

Preliminary Scoping Study Report on Varanasi Textile Cluster

From field visit during the period of 16th April to 17th April and with inputs from EESL



Prepared By:

Project Management Unit

United Nations Industrial Development Organisation

Promoting Market Transformation for Energy Efficiency in MSMEs



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

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1 BACKGROUND

The project on Market Transformation of Energy Efficiency in MSMEs focuses on improving energy efficiency in the MSME industrial sector of India via demonstration of promising technology as well as an innovative financial model through continued capacity building, information dissemination, and establishment of standard operating procedures for implementing energy efficiency (EE) investment projects. The major stakeholders in this project are UNIDO, MoMSME, EESL, BEE & SIDBI.

10 MSME clusters are selected for implementing under the project. The 10 clusters are as follows:

SN	Cluster	Location (State)
1.	Textiles	Surat (Gujarat)
2.	Chemical	Ankleshwar (Gujarat)
3.	Tea	Jorhat (Assam)
4	Galvanizing and Wire drawing	Howrah (West Bengal)
5.	Paper	Muzaffarnagar (Uttar Pradesh)
6.	Forging	Batala, Jalandhar and Ludhiana (Punjab)
7.	Textiles	Varanasi (Uttar Pradesh)
8.	Sponge Iron	Sundargarh (Odisha)
9.	Rice	Vellore (Andhra Pradesh)
10.	Ceramic	East and West Godavari (Andhra Pradesh)

2 CLUSTER PROFILE

Varanasi is a religious city and a center of weaving in the state of Uttar Pradesh. Banaras/Varanasi/Kashi has an ancient history of textile designing. The most exquisite brocades in silk and gold are woven by the weavers on silk pit loom. The weavers of Varanasi are best known for their skill in brocade weaving known as Kinkhabs. There are many exquisite designs in this variety, but more emphasis is given to floral designs. Whether it is the religious activity or earning of livelihood for the population, the weaving activity surpassed all other occupations.

The weaving activity of the Varanasi is cluster based and scattered all over the Varanasi district and some adjacent areas. The Varanasi city is the main centre of weaving. The maximum weavers of the product belong to the city only.

It is very difficult to provide any specific data as no proper survey has been conducted to ascertain the number of looms, different category of manpower engaged in textile related activities or number of units engaged in different production activities or so. However, the information given in this document is based on discussion with the persons engaged in textile related activities.

2.1 Main Product of the Cluster:

- Saree: Mainly using polyester or silk thread.
- Lahanga (Specially designed fabric for brides)
- Shervani Cloth (Special cloth for bridegrooms)
- Dress material (Specially for ladies suits)
- Furnishing fabric (Bed cover, sofa cover, cushions, curtain, etc.)

2.2 Type of Fibre used in the Cluster:

Majority of the products are polyester and silk thread based. Apart from these fibres nylon, viscose and cotton are also used in the cluster.

2.3 Number and Types of Looms:

Initially there were substantial amount of handlooms in the city but over a period of time power looms overtook the handlooms. It is estimated that presently more than 1 lakhs power looms, about 10,000 handlooms and around 3000 shuttles less looms are running in and around Varanasi cluster. Apart from weaving activity, Embroidery is also developing in the cluster.

2.4 Manpower:

Keeping in view of Varanasi and nearby areas, it is estimated that more than 3 lakhs manpower is directly engaged in textile related activities whereas about 2 lakhs manpower is engaged in associated activities. About 70 % of direct manpower is from minority community and about 5 % from SC/ST category.



Moreover, women category constitutes about 35% of total manpower.

2.5 Energy Sources:

Main energy sources used is electricity from the grid. Some Powerlooms has their own DG set which are used as a power back up.

2.6 Facilities in the Cluster:

Apart from weaving activity, the cluster has following facilities

a) Pre-weaving facilities:

- Primitive kind of Warping machines
- Conventional Yarn Twisting machines
- Manual yarn dyeing system for silk, cotton, nylon & viscose fibre whereas there are very few units which have mechanised yarn dyeing system mainly to dye polyester yarn.

b) Post-weaving facilities:

- Fabric finishing i.e. calendaring
- Embroidery machines
- Manual extra thread cutting system (Mostly done by household ladies)
- Printing- small number of block and screen printing and very few units have digital printing machine.

