

PASHMINA FIBRE TRANSFORMATION IN NEPAL

OVERVIEW OF THE PRESENT STATUS IN NEPAL AND RECOMMENTATIONS FOR FIBRE TRANSFORMATION

PROJECT EU-NEPAL TRADE AND INVESTEMENT PROGRAMME (TIP)

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GLOSSARY OF TERMS USED	1
1. Executive SUMMARY	2
2. Processing	3
2.1. Fibre harvesting and storage	5
2.1.1. Fibre opening, dedusting and scouring	5
2.1.2. Dehairing	6
2.1.3. Combing	6
2.1.4. Woollen spinning	6
2.2. The present situation in Nepal	7
2.2.1. Fibre availability	7
2.2.2. Fibre processing	8
3. Elements of costs and benefits for fibre processing	8
3.1. Current production data	8
3.1.1. Potential amount of pure Pashmina fibre available	8
3.1.2. Conversion of potentially available fibre into yarn	9
3.1.3. Cost of production	9
3.1.4. Comparison of cost per kilo versus imported yarn	12
4. Suitable machinery for the available fibre quantity	13
4.1. Alternative processes following the experiences from China	13
4.2. Technical specifications of potential Chinese equipment	14
4.3. The potential of using Indian Pashmina processing equipment	15
5. Recommendations	15
ANNEXES	18
Annex-I Small Scale Scouring Machine made in China	19
Annex- II Potential plant design	21
Annex - III Listing of machinery for the Chinese machinery	22
Annex- IV Function of machinery (India)	23
Annex- V quotation from India	24
Annex- VI Technical specifications of Indian machineries and photos	25
Annex- VII Other suggestions and observation beyond processing	33
Annex-VIII Meeting notes of the International Consultant	34

Charts, Figures and Tables:

Chart 1: Current Production of Pashmina by farmer's vs potential	7
Chart 2: Estimated cost of fibre handling per Kg	10
Figure1: Pashmina processes	4
Table 1: Scenarios (lowest, medium, and highest) of final amount of pure Pashmina extraction	8
Table 2: Converting Pashmina fibre into yarn- three potential scenarios	9
Table 3: Detailed total cost of greasy fibre paid at NPR 4,500/Kg transported to Kathmandu	10
Table 4: Average cost of resources in Nepal	10
Table 5: Processing cost to transform greasy fibre into tops	11
Table 6: Final processing costs to transform greasy fibre into dehaired tops	11
Table 7: Final amount of yarn that could be produced out of 13.17 tons of greasy fibre	12

GLOSSARY OF TERMS USED

Combing:	Process of harvesting Pashmina down from a goat by using a comb.
Dehairing:	Separating the coarse guard hair from the Pashmina by hand or (usually) by machine.
Down:	Fine diameter undercoat of a double-coated goat (e.g., Pashmina).
Fleece:	Entire coat of a goat, containing both coarse outer guard hair and down undercoat.
Scouring:	Washing dirt, vegetable matter, dust, natural oils and dung from the Pashmina.
Shorn:	Process of shearing (cutting) the entire fleece from a goat.
Spinning:	Draining and spinning the fibre into a thread, bracket yarn.
Weaving:	Passing yarn through a warp and Weft on a loom to produce fabric.
Yarn:	Thread made by spinning the fibre.

1. EXECUTIVE SUMMARY

Nepal is an important exporter of final Pashmina products. At the same time around 131,000 Chyangra goats are farmed in Nepal, but their fibre does not find its way into the Pashmina supply chain. This report addresses the missing link in the Pashmina supply chain in Nepal, namely the processing of Pashmina fibre.

In chapter 2 it describes the required steps in Pashmina processing based on industries and good practices that can be found in other Pashmina producing and processing countries.

Chapter 3 looks at the estimated production figures of greasy fibre in the country and estimates the amount of tops and yarn that could possibly be produced in the country. Out of an estimated 131,000 goats about 13.17 tons of greasy fibre could be harvested in the short to medium term. Considering the possible wastage occurring at the dehairing as well as carding and combing stages approximately 6,585 to 7,902 Kgs of dehaired combed fibre could be produced. These could be used for hand-spinning operations. Adding industrial spinning operations, the amount of possibly produced yarn would range from 5,597 to 7,507 Kg of Pashmina yarn.

Building on this, the report looks at the estimated costs at each stage of the value addition process. Nepali Pashmina dehaired tops would cost between 11,345 NPR and 13,0304 NPR (US\$ 101-116 /Kg) per kilogram, depending on the wastage occurring during the processing stage. In early 2022, dehaired Pashmina prices ranged from US\$100/Kg for coarser Afghan Pashmina, US\$ 130 for Tibetan Pashmina to US\$150 for long White Chinese Pashmina.

In order to explore the potential that Nepal has and to develop high quality Pashmina products, industrial scouring and dehairing facilities would be required. Given the relatively low level of fibres presently harvested, a fully-fledged industrial scouring line would, however, economically, not be justified. The same holds true for industrial spinning operations. Thus, semi-industrial scouring plus dehairing equipment up to carding could make economic sense.

Good equipment that could fulfil the needs of the Pashmina industry in Nepal could be sourced from China or India. European or Japanese machinery would be too expensive.

China is the world's leading cashmere producer and as such it developed a cashmere machinery industry that has a good reputation in the world market. Its machinery is widely used in the industry and has proven to process high-quality cashmere products. Given the amount of cashmere processed in China, however, machinery dimensions are on the higher side and might not necessarily adapt to the relatively low quantity of Pashmina fibre presently harvested in Nepal. Moreover, given the present COVID 19 context in China and its zero-COVID policy, a visit to China is very difficult and so is the willingness of Chinese technicians to visit Nepal. Moreover, the supply of processing machinery from China in the near future is doubtful.

Therefore, Indian machinery become a viable alternative. It has a good performance/price ratio as could be observed by the national consultant. In addition, a NPIA delegation went to India to see the machinery in operation. Feedback received has been positive, and NPIA members i.e., Pashmina manufacturers, are very optimistic that the Indian machinery could work effectively in Nepal. Overall, the COVID-19 epidemic has not impacted the delivery time nor the transport logistics between India and Nepal, contrary to export-oriented logistical challenges faced in China in general. Thus, Indian equipment would be available relatively quickly. Availability of equipment would be important to start processing the already harvested 3.7 tons of fibre in 2021 plus the incoming harvest from 2022, which is expected to double. And finally, the Indian machinery is about 1/3 less expensive than the Chinese equipment.

At this stage it is not recommended to invest in industrial spinning facilities. In order to invest or upgrade even the smallest processing plant, a production of at least 30 tons of Pashmina fibre would be required to keep the machineries running. Once the production amount increased, a second phase could be to develop the rest of the Pashmina processing route and or investing in more high-tech machineries if quantities allow.

A viable option would be to transform the dehaired carded and combed fibre into yarn using hand-spinning operations. This would not only provide employment, especially for women, but would also allow to keep the genuine Nepali characteristic of the final product. By ensuring traceability of the final

knitted or hand-woven product back to the weaver, spinner and farmer and highlighting the origin and benefit that it brought to all stakeholders (storytelling), a premium price could be fetched.

Overall, it is not feasible to replace all imported Pashmina yarn with domestic production. However, it could make good economic sense to replace some with yarn produced from domestic Chyangra goats. This provides additional income to farmers, jobs to locals processing the Pashmina and saves foreign currency required to import Pashmina yarn. Once the supply chain is established it is expected that more and more farmers will harvest pashmina fibres.

2. PROCESSING

Figure 1 shows the fibre processing flow from goat to the final product with the following steps:

- 1) Combing or shearing of the Pashmina goat,
- 2) Fibre sorting as per colour, quality, and contamination
- 3) Fibre opening and dedusting to remove excessive sand and dust, dandruff and other impurities.
- 4) Fibre scouring using bio-degradable detergent to remove dust, sand, and natural animal grease to a level between 0.5-1%
- 5) Final sorting operation and dehairing to separate the coarse guard hair and fine down,
- 6) Colour dyeing can be made after dehairing in loose stock or after spinning in yarn form,
- 7) Combing, into tops if the Pashmina is intended for worsted spinning,
- 8) Worsted or woollen spinning,
- 9) Knitting or weaving of garments or fabric

Figure1: Pashmina processes

Pashmina processes



2.1. Fibre harvesting and storage

NPIA/NFPPL members purchase "raw fibres" directly from goat farmers or local farmers groups through the Mustang Chyangra Farmer Association at local level.

In 2021, the Nepal Fibre Processing (P) Ltd., and NFPPL company (under NPIA) collected / purchased raw fibres directly from goat farmers, including through the Mustang Chyangra Farmers' Association. They have collected approximately 3.5 tons of fibres, which are stored at "Nepal Fibre Processing Collection Centre", in Charang (Upper Mustang). This fibre needs to be sorted and graded and packed in bale form in order to transport it to any processing centre.

After sorting for colour and quality, contamination such as polypropylene thread from woven polypropylene sacks needs to be removed. Contamination can be reduced by supplying farmers with jute or hessian bags or even normal polythene bags to pack their greasy Pashmina. The issues of polypropylene contamination to the trade should be covered during awareness and fibre training for farmers as this is the most serious problem for further fibre processing.

Bundling should be done in a "bundling" machine to make the fibre compressed in bale form. That allows for easy transportation to processing facilities. The fibre should then be scoured / washed in order to degrease the fibre which passes through series of machine processes such as opener / beater / dehairing / carding / drawing and finally spinning, to achieve a fine uniform yarn.

2.1.1. Fibre opening, dedusting and scouring

While fibre opening and dedusting is a mandatory requirement for Pashmina value addition, scouring is required to achieve a high-quality product.

The industrial scouring process involves a very large machine of around 50-70 metres consisting of a feed hopper, opening beater/fearnaught, dust extraction and five scouring bowls with squeeze rollers, followed by a drying machine and further fibre opening. This process usually has a large capacity of 250 Kg/hour up to 2,000 Kg/hour, depending on the type of equipment used. An adequate building is required to house the equipment. The scoured fibre should have a grease content of around 0.5%, i.e., well below 1%.

A scouring plant could cost several millions of US\$ from a Western manufacturer. It could be acquired new from China for around US\$250,000. The potential use of a refurbished used line in China would cost around US\$ 120,000. Both prices are ex-factory and would require 10-12 x 40' containers and shipping costs to Nepal.

This would be the ideal start to Pashmina processing, but in reality, the available quantity of raw fibre will never justify economically the investment of a full scouring line. It is possible to improvise by constructing smaller baths from building blocks and cement, lined with tiles. The cost of this would be much lower, requiring mainly a few materials and local labour. The excess water can be squeezed out using a mangle or a centrifugal drier and the washed Pashmina can then be dried in the sun. This process would be very basic and labour intensive but will do the job for small quantities.

