lack both the means and knowledge to comply with ESG. However, it also competes against affordable and easily accessible mass textile production. This results in handloom artisans compromising and now focusing on producing at a lower cost, ultimately sacrificing their sustainability and ethical production along the way, just to offer a cheaper alternative. In addition to its various clumps of locusts, the sector also experiences woes of limited access to credit, weak infrastructure and narrow markets that restrict it from wider growth and international competition (Xu, et al., 2024).

Such a vibey challenges would need proper government and private sector interventions. This includes training and capacity-building modules for weavers, access to finance and markets and awareness to help in understanding the merits of integrating ESG, etc. Policymakers too have a significant role to play in encouraging sustainability and establish a sustainable regulatory framework for the handloom sector.

### 1.4 The Legacy and Revival of India's Handloom Sector

With origins tracing back to 4000 BC during the Indus Valley Civilization, India's handloom tradition is one of the oldest and most sustainable textile traditions in the world. Handloom weaving, the textile technique of weaving cloth by interlacing yarns of one or more sets of warp and weft on a non-mechanised loom, is not just a craft — it is an embodiment of the living traditions of popular heritage in India. Colonialism created tremendous upheaval for this ancient practice, but it revived in the 20th century as part of Mahatma Gandhi's Swadeshi Movement. Handloom is also the largest generator of employment after agriculture, supporting over 36 lakh persons of which over 72% are women from rural areas, making the handloom sector today an important rural economy pillar in the country. Spread across the more than 20 countries, it contributes to the 19 per cent of the textile production in the country (Tiwari, 2024). In addition, to its economic importance, handloom sector is a custodian of India's rich and diverse culture. Our country contains a myriad of weaving traditions in each state, creating fabrics with world-renowned characteristics, such as Banarasi, Pashmina, Muga and Kanjivaram. However, turning into a whole species of clothing, these textiles will speak volumes about Indian art and traditions through their craftsmanship and fabrics, as well as impart the sustainability practice of the world. With designers like Vaishali Shadangulé presenting her 'Shwas' collection in a post-modern style at the Paris Couture Week while still retaining an Indian character, the ease with which it adapted to contemporary requirements is showing the signs of maturity in the big sector (Paužuolienė and Derkach, 2024). Burberry, Louis Vuitton and Alberta Ferretti are some of the many international brands that have adopted Indian handloom, while corporates such as Microsoft have been working through CSR initiatives to support traditional weaving. The handloom sector illustrates the sensitization of ancient, traditional skill-oriented professions into environmental conservation and beauty, as one of the largest employment generating sectors after agriculture, which is rural driven and the second largest rural employer. It is a process that uses natural materials, non-mechanized tools, and recycling, making handloom weaving an inherently sustainable practice. Handloom weaving is an eco-friendly process with a very small ecological footprint, needing less energy and creating less waste compared to mechanized textile production. This is in line with the goal of sustainable development across the world and will make the sector a benchmark for sustainable production (Xu, et al., 2024). Various initiatives, schemes and policies have been taken by the Government of India to promote handloom sector to boost its global exports and recognition around the globe. Yet despite the potential, there are factors that have surfaced threatening the sectors survival and expansion.

## 2: Financial Challenges in Adopting ESG Practices

### 2.1 High Initial Costs of ESG Compliance

The integration of environmental, social and governance (ESG) principles is beneficial for the long term, it requires very high investment costs to be recovered by the handloom sector. For many small-scale artisans and cooperatives that operate on thin margins this can be a prohibitive expense. Among the first expenses associated with ESG compliance are moving to sustainable raw materials, improvements in infrastructure, and other so-called green practices.

#### *Investment in Sustainable Raw Materials*

The purchasing of sustainable raw materials is one of the main costs present when complying with ESG. Organic cotton, which is used as an example, is grown with absolutely no synthetic pesticides and fertilizers, and so is more pricey than traditional cotton. Natural dyes, obtained from plants, minerals and other natural sources, in the same manner have higher price than synthetic dyes. Although these materials are more environmentally friendly and often yield higher-end products, the higher prices can stall small-scale producers.

- **Organic Cotton:** The cultivation of organic cotton necessarily led to higher costs due to environmental and social standards that must be followed as per report by Textile Exchange, organic cotton is 20-30% more expensive than its conventional cotton equivalent. Artisans are often left to absorb this price difference, making it virtually impossible for them to compete with industrially-produced textiles (Rajgopal, 2015).
- **Natural Dyes:** Natural dyes are expensive, and we also need to have expertise in using them. Not only is extracting and applying natural dyes a labor-intensive and time-consuming procedure itself, it also comes with additional costs. Moreover, the natural dyes can have an availability problem which results in supply chain woes.

#### *Costs of Upgrading Infrastructure*

Another significant cost of ESG compliance comes from the necessity to upgrade infrastructure to comply with environmental regulations. These include funding for waste management systems, energy-efficient devices, water-saving strategies. And for many handloom producers, especially in the villages, these upgradations are expensive investments they may not be able to afford.

- **Waste Management Systems:** It is imperative to manage waste to minimize the environmental impact of handloom production. Ensuring that dye waste is disposed of safely, water is recycled and limits set on the production of textile waste. The capital investment to implement these systems often proves to be a challenge for small-scale producers.
- **Energy-Efficient Tools:** Energy efficient tools help in replacing the existing handloom devices and machinery and thus helps in reducing the handloom carbon footprint however they can be somewhat expensive to purchase and implement in the infrastructure. For artisans, whose operations are frequently low-tech, this means they lack capacity to reap the benefits, because often they don't have the capital to purchase things like solar powered looms or energy-efficient dyeing machines (Bhatnagar and Niinimäki, 2024).
- **Water Conservation Measures:** Water, is an indispensable resource in the handloom industry, especially for dyeing. Water conservation measures, such as the use of rainwater harvesting or recycling systems, can not only reduce overall water consumption but also minimize the stress on natural habitat. These systems require a significant investment in both upfront and ongoing maintenance cost.