2.7 Challenges in the cluster:

Varanasi textile industry is developed as cottage industry. Financially, weavers are very weak. Most of the weavers have 2-4 looms which is managed by whole family. Technology of looms is also very old. Automation is almost nil. Owing to which they become out of competition/race in front of the cluster having modern machines. They are surviving because of their designs and hard work.

In absence of proper pre and post weaving facilities, diversification of products is restricted. There is no sizing facility in the cluster because of that cotton-based fabrics on power looms are limited. Fabric dyeing & finishing facilities are also not available in the cluster due to which the weavers manufacture yarn dyed based fabrics. It restricts production of value added fabrics.

Most of the small weavers do job work for local fabric supplier/traders. It happens often that they don't get sufficient job work. As they don't have direct market access, such situation keeps them in trouble.

Keeping in view of above challenges before the cluster, there is need of a common facility center having pre and post weaving facilities. It may be established/managed on PPP model. A platform for marketing of the products may be created that will help the weavers to sell their product directly to the buyers.

2.6.1 Utilisation of Government Schemes:

In-situ scheme for up-gradation of looms is most popular scheme which is availed by the weavers of Varanasi cluster. About 317 weavers have taken the benefit of this scheme. Apart from this about 44 weavers visited other clusters under Exposure Visit program. No project under GWS and CFC scheme has been implemented in the cluster. However, yarn bank scheme is availed by 2 co-operative societies. Major bottleneck to avail the GWS & CFC scheme are as below:

1. "Industrial Non agriculture" land use to establish the project as availability of land in industrial area is very limited and change of land use is also very difficult.
2. Marketing for 24 shuttle less looms production and capital requirement for plant and machinery is also a matter of concern for the above schemes.

2.8 Strengths of the Cluster:

- Unique Textile designs for sarees, sherwani, furnishing cloth, etc.

- Brand image of Banarasi sarees
- Availability of skilled manpower & technicians
- Low cost of manufacturing
- Well connected with rail, road and air.

2.9 Weakness of the Cluster:

- Old technology of production machines.
- Lack of modernisation
- Weavers are financially very weak, can't afford capital intensive schemes.
- Lack of effective power loom associations.
- Absence of pre and post weaving facilities e.g. Warping, sizing fabric dyeing, finishing, etc. for production of better quality products.
- Absence of exclusive textile market place.



3 KICK-OFF MEETING

Kick off meeting was held with the local industries association and technical knowledge agency NITRA Power loom service centre to understand the energy profiling and the scope for EE intervention. Local DI MSME office was also visited for having a detailed discussion on the industrial scenario and energy efficiency requirement.

There are around 0.2 to 0.25 million power looms in Varanasi mainly involved in weaving of textiles. The power cut in the region is around 3 hrs. on an average. In Varanasi almost 40% of the power looms are single phase and the rest 60% is 3 phases. There are shuttle type conventional machine and the most advanced are rapier m/c where productivity is enhanced by two times. Motors that are used in the power looms are ranges from 0.5 HP to 1.5 HP.

Even though it is expected the electricity billing system would be more closer to the actual consumption in coming days, currently the electricity to the power looms are highly subsidized and as low as Rs. 80 is only charged per month in lump-sum against each loom.

The industries are sceptical about the new up-coming billing regime and as such are interested to adopt solar energy system. However, the need in terms of solar technology is more towards the 3-phase system, since the only solar system that are introduced in the cluster is the single-phase system which has number of limitations.

4 MANUFACTURING PROCESS AND PRODUCTS

4.1 Raw Material

The raw material required for the manufacturing textile products is The following types of textile is available in Varanasi district, Uttar Pradesh for manufacturing the textile products.

The silk is mainly sourced from Kashmir, Bangalore or China. The zari is either from Varanasi itself or from Surat.

A traditional Banarasi sari is woven with pure silk and asli (real) zari (silver is of 98 per cent purity). However, it is very common today to find saris made of synthetic materials such as artificial silk and 'tested zari' (either the purity of the silver is low or it is made entirely of synthetic materials).

