

6. Manufacturing of Textiles and Cotton Ginning: Weaving of Textiles

6.1 Definition of the Sector

The focus of this study is on ‘weaving of textiles, NIC code 1312 as mentioned in the above section. This consists of four sub-sectors which are defined in Table 6.1.

Table 6.1: Definition of the agricultural sub-sector used in the analysis

<i>NIC Code</i>	<i>Description</i>
13121	Weaving, manufacture of cotton and cotton mixture fabrics.
13122	Weaving, manufacture of silk and silk mixture fabrics.
13123	Weaving, manufacture of wool and wool mixture fabrics.
13124	Weaving, manufacturing of man-made fibre and man-made mixture fabrics.
13129	Weaving of jute, mesta and other natural fibres including blended natural

Source: Central Statistical Organisation, Ministry of Statistics and Programme Implementation. 2008. National Industrial Classification (All Economic Activities). 2008. https://www.ncs.gov.in/Documents/NIC_Sector.pdf.

6.2 Background

The Indian textile industry is the second largest producer of manmade fibre after China, third largest exporter of Textiles & Apparel in the world.¹ India’s textiles and clothing industry is one of the mainstays of the national economy. India has a share of 4.6 per cent of the global trade in textiles and apparel. Major textile and apparel export destinations for India are USA, EU 27 and UK, accounting for approximately 50 per cent of India’s textiles and apparel exports. The textile industry can be further subdivided into handloom or power loom sectors. Even the power loom is heterogeneous as there are many types of power looms (Box 6.1).

Handloom industry being one of the largest in terms of employment potential, with 28.2 lakh looms, plays a very important role in the country’s economy, producing both for domestic as well as international consumption. The major handloom export centres are Karur, Panipat, Varanasi, and Kannur where handloom products like bed linen, table linen, kitchen linen, toilet linen, floor coverings, embroidered textile materials, curtains, etc. are produced for export markets. According to the Handloom Census 2019–20, about 35.2 lakh handloom workers were employed across the country, out of which 25.5 lakhs were women workers with a share of 72.3 per cent of the total handloom workers. Among all, the States of Assam, Tamil Nadu, and Manipur accounts for highest number of women workers in the sector.

On the other hand, power loom sector contributes nearly 58.4 per cent to total cloth production and more than 60 per cent of fabric meant for export in the country. With about 3.85 lakh power loom units in India, most of these units are concentrated in

¹ Ministry of Textiles, GoI. 2023. Annual Report 2022–23. https://texmin.nic.in/sites/default/files/English%20Final%20MOT%20Annual%20Report%202022-23%20%28English%29_0.pdf

semi-urban, or rural areas. Within the larger textiles sector, the focus of this study is on 'weaving of textiles, NIC code 1312 as mentioned in the above section.

Box 6.1: Type of looms

There are four types of handlooms—pit looms (with Dobby/Jacquard and others), frame looms (with Dobby/Jacquard and others), loin looms, and others. Power looms can be broadly categorised into plain loom, semi-automatic looms, automatic looms, and shuttleless types. The shuttleless looms further divided into air jet, water jet, and rapier looms, each utilising different methods for weft yarn insertion.

Plain loom: Plain loom denotes the loom without any warp or weft stop automatic control mechanisms. Also, the take-off motions may not be present in the loom. However, in such looms doobby, jacquard or drop box attachment may be present as additional attachments according to the requirement of the weaver.

Semi-automatic loom: This type of loom is basically the plain loom with additional attachments of automatic electronic/mechanical warp stop as well as weft stop motions along with positive let off motions. As in the case of plain looms, the semi-automatic loom may have additional attachment of doobby or jacquard or drop box as the case may be.

Automatic loom: An automatic loom is basically one that has auto pirn changing mechanism along with all the automatic warp and weft stop motions as well as positive let off motions.

Shuttleless Looms: These looms insert the weft yarn without using a shuttle, offering faster weaving speeds and lower noise levels. These looms eliminate the shuttle and use alternative methods for weft insertion, enabling wider fabrics. Shuttleless looms have various advantages like: higher weaving speeds, lower noise levels, and suitability for a wider range of fabrics. Example: Sulzer shuttleless weaving machines. Shuttle less looms can be of following types:

- Air Jet Loom: Uses compressed air to propel the weft yarn across the warp yarns.
- Water Jet Loom: Uses water jets to insert the weft yarn.
- Rapier Loom: Employs mechanical rapiers to carry the weft yarn across the warp yarns.

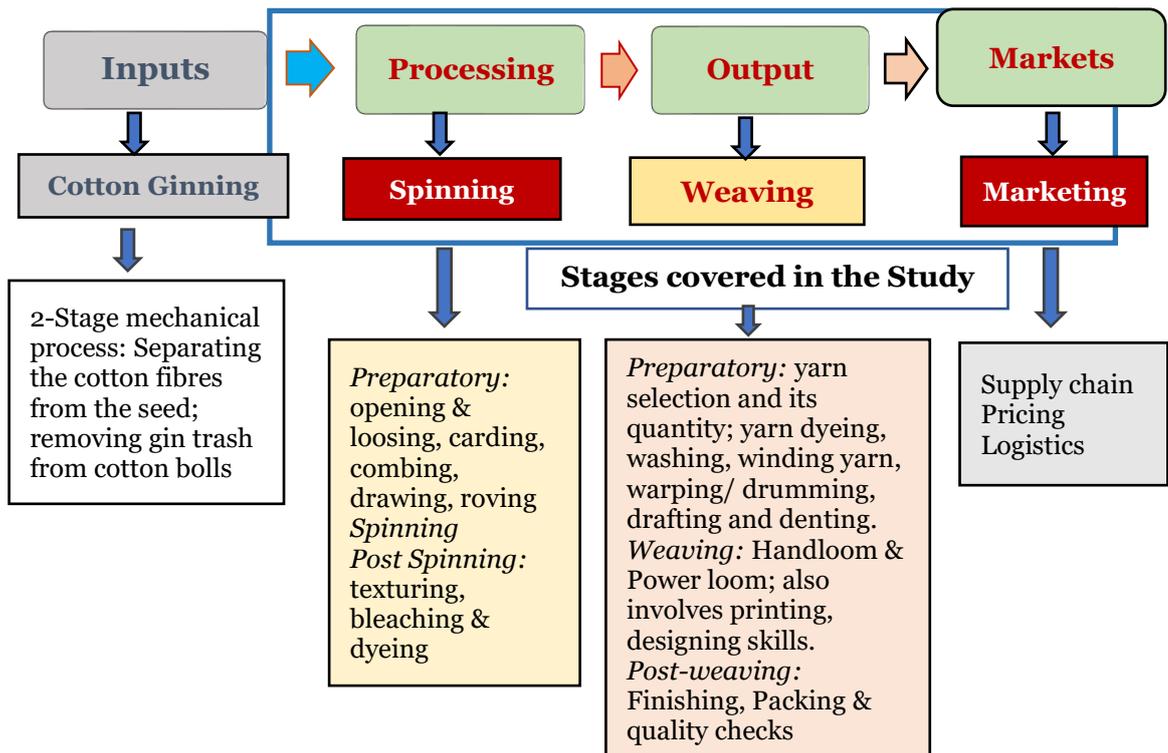
Sources:

Ministry of Textiles. 2020. Status of Power loom Sector in Tamil Nadu— Focus on Modernisation. Chapter 4. <https://www.textilescommittee.nic.in/status-Power-loom-sector-tamil-nadu-focus-modernisation>. November 7.
Office of the Development Commissioner of Handlooms, Ministry of Textiles, Government of India.2019. Fourth All-India Handloom Census 2019-20. New Delhi, India.

6.3. Value Chain

The value chain for textile sector is given in Figure 6.1. The stages of processing which are taken up in the study include a pre-weaving stage (including spinning), and output stage (i.e., weaving and marketing stage).