#### *Financial Burden on Small-Scale Artisans and Cooperatives*

- **Limited Financial Resources:** Small scale artisans and cooperatives lack financial support to tend to ESG compliance. Many of them work in a grey area, where they can be informal and potentially without access to credit or financing. They cannot invest as easily in sustainable raw materials and infrastructure upgrades and training when they need to (Pant and Palanisamy, 2025).
- **Training and Capacity-Building:** Compliance with ESG needs expertise and experience. Trainings can be in the form of organic agriculture methods, natural dyeing processes, or waste management for artisans. It requires additional inputs, which presents a challenge for smallholder farmers.

### 2.2 Limited Access to Capital and Funding

Capital and funding is a key driver for encouraging ESG practice in handloom. However, the truth is that the majority of artisans and cooperatives have to go through an endless number of steps to gain access to the resources they require. These barriers include low financial literacy; difficulty in obtaining loans or grants; and low funding availability for sustainable handloom solutions within government or private organizations (Swami and Padma, 2015).

#### *Lack of Financial Literacy Among Artisans*

In a world where financial literacy is the key that unlocks capital and funding. Most of these artisans, particularly from rural areas, do not know how to handle finance system. So also includes how to take a loan, how to manage finances, or also make a business plan. Consequently, lacking this data, it is not always feasible for artisans to obtain the support needed to secure ESG-linked projects (Leena, Balaji, and Bhat, 2023).

Few artisans have advised on the financial products available to them (including but not limited to microloans, grants or subsidies) When they do not have clarity on what they want to achieve, they often find it a challenge to ascertain what avenues of funding will best suit their needs.

These days, the best chance you will stand at securing funding is to compose a profound business plan of discussion for the eventualism project and how it will actually work, financial plan, as well as its significance. It is natural for many artisans not to have the skills and resources preparing such type of plan which makes it hard for them to effectively present a case to potential funders (Dahiya, 2024).

#### *Difficulty in Securing Loans or Grants*

Although artisans understand what funding is available, they encounter obstacles to the access of loans or grants. This is particularly the case for small producers that might not possess the necessary collateral or credit score to satisfy traditional financial institutions. Furthermore, applying for grants or subsidies is a complex and long process, which turns artisans away from those avenues.

- **Collateral Requirements:** Traditional financial institutions typically demand collateral so they can only lend if they advance a loan. Most of the artisans especially in the rural would not have the assets to make these requirements. This can complicate securing the funding required to allow ESG-focused projects to get off the ground.
- **Complex Application Processes:** When seeking grants or subsidies, the process may be complicated and lengthy, necessitating thorough documentation and compliance with certain rules. In addition, not all artisans could have access to hiring someone for the various processes involved, and assistance with processes requires having the needed expertise to navigate these processes, making funding access difficult for artisans (Swami and Padma, 2015).

#### *Limited Government and Private Sector Funding*

There are a few government and private sector funding attempts to bolster sustainable handloom production but the amount of funding is often inadequate. This is especially so for small-scale producers who may not be able to draw funding attention from big organizations as per marketing clout.

Indian government has some schemes like NHDP, HWCWS aimed to support the handloom sector. But one limitation of these programs is that they do not offer enough funding, especially for hundreds of artisans that are looking for help (Nayak, Mohanty and Swain, 2023).

Other than government handicaps the private sector funding for sustainable handloom initiatives are also limited. Although specific projects may be funded by some companies or organizations, such as grants or other forms of support, the overall funding levels do not meet the needs of the sector. At the same time, more visible, larger, and larger organizations may benefit more and resource-poor producers may be cut off from such private sector funding opportunities.

### 2.3 Economic Viability of ESG Practices

Handloom producers have to consider the economic sustainability of ESG practices. These practices tend to follow with expensive production; yet, over time these practices can lead to both a better environmental and social impact. This can impose a significant burden on the producers of handloom products, making it difficult to compete with cheaper and non-sustainable products in price-sensitive markets (Rahaman, et al., 2024).

### *Higher Production Costs Leading to Increased Product Prices*

ESG practices often translate to increased production costs, which can be simply reflected as higher prices of products and services. That is a major hindrance, especially in price-sensitive markets where consumers are not willing to spend more on sustainable offerings.

- **Cost of Sustainable Raw Materials:** As discussed earlier, sustainable raw materials such as organic cotton and natural dyes are often more expensive than their conventional counterparts. These higher costs are typically passed on to the consumer in the form of higher product prices (Raju, 2014).
- **Infrastructure Upgrades:** Infrastructure APIs also add to production costs where the existing infrastructure needs to be upgraded to meet environmental standards. Investments in energy-efficient equipment or waste disposal systems that can save costs in the long term incur initial expenditure; thereby raising production costs ().
- **Labor Costs:** ESG compliance is labor-intensive, for example, uses hand dyeing/organic farming, etc. These processes can also cause an increase in wages, further increasing the cost of production (Pande, 2022).

### *Competition from Cheaper, Non-Sustainable Alternatives*

Cheaper production of power loom products and fast fashion is eating heavily into the sacred piekeepers of handloom products. These alternatives are usually made with synthetic fibers and mass production that can lead to lower production costs and quicker production speeds. It also becomes hard for handloom products as they are costlier and time-consuming to match the market.