4.1.1 Type of Fibre used in the Cluster:

Majority of the products are polyester and silk thread based. Apart from these fibres nylon, viscose and cotton are also used in the cluster.

4.1.2 Number and Types of Looms:

Initially there were substantial number of handlooms in the city but over a period of time power looms overtook the handlooms. It is estimated that presently more than 1 lakhs power looms, about 10,000 handlooms and around 3000 shuttles less looms are running in and around Varanasi cluster. Apart from weaving activity, Embroidery is also developing in the cluster.

4.2 Main Product of the Cluster:

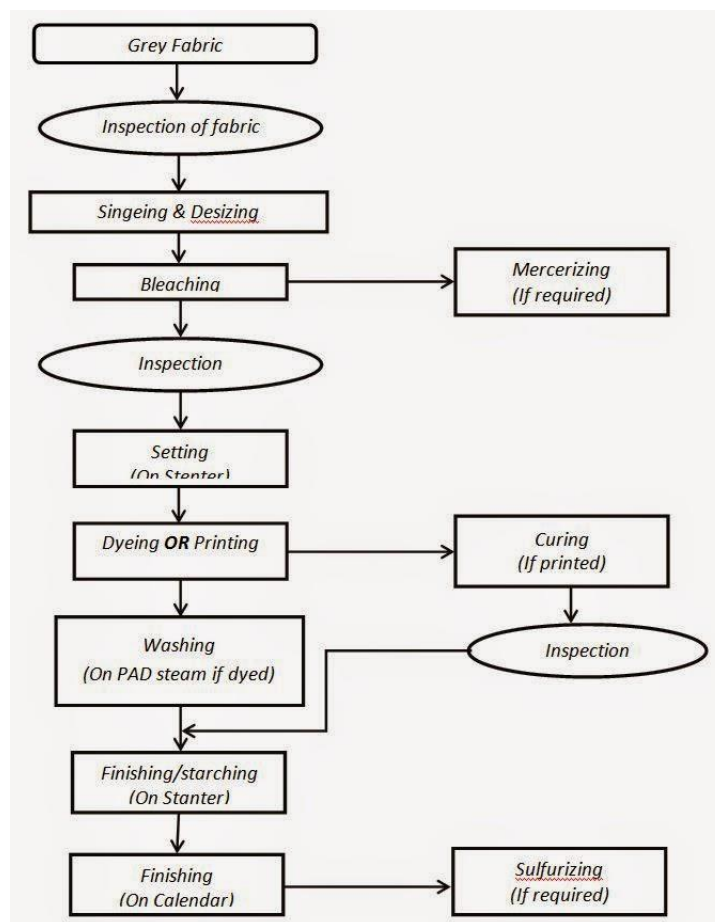
- a) Saree: Mainly using polyester or silk thread.
- b) Lahanga (Specially designed fabric for brides)
- c) Shervani Cloth (Special cloth for bridegrooms)
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- e) Furnishing fabric (Bed cover, sofa cover, cushions, curtain, etc.)

4.3 Manufacturing Process

Brocade weaving is a complex process carried out in various steps. First, the design that will feature on the textile is made on graph paper by the nakshaband or pattern drawer. Then the yarn is readied for the warp and weft. Then the warp threads are opened up and attached to the loom. The weft yarn is reeled onto bobbins using special equipment. Once the warp and weft are ready the weaving is done on either a jala or jacquard loom.

If the weaving is being done on a jala loom, the nakshaband then recreates this pattern onto a frame loom using threads. Through this, a jala is produced, which is attached to the loom so as to transfer the pattern or motif as a repeat on the main fabric. The jala acts as a master harness lifting and dropping the threads. Two people are required to operate this type of loom—the weaver seated at the front of the loom and the helper at the back to help control the jala itself.

In a jacquard loom, the designs for the textiles are punched onto cards which are then sewn together and attached to the top of the loom from where they control the heddles. The cards lift a series of warp threads so that weft threads can be inserted. This creates the silk and gold patterns on Varanasi brocades.