Figure 6.1: Value chain for textiles sector



Source: Author's conceptualisation based on literature review.

These stages are defined here:

- Ginning: Process in which the cotton fibres are separated from the cotton seeds or lint.
- Spinning: Process of winding together drawn-out strands of fibres to form a yarn.
- Weaving and Finishing: Process of interlacing two sets of yarn that cross each other at right angles to create fabric.
- Marketing: Process of supply chain of final products (carpets, blanket, towels, sarees, etc.).

Digital Technologies in the 'Weaving of Textiles'

The advent of digital technologies has affected both the production process and the nature of textiles being produced. Here are some examples.

Production Process

- **Artificial Intelligence and Machine Learning:** Traditionally, textile production has encompassed several manual and machine-based steps like

spinning fibres, weaving or knitting, dyeing, and finishing.^{2,3,4,5} These methods depended heavily on skilled labour, often resulting in errors and fabric waste. Artificial intelligence can help in textile production by handling tasks like predictive maintenance and fabric inspection while improving quality and cutting down on waste. By making machines smarter, AI reduces the need for constant human input, is making production faster, more accurate, and less wasteful and helps streamline the entire process. AI can help optimise spinning and weaving by analysing sensor data like machine vibrations, speed, and tension. It makes real-time adjustments to ensure consistent quality and predicts maintenance needs to reduce downtime.

- **Automation & Digital Technologies:** In the textile production department, automation and digital technologies can revolutionise processes, from design and production to quality control, by using robotic sewing, computerised cutting, and digital printing systems, leading to increased efficiency and product quality.⁶
- **Supply Chain Invocations (Traceability, Blockchain, etc.):** Blockchain is an encrypted ledger of digital data that is continuously authenticated with every new change by linking transactions in the form of a chain.⁷ The entire process is automated and hence transparency and efficiency are ensured for various parties involved including—dealers, distributors, suppliers, and third parties. The information or data is stored digitally in blocks, spread over thousands or millions of computers through an integrated network having algorithms to authorise/ check the authenticity of transactions. It helps reduce time and effort by removing activities like manual recording, inaccurate pickups, inaccurate deliveries, etc., thus making the entire process much more accurate and faster.
- **Sustainable Technologies (Eco-friendly chemicals/ dyes):** Sustainable technologies, including eco-friendly chemicals and dyes, focuses on minimising environmental impact through the use of natural, biodegradable, and renewable resources, offering alternatives to conventional, often harmful, synthetic options.

² Nagesh, J. Salanke, P. and S. Kumar, S. 2022. “Digital Revolution in Textiles”. *Asian Textile Journal*. 58. March-April.

³ Shah, D. 2023. “Impact of Digital Technologies on the Textile Industry”. *Fibre2fashion.com*. <https://www.fibre2fashion.com/industry-article/9622/impact-of-digital-technologies-on-the-textile-industry>. April.

⁴ Rahman, M.M. 2020. “Applications of the digital technologies in textile and fashion industry”. *Technium* 3(1): 114-127.

⁵ Vina, A. 2024. “The Future of Textile Production with AI-Driven Manufacturing”. <https://www.ultralytics.com/blog/the-future-of-textile-production-with-ai-driven-manufacturing>. November 19.

⁶ Mohapatra, L. 2023. “Automation in Garment Making”. *Fibre2fashion.com*. <https://www.fibre2fashion.com/industry-article/9744/automation-in-garment-making#:~:text=Advantages%20of%20Automation,%E2%80%A2>. August.

⁷ <https://www.investopedia.com/terms/b/blockchain.asp>

New Types of Textiles

- **Circular textiles:** A circular textile system aims to minimise waste and pollution throughout the textile lifecycle by focusing on sustainable sourcing, eco-friendly production, and the ability to recycle or compost textiles after use, ultimately keeping products and materials in use for as long as possible.
- **Green textiles:** (or eco-textiles) are part of the sustainable fashion and eco-friendly trends, providing alternatives to the otherwise pollution-heavy products of conventional textile industry, which is deemed the most ecologically damaging industry.
- **Recycled textiles:** Textile recycling is the process of recovering fibre, yarn, or fabric and reprocessing the material into new, useful products.⁸ Textile waste is split into pre-consumer and post-consumer waste and is sorted into five different categories derived from a pyramid model.
- **Sustainable textiles:** The sustainable production and consumption of eco-friendly textiles which improves employment and working conditions of textile artisans.⁹ This includes fabrics produced with minimal environmental impact and ethical labour practices, often using organic or recycled materials and processes that reduce waste, energy, and water consumption.¹⁰
- **Advanced Materials (Technical Textiles, Smart Textiles, etc.):** Technical textile are fabrics and products designed for functional, non-aesthetic purposes, used in diverse industries like automotive, medical, construction, and agriculture, prioritising performance and durability over aesthetics. Smart textiles on the other hand, also known as e-textiles or smart fabrics, are fabrics that incorporate electronic components like sensors, microcontrollers, and batteries, enabling them to sense and respond to environmental changes or stimuli.

The technical textiles is an advanced technology backed sunrise sector which is steadily gaining ground in India. Technical textiles are functional fabrics that have applications across various industries including automobiles, civil engineering and construction, agriculture, healthcare, industrial safety, personal protection, etc. This is a futuristic and niche segment of textiles, which are used for various applications ranging from agriculture, roads, railway tracks, sportswear, health on one end to bullet proof jacket, fireproof jackets, high altitude combat gear and space applications on another end of spectrum. Technical textiles are textiles materials and products manufactured primarily for technical performance and functional properties rather than aesthetic characteristics. Technical textiles may be produced using either power loom technology or shuttle-less loom (see Box 6.1 for definitions of different types of power looms).

⁸ Hawley, J.M. “8—Understanding and improving textile recycling: A systems perspective”. In Sustainable Textiles; Blackburn, R.S., Ed.; Woodhead Publishing Series in Textiles; Woodhead Publishing: Cambridge, UK, 2009; pp. 179–199. ISBN 978-1-84569-453-1.

⁹ UN Climate Change website. <https://unfccc.int/climate-action/momentum-for-change/activity-database/sustainable-textiles-for-sustainable-development>

¹⁰ Cottonmonk.com website. <https://www.cottonmonk.com/blog/sustainable-textiles-the-future-of-eco-friendly-fabric-production/#:~:text=Sustainable%20textiles%20are%20fabrics%20produced%20in%20ways,reduce%20waste%2C%20energy%20consumption%2C%20and%20water%20usage>.

With a view to position the country as a global leader in technical textiles, National Technical Textiles Mission (NTTM) was created with the approval of Cabinet Committee on Economic Affairs (CCEA) at an outlay of Rs 1,480 crores with a four-year implementation period from FY 2020–21 to 2023–24, and it has been extended till 2026.¹¹ To promote domestic production of technical textile products such as agro-textiles, medical textiles, and geo textiles at competitive prices, the recent budget 2025 has added two more types of shuttle-less looms to the list of fully exempted textile machinery.^{12,13}

6.4 Workforce Characteristics

This section of the chapter gives the macro trends for the textile sector in terms of labour participation in textile industry, female workforce, educational attainment, types of skills, etc. based on various available renowned secondary data sources.

- a. ***Share of female workers***: 42.8 per cent of workers engaged in ‘weaving of textiles’ are women.
- b. ***State***: The Periodic Labour Force Survey data indicates that 80 per cent of the workers engaged in ‘weaving of textiles’ were concentrated in six States, namely Tamil Nadu, Assam, Gujarat, Andhra Pradesh, West Bengal, and Uttar Pradesh in 2022–23 (Figure 6.2). Figure 6.3 shows the State-wise distribution of female workers. In majority of the North-Eastern States, 100 per cent of workers in this sector are women. Assam accounts for 50 per cent of women workers in India for handloom sector.¹⁴ However, the PLFS can also give erroneous results like in the case of Haryana. Box 6.2 expands on the subject. Therefore, for the manufacturing sectors, enterprise data such as data from the Annual Survey of Industries (ASI) and Annual Survey of Unincorporated Sector Enterprises (ASUSE) are used to support the PLFS data.