- **Power Loom Products:** These are manufactured using power loom machines, which helps in faster and efficient production process. Such products are comparatively cheaper than handloom products, thus attracting price-sensitive consumers.
- **Fast Fashion:** Clothing for cheap using synthetic fabrics and exploitative labor practices ... produced in bulk in no time. These are shown to be fashionable, disposable goods; and therefore, very attractive to a fashion-conscious consumer who cares more for price than planet (Ali, et al., 2024).

### *Challenges in Achieving Economies of Scale*

It is further complicated that the handloom sector is organized decentrally which works against the hope of attaining large scale economies. While mass textiles have the advantage of mass production and distribution, handloom goods are often produced by small artisans and cooperatives. This inhibits the cost efficiencies that would come with large-scale production. Handloom manufacturing is generally done by small-scale artisans and cooperatives, many of them in rural areas. This decentralised nature of production makes it hard to realise the economies of scale that larger more centralised production facilities can afford (Hari and Mitra, 2022). Attributing the lack of economies of scale is also the fact they are small-scale producers with a limited market reach. These producers may struggle to scale up production and bring down costs per unit without larger markets.

### *2.4 Market Barriers and Consumer Perception*

Adoption of ESG practices in handloom sector is beset with wide ranging sustainability challenges, that include market barriers and consumer perception. Although, Sustainable lifestyle is getting a lot of traction nowadays but the consumers are still not much aware of the ESG-compliant handloom product. Weighing against this tremendous potential, of course, is the risk of greenwashing, which can erode consumer trust and make it hard for truly sustainable product offerings to be distinguished in the marketplace (Anumala, 2021).

#### *Limited Awareness Among Consumers*

Lack of consumer perception in favour of ESG compliant handloom products is one of the major market barriers. Those products have environmental and social benefits however most consumers are still not aware of their impact and will not purchase such products at a higher price. It creates a challenge for the handloom manufacturers to position & differentiate their product with respect to others in the market overall lack of awareness.

- **Lack of Education:** The consumers do not get educated on the environmental and social impact of the product that they try to consume. This means many lack the understanding and knowledge of how valuable an ESG-compliant product is, as well as why they should seek to support more sustainable practices (Singh and Gautam, 2019).
- **Price Sensitivity:** When in price-sensitive markets, if the consumers are price-sensitive, they may have cost as a main priority rather than sustainability. Handloom products are usually produced in sustainable way which makes them a bit expensive, making it really difficult as cheaper alternatives are always available in the market.

#### *Difficulty in Communicating the Premium Value of Sustainable Products*

Another major challenge is that it can be hard to communicate the superior value of sustainable products. Even though handlooms are ESL compliant products that can conserve environment and can empower the social fabric, these benefits may not be visible to a consumer. It is also challenging for producers to rationalize the price of their products as they are more expensive than non-sustainable alternatives, making differentiation increasingly difficult.

- **Branding and Marketing:** Sustainable products need effective branding and marketing to highlight its value. But there are many small-scale producers who may not be able to develop the strong brands and marketing campaigns that others will be able to do. That makes it more challenging for them to get to and educate consumers about the product benefits.
- **Certification and Labeling:** Sustainable products can be easier for consumers to identify and trust through certification and labeling. Still, getting certified as organic or fair-trade is expensive and tedious. Moreover, the absence of standardized labelling results in confusion among consumers, who often find it hard to locate real sustainable products (Singh and Gautam, 2022).

#### *Risk of Greenwashing and Its Impact on Consumer Trust*

The market for sustainable products is prone to the risk of greenwashing (making false or exaggerated claims about the environmental benefits of a product). Such practice can undermine consumer trust and prevent sustainably made goods to be differentiated. The threat of greenwashing is very risky for handloom producers as it can devalue their ESG-compliant products and cause them to lose the competition with the non-sustainable alternatives

- **False Claims:** Companies may falsely or misleadingly claim their products as environmentally friendly, luring eco-conscious customers. Consumers may become skeptical, making it harder for bona fide sustainable goods to gain a foothold in the market (Yadav, et al., 2023).
- **Lack of Transparency:** This difficulty in tracking the complete supply chain can also result in greenwashing. The second concern surrounding sustainability claims is that consumers may not always understand the sustainability of a product without clear and verifiable information regarding the production process, and be left with a task of trying to figure out if a sustainable product is actually sustainable or if it just has sustainable marketing.

### *2.5 Case Studies: Financial Challenges in Practice*

#### *Case Study 1: The Struggle of Pochampally Weavers*

Telangana boasts of Ikat handloom weaving, particularly from the town of Pochampally. The weavers are enthused about ESG practices but they have multiple financial problems. The main problem lies in the high price of one of its crucial sustainable ingredients, organic cotton, since many weavers work on thin profits, and additional costs are something they just cannot take. Or they have to limit the scale of the production (especially eco-friendly approach must cover whole process), as upgrading only sections of the infrastructure regarding renewable production (provably solar energy powered looms and etc.) have also limited access to funding the same applied to the waste system. The inability of sustainable handloom fabrics to command a premium price due to competition from cheaper power loom products also drives the weavers back to conventional power loom practices.



**Figure 4** Struggle of Pochampally Weavers

*Case Study 2: The Challenges of Kutch Embroidery Artisans*

Kutch, Gujarat is famous for the exquisite embroidery done on their handwoven fabrics. Intent to adopt ESG practices, but financial barriers remain. Because natural dyeing production is not feasible to many artisans and craftspeople due to the high cost of nature dyes compared to cheaper synthetic alternatives.



**Figure 5** Kutch Embroidery Artisans

Understanding finance for ESG-related projects is limited, making it difficult for them to change tools or conserve more water since it is hard to find loans or grants. In addition, consumers remain unaware of the environmental and social advantages of their products, which presents a challenge of communicating the premium value of ESG-compliant embroidery and justifying premium prices, in a competitive environment (Pathak and Mukherjee, 2021).