5 FIELD STUDY:

Following representative industries Visited were visited in consultation with the local industrial association by the joint team of DI MSME office, EESL and UNIDO during the period of 16/04/2018 to 17/04/2018:

1. NITRA Power Loom Service Centre & Testing Lab
2. Global Text Creation
3. Chow Ghat, IIST Testile Silk Board
4. National Handloom Development Corporation
5. Central Silk Board



5.1 Recommendations:

1. Replacement of all the older motors of power loom with IE3 motors.

S.No.	Parameters	Old Motor	New Motor
1	Rating (kW)	0.37	0.37
2	Total Quantity (No.)	1,00,000	1,00,000
3	Efficiency Class	IE1	IE3
4	Efficiency (%)	65	73.5
5	Loading (%)	70	70
6	Annual Operating Hours (hr.)	5000	5000
7	Annual Energy Consumption (kWh)	1992,30,769	1761,90,476
8	Energy Saving per Annum (kWh)	230,40,293	
9	Tariff Rate (Rs./kWh)	6	
10	Energy Saving per Annum (Rs.)	1382,41,758	
11	Estimated Capital Cost per IE3 Motor (Rs.)	5430	
12	Estimated Capital Cost of 1,00,000 IE3 Motors (Rs.)	54.3 Cr.	
13	Payback Period (yr.)	3.93	

2. Replacement of all the conventional looms with Shuttle less looms

- Disadvantages of Shuttle looms:
 - a) Greater strain imposed on the picking mechanism, thus rendering it liable to frequent failure.
 - b) Greater amount of noise and vibration.
 - c) The movement of shuttle will be more difficult to control and there will be a greater possibility of its ejection from the loom.

To overcome the above limitations of shuttle loom, the need for better weft insertion system without shuttle has been realised.

Advantages of Shuttleless Weaving Technology are

- a) High machine productivity due to high speed and wider width of looms.
- b) Reduced labour cost due to higher allocation of looms and productivity.
- c) Defect free cloth for longer length.
- d) Better environment due to low noise level.
- e) More colours in weft direction (upto 12) by Pick and Pick method.
- f) Wider width fabrics and multi width fabrics can be woven.
- g) Due to less beam changes lower down-time and lesser wastages.
- h) Higher design capabilities due to microprocessor and electronic controls.
- i) Lesser accidents.

Following table gives a comparison of in terms of the productivity of the two machine.

Loom Type	Available width (cm)	Speed (rpm)	Weft Insertion rate (m/min)
Conventional Power loom	180	180	300- 400
Shuttleless/Rapier loom	165- 410	550	1300

Following table gives a comparison of Fabric Production in both the looms

Parameters	Conventional Loom	Rapier Loom
Reed space (cm)	180	180
Speed (rpm)	90	450
Avg. PPI	52	52
Efficiency (%)	70	80
Production/day (m/mc)	35	215
Production/yr. (m/mc)	12,250	75,250
Expense/metre (Rs.)		
Wages	5.7	0.93
Power	1.5	4.5
Maintenance	2.19	0.51
Weft yarn Waste	0	2.64
Administrative expenses	1.0	0.1
Total	10.39	8.68
Expected Value Loss (%)	10	1.0

Value Loss/m (Rs. 40/m)	4.0	0.4
Total weaving cost/m (Rs.)	14.39	9.08
Weaving Cost/yr. (Rs.)	1,76,277	6,83,270
Selling Cost/yr. (Rs.)	4,90,000	30,10,000
Profit/yr. (Rs.)	3,13,723	23,26,730
Loom Cost (Rs.)	1,00,000	17,00,000
Payback Period	0.32	0.73

Note: - Currently weavers are paying Rs. 80/loom/month to government as an electricity bill.

6 OBSERVATIONS:

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As such the EE technologies that are viable in the cluster are

1. replacement of existing motors with EE motors
2. Replacement of shuttle type machines with rapier machine
3. Installation of solar system for power supply.

Since the new electricity billing regime timeline is uncertain, it is quite challenging to undertake the EE intervention in the present situation in the cluster.