The dry fibre should then be passed once more through the opening and deducting machines to remove any remaining sand and dust. It will probably require 4 or 5 workers to operate the scouring and drying process. 2 or 3 workers would be required to operate the opening and dedusting.

The wastewater generated contains sand, grit, grease, oil and others, this wastewater needs to be cleaned and treated, which typically involves several phases. Wastewater filtration and separation system would be needed.

Effluent treatment plants are very expensive. Alternatively, factories' effluent may be taken by tanker for disposal at a waste treatment facility, however this practice needs to be verified with the local law enforcements.

2.1.2. Dehairing

Dehairing is the process to separate the coarse protective guard hairs from the fine, soft Pashmina. This involves final sorting of the fibre for any contamination, prior to machine processing, after which it becomes impossible to remove any foreign fibre contamination.

Dehairing is done through a series of mechanical rollers, using gravity and centrifugal force to separate the coarse and fine fibres. The fibre should be dehaired to a coarse hair content of below 0.1% for knitting and 0.3% for weaving. The dehaired fibre should then be finished on a carding machine to realign the fibres' so that they can be finished in a carded web or a sliver if it is to be combed into top for worsted yarn production. It will be further processed into a carded web or a sliver if it is to be combed into tops for worsted yarn production. Ideal dehairing conditions are 23-25°C and 85-90% humidity, the costs would depend on size of processing facility.

New Western manufactured dehairing machinery tends to be very expensive, while new Chinese opening, and dedusting plant feeding two dehairing lines and finishing card would cost around US\$450,000 ex-factory and requires about 8 x 40' containers for shipping. This would be in addition to the cost of fitting, commissioning, and purchase of ancillary equipment. Such a plant would produce around 4-5 Kg of dehaired product per hour and would require 4 to 5 well trained operators. With a potential amount of 8,500 Kg available in Nepal (see chapter 3), this would keep the machines busy for about 265 days p.a. The same is true for Indian machinery, which is less expensive than the Chinese equipment and logistically easier to procure.

The dehaired and carded fibre would be suitable for fine woollen spinning and can be dyed either before or after spinning into yarn. If the dehaired Pashmina is intended for worsted spinning, which generally produces a finer yarn, it must first be combed into top form.

2.1.3. Combing

Combing involves carding the dehaired Pashmina film into slivers. The process includes a series of preparing gill boxes, combing machines, finisher gill boxes and a bump press to package the combed top. New equipment for this process would cost over US\$1 million and would usually operate too fast for combing Pashmina, resulting in severe damage to the fibre. For that reason, Pashmina manufacturers use older machineries such as the one manufactured by NSC Schlumberger in France or St Andrea in Italy. Such refurbished equipment from Schlumberger would be available in the United Kingdom for around US\$175,000 plus shipping and installation. It would take on average two to three x 40' containers to ship.

Such equipment would have a potential production of around 250-300 Kg per 40-hour shift per week, which would widely exceed the available quantities in Nepal. Moreover, the process of combing towards extremely fine and good quality of yarn would lead to a relatively high percentage of wastage. For many processors, including in Nepal, it would hence not be recommended to add further combing machine to the process.

The combing process is only necessary for worsted yarn production and for finer yarn.

2.1.4. Woollen spinning

Woollen spinning involves fibre blending into a carding set, which is then spun on a mule spinner or ring frame, followed by yarn clearing and twisting, depending on the final technique use. This system produces yarn of medium thickness/count to 28s metric.

This type of machinery is large scale and costly, requiring quite a large operating area.

Worsted spinning from combed tops requires gill boxes (similar as to those used in the combing process) to reduce the weight of the sliver. Followed by a rubbing frame to produce a fine roving, which then feeds either a ring spinning frame for very fine yarns or a flyer spinning frame for coarser yarns. Sometimes cotton spinning equipment could be used to produce Pashmina yarns too.

Ring spun yarn can be produced as fine as 300s count when spun with a soluble PVA fibre and small ring diameter.

All the above require extensive investment in machinery, staff training and factory building to accommodate the equipment. Such machinery would only be economically viable if it could spin a relatively

large amount of fibre. At the present time, there does not seem to be the volume of Pashmina available in Nepal to justify such an investment.

The alternatives:

- a. Use hand spinning wheels at a fairly cheap cost of around US\$ 200 each. These wheels provide jobs for women to hand spin Pashmina yarn, suitable for coarser Pashmina shawls and blankets. This involves intensive training and investment in people, but relatively low capital outlay. Products made from hand-spun yarn could be marketed separately and could fetch premium prices when highlighting traceability and the livelihood benefits of all people involved in the process (storytelling).
- b. The dehaired Pashmina could be carded into slivers at the end of the dehairing process. This could then be gilled to make the fibres more parallel, and drafted into a fine roving, which could then be either flyer or ring spun into yarn. This type of machinery could be operated on a much smaller scale than a full woollen spinning system.

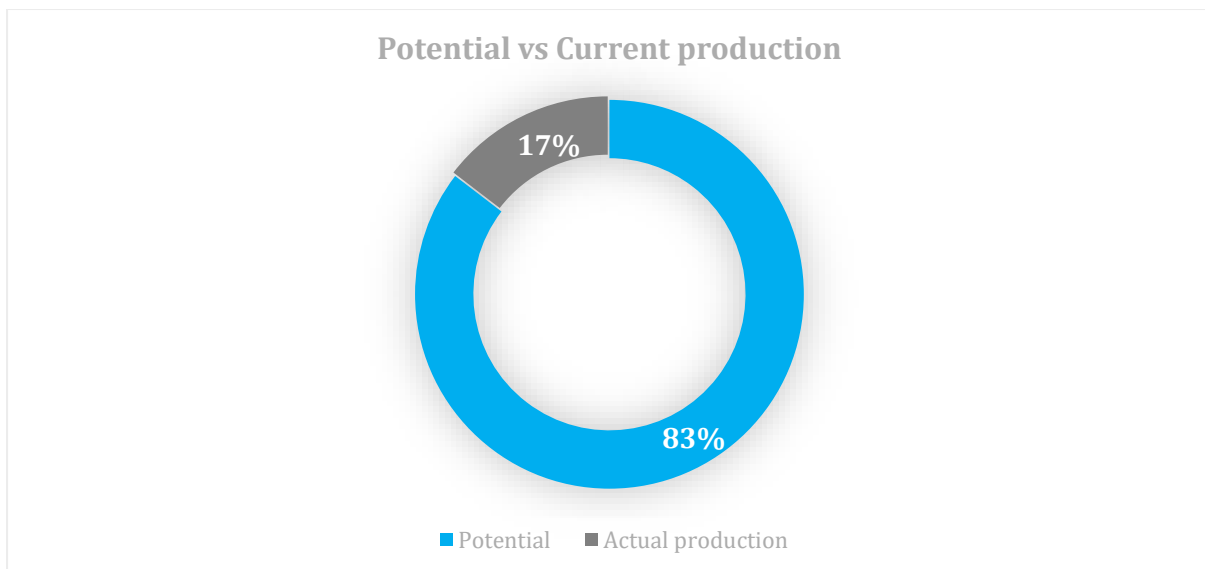
2.2. The present situation in Nepal

2.2.1. Fibre availability

The total Chyangra goat population was estimated to be 131,695 in 2015¹ with about 63,925² heads counted in Mustang alone, according to the Nepal CP Export Strategy report. It is estimated that about 200 grams of fibre could be harvested by animal. Assuming about 50% of all animals in the short to medium term, 13,170 Kg of greasy Pashmina could potentially be expected every year. Presently, however, the TIP project estimates that only about 17% of the fibre is being harvested by farmers and most of this fibre does not find its way into the Nepali Pashmina value chain.

From the greasy fibre already collected by the Nepal Pashmina Industry Association (NPIA), the fibre diameter seems to be quite fine (13.5-15 micron) as tested by NBSM. Based on these figures a dehaired length of around 32 mm could be expected with a yield of around 45% from greasy fibre, after scouring and dehairing.³

Chart 1: Current Production of Pashmina by farmer's vs potential



¹ Source: Nepal export strategy report referring to the data of the MoAD,2015 report. This number is a total of goats regardless of districts/ areas of origins from Nepal

²Source: Nepal export strategy report referring to the data of the MoAD,2015 report.

³ The TIP programme plans to undertake scientific fibre sampling and testing in Mustang in 2023.

2.2.2. Fibre processing

There is a thriving weaving and knitting industry in Nepal producing a full range of Pashmina garments to supply the domestic market, primarily catering for the growing tourist industry as well as an established export market. Pashmina garment production is currently supplied by over 200 tons per year of Pashmina yarn, mainly from China, with a current cost of over US\$30 million per year.

However, there is hardly any primary Pashmina processing existent in Nepal. About 15 - 20 companies are operating wool carding and spinning equipment for the carpet industry. The wool is mainly imported from New Zealand in a scoured and de-haired form. Thus, there are no scouring or dehairing required in the carpet industry in Nepal. Moreover, wool fibre is much coarser than Pashmina and as such the equipment cannot be used for Pashmina processing.

The consultant team visited 3 facilities in Kathmandu that claim to have Pashmina fibre processing facilities. However, none of them operate any scouring or washing facility for greasy Pashmina. One factory operates one ordinary dehairing machine (China made) which could produce appx. 5-7 Kg of sorted fibres in sliver form per day. The same fibre needs to pass a minimum of 2-3 times through the machine to properly remove dirt and dust of the fibres and make the fibre parallel and straight. Other companies operate small spinning facilities for cotton or wool, but none has been spinning any Pashmina fibre apart from small trials.

3. ELEMENTS OF COSTS AND BENEFITS FOR FIBRE PROCESSING

3.1. Current production data

In 2021, harvested Pashmina fibre was around 3.5 tons of raw fibre collected from about 15-20% of Chyangra goats from the Upper Mustang area out of an estimated goat population in this region of 63,000 goats. The estimated Chyangra goat population was around 131,695 heads in 2015⁴

3.1.1. Potential amount of pure Pashmina fibre available

With an estimated entire Chyangra goat population of 131,695 heads for the year of 2015 (source Nepal export strategy report), the available fibre and corresponding yarn amount can be calculated. Three (3) scenarios with regard to the number of goats combed and the expected yield from fibre extraction per goat are shown below in Table 1. With the corresponding data, the amount of yarn that could be produced can be calculated subsequently.

Table 1: Scenarios (lowest, medium, and highest) of final amount of pure Pashmina extraction

	Low Estimate	Medium Estimate	High Estimate
Chyangra Goat Population	131,695	131,695	131,695
Goat Used for Fibre Harvesting (%)	15	30	50
Fibre Extraction in Grams/ goats	140	185	200 ⁵
Total Raw Fibre in Kg	2,765	6,549	13,169

The table shows that about 13.2 tons of ready fibre could be harvested if at least 50% of all goats were combed for Pashmina fibre. Theoretically the amount could be doubled if all goats were combed.