*Case Study 3: The Failure of a Sustainable Handloom Initiative in Odisha*

A cooperative of handloom weavers in Odisha tried to pilot an organic cotton and natural dye sustainable project but the initiative fizzled out because of financial and market obstacles. It was the higher-than-expected start-up costs for many of the materials and needed infrastructure upgrades that set the cooperative back, and that resulted in inadequate funds being raised (Aggarwal, 2020).



**Figure 6** Sustainable Handloom Initiative in Odisha

While these fabrics were high quality and sustainably produced, ultimately that meant little, because consumers were unwilling to pay the price for those premium products. The cooperative struggled to compete in selling products for food and was unable to overcome the challenges posed by government support programs that seemed to take longer than sustainable for them to navigate, leaving them emptyhanded of the finances needed for the ongoing initiative. It reflects the fundamental requirements of financial and market support for making such sustainable handloom practices financially viable (Aggarwal, 2020).

### 3: Social and Governance Challenges in ESG Integration

The adoption of Environmental, Social, and Governance (ESG) in the handloom sector comes with its own challenges. Although the environmental side of ESG often gets the most attention, the social and governance sides are just as important. This chapter highlighted the social and governance barriers for the implementation of ESG in the handloom industry on low wages, working condition, gender gap, poor enforcement of policies, protective rights for traditional designs and handicraft (Chourasiya, Pandey and Malviya, 2022).

#### 3.1 Social Challenges: Empowering Artisans

##### Low Wages and Poor Working Conditions

One of the most pressing social challenges in the handloom sector is the issue of low wages and poor working conditions. Most artisans, especially in rural areas, work in unorganized sectors with no or less job security. They frequently receive very low wages, too low to cover their needs or to invest in sustainable practices.

- **Low Wages:** The handloom specific reminder of low wages as many artisans receive below minimum wage. As per a report by the Ministry of Textiles, the average daily wage of a handloom weaver has been much lower compared to that in other sectors. As a result, artisans either struggle to uplift their standard of living or adopt sustainable practices that qualify as ESG compliant (Shahi, Shiva and Dia, 2021).
- **Poor Working Conditions:** Work in extremely poor conditions, little access to basic things such as clean water and health care; (some 8784 (549) even lack toilet facilities at work. Poor quality children playing area and no institutional control creates morbidity and slows down the production of reproductive population.

##### Lack of Access to Education and Training on ESG Practices

Another key social issue is education and training related to ESG practices. Most artisans, especially the rural ones are not exposed to formal education and may not know the positive aspects of sustainable practices. Such ignorance can restrict them to ESG-compliant methods and advance their lives.

- **Limited Education:** Most handloom artisans have low or no formal education which makes it difficult to comprehend and apply ESG practices. This includes the understanding and knowledge of biobased raw materials and processing, renewable energy and caring of end-of-lives matters (Gbolarumi, Wong and Olohunde, 2021).
- **Training Programs:** There are various training programs available for handloom artisans, but they are not substantial and widespread. However, most artisans especially those in rural area might not be cover under such programs. Moreover, it may not be relevant to them.

#### 3.2 Intellectual Property and Cultural Preservation

##### Challenges in Protecting Traditional Designs and Craftsmanship

A major concern for handloom units, however, is how to protect the traditional designs and craftsmanship involved at the local level in handloom. Many handloom products also derive from traditional patterns and practices. But most of the time these are copied & reproduced by the mass production textiles deterring the whole point of the authentic handloom products.

- **Intellectual Property Rights:** One of them is the poor IPR protection on traditional designs and craftsmanship. Even artists find it difficult to protect their designs against imitation or reproduction. Either they do not know what their rights are, or they do not have the means necessary to demand them (Desore and Narula, 2018).
- **Design Piracy:** A huge challenge of handloom is the piracy of designs, putting the traditional designs in mass manufactured textiles and selling the items for lesser prices. This is detrimental to the real handloom industry and as a result reduces artisans earnings.

##### Risk of Cultural Appropriation in Global Markets

With the increase in cultural appropriation, Handloom Industry is confronted with yet another big challenge. This can potentially result in appropriation of designs by foreign markets, with no credit or compensation going to original craftspeople in the local milieu, given the burgeoning global market in handloom.

- **Cultural Appropriation:** When aspects of a marginalized culture are taken by the dominant culture without proper acknowledgment or compensation. This can mean that foreign entities use the traditional designs and techniques of handloom weavers without any profit reverting back to the original artisans in the context of the handloom sector (Luján-Ornelas, et al., 2020).
- **Lack of Recognition:** This is a concern never heard of, but ask artisans about it, many traditional designs and techniques are not recognized or protected by international intellectual property laws, leaving artisans with little recourse to prove their right and prevent cultural appropriation.

##### Balancing Innovation with the Preservation of Heritage

Preserving heritage, much like innovation, is another major challenge within the handloom landscape. Although growth of the sector, and its longevity, would not occur without a continuous culture of innovation, converging of traditional designs and techniques of textile, which is a part of a country or regions of political and cultural significance, make implementing this ethos practical and simple.

- **Innovation:** The handloom sector needs innovation to grow and thrive. This further includes new designs and products created together with external collaborators that are appealing to modern markets.
- **Preservation of Heritage:** At the same time, traditional designs and techniques that are part of the cultural heritage also need to be preserved. It takes a delicate balancing act; one that ensures in modernizing our world, we do not lose practices or knowledge that has paved the way for the future (Rathore, 2023).