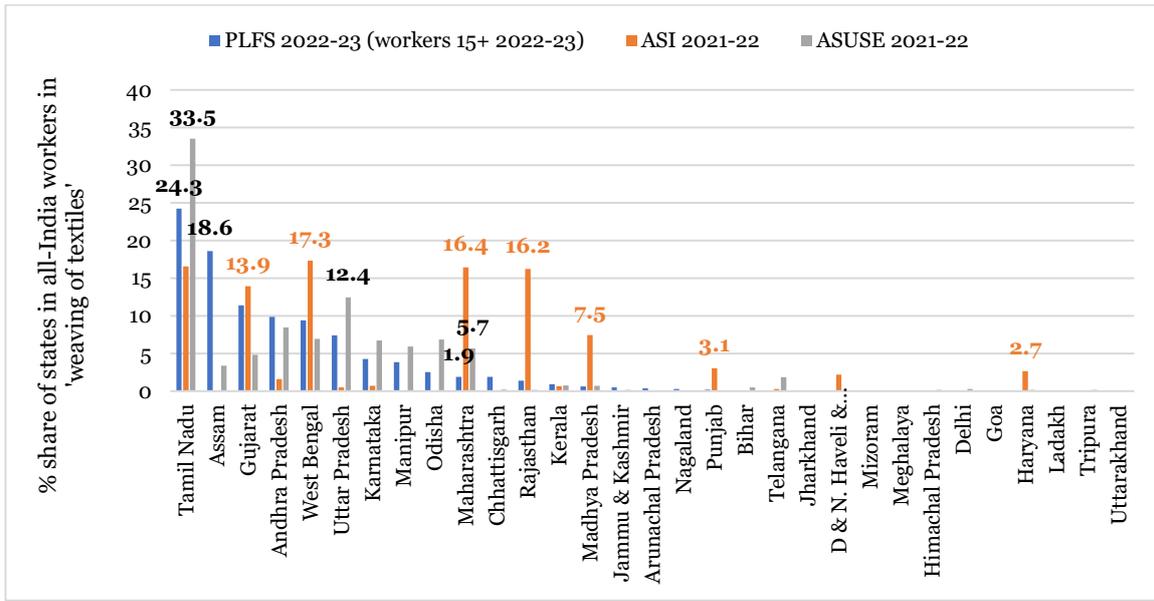
¹¹ National Technical Textiles Mission website. <https://nttm.texmin.gov.in/PI/AboutMission>.

¹² Ministry of Textiles. 2025. “Budget announces Rs 5272 crores for the Ministry of Textiles for the FY 2025–26”. *PIB*. <https://pib.gov.in/PressReleasePage.aspx?PRID=2099411>. February 4.

¹³ Ministry of Textiles. 2024. “Ministry of Textiles approved Startups in Technical Textiles to boost innovation: Textiles Secretary”. *PIB*. <https://pib.gov.in/PressReleasePage.aspx?PRID=2025052>. June 13.

¹⁴ Ministry of Textiles. 2022. “Power loom sector contributes nearly 58.4% to total cloth production and more than 60% of fabric meant for export in the country”. *PIB*. <https://pib.gov.in/PressReleasePage.aspx?PRID=1814211>. April 6.

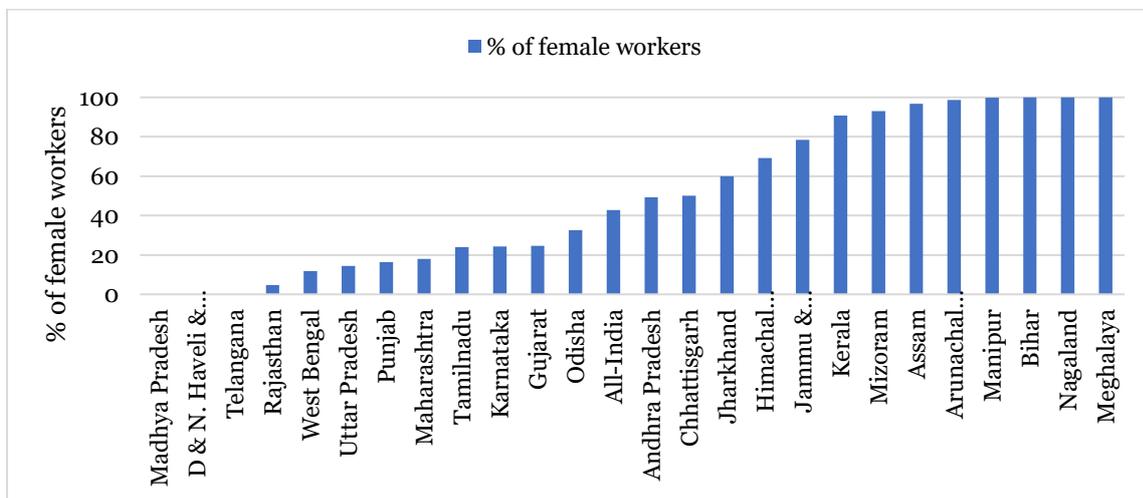
Figure 6.2: State-wise share of labour force (%)



Source: NCAER analysis from: 1. PLFS 2022–23; 2. Ministry of Statistics and Programme Implementation (MOSPI), Govt. of India. 2024. Annual Survey of Industries 2021-22. DDI-IND-NSO-ASI-2021-22. <https://microdata.gov.in/nada43/index.php/catalog/188>. (ASI 2021-22); 3. MoSPI. 2024. Annual Survey of Unincorporated Sector Enterprises (ASUSE) of 2021-2022. DDI-IND-MOSPI-SSO-ASUSE2122. <https://microdata.gov.in/nada43/index.php/catalog/196>. (ASUSE 2021-22)

Notes: 1. PLFS gives age-wise data but ASI and ASUSE do not. PLFS is a household survey data and the latter two are enterprises data. 2. All three sources of data report zero labour employed for the missing States in the graph.

Figure 6.3: State-wise distribution of female workers (aged 15+) in the 'weaving of textiles' sector, 2022–23



Source: NCAER analysis from PLFS 2022–23.

Note: One critical comment that was received was that in Assam and North East, all workers in the 'weaving of textiles' sector are women. However, the PLFS shows that 97 per cent of the workers were women. Then the occupation status of the workers were checked and it was found that they all fell in the 'handicraft workers' NCO code of 731. NCO code 7318 are Handicraft Workers in Textiles, Leather and Related Materials. And under that there are several 8-digit NCO codes. Men could be employed in supportive roles. Without detailed 8-digit NCO codes, these kinds of puzzles would continuously arise. A further problem is that different sources of data (PLFS, Enterprise Surveys and All-India Handloom Census) are yielding different numbers of weavers in the country (Bhandari, Jain and Sahu, 2025)¹⁵

¹⁵ Bhandari, B., Jain, C. and Sahu, A.K. 2025. "Counting Handloom Weavers in India". Fibre2Fashion. <https://www.fibre2fashion.com/industry-article/10408/counting-handloom-weavers-in-india>. April 30.

Box 6.2: Corrigendum for workers in textile sector in Haryana

The PLFS 2022–23 shows that there are zero labour force employed in the sector (NIC 1312) ‘weaving of textiles’ in Haryana despite the fact that the State includes mega cluster for handloom industries and cooperatives and also have certain number of power loom mills. There could be two reasons for this data anomaly. First reason could be that due to small sample, the data on particular sub-sector may not have been captured. Second reason could be that the PLFS is a household survey, which is not capturing the workforce, which is primarily composed of migrant workers. In that case enterprise data are more useful.