⁴ Source: Nepal export strategy report referring to the data of the MoAD,2015 report. This number is a total of goats regardless of districts/ areas of origins from Nepal

⁵ Estimation by the export of 200mg /goats

3.1.2. Conversion of potentially available fibre into yarn

During the processing of greasy fibre, wastages of up to 50% occurs as greasy fibre contains non-fibre material as well as coarse guard hair. Thus, out of an estimated 13.2 tons of greasy fibre, between 5,597 and 7,507 tons of yarn could be produced, if industrial spinning facilities would exist in the country as shown in Table 2. If the fibre from all goats in Nepal could be harvested, the figure could theoretically double.

Table 2: Converting Pashmina fibre into yarn- three potential scenarios

Wastage	High	Medium	Low
Total Fibre Produced ⁶	13,170	13,170	13,170
Dehairing / Scouring Process Wastage (%)	50	45	40
Total Fibre after Dehairing/ washing ⁷	6,585	7,244	7,902
Carding / Drawing Process wastage (%)	15	10	5
Finished Yarn (Kg)	5,597	6,520	7,507

3.1.3. Cost of production

Below please find an estimation of local costs of Pashmina production, based on information received from local stakeholders as well as transport companies⁸:

- ➔ Coarse fibre price paid to farmers has, on average, been NPR 4,500 in 2021, or approximately US\$37.50 per kilogram.
- ➔ Local transportation cost to the collection centre is estimated at NPR 75/kg, or approximately US\$0.62 per kilogram,
- ➔ Cost of operating the collection centre is NPR 150/kg, or approximately US\$1.25 per kilogram,
- ➔ Transport cost to Kathmandu is around NPR 250/kg, or approximately US\$2.08 per kilogram,
- ➔ Storage cost in Kathmandu would be around NPR 75/Kg, or approximately US\$0.62 per kilogram,

Thus, apart from paying for the greasy fibres at 4,500 NPR per kilogram, processor would need to add a price tag of 750 NPR per kilogram, (or US\$ 4.55) to bring the fibre from Upper Mustang to Kathmandu for further processing.

⁶ High estimate of produced fibre from [Table 1](#)

⁷ Calculation based on the percentage of wastages of dehairing /scouring process e.g.: 13,170 – 40% = 7,507

⁸ Estimated by national consultant Prakash Jha through discussions with stakeholders and service providers

Chart 2: Estimated cost of fibre handling per Kg

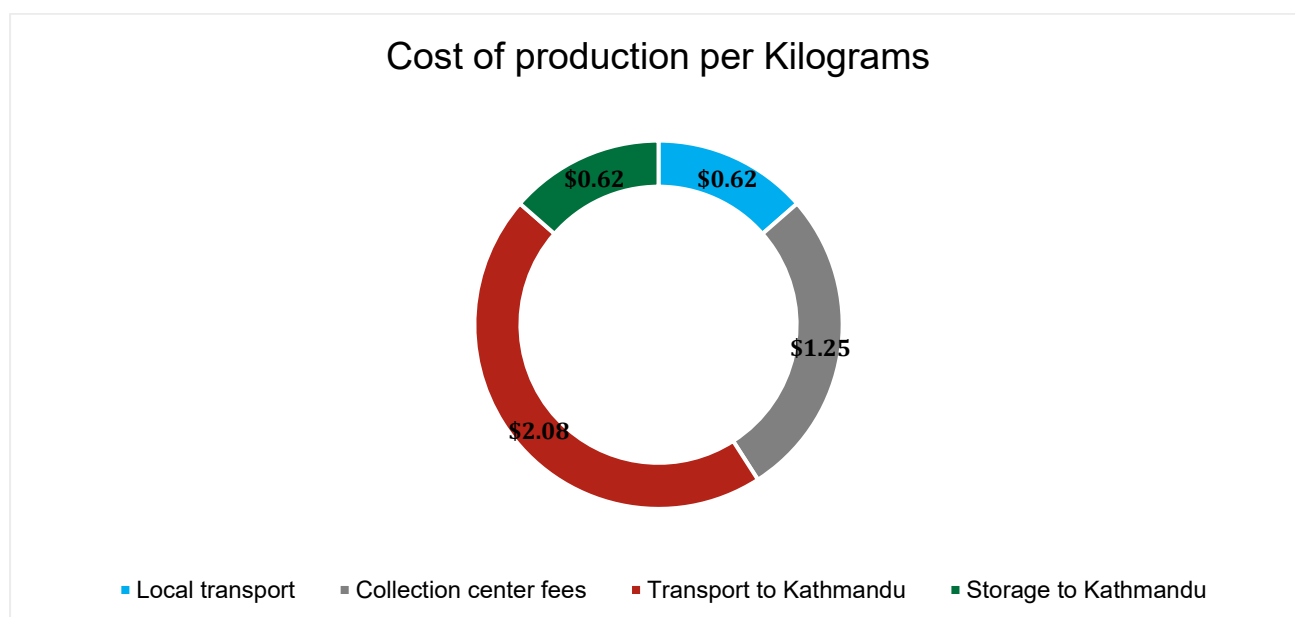


Table 3: Detailed total cost of greasy fibre paid at NPR 4,500/Kg transported to Kathmandu

	Kg	Price (NPR) ⁹ /Kg	Total Cost (NPR)	Total Cost (\$USD) ¹⁰
Total greasy Fibre Collected	13,170 ¹¹	4,500 ¹²	59,265,000	528,350
Local transportation	13,170	75	987,750	8,806
Collection centre rent and expenses	13,170	150	1,975,500	17,612
Transport to Kathmandu	13,170	250	3,292,500	29,353
Storage	13,170	75	987,750	8,806
	13,170		66,508,500	592,926
Total cost	Per Kg	5,050		45

Table 3 presents the overall cost of buying greasy fibre from farmers, transporting it to Kathmandu valley and the storage. An estimation of the required utility cost in the preparation of yarn in Nepal¹³ is given in Table 4.

Table 4: Average cost of resources in Nepal

Sl.	Particulars	Price (NPR)	Price \$USD	Remarks
1	Water (Filter / Iron Free/ Processed)	2.85	0.025	Per Liter
2	Electricity	9	0.080	Per Unit
3	Diesel for Boiler / Generator	125	1.109	Per Liter

⁹ Estimated costs during assessment mission by national consultant Prakash Jha and Expert David Lee

¹⁰ UN rate \$1 =112.17 NPR

¹¹ Total of raw fibre in Kg: low wastage estimates from [table 2](#)

¹² Price of purchase by the Nepal Fibre Processing Company (NFPPL) of raw fibre

¹³ The estimation was established by national consultant Prakash Jha for the year of 2022

4	Manpower / Technician	32,000 ¹⁴	283.94	Per Month
5	Factory Rent	100,000	887.31	Per Month

Table 5: Processing cost to transform greasy fibre into tops

Sl. No.	Cost items	Kg	Price /Kg (NPR)	Total Cost (NPR)	Total Cost (\$USD)
1	Scouring	13,170	225.4 ¹⁵	3,223,220	28,735
2	Dehairing	13,170	901.6¹⁶	11,874,072	105,858
	Carding, and drawing¹⁷				
3	Remaining fibre based on assumption of 50% waste after the dehairing process	6,585	1,803.2¹⁸	11,874,072	105,858
	Remaining fibre based on assumption of 45% waste after the dehairing process	7,244	1,803.2	13,062,381	116,452
	Remaining fibre based on assumption of 40% waste after the dehairing process	7,902	1,803.2	14,248,886	127,029

The table 5, provides an overview of the estimated cost of transforming 13.17 tons of greasy fibre into dehaired Pashmina tops. The overall price of producing 13.17 tons of tops is estimated at 2,930 NPR (i.e., the sum of the cost of scouring, dehairing and drawing), depending on the wastage eliminated during the scouring, dehairing, carding, and drawing steps.

Table 6 providing the final cost of processing greasy fibre into tops based on the remaining fibre available following the three steps of transformation. The following present the overall cost which includes the processing steps as well as the transportation to Kathmandu.

Table 6: Final processing costs to transform greasy fibre into dehaired tops

Processing costs including scouring dehairing and carding/drawing		Kg	Overall price / Kg (NPR)	Total cost (NPR)	Total cost (\$USD)
	Remaining fibre based on assumption of 50% waste after the dehairing process	6,585	2,930.2	19,295,367	172,019
	Remaining fibre based on assumption of 45% waste after the dehairing process	7,244	2,930.2	21,226,369	189,234
	Remaining fibre based on assumption of 40% waste after the dehairing process	7,902	2,930.2	23,154,440	206,423

¹⁴Nepali salary is very similar to Afghanistan salary

¹⁵Calculated on estimated basis at 2\$US per Kg by International consultant David Lee based on his experience in Afghanistan

¹⁶ Calculated on estimated basis at 8\$US per Kg by National consultant Prakash Jha and David Lee following experience in other countries

¹⁷ See table 6 after dehairing /scouring process the total fibre available on high, medium, and low wastage estimates

¹⁸Price calculated based on international consultant' experience David Lee in Afghanistan

Overall costs including transportation to Kathmandu and processing		Kg	Total cost of tops prepared in NPR ¹⁹	Cost of producing 1 Kg of tops in NPR	Cost of producing 1 Kg of yarn in \$USD
	Remaining fibre based on assumption of 50% waste after the dehairing process	6,585	85,803,867	13,030	116.16
	Remaining fibre based on assumption of 45% waste after the dehairing process	7,244	87,734,869	12,111	107.97
	Remaining fibre based on assumption of 40% waste after the dehairing process	7,902	89,662,940	11,347	101.16

The actual amount of yarn that could be produced out of the greasy fibre depends on the wastage occurring during processing as shown in Table 2. Table 7 builds on this table and shows the cost per Kg in producing the final yarn for the three scenarios of high, medium, or low wastage occurring during the yarn formation process.

Table 7: Final amount of yarn that could be produced out of 13.17 tons of greasy fibre

Wastage	High	Medium	Low
Total grease fibre collected ²⁰	13,170	13,170	13,170
Dehairing / Scouring Process Wastage (%)	50	45	40
Total Fibre after Dehairing/ washing ²¹	6,585	7,244	7,902
Carding / Drawing Process wastage (%)	15	10	5
Finished Yarn (Kg)	5,597	7,234	7,507

Thus, the cost of producing one Kg of Pashmina yarn would range between 11,345 and 13,030 NPRs, depending on the amount of wastage occurring during the processing stage. This, however, excludes the investment costs of setting up a scouring, dehairing and spinning facility, including the required civil works.