#### 3.4 Case Studies: Social and Governance Failures

##### Case Study 1: Exploitation and Labor Abuses in the Handloom Sector

In UP, the news piece reported about a cooperative of handloom weavers that was practicing exploitation of workers in terms of low wage and unhealthy working environment. But despite labor laws, the cooperative had been able to operate without consequence due to weak enforcement and little oversight. The Chinese manufacturers wove their workers closer to the minimum wage, which made it impossible for the weavers to get their essentials of life (Lahiri and Nizami, 2024).

Because they are informal workers, their exploitation is even worse, and they do not have job stability. In addition to this, the weavers started working under unsuitable conditions — devoid of amenities like potable water and sanitation. Immediately, this led to health challenges released to lesser infrastructure and safety protocols but also to efficiencies. This case just, once again, highlights that the handloom sector lacks any governance, enforcement of labour laws and accountability.

##### Case Study 2: Policy Gaps and Their Impact on ESG Adoption

In Tamil Nadu, poorer implementation of the scheme and a number of policy gaps forced the failure of a government scheme to promote sustainable handloom production. While these initiatives were meant to promote sustainability practices only a small part of the market was a part of them and in rural locations very few handloom producers were part of it (Singhania and Saini, 2023).





**Figure 7** Poor Implementation of the scheme

The delay was mainly because of a lack of coordination between different wings of the government. Further, no systematic monitoring and evaluation of the scheme was made to identify its efficiency and accountability. This case also highlights the need for improved coordination among stakeholders, complemented by robust monitoring systems and efficient data collection to facilitate effective ESG (Environmental, Social and Governance) practices in handloom. But without these improvements such efforts are likely going to be aimless (Finger and Rosenboim, 2022).

**4: Opportunities and Solutions for Financial Sustainability**

Although it is challenging, the financial sustainability generated by ESG integration can be of immense value to the handloom sector. Various incentives and solutions that can help the handloom sector achieve economic sustainability are described and covered in this Chapter, particularly concerning government programs, sustainable technology access, financial inclusion, market development, and stories of success in ESG integration.

**4.1 Government Initiatives and Policy Support**

*Overview of Existing Schemes*

Several initiatives have been taken by the Indian government to develop the handloom sector in the country which mainly include National Handloom Development Programme (NHDP) and GST exemptions. The Centre has been issuing these schemes to enable handloom artisans to earn a better livelihood and promote sustainable technologies.

**National Handloom Development Programme (NHDP):** This is an extensive-aged schemes for development of all aspects of handloom sector through a wide range of interventions including skill up-gradation, infrastructure development and market linkages. It entails tracing handloom cooperatives and individual artisans from all over the country and providing them the financial support to adopt sustainable practices and rural crafts boost (Priyanka and Vimala, 2021).



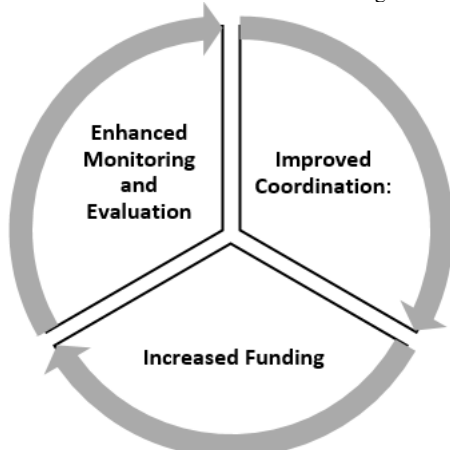
**Figure 8** National Handloom Development Programme (NHDP):

**GST Exemptions:** The government has implemented GST exemptions in a way that gives comparative edges to the many handloom products. It reduces the burden on the artisans, as they get complete exemption and also helps them in selling their products at competitive prices (Sinha, 2019).

*Recommendations for Strengthening Policy Frameworks*

Existing schemes make for a good foundation towards supporting the handloom sector but we must reinforce the policy structures in place to ensure that they can be executed optimally and will have material impacts. These efforts should be in a multi-pronged approach to coordination, increased sustainable development funding mechanisms, as well as robust monitoring and evaluation tools.

- **Improved Coordination:** A better collaboration between government departments is an absolute necessity to ensure that the handloom schemes run effectively. It involves improved co-ordination between Ministry of Textiles, state governments, and local authorities.
- **Increased Funding:** There is a need to increase funding for sustainable innovations for widespread acceptance of the ESG practices in the said vertical of the handloom. That means financing for sustainable feedstocks, infrastructure updates, and education.



**Figure 9** Strengthening Policy Frameworks

- **Enhanced Monitoring and Evaluation:** Establishment and strengthening of monitoring and evaluation mechanisms are also necessary for imparting accountability and impact to handloom schemes. This involves not only the use of standardized metrics for measuring ESG performance, but also regular checks and assessments.

#### *Role of Public-Private Partnerships in Funding ESG Initiatives*

Public-private partnerships (PPPs) hold immense potential for financing of ESG initiatives in handloom sector. PPPs can help bridge this funding gap by leveraging the skills of both sectors as well as the sustainability incentive efforts of both sectors.

- **Collaborative Funding:** PPPs allow for a co-financing of ESG initiatives, whereby government grants and private sector investment will flow into ESG initiatives. This could attract more overall capital for sustainable projects and ensure their long-term sustainability (Nikam, 2022).
- **Technical Expertise:** The private sector is able to provide the technical expertise and innovation required to mainstream sustainable practices in the handloom sector. That involves new technology and supply chain transparency and access to markets.
- **Capacity Building:** This also adds to its footsteps towards supporting capacity building through PPPs, training and making resources and assistance available to the handloom artisans and cooperatives. This consists of training courses related to ESG, financial literacy, and enterprise management.

#### **4.2 Access to Sustainable Technologies**

##### *Adoption of IoT-Based Authentication Systems*

This led to the establishment of the KOSHA and the correlated come of IoT-based authentication systems. AI based tools can enhance the transparency and traceability of the value chain right from the farmer to end consumers. It executes to validate the identity as well as track each handloom product through IoT technology to ensure authenticity and quality.