Discussions with the Textile Skills Council (TSC) revealed that more than 90 per cent of the workforce migrate in the textile sector for employment. The major source States for textile workers to other States have been from Odisha, Bihar, Jharkhand, Chhattisgarh, and Uttar Pradesh.

Deep dive in enterprise surveys shows employment in this sector. According to 4th All India Handloom Census 2019–20 by Office of DC Handlooms, MoT, more than 14,000 of women workers were working in the unorganised sector, viz. Handlooms and Handicrafts sector of the textile industry. As per ASI 2021–22 and ASUSE 2021–22 data, the labour force working in weaving of textile sector was 11,445 and 1,909 in Haryana.

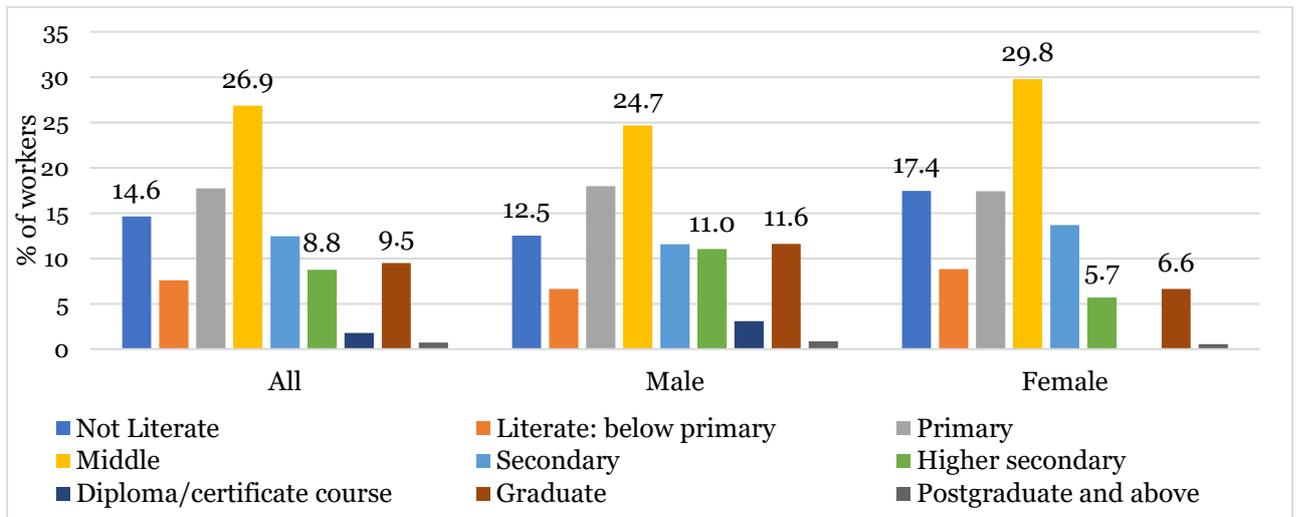
In regions and sectors characterised by high migration, one should look at the combination of household surveys such as PLFS and enterprises surveys to get an idea about the labour employed. Otherwise it may lead to erroneous results.

Source: NCAER analysis from PLFS 2022–23.

- c. **Education:** The distribution of workers in weaving activities (15+) by their level of general education is given in Figure 6.4. Compared to agriculture and livestock, a small proportion of workers are not literate in this sector. However, 52 per cent of the workers have education ranging from basic literacy (below primary) to middle school level. The corresponding number for female workers is 56 per cent. 12 per cent of all workers have attained either diploma/certificate or graduate and above degrees. The corresponding numbers for males are 15 per cent and females are 7.2 per cent. About 2.4 per cent of the workers in this sector have technical education. A higher proportion of male workers have technical education (3.8 per cent) versus female workers (0.5 per cent).

In this sector, majority of workers have received vocational training; 2.5 per cent of workers have received formal vocational/technical training and 61.6 per cent of workers have received non-formal vocational/technical training. The share of female workers who have received non-formal vocational/technical training was 69.8 per cent in 2022–23 (Figure 6.5). 26 per cent of workers have received non-formal vocational training through hereditary means and 18 per cent through on-the-job training.

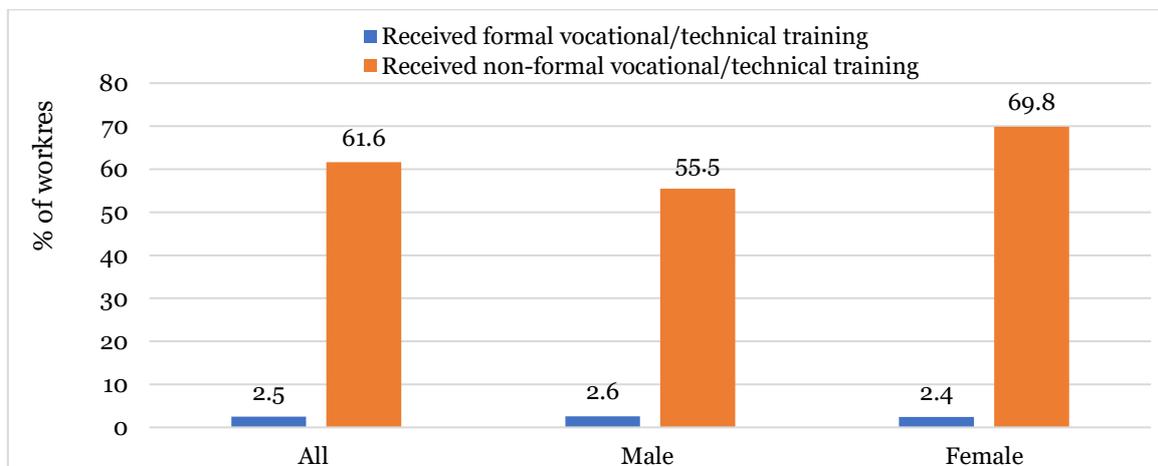
Figure 6.4: Percentage share in general education for workers (15+) in textile weaving



Source: NCAER analysis from PLFS 2022-23.

Note: Not Literature includes data from the following four categories — Not literate, Literate without formal schooling: EGS/ NFEC/ AEC, TLC and not literate-Others.

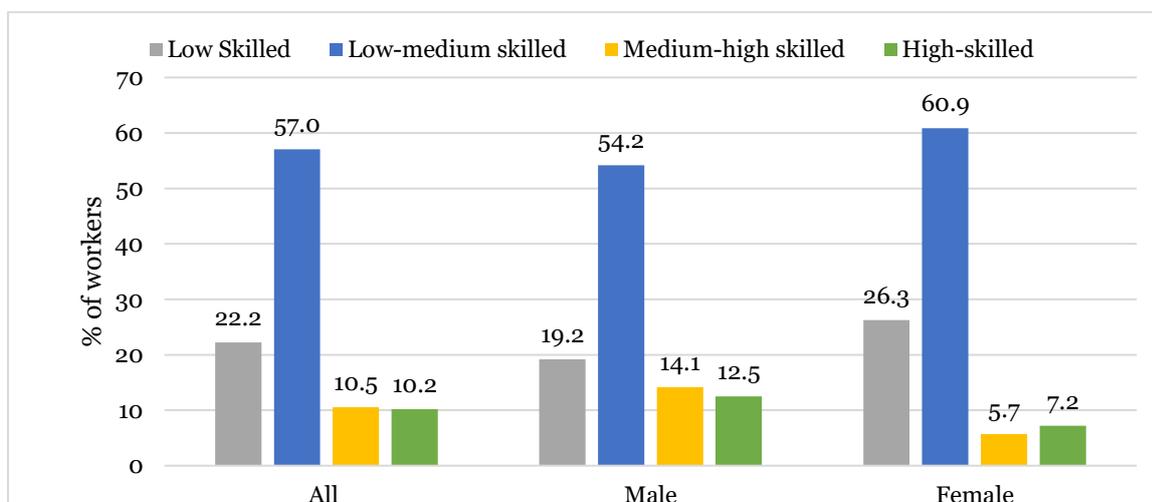
Figure 6.5: Percentage share of workers (aged 15+) engaged in weaving of textiles who have received either formal or non-formal vocational/technical training (%)



Source: NCAER Analysis from PLFS 2022-23.