3.1.4. Comparison of cost per kilo versus imported yarn

Based on the processing cost presented in chapter 3.1, Nepali Pashmina dehaired tops would cost between 11,345NPR and 13,030NPR (US\$101-116) per kilogram, depending on the wastage occurring during the processing stage. In early 2022, dehaired Pashmina prices in early 2022 ranged from US\$100/Kg for coarser Afghan Pashmina to US\$150 for long White Chinese Pashmina. It is important to mention that Nepal Pashmina has similar quality property to Tibetan Pashmina, which is geographically near to Nepal. The dehaired Tibetan Pashmina brown or light grey in the form of tops has a value US\$130/Kg in today's market price.

Similarly, market price of Pashmina yarn imported from China ranged between 18,000- 25,000 NPRs. Landed cost of imported yarn in local market would be approximately 10 % higher than the international market, accounting for transportation, handling, and other cost.

¹⁹ Calculation of total cost of tops in NPR by estimation of wastages including scouring e.g.:

- 50%: Total cost table 3 (66,508,500) + Total cost table 6 (19,295,367) = 85,803,867
- 45%: Total cost table 3 (66,508,500) + Total cost table 6 (21,226,368.8) = 87,734,869
- 40%: Total cost table 3 (66,508,500) + Total cost table 6 (23,154,440.4) = 89,662,940

²⁰ High estimate of produced fibre from [Table 1](#)

²¹ Calculation based on the percentage of wastages of dehairing /scouring process e.g.: 13,170– 40% = 7,902

Hence, there would be a financial advantage to the processing of Nepal Pashmina as well as the social gains and added income to farmers and an operative working in the factories. The estimated local production cost, however, only refers to the operating costs of producing the dehaired Pashmina tops and yarn. It does not take into consideration the investment costs of setting up a complete line from scouring, dehairing, combing and spinning. These would need to be taken into consideration for a fully fledged cost-benefit analysis but goes beyond the scope of this report.

Investing into Pashmina fibre processing could or ideally should be regarded as development inputs from the government or development partners to develop the sector and a fully Nepali Pashmina supply chain. This would not only ensure a genuine Nepali product that could be marketed at high values but would also have positive effects of increasing the livelihood of farmers by earning more from their activities and increasing jobs along the entire value chain within Nepal.

4. SUITABLE MACHINERY FOR THE AVAILABLE FIBRE QUANTITY

Operating conditions necessary for a successful dehairing operation.

As well as proper scouring and dehairing machinery as explained below, any industrial fibre value addition process would need to have the following requirements in place:

- A constant regulated supply of electricity.
- Temperature control-heating in the winter, cooling in the summer. ideally between 24-28c.
- A humidification system to maintain air moisture content between 85-90%.
- A comprehensive program of staff training to cover, health and safety, hazard awareness, material sorting and preparation and correct operation of machinery.
- Suitable fibre packing facilities.
- As well-equipped engineering workshop to maintain and repair the machinery when necessary.
- A dry, cool, clean warehouse area to store raw material and finished product.

4.1. Alternative processes following the experiences from China

The first step of any Pashmina processing is to establish scouring and dehairing facilities, and it is recommended that this should be the initial area of attention.

For many years, the Chinese have dehaired Pashmina on a cottage industry system rather than the internationally accepted commercial system, previously described in the report. The main area where this Pashmina processing system is used is Hebei Province, 400 Km west of Beijing. After sorting the greasy Pashmina for shade, quality, and any contamination, it is willowed/opened through a beater. It is then dehaired in the grease by passing several times through a modified cotton flat card, until the desired hair content is achieved. The Pashmina is then scoured and rinsed in a very basic tank.

The quality of the fibre is not as good as it could be achieved using a conventional, commercial scouring and dehairing line, but the equipment is much cheaper, more labour intensive and produces much lower weights. A combination of this type of system and some modern technology could be a good way forward for Nepal to get the project started with primary Pashmina processing.²²

A machine plan and quotation for such a system is attached in Annex I. However, even this small plant may be too big a capacity for the present Pashmina availability and could probably be further reduced to save cost.

The manufacturer in China is a company the consultant has used previously and produces a good quality machine with an excellent spare parts and technical support. However, due to Covid restrictions at the present time it is not practical to visit the factory or China.

²² Information provided by NPIA and own observations of the consultants' team

The equipment quoted by the Chinese manufacturer Yangquan is to produce around 30 tons of dehaired product per year. That would require 50-60 tons of greasy fibre. A possibility could be of reducing the capacity by half, which would match current fibre potential and would significantly reduce initial investment. If the quantity of raw fibre could be significantly increased in a timely manner, more machine capacity can be purchased at a later stage and scouring, and opening capacity will accommodate the extra quantity and weight.

The Chinese manufacturer suggested to take 40-50 Kg of scoured fibre to the machine manufacturer to conduct processing trials in order to finalise the best machine configuration for the fibre. Unfortunately, it is not possible to visit China at present, due to Covid restrictions, nor could any fibre be exported.

4.2. Technical specifications of potential Chinese equipment

The Pashmina processing plant supplied from Yangquan in China as shown in Annex I and II works as follows:

Pre-cleaning

First, the greasy sorted Pashmina is passed through a mixing machine, a 5-roller opening machine and a dandruff removing system to open the fibre and remove as much sand, dust, and dandruff (skin pieces) as possible prior to scouring.

Washing line

Secondly, the washing line processes follow. A first washing pool contains water at 50-55 degree centigrade and biodegradable detergent to clean the natural animal grease and any remaining sand and dust from the fibre. As a dewatering machine a centrifugal dryer is used to remove any excess water remaining in the fibre. A second washing pool contains clean water at 45-50c to rinse any residual detergent, grease, and sand from the fibre. A dewatering machine again removes any excess water from the fibre. A third washing pool also contains clean water at 40-45c to final rinse the fibre prior to drying. This is followed by a third dewatering machine again extracts any excess water from the fibre prior to drying. The water in the bowls will need to be drained and disposed of in accordance with local regulations.

The clean fibre should have a residual grease content between 0.5-1.0%. Drying the fibre on could use sunlight. The clean fibre could be laid outside under nylon nets to dry naturally in the sun. This would be much cheaper in capital expense and power than using a commercial gas or steam conveyor drier.

Opening line

The dried, scoured Pashmina should be again passed through the opening line by hand feeding onto the feeding curtain into the wool mixing machine which opens the scoured Pashmina prior to dehairing.

The opened fibre is then blown by a fan into the five-roller opening machine, which further opens and removes any remaining sand and dust. The fibre is then blown by fan into the dandruff removing system which drops any loose skin pieces.

Pre-dehairing

After the opening line water, should be added to the fibre to achieve a 24-25% moisture content and allowed to soak into the fibre for 24 hours.

The fibre should be loaded by hand into fn150 feeding machine (hopper), which feeds the single cylinder carding machine to fully open the fibre before the two double doffer dehairing machines comes into play. By a combination of centrifugal force and gravity the heavier coarse hair drops onto the floor.

After this process, the fibre should be rested for several hours, and more water added and allowed to soak into the fibre to reduce build-up of static.

Single group intermediate dehairing machine.

The semi dehaired fibre is fed into the feeding machine(hopper) of the fn150 double doffer dehairing machine which drops more hair. the dehaired fibre is rested and more water added before entering the final dehairing machine.

Double dehairing machine.

The rested, dehaired fibre from the intermediate machine is manually loaded into the feed hopper which supplies the first of the double dehairing machines. A rotating lattice sheet feeding into the second

double doffer dehairing machine. At the end of this machine, the Pashmina will be dehaired down to 0.1-0.2% hair content. The final hair content could be adjusted up or down by speeding up or slowing down the rate of material feed into the machine.

Fibre reclaiming machine

Any strong hair containing fine fibre should be passed through these machines to separate the coarse and fine fibre, which can then be reintroduced into the dehairing process to maximise the fibre yield.

Auxiliary machines

These are for reclothing the swift, doffer and licker-in rollers on the dehairing machines. This process is necessary over time to reinstate the condition of the working surfaces damaged due to foreign objects accidentally entering the machines or fair wear and tear over a period of time. If well maintained and serviced, the card clothing should last for several years.

4.3. The potential of using Indian Pashmina processing equipment

In India, the Ministry of Textile (Government of India) has played an important role in developing the textiles sector, including for Pashmina. This included Pashmina wool development schemes implemented with the help of the Ladakh Autonomous Hill Development Council for the development of the sector in the Ladakh region.

The Ladakh region produces about 45 tons of Pashmina wool every year from a Chyangra goat population of about 250,000 heads.

Indian Pashmina average finesse is similar to that of Nepal, with a micron of 13-15 mm whereas average length of Indian Pashmina fibre ranges from 55-70 mm, i.e., higher than that of Nepal (however, a Mustang-wide sampling process planned for 2023 would need to confirm this).

The provincial Government of Ladakh started to process Pashmina fibres using a Chinese dehairing plant. However, when facing challenges with the Chinese machinery with regard to the availability of spare parts, machine maintenance and operating system, the provincial government started to use assembled dehairing, carding and other machines made in India. So far, the feedback received from the plant operators the Indian machinery are good and the assembled machines are running perfectly.

In addition, a couple of privately-owned Pashmina wool processing plant operate in Srinagar, using similar machines. They were found to be in good shape following a visit of NPIA and conversation with the national consultant.

Technical specifications of Indian machines have been received and can be found in Annex IV. While the consultants did not have any experience using nor seeing the equipment in operation, the specifications look complete. A delegation of NPIA members went to India (Leh, Ladakh as well as Jammu, Kashmir, and Bikaner in Srinagar) to see them in operation and talk to the machine manufacturer. Feedback of the NPIA delegation received by the national consultant were discussed in detail. While the efficiency of the equipment seen was not comparable to that of the Chinese equipment as indicated by the international consultant, the price/performance ratio of the Indian machinery seem to be higher, especially given the relative low volume of Pashmina presently available in Nepal.

In addition, the following factors make Indian machineries an appropriate choice for Nepal:

- Easy access to and from India, including a free trade agreement
- Spare parts are easily available.
- Machine maintenance and technical support is easy as Indian technicians can easily communicate with Nepali counterparts
- Transport costs are included in the quotation and delivery is relatively fast and easy, compared to shipping machinery form China

5. RECOMMENDATIONS

Overall, there is good potential for the development of the Pashmina industry. The animals and the fibre samples seen point to good quality Pashmina that could fetch premium prices in the market. However, presently there is no industrial fibre processing facility available in Nepal.

In the short to medium term about 13.2 tons of greasy fibre could be harvested in Nepal. The quantity could increase with additional technical support by augmenting the number of goats and/or increase the percentage of farmers that actually harvest the fibre.

Transforming and processing the fibre would require scouring, dehairing, carding, drawing, and spinning facilities in the country that are presently not available. Before dehairing it is necessary to scour, open and de-dust the greasy fibres as explained above. These machines as listed in the annex are compulsory in order to start a processing line of Pashmina. Some small but rather rudimentary dehairing and spinning facilities exist in Nepal, but it is not clear on how they could be scaled up or integrated into the process.