- **KOSHA.ai:** KOSHA. Ai, which is languaged as an IoT-based authentication system featuring "Blockchain-based monitoring and verification of handloom products authenticity". This works as an anti-counterfeiting system and assures consumers that they are getting real handloom products (Nadu, 2024).
- **Supply Chain Transparency:** Authentication systems based on IoT can also create a chain of transparency in the supply chain, providing consumers with details of the origin and the process the handloom products pass through. Such a system can gain confidence of consumers and create market for both natural and manmade yarns used in handloom products (Montecchi, Plangger and West, 2021).

##### *Use of Blockchain for Supply Chain Transparency*

Blockchain technology is a solution to scale up supply chain transparency in the case of the handloom sector. Blockchain can provide an unalterable, permanent and secure record of transactions which may help in authenticating and tracing handloom products.

- **Blockchain for Traceability:** Blockchain technology can be used for creating a transparent and audit-able supply chain for products pertaining to handlooms. This comprises information about the source of raw materials, production process, and distribution of finished products (Xu, 2021).
- **Consumer Trust:** Blockchain helps consumers get transparent and verifiable information regarding the production, allowing the buyers to build consumer trust and increase the market value of handloom products. It can also curb duplication and assure originality of the handloom products.

##### *Digital Tools for Market Access and E-Commerce Platforms*

With this, the other half of the plan, digitization with e-commerce platforms, Deepak hopes, could help handloom artisans reach potential new customers and in turn, help increase sales considerably. Artisans can also shift to selling their goods online as a last resort using some digital technologies which will help them escape from their traditional market spot.

- **E-Commerce Platforms:** Platforms like Amazon, Flipkart, and Etsy help handloom artisans reach international consumers. These platforms provide artisans and craftspeople an exterior platform to exhibit their craftsmanship to an extensive audience while making higher gross sales (Hellani, 2021).
- **Digital Marketing:** Digital marketing tools, such as social media and search engine optimization (SEO), can help handloom artisans to market their products and reach new customers. It encompasses everything from setting up online profiles to posting product images to interacting with customers on social media.
- **Mobile Applications:** Mobile applications can also cover hands of handloom artisans to manage their business and reach out to the new market. These include apps for inventory management, order tracking, and customer communication (Loy, 2022).

#### **4.3 Financial Inclusion and Capacity Building**

##### *Microfinance and Self-Help Groups for Artisans*

Microfinance and SHGs may provide access to credit and financial services to the handloom artisans which should be helpful for upgradation of the livelihood in sustainable manner.

- **Microfinance:** By extending these small loans, micro-finance institutions assist handloom artisans in investing in sustainable practices and increasing their productivity. They are usually available at low interest rates and having flexible repayment periods for low-income artisans.
- **Self-Help Groups:** SHGs are associations of individuals that are formed to provide financial and social support for their members. Handloom artisans can be linked to SHGs to gain access to credit and skill development and for sustainability by pooling resources and sharing knowledge (Stocchi, 2022).

##### *Training Programs on ESG Practices and Financial Literacy*

To empower handloom artisans with sustainable practices, training programs on ESG practices and financial literacy are quintessential. And, this varies as per artisans, so the programs should be designed in a way that not only caters the need of the artisans but also provide them with relevant knowledge, necessary skills to uplift their livelihood.

- **ESG Training:** Employees should be versed on ESG practices such as use of sustainable raw materials, sustainable methods of production, and waste management. They should be reality-based in the field and impart the technical knowledge that artisans can apply to use sustainable methods (Misra, 2024).
- **Financial Literacy:** Financial literacy training might include budgeting, saving, and access to credit. Such programs ought to assist craftspersons in maintaining their monetary balance and assessing business planning.

##### *Incentives for Adopting Sustainable Practices*

Financial incentives, in the form of subsidies and tax breaks, can motivate handloom artisans to embrace sustainability. Such incentives can reduce the upfront cost of adopting ESG practices and shall therefore be more affordable for low-income artisans.

- **Subsidies:** Subsidies can be made in terms of subsidies towards use of sustainable raw materials, enhancements in infrastructures, training, etc. These subsidies play an essential role in the relief of the craftsmen and will facilitate the shift towards sustainable practices (Saka, Olanipekun and Omotayo, 2021).
- **Tax Breaks:** Tax breaks may be given on handloom products that adhere to the ESG standards. This would eventually contribute improving the sales of handloom products in the market via these tax breaks.

#### **4.4 Case Studies: Successful ESG Integration**

##### *Case Study 1: The Success of the Chendamangalam Handloom Cluster*

The Chendamangalam handloom cluster in Kerala is an exemplary case for ESG integration in handloom sector. However, handloom as a sector has been under severe strain with decreasing enrolments in the last few decades. The cluster practices sustainable practices, use Organic Cotton, Natural Dyes, etc, and do branding and marketing strategies.