- d. **Skill:** Majority of the workers in the sector are low-medium skilled with a relatively larger share of female workers being low-medium skilled (Figure 6.6.). A higher share of male workers are medium-high skilled and high skilled.

Figure 6.6: Majority of workers in the ‘weaving of textiles’ sector are low-medium skilled (aged 15+), 2022–23



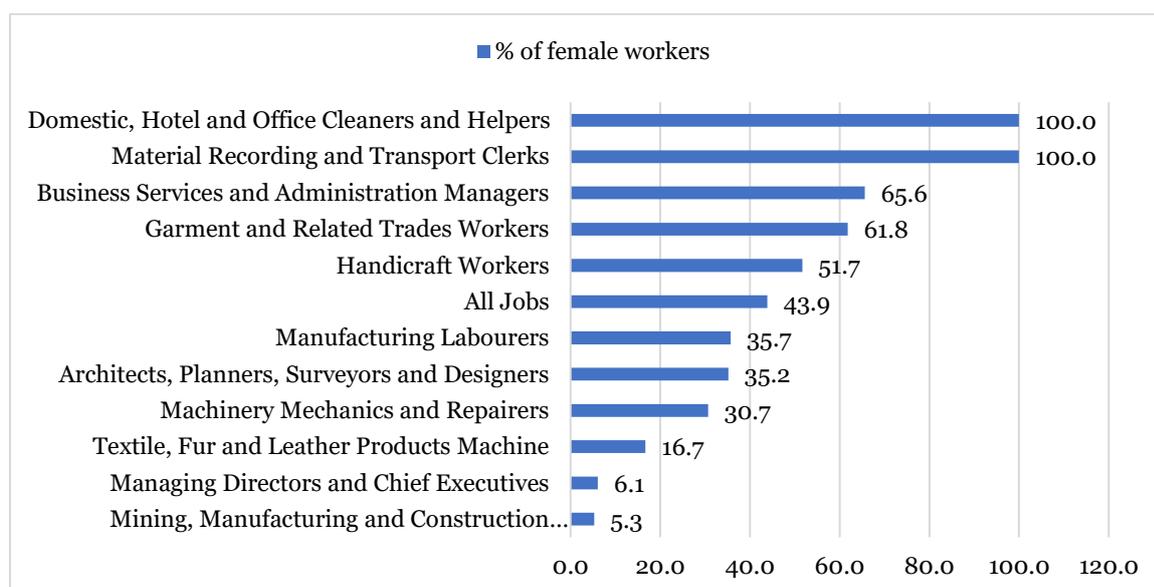
Note: Look at Annexure 4.2 for the definition of skills.

Source: NCAER analysis from PLFS 2022–23.

- e. **Occupation:** 95.5 per cent of workers in this sector work in these job roles—handicraft workers; textile, fur, and leather products machine workers; garment and related trades workers; managing directors and chief executives; manufacturing labourers; mining, manufacturing, and construction supervisors and; business services and administration managers. About 67 per cent of workers are handloom workers. The gender distribution reveals that 79 per cent of female workers are handloom workers whereas only 57.5 per cent of male workers are handloom workers. About 12.4 per cent of workers are textile, fur and leather products machine’ operators. 18.5 per cent of male workers work in this job role but only 4.7 per cent of female workers work in this job role. 8 per cent of workers are ‘garment and related trades workers’. 5.5 per cent of males and 11.3 per cent of female workers work in this job role.

Figure 6.7 shows the share of female workers in job roles. The share of women is high in ‘weaving of textiles’ in the North Eastern States. A larger share of female workers being low-medium skilled. A higher share of male workers is medium-high skilled and high skilled. The presence of women in ‘Managing Directors and Chief Executives’ job roles is fairly small at 6.1 per cent. The share of female workers who are working as Supervisors is also low. In contrast, 100 per cent of women work in the job role — ‘domestic, hotel, and office cleaner and helpers’ and ‘material recording and transport clerk’. In the job role, ‘handicraft workers’, 51 per cent of workers are females. There is a need to encourage women in non-traditional job roles.

Figure 6.7: Percentage of female workers (aged 15+) in job roles, 2022–23



Source: NCAER analysis from PLFS 2022–23.

- f. **Engagement Status:** 73 per cent of workers are self-employed in this sector, of which 46.7 per cent are own-account workers, 3.7 per cent are employers and 22.3 per cent are unpaid family workers (Table 6.2). Nearly 23 per cent of workers are regular wage workers and 4.2 per cent are casual wage workers. The corresponding statistics for male workers in this sector are 38.5 per cent, 6.0 per cent, 14.7 per cent, 35.1 per cent and 5.7 per cent respectively. In contrast, the corresponding statistics for female workers are 57.6 per cent, 0.6 per cent, 32.6 per cent, 7.1 per cent and 2.2 per cent respectively.

Table 6.2: Engagement status of workers

Sector	Self-employed			Regular salaried/ wage employee	Casual Wage Labour	Total
	Own account worker	Employer	Worked as helper in h.h. enterprise (unpaid family worker)			
	All Workers (aged 15+)					
Weaving of textiles	46.7	3.7	22.3	23.1	4.2	100.0
All workers 15+	35.6	3.2	18.6	21.4	21.2	100.0
	All Male Workers (aged 15+)					
Weaving of textiles	38.5	6.0	14.7	35.1	5.7	100.0
All workers 15+	39.6	4.5	9.5	24.0	22.3	100.0
	All Female Workers (aged 15+)					
Weaving of textiles	57.6	0.6	32.6	7.1	2.2	100.0
All workers 15+	27.3	0.6	37.4	15.9	18.8	100.0

Source: NCAER Analysis from PLFS 2022–23.

6.5 Identification of Geographical Clusters

There are many ways of identifying geographical clusters. The Ministry of Textiles has defined handloom and power loom clusters (see Annexure 6.1). Since the objective in this research work is to have a unified methodology across sectors, the Porter (1990) definition is used here to define clusters.¹⁶ Industry cluster is defined as a geographically proximate group of firms and associated institutions in related industries, linked by economic and social interdependencies.

Amongst the many potential sources of data (see Annexure 6.2), there are four key data sources that are used here in this report to identify clusters in the ‘weaving of textiles’ sub-sector.

- The Annual Survey of Industries (ASI) is the principal source of industrial statistics in India conducted by Ministry of Statistics and Programme Implementation (MoSPI), collecting the data on registered manufacturing and repairing units. ASI gives data of organised sector. Data for 2021–22 has been used.
- The MoSPI also conducts enterprises survey of the unorganised sector. Now it is conducting Annual Survey of Unincorporated Sector Enterprises (ASUSE). Data for 2021–22 was used to compute the spread of units State-wise.
- The Ministry of Textiles¹⁷ also provides latest data on number of units. State-wise separately for handloom and power loom sectors in India for 2021–22. According to this data, there are about 28.2 lakh handloom units and 3.85 lakh power loom units in India. For power loom sector, Maharashtra, Tamil Nadu, and Uttar Pradesh are among the top five States, and for handloom sector, Assam and Tamil Nadu are among top five.

Given the disparate information at different dates, each information is ranked separately—number of units from ASI in 2021–22, number of units from the ASUSE in 2021–22 and number of power loom & handloom units in 2021–22. The average of the rankings informs us about the clusters. If any State/UT has only one source of information, that State/UT is dropped.