In order to explore the potential that Nepal has and to develop high quality Pashmina products, industrial scouring and dehairing facilities would be required. Given the relatively low level of fibres presently harvested, a fully-fledged industrial scouring line would, however, economically, not be justified. Instead, a semi- industrial set up as discussed above and shown in Annex I -VI and delivered either from China or India could do the job.

Both, Chinese as well as Indian manufacturing equipment as described above would be viable options for the Nepali industry to establish fibre processing capacities. China is the world's leading cashmere producer and as such it developed a cashmere machinery industry that has a good reputation in the world market. Its machinery is widely used in the industry and have proven to process high-quality Pashmina products. Given the amount of cashmere processed in China, however, machinery dimensions are on the higher side and might not necessarily adapt to the relatively low quantity of Pashmina fibre presently harvested in Nepal. While prices are not as high as sophisticated European machinery, the Chinese machinery is not cheap as the quotation in Annex III shows.

Moreover, given the present COVID 19 context in China and its zero-COVID policy, a visit to China is very difficult and so is the willingness of Chinese technicians to visit Nepal. That would not favour investing in Chinese machinery, given the urgency to establish a fibre processing plant in Nepal. As a result, delivery of Chinese machinery is delayed, as experienced by the international consultant for similar equipment destined for Kyrgyzstan.

Therefore, Indian machinery might be a viable alternative. It has a good performance/price ratio as could be observed by the national consultant. In addition, a NPIA delegation went to India to see the machinery in operation. Overall, the COVID-19 epidemic has not impacted the delivery time nor the transport logistics between India and Nepal, contrary to export-oriented logistical challenges faced in China in general. And finally, the Indian machinery is about 1/3 less expensive than the Chinese equipment. The quoted price was for US\$ 301,864 inclusive of transport costs from India to Kathmandu. The price from China, however, excludes any transportation that would need to be added. In addition, the quotation does not include industrial scouring baths. Such a set-up would need to be built on locally constructed baths from building blocks and cements, lined with tiles. Ideally, a trial production in India should be envisaged to test the machinery with Nepali fibre. But given the urgency to procure the machinery and the present fibre exporting restriction that might not be possible in the short term.

At this stage it is not recommended to invest in industrial spinning facilities. In order to invest or upgrade even the smallest processing plant, a production of at least 30 tons raw Pashmina would be required to keep the machineries running. Once the production amount increased, a second phase could be to develop the rest of the Pashmina processing route and or investing in more high-tech machineries if quantities allow.

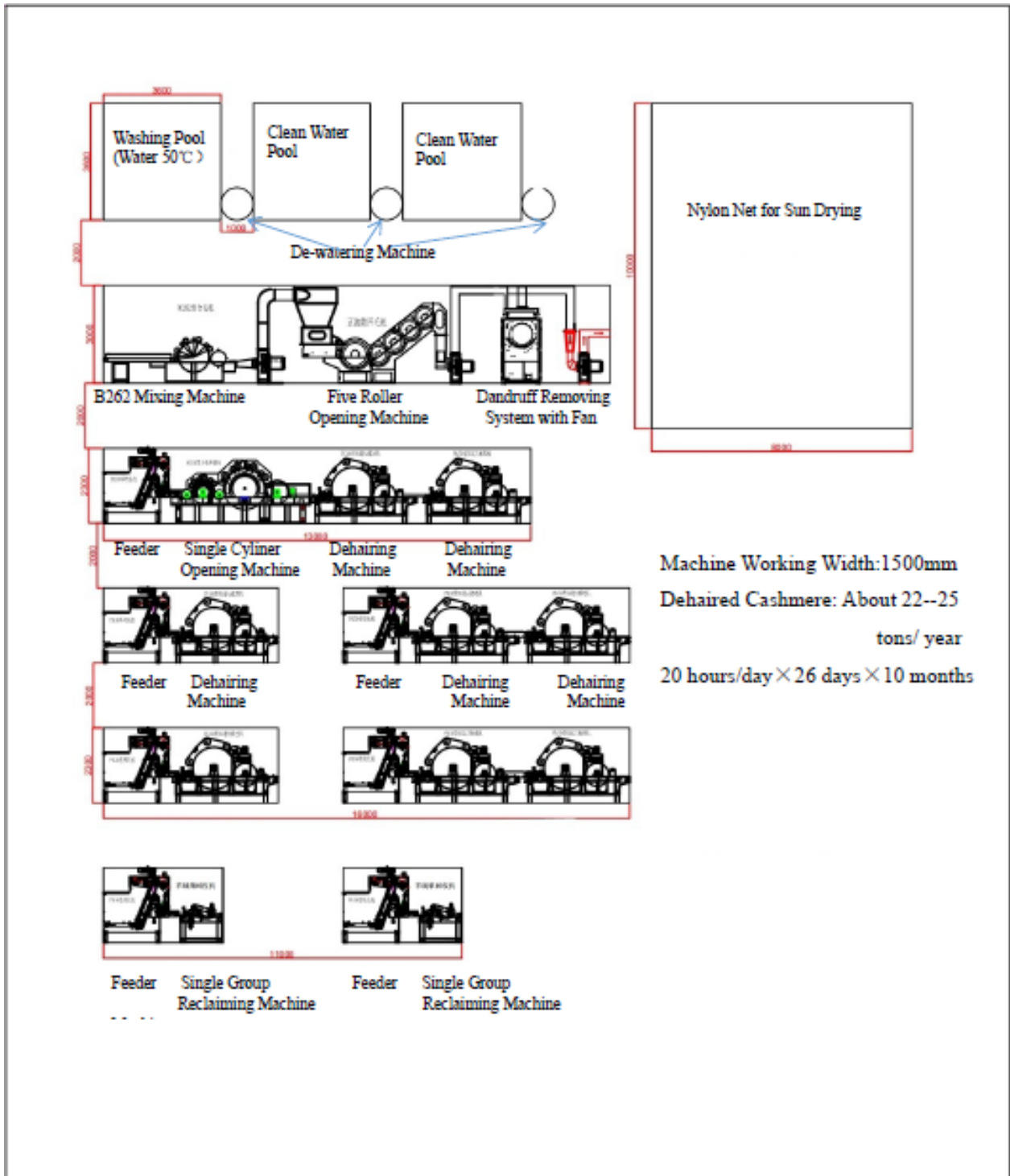
A viable option would be to transform the dehaired carded and combed fibre into yarn using hand-spinning operations. This would not only provide employment, especially for women, but would also allow to keep the genuine Nepali characteristic of the final product. By ensuring traceability of the final knitted or hand-woven product back to the spinner and farmer, and highlighting the origin and benefit that it brought to all stakeholders (storytelling) a premium price could be fetched. Give the high quality that is being produced by Pashmina manufacturers in Nepal, the storytelling would allow for an extra value addition that is highly valued in international markets. Thus, even if the cost of producing hand spun yarn from Nepali fibre (as calculated in chapter 3) might exceed that of imported yarn, the final product would have a much higher value, benefitting everyone along the supply chain.

Keeping the process basic, investing in labour to create jobs, and developing skilled employees (through training) will, support the growth of the Pashmina industry instead of investing in highly technical machineries.

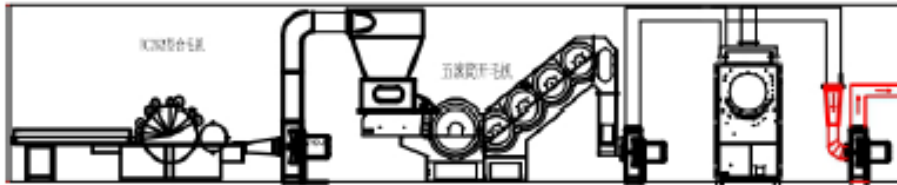
As regards the location of the equipment, it is suggested to install this in Kathmandu valley rather than in Mustang. Due to lack of Infrastructure, electricity, roads to remote areas and as being part of the "Annapurna Conservation Area Project (ACAP), it would be difficult to set-up any scouring or dehairing plant in the Mustang region. However, sorting and bundling processes could be carried out in the Upper Mustang area, which would create employment for locals.

ANNEXES

Annex-I Small Scale Scouring Machine made in China

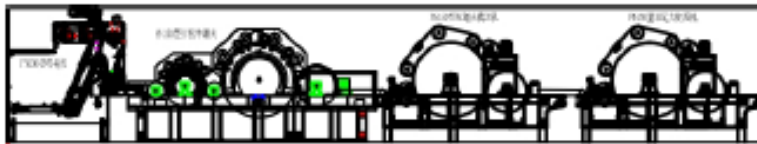


1. Opening Parts:



Lengthened Feeding Curtain + BC 262 Wool Mixing Machine + Five Rollers Opening Machine + Dandruff Removing System with fan

2. Pre-Dehairing Parts:



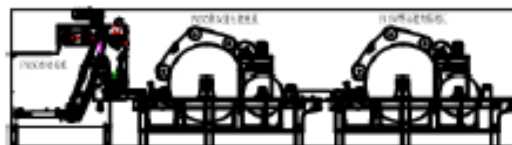
FN150 Feeding Machine + FN150 Single Cylinder Opening Machine + FN150 Double Doffer Dehairing Machine + FN150 Double Doffer Dehairing Machine

3. Single Group Dehairing Parts:



FN150 Feeding Machine + FN150 Double Doffer Dehairing Machine

4. Double Groups Dehairing Parts:



FN150 Feeding Machine + FN150 Double Doffer Dehairing Machine + FN150 Double Doffer Dehairing Machine