**Figure 10** Chendamangalam Handloom Cluster

These sustainable practices adopted by Chendamangalam cluster like organic cotton, natural dyes etc., allow the clusters to reduce environmental impact through these practices. Apart from these, the group has also introduced waste management technologies and energy-efficient tools to ensure environmental sustainability. A good reputation on their craftsmanship and sustainability of their products has made the Chendamangalam cluster more promising. It has also used digital marketing tools like social media and e-commerce platforms to attract global customers and promote its products. One such example is that of the Chendamangalam cluster, where artisans managed to improve their sales by following sustainable practices and suitable branding and marketing strategies. The cluster is also recognized for its sustainability by new customers and investments

*Case Study 2: The Impact of the Dastkar Andhra Initiative*

Dastkar Andhra is another successful initiative focusing on ESG issues in the handloom sector. With the aim of building resilience in handloom artisans through a focus on improving their livelihoods and sustainable livelihoods, the initiative has also provided linkages to sustainable technologies, financial services and market access. Handloom artisans bagged various sustainable technologies including those solar-powered looms and natural dyes, due to the Dastkar Andhra initiative. These technologies are used to reduce the environmental impacts of handloom production and improve the quality of handloom products.

through a focus on improving their livelihoods and sustainable livelihoods, the initiative has also provided linkages to sustainable technologies, financial services and market access. Handloom artisans bagged various sustainable technologies including those solar-powered looms and natural dyes, due to the Dastkar Andhra initiative. These technologies are used to reduce the environmental impacts of handloom production and improve the quality of handloom products.

**Figure 11** Dastkar Andhra initiative



Besides this, the initiative has provided financial services including microfinance and SHGs for the handloom artisans (Sriram and Sarin, 2012). The backing has allowed craftspeople to increase their productivity while adopting sustainable practices. By leveraging e-commerce platforms and digital marketing tools, handloom artisans are able to explore new markets with Dastkar Andhra initiative. This has done them a good because in return bonus sales has increased and so the users' lives have improved. Experience of improved well-being of handloom artisans in Andhra Pradesh has followed suit with adoption of sustainable practices and access to financial services and market access. It has liberated women artisans from the fangs of poverty by creating additional income avenues for them and has provided them a rung on the social mobility.

**5: The Road Ahead: Balancing Tradition and Modernity**

The handloom sector in India is at a nexus where ESG being interlinked with it can statuate a two-fold avenue that can make this sector sustainable as well as scalable. Achieving this equilibrium, however, involves a more integrated process, one that retains the cultural legacy of the industry while incorporating more contemporary practices. Road ahead for the handloom sector –Balanced ESG integration, AI and technology, A vision, A call for action (Finger and Rosenboim, 2022).

**5.1 A Holistic Approach to ESG Integration**

*Importance of Balancing Environmental, Social, and Governance Aspects*

Towards a holistic framework for the integration of ESG measures is key to the sustainability of the handloom sector. It is about striking a balance throughout the environmental, social and governance aspects in order to preserve the cultural heritage of the sector whilst still being able to develop, and still bettering the lives and livelihoods of artisans.

- **Environmental Sustainability:** The Handloom industry need to embrace the green practices which include organic cotton, natural dyes and energy efficient tools to minimize the environmental impact. That also means setting up effective waste management and water conservation systems to ensure sustainable production.
- **Social Empowerment:** Empowering artisans, and particularly women, is a prerequisite for social sustainability in the handloom sector. Fair wage, good working conditions, education and training are part of this. The diaspora of ESG must be led by gender equality and social inclusion (Priyanka and Vimala, 2021)
- **Governance and Transparency:** Governance is an important part of ensuring accountability and transparency in the handloom sector. This encompasses raising the bar on policy frameworks, closing significant gaps in regulation enforcement, as well as developing much clearer metrics on ESG performance.



**Figure 12** Holistic Approach to ESG Integration

*Role of Stakeholders in Driving Change*

To successfully integrate ESG principles, there is a need for coordination and partnerships between the government, private sector, and consumers to collaboratively work towards the objectives of sustainability, human equity, and ethical practices of business in the handloom sector.

- **Government:** Serious amount of policy support, funding and infrastructural support is given by the government to ESG initiatives. It is supposed to then build upon initiatives that already exist like the National Handloom Development Programme (NHDP), and, create fresh policies that will drive sustainability.
- **Private Sector:** Investing in sustainable technologies, offering technical expertise, and it supports capacity-building projects at the same time public-private partnerships (PPPs) provide additional financing helping the sector innovate (Machalaba and Sleeman, 2022).

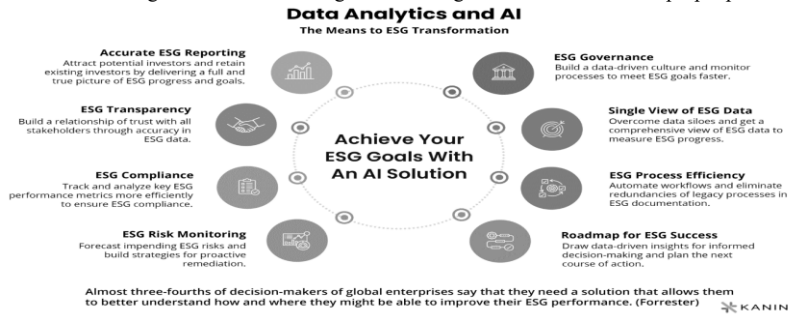
- **Consumers:** Change in the supply chain can be driven by consumers by demanding fair trade and sustainable handloom products. By buying ESG compliant goods, consumers can boost the livelihoods of artisans and sustainable practices about the environment.

**5.2 The Role of AI and Technology**

*Opportunities for AI in Streamlining ESG Compliance*

This implies an enormous untapped opportunity in leveraging Artificial Intelligence (AI) and other technology in simplifying ESG compliance in handloom sector. Such technologies have the ability to provide transparency and enable efficient and accountable solutions through which artisans can embrace sustainable solutions with relative ease.

- **AI for Supply Chain Transparency:** A major challenge with Family Handloom is figuring out how transparent products can be when it comes to understanding the source and method of how the products are made and AI can make the transparency of Family Handloom products possible. This includes using blockchain to record immutable financial transactions, thus ensuring product integrity and traceability (Saka, Olanipekun and Omotayo, 2021).
- **IoT-Based Authentication Systems:** IoT based authentication systems like KOSHA On the other hand, ai will prevent the duplicitious quality of handloom goods. These systems use IoT to provide consumers with easily verifiable and transparent authentication of the products.
- **Digital Tools for Market Access:** Digital solutions and e-commerce platforms can help handloom weavers reach new markets and make more sales. Putting social media and digital marketing instruments at work to propel products and take them to users all over the world.