The results are shown for the sector in Table 6.3. Tamil Nadu is the topmost cluster followed by Uttar Pradesh and West Bengal.

¹⁶ Porter, M. E. 1990. *Competitive advantage of nations*. New York: Free Press.

¹⁷ Ministry of Textiles. 2022. “Power loom sector contributes nearly 58.4% to total cloth production and more than 60% of fabric meant for export in the country”. PIB. <https://pib.gov.in/PressReleasePage.aspx?PRID=1814211>. April 6.

Table 6.3: Geographical clusters for ‘weaving of textiles’

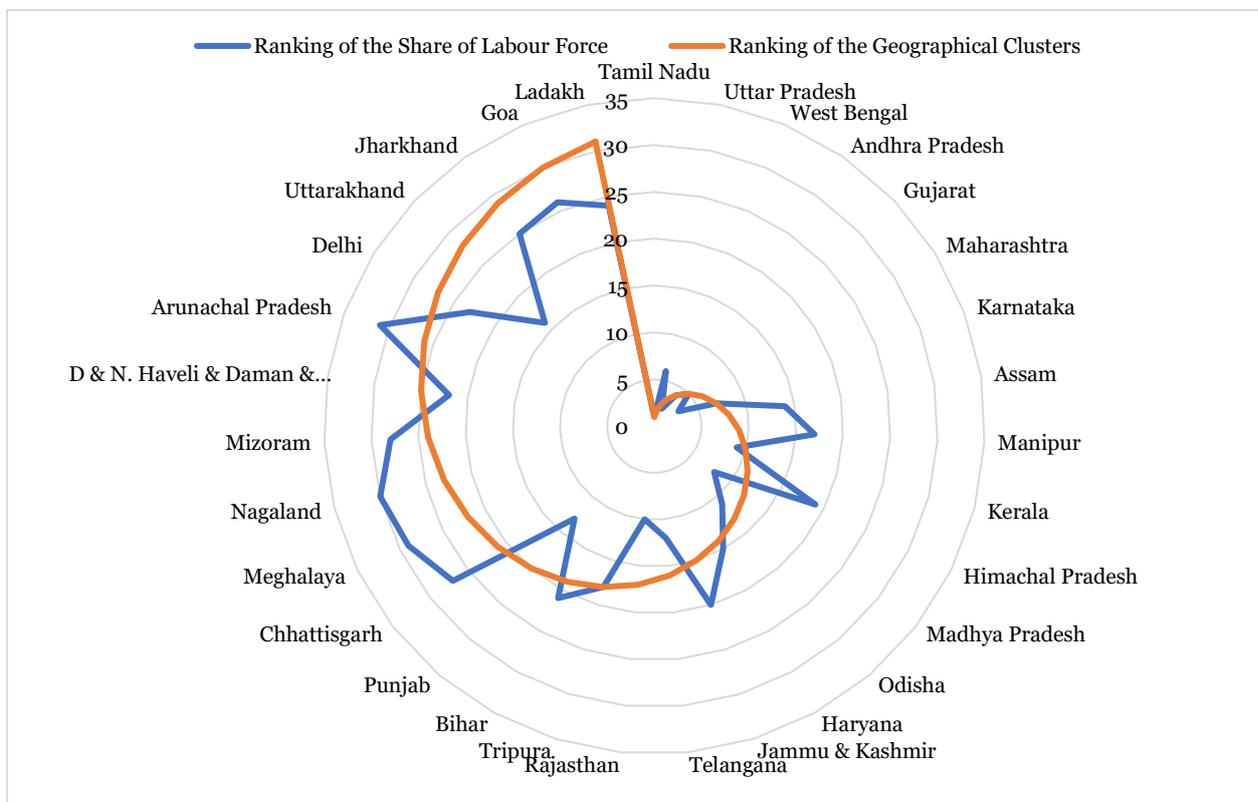
<i>States/ UT</i>	<i>Rank using ASI 2021–22</i>	<i>Rank using ASUSE 2021–22</i>	<i>Ranking using no. of power loom units from the MoT, April 2022</i>	<i>Ranking using number of handloom units from the MoT, April 2022</i>	<i>Average</i>
Tamil Nadu	2	1	2	5	2.5
Uttar Pradesh	8	5	3	7	5.8
West Bengal	12	3	9	2	6.5
Andhra Pradesh	10	4	6	9	7.3
Gujarat	1	10	4	22	9.3
Maharashtra	3	9	1	26	9.8
Karnataka	11	8	5	16	10.0
Assam	16	6	20	1	10.8
Manipur	20	2	21	3	11.5
Kerala	9	11	16	15	12.8
Madhya Pradesh	14	13	7	20	13.5
Odisha	18	7	18	11	13.5
Haryana	5	24	10	21	15.0
Jammu & Kashmir	20	17	11	12	15.0
Telangana	13	12	21	18	16.0
Rajasthan	4	19	17	25	16.3
Tripura	25	16	21	6	17.0
Bihar	23	14	8	24	17.3
Punjab	7	22	11	31	17.8
Chhattisgarh	19	18	19	19	18.8
Meghalaya	25	27	21	3	19.0
Nagaland	25	21	21	10	19.3
Mizoram	15	27	21	17	20.0
Dadra & Nagar Haveli and Daman & Diu	6	27	21	31	21.3
Arunachal Pradesh	31	27	21	8	21.8
Delhi	20	20	21	27	22.0
Uttarakhand	23	25	11	31	22.5
Jharkhand	25	27	21	23	24.0
Goa	25	27	21	30	25.8
Ladakh	31	23	21	31	26.5
Puducherry	31	27	21	28	26.8
Chandigarh	31	27	21	31	27.5
Lakshadweep	31	27	21	31	27.5
Sikkim	32	28	21	29	27.5

Sources:

1. Ministry of Statistics and Programme Implementation (MOSPI), Govt. of India. 2024. *Annual Survey of Industries 2021-22*. DDI-IND-NSO-ASI-2021-22. <https://microdata.gov.in/nada43/index.php/catalog/188>.
2. MoSPI. 2024. *Annual Survey of Unincorporated Sector Enterprises (ASUSE) of 2021-2022*. DDI-IND-MOSPI-NSSO-ASUSE2122. <https://microdata.gov.in/nada43/index.php/catalog/196>.
3. Ministry of Textiles. 2022. “Power loom sector contributes nearly 58.4% to total cloth production and more than 60% of fabric meant for export in the country”. PIB. <https://pib.gov.in/PressReleasePage.aspx?PRID=1814211>. April 6.

As mentioned earlier the share of labour force are computed from the PLFS, ASI and ASUSE and are individually ranked. The average ranking of the share of labour force are compared to the average ranking computed for the geographical clusters. The correlation between the rankings of the States using share of the labour force and geographical clusters is 0.8 (Figure 6.8). Tamil Nadu, Gujarat and Karnataka have exactly the same ranks using either of the same variables. Manipur and Assam are ranked lower (higher concentration) in geographical clusters but higher in share of labour force (lower shares). Punjab is the opposite – ranked higher in clusters (lower concentration) but ranked lower (higher shares) in share of labour force. Spatial mismatch suggests that gaps are met by migrant workers.

Figure 6.8: Rankings using share of labour force and geographical clusters for the ‘weaving of textiles’ sector



Sources: NCAER Computations from Table 6.3 and PLFS 2022–23, ASI 2021–22 and ASUSE 2021–22.

Note: Lower ranking means that shares are higher.

6.6 Occupational Mapping

Following procedure was adopted for mapping of the job roles:

- The PLFS gives 3–digit NCO 2015 code.
- Using the NCO 2015, we derived the 8–digit NCO codes under those specific NCO 3–digit codes to understand job roles that are ‘used’ in the industry.
- Mapped the SSC job roles available on website to the identified NCO 8–digit codes, wherever applicable.