5. Fiber Reclaiming Parts

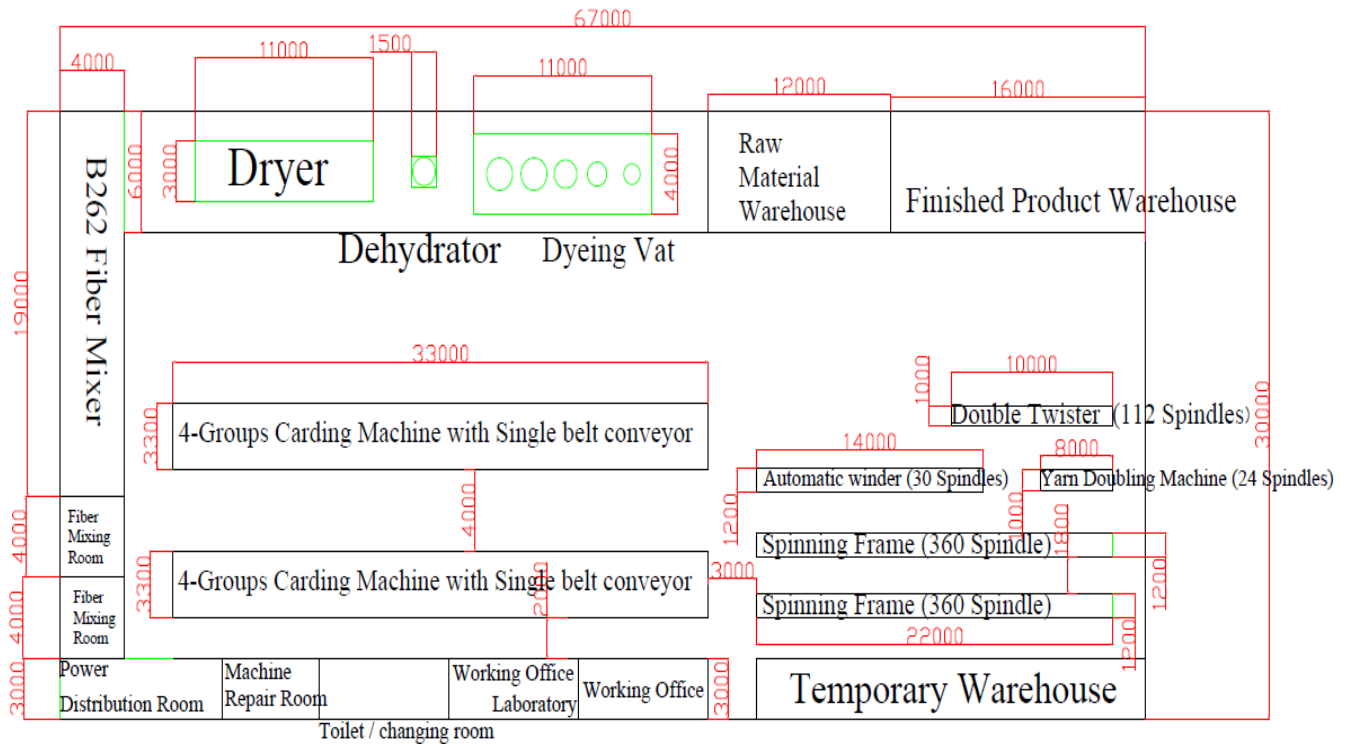


YQ-FN150 Feeding Machine + FN150 Single Group Reclaiming Machine

6. Auxiliary Machines:

Metal Card Clothing Wrapping Machine, Licker-in Roller Card Clothing Wrapping Machine, Card Clothing Welding Machine, Speed Reducer

Annex- II Potential plant design



Annex - III Listing of machinery for the Chinese machinery

Price List for a Small-Scale Scouring Machinery as shown in Annex I-China

Price List

Date:14th/May/2022

Item	Machine Name	QTY	Unit Price USD	Amount USD
Opening Parts	B262 Mixing Machine	ONE SET	15000	15000
	Five Roller Opening Machine		24000	24000
	Dandruff Removing System with Fan		19000	19000
YQ-FN150 Pre-Dehairing Parts	Feeding Machine	ONE SET	118500	118500
	Double Cylinder Opening Machine			
	Double Doffer Dehairing Machine			
	Double Doffer Dehairing Machine			
YQ-FN150 Single Group Dehairing Parts	Feeding Machine	TWO SETS	38000	76000
	Double Doffer Dehairing Machine			
YQ-FN150 Double Groups Dehairing Parts	Feeding Machine	TWO SETS	63200	126400
	Double Doffer Dehairing Machine			
	Double Doffer Dehairing Machine			
YQ-FN150 Reclaiming Parts	Feeding Machine	TWO SETS	13500	27000
	Single Group Reclaiming Machine			
De-watering Parts	De-watering Machine	THREE SETS	6500	19500
Auxiliary Machines	Auxiliary Machines	ONE SET	6500	6500
Humidification System	YQ-JSQ-A1 Workshop Humidification System	ONE SET	6500	6500
Total	SAY U.S.DOLLARS FOUR HUNDRED AND THIRTY-EIGHT THOUSAND AND FOUR HUNDRED ONL		438400	
Remarks: (1) Trade Terms: FOB Qingdao. (2) Shipment Time: About 60–70 days after get the earnest money. (3) Payment: 50% T/T in advance and the balance should be payed before shipment. (4) For more details, please feel free to contact us.				

Annex- IV Function of machinery (India)

Function of Machinery		
Sl. No.	Machine Name	Function
1	Willow Machne	De Dusting. It removes Dirt / Dust from the Fibers
2	Beater Drum	Open the Fibers. Make Parallel
3	Hopper Feeder for Wool Washing	Feeder m/c for Scouring
4	Conveor Dryer	For Drying the Febers after socuring/washing
5	Boiler	For Steam Generation
6	Hydro Extraction	For Extraction of Washed/ scoured Fibers. Removes Excess Moisture.
7	Electrical Panel with power Factor, Wire with Cable Machine to Machine.	For Electrical Connections with Panel Board.
8	Steam Line with Insulation Auto Valve, Water Line CPVC Pipe Machine to Machine & Valve.	Steam Pipe Line / Water Supply Pipe Line.
9	Pashmina Carding Machine Feeding System / 4 Parts Carding Machine	Carding Machine, where 4 sliver is delivered after feeding.
10	Ball Head Machine Auto	This Machine conerts Sliver to Ball form.
11	Gill Box 2 Ball 2 Head	Drawing Machine
12	Gill Box 4 Ball 2 Head	Drawing Machine
13	Gill Box GN 5	This Machine is very important as this machine is used for Super Fine Qualiy Fiber processing Specially designed for Cashmere & other Hair Fibers.
14	Bobbner Machine	This is type of Roving Machine, used just before Spinning.
15	Zinsar 319 Ring Spinning	Spinning Machine as per desigred Yarn Count.
16	Winder Machine	For Winding Finished Yarn.
17	Twisting Machine	To Adjust Twist of Yarn & Twist Direction as well.
18	Reeling Machine Auto	To Convert the Finished Yarn in Hank Form (For Dyeing Purpose).
19	Yarn Dyeing	Yarn will be dued in Hank Form.
20	Fiber Dyeing	Dyeing Can be done on Fiber Stage.

Annex- V quotation from India

1st Quotation of the machineries from India in \$USD

GSTIN : 08AAQPV3386E1Z3

Mobile { 9950029477
9351577699



Om Iron & Engineering Works

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Riico Road No.5, Rani Bazar Industrial Area, Bikaner-334001 (Raj.) INDIA

♦ Email : omiron233@gmail.com

PRICE SCHEDULES FORM

Ref.No. **DATE: 28 March 2022**

Date.....

No	Description	Unit Price of Goods Delivered to Destination (USD)	Qty	Total Amount (USD)
A	Willow Machine	3206.00	1	3206.00
B	Beater Drum	8350.00	1	8350.00
C	Scouring Bowls	12,180.00	3	36540.00
D	Hopper feeder for wool washing	6400.00	3	19200.00
E	Conveyor Dryer	10260.00	4	41040.00
F	Boiler	25000.00	1	25000.00
G	Hydro Extractor	9620.00	1	9620.00
H	Electrical Panel with Power Factor, Wire with Cable Machine to Machine	10300.00		10300.00
I	Steam Line with Insulation Auto Valve, Water Line CPVC Pipe Machine to Machine & Valve	8330.00		8330.00
J	20 KLD ETP PLANT With Electrical Panel	32500.00		32,500.00
K	Pashmina Carding Machine Feeding System + Four Parts Card Machine	83400	1 Set	83400.00
L	Ball Head Machine Auto	3200.00	1	3200.00
M	Spare Parts One Year	148.00		148.00
N	Tools	1090.00	1	1090.00
O	Installation and Commissioning	8400.00	1	8400.00
P	Transportation from our Works at Bikaner, Rajasthan to Kathmandu, Nepal	11540.00		11540.00
TOTAL QUOTE INCLUSIVE OF ALL CHARGES				
In Words- USD Three Lakhs One Thousand Eight Hundred Sixty Four Only				\$301,864.00

Annex- VI Technical specifications of Indian machineries and photos

Technical Specifications / Details of Cashmere Processing Machines from India			
Sl. No.	Machine	Technical Specification	Function
1	Willow / Opener Machine	Length-8 Feet 8 Inch Width-30-34 Tapering End Bearing Size: 22215K Roll Length-95 Inch Roll Nail-42 Pieces Roll Nail Size: 1.5 "	De dusting / Open the Fibers.
2	Beater Machine Drum	Beater Drum Diameter 30" Pin to Pin Beater Drum width 30" 100 mm long Spikes Fixed to the drums surface 5h.p. Motor 1 Unit and 1 HP Gear Motor Plastic Lattice fitted with the Machine	Open the Fibers / Parallel.
3	Scouring Bowls	All 3 scouring bowl - 14 Feet L x 3 Feet W Tank will be made of 304 Grade S.S. Sheet. Features: 1) Bowl made of perforated S.S. Sheet over which loose wool will be placed. 2) Provided with false bottom made of perforated S.S. Sheet 3) Swinging fork arrangement comprising of rows of fingers mounted on each tank with eccentric mechanism for to and fro movement of fork assembly to move forward the loose wool on perforated bottom. 4) S.S. harrow mechanism fitted above each bowl to feed the loose wool. 5) Squeezing head mounted on sturdy M.S. frame structure, installed after each tank with pneumatic And with to roll fitted 15.S. Roll and second is Segmented rubber roll. 6) Complete with pneumatic cylinders, lubricator regulator etc. 7) One no. side setting 55 tank size 127A mm length x 610 mm width make S.S 304 provided with each main tank. 8) Each bowl provided with counter flow from tank to tank. 9) The squeezing head and swinging fork arrangement driven by 3 A.C. motor with Reduction gear box, pulleys and 3 A.C. motor with reduction gear box for eccentric mechanism of auxiliary harrow mechanism. 10) Plastic lattice conveyor after each squeezing head for conveying wool to the next bowl. 11) One speed indicator and electrical control panel	Scouring / Washing the Fibers to remove oil / dirt / dust.
4	Feeder for Cashmere Washing/ Scouring	Hopper feeder for conveyor, feeding the Pashmina fiber to the conveyor.	Feed the fibers to scouring/ washing.
5	Conveyor Dryer	Drier of modular construction with each chamber of 3 m length fitted with 2 nos. circulating 5 HP fan motor assembly and 2 nos. oil radiators. Chambers insulated from all sides with mineral wool panels. Exhaust duct fitted on each chamber. Conveyor with gearbox for transport of wool through then drier. Electrical control panel with all controls and protective equipment such as air break contractors, overload relays temperature indicator etc. Timer operated sludge blow off valves installed.	For Drying the Fibers
6	Hydro Extraction	Centrifugal Hydro Extractor generally of S.S. 304 quality revolving cage and 40mm thick (approx.) with C.I. bottom pan of 1530 mm dia. S.S. outer shell of 670 mm height with central hole of 1030mm dia. Manual lid lifting for spring loaded system. Machine fitted on a triangular heavy duty cast iron channel with 3 nos. foundation arrangements with cooling fan provided on shaft at the bottom of the machine. Machine generally to be heavy duty based on 3-point suspension system with 3 nos. keys on groove locks. Machine runs on 15 HP motor and starter	For extraction of Washed Fibers.
7	Steam / Water Pipe Line Installation		
8	Electrical Panel Installation		
9	Cashmere Carding / Dehairing Machine feeding system with 4 parts card machine	Pashmina Dehairing Carding Machine: Feed Roller 50.8 MM OD x 1016 MM Width 2 Pcs Lickrin Roller 203.2 MM OD x 1015 MM Width 1 Pcs. Breast Cylinder 609.6 MM OD x 1016 MM Width 1 Pcs Worker Roller 152.4 MM OD x 1016 MM Width 2 Pcs Steaper Roller 76.20 MM OD x 1016 MM Width 2 Pcs Four Parts of Carding: Main Cylinder 1270 MM OD x 1016 MM Width - 4 Pcs Doffer Cylinder 685.8 MM OD. x 1016 MM Width 4 Pcs Delivery Roller 127 MM OD x 1016 MM Width 1 Pcs High Speed Comb Box with Comb Blade 2 Pcs All Kind Machinery Band Frame Cl. All Carding Machine with Electrical Motor 5 HP X 4 All Carding Machine Included Card Clothing. Attached Auto Working Ball Head Machine.	Carding / Dehairing Machine.
10	Ball Head Machine		This Machine converts sliver to Ball form.
11	Spare Parts for 1 Year		
12	Tools		
13	Installation Charge		
14	Transportation from India to Nepal/ KTM.		
15	Boiler	Working capacity: 1.5 tons Steam boiler dimension: 7650x41"50x4280mm Steam boiler front, sideway and back required space:2000x600x600mm Feed water temperature: 105 Deg cent. Rated thermal efficiency: 93.01% Loading adjustment: 3A-114%	For Steam Generation.