**Figure 13** AI in Streamlining ESG Compliance

*Ethical Considerations and the Need for Cultural Sensitivity*

While the potential of AI and technology is endless, here also need to check ourselves to see if are being ethical and culturally responsive when using it. It also means preserving that craftsmanship so that such tech can live alongside the traditional knowledge and skills of tradespeople.

- **Ethical AI:** The deployment of AI in handloom sector should follow set of ethical principles which should ensure that ethical use of AI should not impact any artisans and their traditional way of weaving. This could involve things such as not copying traditional designs or ensuring AI tools are low-cost and accessible to small-makers (Desore and Narula, 2018).
- **Cultural Sensitivity:** Technology should be employed without disrespecting the cultural legacy of the handloom sector. That should also imply protecting their traditional designs and manufacturing techniques — and the technology enabling them to be marketable services — so that they can be memorable services that consumers desire and pay a premium for, long into the future.

**5.3 Vision for the Future**

*Positioning India as a Global Leader in Sustainable Textiles*

By blending traditional handloom heritage with modern ESG practices, India can establish itself as a global leader in sustainable textiles. It also includes positioning handloom products as a part of sustainable sourcing for mass-produced textiles.

- **Global Recognition:** India can attain global recognition of its handloom products through taking ESG principles and sustainable practices. Particularly, this includes highlighting the environmental and social benefits of handloom products at international forums and trade fairs (Nikam, 2022).
- **Sustainable Fashion:** The role of handloom sector in it: This handloom sector can act as a major contributor towards global sustainable fashion demand by supplying environment-friendly and ethically-produced textiles. It is this that involves global brands and designers coming together to create new innovative, sustainable fashion products.

*Ensuring the Economic and Environmental Sustainability of the Handloom Sector*

Ensuring the economic and environmental sustainability of the handloom sector is essential for its long-term viability. This includes adopting sustainable practices, improving market access, and providing financial support to artisans.

- **Economic Sustainability:** Its handloom sector has to migrate to sustainable practices with effective and sustainable household earnings of artisans/ weavers introducing systematic and proven economic sustainability. This involves paying them properly, access to credit, and market access.
- **Environmental Sustainability:** The industry too, need to embrace green practices to minimize their environmental footprint Such as making use of sustainable natural resources, waste management systems as well as preserving natural resources (Rajgopal, 2015).

*Preserving Cultural Heritage While Embracing Modern ESG Principles*

Relevance for Sustainable Development of the Handloom Sector While Wearing the Modern ESG Principles, for Preservation of its Cultural Heritage This means balancing innovation with why we design traditional designs and traditional techniques.

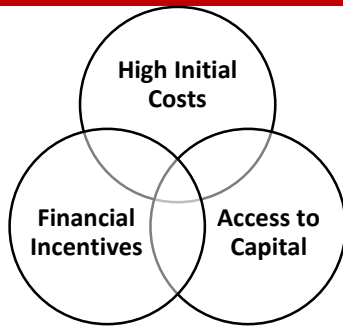
- **Cultural Preservation:** The handloom sector should safeguard its cultural heritage through protection of traditional designs and techniques. This involves establishing IPR systems for safeguarding traditional knowledge from the threat of cultural appropriation (Kumar, et al., 2024).
- **Innovation:** At the same time, the industry must transform to remain competitive in the global marketplace. Which consists of making modern designs and techniques and products that can appeal to the modern consumer while respecting traditional craft.

**5.4 Call to Action**

*Urgency of Addressing Financial Challenges in ESG Adoption*

The challenges of acquiring ESG practices for the handloom sector can be huge and need an immediate solution. That means solving for some of the biggest roadblocks to ensuring a successful energy transition such as those high upfront costs, access to capital and funding, and financial incentives for sustainable practices.

- **High Initial Costs:** Sustainable material sourcing and infrastructure upgrades in cultivating a sustainable business are much more expensive and must be fixed through government subsidies, grants, and supporting mechanisms.
- **Access to Capital:** As enhancing sustainable practices is also a costly endeavor, thus the must provide financial assistance. This entails deploying microfinance, SHGs and other financial services to artisans (Singhania and Saini, 2023)
- **Financial Incentives:** Monetary incentives in the form of tax break and subsidies can encourage the artisans to shift to the sustainable practices It could include promoting the sustainable sourcing of virgin materials and supporting clean production methods.



**Figure 14** Financial Challenges in ESG Adoption

*Need for Collaborative Efforts to Secure the Future of the Handloom Sector*

To secure a better future for the handloom sector, all stakeholders — the government, private sector and consumers — need to come together to play their role. This is through partnership in policy, funding and developing the balance of nature.

- **Government Support:** Government needs to play its part and provide policy, funding and required infrastructure support to ESG initiatives. This includes improving existing schemes and formulating new policies that are aligned with sustainability.
- **Private Sector Involvement:** More full engagement of the private sector in financing for development, on investment on sustainable technologies, corporate technical assistance and capacity-building are needed. Private sector money alongside public-private partnerships (PPPs) — which grow more vital with rising economic growth — can drive innovation and narrow financing gaps in the sector.
- **Consumer Awareness:** Spreading knowledge that handloom products have several economic and even environmental benefits can enhance the market for handlooms by convincing the consumers to prefer these products whilst promoting sustainability. They do this by promoting ESG compliant products and spreading awareness regarding sustainable fashion.

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