Annexure 6.3 shows the occupations mapped between PLFS NCO 3–digit and the job roles offered by the TSC.

6.7 Stakeholders' Survey

6.7.1 Sampling

To get the detailed industry insight, various stakeholders were reached out in the textile weaving industry including Ministry of Textiles, TSC, National-level industry associations, TVET institutions, research institutes, and the respective firms/industries. Interviews with these stakeholders were more of a conversation rather than just asking questions from the questionnaire from the respondents. Separate questionnaires were developed for each stakeholder. It helped NCAER to gain a holistic perspective from all stakeholders. The questionnaire for firms in the 'weaving of textiles' sub-sector is attached at the end of the report (Questionnaire No. 4).

Successful interactions were held with the 27 stakeholders in the sector as given in Table 6.4.

Table 6.4: List of stakeholders covered for textile weaving industry

Sector	Number of Stakeholders
Ministry	No response
Sector Skill Council	1
National-level Industry Association – Confederation of Indian Textile Industry (CITI)	1
No of Firms	
Micro/Small	11
Medium	6
Large	3
Total	20
No. of Placement Cells/TVET Institutions	5
Firms plus Other Stakeholders	27

Source: NCAER.

Note: Response Rate – 12 per cent.

Out of the firms that were covered, about 9 were Private Limited firms, 8 were cooperatives and 3 were public limited firms (majorly textile mills). The interviews were conducted with the officials holding following positions: Cooperative owners/Proprietor (16), Human Resource/Learning & Development Managers/Director (Training) (3), and Production-in charge/Designer (2).

The firms/ cooperatives/mills covered in the study were majorly taken from handloom/ power loom clusters. The survey was conducted at different locations in Uttar Pradesh (Varanasi), Odisha (Bargarh), Karnataka (Bangalore), Punjab (Ludhiana) and Himachal Pradesh (Solan) where handloom cooperatives and power loom mills/ industries / private firms were situated (Table 6.5).

Table 6.5: Frequency of firms location

Sector	Frequency of Firms
Himachal Pradesh	2
Karnataka	3
Odisha	1
Punjab	1
Uttar Pradesh	13
Total	20

Source: NCAER.

6.7.2. Sectoral findings about skill shortages and skill gaps from stakeholders' survey

The survey revealed some key challenges that the 'weaving of textiles' sector is facing:

- Handloom
 - Loss of market share due to competition from the power loom sector. The power loom sector can produce relatively cheaply at scale with a fast turnaround time.
 - Handloom is known for its pure silk and unique designs which is not possible in power loom.
 - Jobs in this sector are non-aspirational for youth due to low wages, tedious work. Middle/senior generation working currently in handloom; youth attracted towards power loom.
 - Due to expensive nature of handloom products, customer base is small.
 - Lack of access to market for weavers or entrepreneurs/ cooperatives.
 - Lack of entrepreneurship skills—limited market access/ networks and lack of finances.
 - Issues of genuine 'handloom mark' that reflects purity of the silk and protect handloom weavers.
 - Big weavers still able to survive being retailer/ wholesalers-networks for selling their product on offline and online mode; small weavers facing market crunch.
 - Small weavers/cooperatives suffering most for handloom—not able to get loans easily even under Mudra scheme, provision for Electronic Jacquard' not reachable under various govt. schemes due to high waiting period of more than 2 years and intermediaries' involvement like Weaving Service Centre (WSC).
- Difficulty in getting weavers and weaving assistants for handloom, power loom not facing any skill shortage/ human resource issues as such.
- Only problem in power loom is of high electricity.

Primarily the firms were asked which job roles were difficult to fill and their associated qualifications and skills. Three job roles emerged which are facing skill shortages in the textile weaving industry. These key job roles are:

1. Weaver-Handloom (Jacquard/ Loin loom)

- “A Jacquard handloom weaver weaves various types of jacquard woven fabrics and artistic textiles on a jacquard handloom, using different kinds of yarns—cotton/raw silk on a fly-shuttle or throw-shuttle handloom. The jacquard weaver is responsible for carrying out pre-weaving activities mend broken ends, weft picks, change jacquard punch cards and carry weft replenishment activities to produce defect-free jacquard woven fabrics.”¹⁸
- “A Loin Loom Weaver is the one who weaves various types of fabrics and artistic textiles by hand using a Loin Loom. A weaver can weave basic weaves Plain and its variations, using different kinds of yarns—cotton/wool/silk on

¹⁸ Textile Sector Skill Council and National Skills Development Corporation website. https://texskill.in/wp-content/uploads/QP-docs/QP/TSC_Q7306_v2.o.pdf.

- a fly-shuttle or throw-shuttle Loin Loom as per pattern or design provided.”¹⁹
2. Weaver- Power loom: The tasks that a power loom operator is supposed to operate are the following²⁰:
 - Operating the power-loom to weave cloth
 - Checking that the looms shuttles are in position
 - Supplying the full weft bobbins into the loom
 - Ensuring that the wrap yarn is not broken and that the set-up is ready
 - Checking the looms for defects in weaving
 - Ensuring that the broken ends of the warp yarn are mended
 - Ensuring that the ties are of short length so that the yarn is there at the broken end of the warp beam
 - Drawing the end through the drop wire
 - Healding and reeding by making use of the reed hook in the loom
 - Tying the reeds to the other end with a weaver's knot
 - Removing all the defects caused in the loom by the mispicks
 - Cutting and pulling out the filling of the weft yarn up to a point of defect
 - Adjusting and starting the loom every time a repair is done
 - Replacing the empty bobbin in the shuttles
 - Cutting the cloth when the cloth roll becomes full in the loom
 3. Weaving Assistant (Handloom): Assists the Master trainer, should have loom training and helps out in preparation process to weaving, including preparing samples, assisting with yarn sizing and winding, etc.

The indicative computation for the number of vacancies for these job roles is given in Table 6.6.

¹⁹ Textile Sector Skill Council and National Skills Development Corporation website. https://texskill.in/wp-content/uploads/QP-NOS/TSC_Q7307_v1.0.pdf.

²⁰ National Career Services website. <https://www.ncs.gov.in/content-repository/Pages/ViewNcoDetails.aspx?List=8db9be14%2D2b47%2D4f30%2D97fb%2D5de315d871c0&ID=5635&ContentTypeId=ox01003FEA8C7117A78D4F93DC52780D878B2F0015F91119E23A874E9006BoFo68F1089C>.

Table 6.6: Assessment of current & future skills shortage for top job roles in ‘weaving of textiles’