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Ref.No.

TECHNICAL SPECIFICATIONS

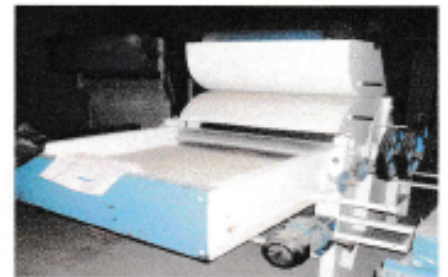
Date.....

A. Willow Machine

Length	8'-8"
Width	30-34" tapering end
Bearing Size	22215K
Roll O.D.	11"
Roll Length	95"
Roll Nail	42 Pcs.
Roll Nail Size	1.5"

B. Beater Drum

- Beater Drum Diameter 30" Pin to Pin
- Beater Drum Diameter 30". Pin to Pin
- Beater Drum width 30"
- 100 mm long Spikes Fixed to the drums surface
- 5h.p. Motor 1 Unit and 1 HP Gear Motor
- Plastic Lattice fitted with the Machine





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Date.....

C. Scouring Bowls

- 1st scouring bowl - 14 Feet L x 3 Feet W
- 2nd scouring bowl - 14 Feet L x 3 Feet W
- 3rd scouring bowl - 14 Feet L x 3 Feet W



Features:

1. Bowl Tank will be made of 304 Grade S.S. Sheet.
2. Provided with false bottom made of perforated S.S. Sheet over which loose wool will be placed.
3. Swinging fork arrangement comprising of rows of fingers mounted on each tank with eccentric mechanism for to and fro movement of fork assembly to move forward the loose wool on perforated bottom.
4. S.S. harrow mechanism fitted above each bowl to feed the loose wool.
5. Squeezing head mounted on sturdy M.S. frame structure, installed after each tank with pneumatic And with to roll fitted 1 S.S. Roll and second is Segmented rubber roll.
6. Complete with pneumatic cylinders, lubricator regulator etc.
7. One no. side setting SS tank size 1220 mm length x 610 mm width make SS 304 provided with each main tank.
8. Each bowl provided with counter flow from tank to tank.
9. The squeezing head and swinging fork arrangement driven by 3 A.C. motor with Reduction gear box, pulleys and 3 A.C. motor with reduction gear box for eccentric mechanism of auxillary harrow mechanism.



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Ref.No.

Date.....

10. Plastic lattice conveyor after each squeezing head for conveying wool to the next bowl.
11. One speed indicator and electrical control panel

D. Hopper Feeders for Wool Washing

Hopper feeder for feeding the Pashmina Wool to the conveyor.



E. Conveyor Drier

- Drier of modular construction with each chamber of 3 m length fitted with 2 nos. circulating 5 HP fan motor assembly and 2 nos. oil radiators.
- Chambers insulated from all sides with mineral wool panels.
- Exhaust duct fitted on each chamber.
- Conveyor with gearbox for transport of wool through the drier.
- Electrical control panel with all controls and protective equipment such as air break contractors, overload relays temperature indicator etc.
- Timer operated sludge blow off valves installed.



Om Iron & Engineering Works

Manufacturers of Woollen Machinery Plant & Parts

Riico Road No.5, Rani Bazar Industrial Area, Bikaner-334001 (Raj.) INDIA

◆ Email : omiron233@gmail.com

Ref.No.

Date.....

F. Steam Boiler

- Working capacity: 1.5 tons
- Steam boiler dimension: 7650×4150×4280mm
- Steam boiler front, sideway and back required
- space: 2000×600×600mm
- Feed water temperature: 105 Deg cent.
- Applicable fuel: Wood
- Rated thermal efficiency: 93.01% Loading adjustment: 30~110%
- Complete steam line pie, valves etc.

G. Hydro Extractors

- Centrifugal Hydro Extractor generally of S.S. 304 quality revolving cage and 40mm thick (approx.) with C.I. bottom pan of 1530 mm dia.
- S.S. outer shell of 670 mm height with central hole of 1030m dia.
- Manual lid lifting for spring loaded system
- Machine fitted on a triangular heavy duty cast iron channel with 3 nos. foundation arrangements with cooling fan provided on shaft at the bottom of the machine
- Machine generally to be heavy duty based on 3-point suspension system with 3 nos. keys on groove locks.
- Machine runs on 15 HP motor and starter





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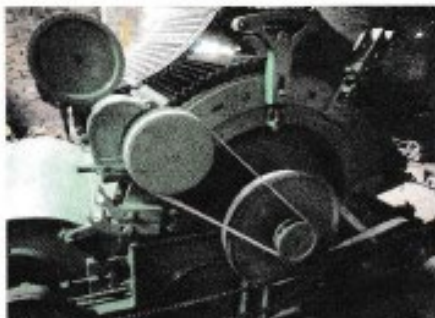
◆ Email : omiron233@gmail.com

Ref.No. **H. Pashmina Dehairing Carding Machine** Date.....

- Feed Roller 50.8 MM OD x 1016 MM Width 2 Pcs
- Lickrin Roller 203.2 MM OD x 1016 MM Width 1 Pcs.
- Breast Cylinder 609.6 MM OD x 1016 MM Width 1 Pcs
- Worker Roller 152.4 MM OD x 1016 MM Width 2 Pcs
- Steaper Roller 76.20 MM OD x 1016 MM Width 2 Pcs

I. Four Parts of Carding

- Main Cylinder 1270 MM OD x 1016 MM Width - 4 Pcs
- Doffer Cylinder 685.8 MM OD. x 1016 MM Width 4 Pcs
- Delivery Roller 127 MM OD x 1016 MM Width 1 Pcs
- High Speed Comb Box with Comb Blade 2 Pcs
- All Kind Machinery Band Frame Cl.
- All Carding Machine with Electrical Motor 5 HP X 4
- All Carding Machine Included Card Clothing.
- Attached Auto Working Ball Head Machine.



- J. Tools required for installation and commissioning will be provided us. Tackles, Cranes etc. for movement of equipment on site will have to be provided by you.



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Ref.No.	Currency of Offer	INR	Date.....
	Term	CIF, Nepal	
	Price	As per Price Schedule Form. Offered prices will remain firm/fixed during the whole period of the Contract. Food, Hotel & Flight Charges etc. will be extra as applicable at the time of travel program.	
	Custom Duties	Our offer does not include VAT or any taxes levies & custom duties applicable in Nepal.	
	Delivery/Shipment	Shipment will be By Road from point/port of origin within 5 months from the date of confirmed order.	
	Country of Origin	India	
	Payment	<ul style="list-style-type: none"> - 70% of the Contract Price as an advance payment within 10 days of the signing of the contract. - 20% of the contract price pertaining to the plant through irrevocable LC on pro-rata basis for each shipment upon presentation of the shipping documents. - Remaining 10% after plant commissioning and upon issuance of provisional acceptance certificate. 	
	Spare Parts	Yes	
	Guarantees	As per the attached declaration	
	Signature of the Bids	Legally authorized personnel from our side will sign the contract on behalf of Om Iron and Engineering Works.	
	Validity	Our offer will remain valid for 60 days. Thereafter it is subject to reconfirmation or revision.	



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Date.....

LIST OF EXCLUSIONS

Unless otherwise agreed upon, the exclusions mentioned below, but not limited to, are as follows:

1. The gaining of all authorities, sanctions, local permissions & licenses required to execute the project.
2. All buildings, foundations, infrastructure, electrical power and civil engineering works as stipulated.
3. Provision of drains of adequate capacity at points to be agreed.
4. Thermal insulation, cladding and support (except where specified).
5. Off-loading and final positioning of equipment at site.
6. The supply of personnel safety equipment, emergency lighting and firefighting equipment.
7. Labour and Technical staff needed during machines installation and running of the entire line.
8. Lodging, Boarding, local transportation for our technicians during assembling, commissioning, and training period.
9. Supply and disposal of chemical detergents, products and containers used for testing and commissioning.
10. Electric power and other utilities used during plant assembling, start-up, testing and training.
11. Any other goods or services not otherwise specified and necessary for completion of the project.