<i>Items</i>	<i>Weaver-Handloom (Jacquard/ Loin loom)</i>	<i>Weaver- Power loom</i>	<i>Weaving Assistant (Handloom)</i>
NCO-3/8 digit code	731	731	No code available
NCO 8-digit (QP code)	TSC/Q7306, TSC/Q7307 (7318.58)	TSC/Q2210 (7318.55)	No code available
Match from Job Projections (731, 815, 753, 112, 632) @	Yes	Yes	No
No. of all stakeholders mentioned this (22)	16	11	16
Indicative computation of the extent of the need & vacancy rate (NCAER computations)	<p>Dominated by unorganised sector; Weavers working from their own workspace at home using own looms/cooperatives. Unutilized capacity—more weavers, more output</p> <p>There are 28.2 lakh handlooms in the country. Assuming that each loom requires one weaver and one weaver assistant, makes the requirement 56.4 lakh weavers in the country. In the power loom sector, there are 3.85 lakh looms. Assuming, on average, one weaver operates 8 looms simultaneously, one would need 0.5 lakh power loom weavers. In total the need is for 57 lakh weavers However, in the PLFS 2022–23, there were 13.3 lakh workers under the NCO code 731. Therefore, the skill gap under NCO code 731 is 43.7 lakh. However, this estimate is indicative as many handlooms are non-functional due to a variety of reasons and there may be other occupations under NCO 731. Even then just in the case of weavers, the skills gap is high. More precise numbers requires a survey.</p>		
Manpower projection by 2030 (NCAER computations)*	Weavers required by 2030 = 0.5 million, Allied workers required by 2030 = 0.2 million		
Location of firms	Varanasi, UP & Bengaluru, Karnataka	Ludhiana, Punjab and Solan, HP	Varanasi, UP & Bargarh, Odisha
Average daily income (₹)	Up to ₹ 600 per day, Product-based payment	₹ 450-500 per day, less working hrs than handloom	₹ 200-300 per day
Educational Qualifications	Primary/Matric/Diploma/NSQF Aligned Course	Primary/Matric	Primary/Matric/Diploma/NSQF Aligned Course
Skills required at the competency level (3)	<p>Cognitive Skills: Reading, numeracy, Active Learning (Ability to learn new skills), Creative thinking—Ability to create new design patterns with different colour combinations; Digital Skills, Financial Management, Resources Management and Entrepreneurship Skills,</p> <p>Socio-emotional Skills: Conscientiousness (efficiency, patience), instruction, persuasion, negotiation and networking skills</p> <p>TVET: Weaving, setting up the loom and warp and how to manipulate threads and patterns, Basic knowledge of fabrics, yarn count, colours, designing and card punching skills, types of weaves & looms, quality parameters, marketing skills, Health consciousness due to heavy loom handling;</p> <p>Physical Skills— hand-eye coordination, ability to sit for long</p>		
Skills Shortage	Yes	Yes	Yes
Skills Gap	No	No	No
Relevance of TVET System	It is relevant and providing basic skills for weaving and allied activities	It is relevant and providing basic	Apprenticeship programme should be strengthened

<i>Items</i>	<i>Weaver-Handloom (Jacquard/ Loin loom)</i>	<i>Weaver- Power loom</i>	<i>Weaving Assistant (Handloom)</i>
Gender (Challenges)	Women are not able to operate heavy handlooms; they are involved in allied activities.	skills for weaving and allied activities No issue	Varies by region depending on the nature of the loom
Challenges Faced by Industries in Meeting Skill Requirements	Skills shortage; spatial mismatch; tedious work conditions; low wages; not aspirational; spatial mismatch (unemployed weavers in one place and industry in another)	Skills shortage	Skills shortage; tedious work conditions; low wages; not aspirational
Industry-specific interventions that facilitate skill & capacity development (best practices)	<ul style="list-style-type: none"> Cooperatives help weavers acquire looms and set them up at their homes-this enables them to work from home and make it aspirational for the youth Cooperatives helped weavers to on-board on government schemes (schools, scholarships, etc.), which enable their longer tenure at the cooperative Females employed in allied activities of knitting, stitching, designing, dyeing, etc. 	<ul style="list-style-type: none"> Firms are providing training for specific skills Providing accommodation 	
Policy Recommendations	<p>Skill Training Programme: Introducing basic weaving skills on handloom and power loom and setting up of looms, creative designing, usage of new fabrics/yarns & technologies, RPL needs to be encouraged</p> <p>Curriculum Development: Digital skilling, Automation and Digital Technologies, Sustainable Technologies Circular/ Green/ Recycled/ Sustainable textiles, Advanced Materials, Supply Chain invocations, Artificial Intelligence and Machine Learning, Entrepreneurial training</p> <p>Gender: Encourage women in new areas— designing (computerised), ICT skills which use CAD technology, new dyes (computerised), green textile</p> <p>Skill Initiatives: Encourage academia-industry collaboration, Guest faculties from industries, Vocational skilled teachers getting industrial training; industry visits; ITI adopted by large industry (like in the auto sector, Apprenticeships should be encouraged at the cooperative level</p> <p>Others: Improve spatial matching of industry and workers; Government in collaboration with industries may take initiatives to set up exhibition cum sale outlets with right customer group for weavers to directly sell their products, e.g. one group did it recently for handloom; help with marketing; forecasting; designing</p>		

Source: NCAER Conceptualisation.

Notes: @ Pink shade indicates no match between I-O quantitative top 3 occupation projections and survey-based top 3 occupation projections. Green shade indicates a match.

*Manpower does not change frequently in this industry. In alignment with the textile industry, manpower projections have been done till 2030.

6.8 Recommended Methodology

The ‘weaving of textiles’ sector is going through a transition. While the relatively more traditional sub-sector of handloom within the ‘weaving of textiles’ sector suffers from many challenges but technological changes and innovations in new types of textiles have opened up new opportunities in other parts of the sector. As mentioned in the introductory chapters of this report, weaving skills is an indirect demand, i.e., it is linked to the products that are being demanded. While the demand for traditional

handloom products lag, the demand for new-age products will soar. The challenge is how to help the lakhs of workers who derive their livelihoods from traditional sectors to more modern aspects of the same sector. A complex combination of youth aspirations and low wages are already driving workers to move out of the handloom sub-sector. Skills has a critical role to play in navigating this path.

Therefore, the overall recommendations for skilling are the following:

- Power loom—Recognition of prior learning (RPL) followed by Upskilling and Reskilling and Fresh training.
- Handloom—Majorly RPL followed by Upskilling and Reskilling and Fresh training.
- Textile Mill Sector (Spinning/ Weaving Mills/Technical/ Composite units): Majorly Fresh skilling followed by RPL and Upskilling and Reskilling.

Based on the above, the recommended methodology to assess skills shortages and skill gaps for this sector is the following:

1. Map the sub-segments of the sector to the NIC code. The sub-segments maybe based either on the type of textiles or types of looms. The Textiles Sector Skill Council should do this mapping so that the sector can be tracked in that manner. The shares of the sub-sectors both in terms of workers and share of industries should be spelled out.
2. Update mapping of NCO 2015 job roles with job roles identified by the Sector Skill Councils.
 - a. For example, 731 is the NCO code for handicraft workers.
 - b. Code for a power loom weaver is 7318.5500 whereas that for a handloom weaver is 7318.5800.
 - c. The power loom weaver code captures four different types of technologies (plain loom, semi-automatic loom, automatic loom and shuttle-less loom). All these need to be delineated and spelled out.
 - d. The SSCs (along with MSDE) should also coordinate with the National Career Services to refine the job roles.
3. The Handloom Census needs to start using occupation codes in their surveys and also probe about skill sets that the workers may have, the orientation and training programmes that the workers may have undergone, etc.
4. In coordination with the MSDE, the Sector Skill Council needs to implement surveys on a regular (at least annual) basis, which captures vacancies of firms. The job roles should be mapped/matched with job roles identified in Step 1. Ideally the Economic Census forms the frame for any survey. Given the lack of data, the Ministry of Corporate Affairs' database or Goods and Services Tax Network are the other sources of universal data, from where data may be used to derive the universe. That universe needs to be divided into the sub-sectors as defined in Step 1. Then proper sampling strategy needs to be adopted to understand the validity of the results. Biases needs to be addressed. Response rates should also be collected.
5. Big Data analysis is highly recommended for SSCs using various job sites. They should also use/assess data from National Career Services and various employment exchanges around the country. The job roles should be mapped/matched with previously identified job roles.
6. Stakeholder interactions needs to be carried out as an annual exercise based on templates designed by the MSDE. It will capture jobs which are difficult to fill but also get a holistic view of the sector in terms of emerging technological

trends, emerging jobs, detailed qualitative needs for qualifications and skills, hiring practices, best practices of firms, migration trends, practices to encourage female labour force participation, etc.

7. Last but not the least, the MSDE, Ministry of Labour and Employment, and Ministry of Statistics and Programme Implementation should design an occupation-wage-employment survey. It is absolutely important to identify the occupation codes mentioned in Step 2. Ideally the Economic Census forms the frame for any survey.