Authorised Signatory

Stamp

HIMANSHU VERMA

Om Iron & Engineering Works

Himanshu Verma

Proprietor/Manager

Date: 26.02.2022

Place: BIKANER, RAJASTHAN

Annex- VII Other suggestions and observation beyond processing

Beyond fibre processing, the following aspects for Pashmina development, starting from goat farming, should also be considered, and addressed:

- ➔ Awareness and training for farmers of the value of Pashmina for them and additional processors in Nepal is essential and should cover the following aspects:
 - 1 The value of the Pashmina fibre grown by their goats.
 - 2 When and how to harvest the fibre. They should be provided with suitable combs to remove the Pashmina.
 - 3 How to prepare the raw fibre, sorting into shade and removing any contaminants such as stick, excessive strong hair and stones etc. As lighter colour has a higher fibre value (because they could be used for more fashionable shades and thus achieve a premium) farmers should be made aware of this advantage.
 - 4 How to package the fibre to avoid further contamination.
 - 5 Harvesting the Pashmina, i.e., combing off the fibre from the goats in spring is beneficial to the animal. Combing provides more comfortable conditions for the goats in the hot summer months, and does not damage the goat, or its growth and meat production in any way.
- ➔ Fibre Collection and sale

Farmers are to grow and harvest Pashmina to sell their fibre for a fair market price in order to earn additional and regular income from their goat. There is already a fibre collection centre set up at Charang. It would be an advantage to set up several more throughout Mustang and any other collection areas. They could be a temporary arrangement during the harvesting/collection season. Collecting staff will require adequate training on fibre recognition, value, and preparation. The fibre from the temporary collection stations could then be reconciled at the Charang station for sorting into different shades, qualities, and removal of any unwanted contamination, before onward transport. The processing is required to give farmers the incentive to grow and harvest Pashmina

Annex-VIII Meeting notes of the International Consultant

Context

The herd

All goats inspected are in good health and well-nourished the characteristics are for the animal to have a nice shiny coat and no sign of foot rot. The rainfall in Upper Mustang and most irrigation being a result of snowmelt in the mountains in late spring and summer, hence the vegetation is more nourishing and improving the health of the herd.

In November, at the time of the mission, the mountains were covered in a type of small bush in plentiful numbers, which farmers cut and dry to feed the herd over winter. In winter, goats are brought to villages and corralled at night, to protect them from severe winter weather and predators. All the goats are kept together, male and female. Farmers tend to not have a selective breeding and therefore, there is a good chance of interbreeding. Nevertheless, farmers do exchange their male and female goats from one heard to another in order to control interbreeding and balance the herd internally.

Goat farmers generally face "mouth and feet" (PPR) diseases in chyangra goats. In order to address these issues, the district animal health / livestock office, of Jomsom recently have vaccinated and provided medicine to approximately 42,000 chyangra goats in the Mustang district only.

Farms

The main income of farmers is from goat meat production, selling males at around age 4-5 up to US\$400 and females at age 6-8 for around US\$200. Additionally, farmers prefer black goats as they think they are sturdier and produce better meat. Furthermore, all farmers don't necessarily have their own combs to harvest the Pashmina.

Meeting Notes

Consultant, David Lee arrived in Kathmandu early morning of Tuesday 9th November 2021.

A three-day agenda had been planned with Government Ministries, Pashmina industry manufacturers and trade bodies and other stakeholders. To provide current trade information and background knowledge, prior to a five-day trip to the main Pashmina goat region of Upper Mustang. Followed by a further two days of meetings and debrief back in Kathmandu.

→ Tuesday 9th November

- 14.00 - MINISTRY OF INDUSTRY, COMMERCE and SUPPLY(MICS,)

Met with, Mr Goninda Bahadur (contact details: Karkee-gbkarkee@hotmail .com +977 9841290922)

MICS are interested to work with the Ministry of Agriculture and Livestock to promote and develop Pashmina and Coffee in Nepal. both are considered key agricultural activities within the country.

The Nepal government provides:

- 3-5% export subsidy for the sectors.
- A low import tariff for processing machinery.
- Several special economic zones throughout Nepal.
- Subsidy for land purchase.
- Subsidised electricity at 8-9 US Cents per Kw/h
- Minimum salary in Nepal is US\$ 127/month

Mr Karkee seemed well informed of the situation in the Pashmina sector. He advised the farmers faced 4 months winter weather and snowfall each year from November to February.

- 15.00 ITC Project Team

Met with, Mr Vidur Ghimire-Nationa1 Coordinator of EU/Nepal TIP (contact details: vidur.ghimire@intracen.org +977 9860298462)

Brief introductory meeting, with some general updates of the current situation within the Nepal Pashmina sector.

- 16.00 Guru Pashmina Industry -Pashmina Shawl Weaver and Manufacturer Mister Suman

Producing a range of woven shawls from Pashmina and other fibres. All Pashmina is imported in yarn form, mainly from China. All warping, weaving, and finishing machinery is old with high manual labour input and little or no automation. Product is mainly exported.

→ Wednesday 10th November

- 11.00 NEPAL PASHMINA INDUSTRY ASSOCIATION(NPIA)

Met with, Mr Vijoy Dugar-President, Mister Dhan Prasad Lamichhane-Vice President. Mr. Ajaya Singh Karki-General Secretary, Mr Netra Raj Giri- Member Mr Dinesh K Shrestha-Member.

NPIA represents the interests of Pashmina manufacturers in Nepal. Mainly weaving of shawls but some knitting of sweaters and shawls. They are very concerned that Pashmina fibre grown in Nepal is not harvested or processed for their members to manufacture a genuine garment of Nepal origin. All Pashmina yarn is imported mainly from China and Mongolia, with a small percentage from India and other countries.

There is little or no primary processing of Nepal Pashmina in country and around 200Tons of Pashmina yarn is imported annually at a current cost of US\$ 150-200/Kg, totally US\$30-40million/year. The NPIA are very keen to develop the domestic Pashmina processing. In order to reduce Pashmina yarn import and provide a garment of genuine Nepal origin. The NPIA have already purchased 3200Kg of Pashmina fibre from the Upper Mustang region, in an effort to kickstart domestic fibre production. The NPIA are very interested to be heavily involved in the setting up of primary processing of Pashmina to produce yarn to the mutual benefit of all its members. They do not seem to be aware of exactly what would be required to accomplish this goal, or the level of finance required.

- 16.00 Nepal Trekking Agency-Mister Ganesh Simkhada

Discussed the trip to Upper Mustang and receive trekking permit, required for all foreigners visiting the Himalayas, at a cost of over US\$ 1000. Given approximately 2 weeks lead time, a pass can be obtained free of charge from the Nepal government, for visits in the best interest of Nepal.

→ Thursday 11 November

- 11.30 KAMALA PASHMINA-Mr Bishnu Prasad Dhakal

They have a very primitive fibre beater/opener and a single Chinese Flat Card to open and dehair Pashmina in the grease. Producing around 2Kg per hour per pass and requiring 2 passes to give a reasonable dehaired quality. After the second pass the carded web is fed through two calendar rollers to create a primitive carded sliver. Production capacity is around 7-8Kg per day.

The carded sliver is sent out to be hand spun into yarn. The Pashmina yarn is then returned and wound on to hanks for dyeing and hand weaving into shawls, scarves, and blankets. However, Hand Spun Yarn strength is low, and this yarn cannot be used in weaving machine. However, for lower Gauge Knitting Machine (Coarse Fabric), Hand spun yarn can be used. Furthermore, for "Hand Loom", "Hand Spun" Yarn can be used as weft (Pick) Yarn. In warp, it cannot be used due to very low strength.

- 14.00 Delegation of EU to Nepal

Mr Mohamad Owais Khan-ITC and Mr Mim Hamal-Senior Programme Manager

Discussion learnings:

There are conflicting and confusing reports on the number of Pashmina goats in the Mustang area and Nepal as a whole. There are many Pashmina goats in Tibet, and usually no border controls between Nepal and Tibet. Although the border has been closed since 2020 due to Corona Virus. Any raw Pashmina fibre usually finds its way across the border into Tibet and China but sold at a very low price for the farmers. This outlet has not been available for the last two years, and as the official export of raw Pashmina is prohibited by the Nepal government, and there is no commercial Pashmina processing in Nepal. There is no market for the farmers to sell their Pashmina.

As a result, it is estimated only 10-15% of the Pashmina grown in Nepal is Harvested. The farmers are not aware of international Pashmina prices, do not have the correct equipment to harvest the fibre. They also think that removing the fine Pashmina down from the goats will adversely affect the animal's health and growth potential for meat production.

There is a reluctance to allow farmers to increase the number of goats for environmental and sustainability reasons. There also seems to be some problems with 'Foot and Mouth Disease' from time to time.

Visit to Pashmina retail store-Nepal Pashmina Ltd. (Chyangra Pashmina brand). Very nice high-quality garments produced locally in Kathmandu.

→ Friday 12th November

- 13.00 Zoom meeting with EU Delegation from Bandipur

EU Ambassador to Nepal, Mr David Tuchschnieder, Mr Matthias Knappe-ITC and World Bank

Discussed topics:

- ✓ The Mustang Chyangra (Pashmina) market and the domestic weaving and knitting garment industry in Kathmandu/Pokhara. Currently importing 200Tons/year Pashmina yarn, mainly from China at a cost of over US\$30 million.
- ✓ Farmers need educating about Pashmina awareness, animal husbandry, veterinary care of goats, harvesting timing and procedures.
- ✓ It is important to manufacture and distribute suitable Pashmina combs to the farmers for harvesting. This will provide an extra income to farmers. I provided a suitable comb, which could be easily and cheaply manufactured locally.
- ✓ They also require help with good breeding practice for animal strength, fibre quality and quantity.
- ✓ Farmers also need help with better feedstuffs and winter supplements to locally available feed.
- ✓ Can ITC provide all the information, training, and equipment necessary?
- ✓ Despite a thriving Pashmina garment industry, there is little or no processing for the raw Pashmina, and the Nepal government forbid the export of raw Pashmina. Hence, at the moment the farmers have no market for their Pashmina.

→ Saturday 13th November - Travelling

→ Sunday 14th November - CHARANG

Held various meetings to discuss and investigate issues and problems facing Pashmina farmers in Upper Mustang.

- Lomangthan Village Development Centre-Mr Suwarna Bista (chairman)
- Women Development Association-Ms Maya Bista
- Local Farmers-Chyangra Farmer Association Members
- Mustang Chyangra Fibre Processing Co-Mister Chhiring Wangd Wangdi
- Visit to local Chyangra Goat Farm

Topics of discussions:

- ✓ Lack of knowledge,
- ✓ Education of farmers
- ✓ Lack of market for Pashmina
- ✓ Predator attack on goats

The farmers main source of income is meat from their goats. Males are usually slaughtered at 4-5 years, and females later at 6-8 years. Until this time farmers are reluctant to comb the Pashmina as they

believe it affects the animal's health and growth potential for meat production. They do not have a ready supply of combs for harvesting and at present only 10-15% of available Pashmina is harvested.

The 3.2T of combed Pashmina bought by the NPIA is stored at the Nepal Fibre Processing Co. It has been well packed and stored in good cool conditions. The fibre is very fine, but a little on the short side. It should make a good product after processing suitable for fine weaving types. The NFPC is the local collection centre for the area.

→ Monday 15th November-JOMSOM

Animal Health and Livestock Office- Mr Dand Pani Sharma Annapurna Conservation Area

Brief of discussion:

Very keen to promote Pashmina production to help create a sustainable living for farmers. However, would not be keen to see a large increase in animal numbers, which would be detrimental to the environment:

→ Tuesday 16th November

Travelling back to Pokhara where we met with the Dr Resham Gywali of the NLSIP. A courtesy call as we were passing through.

→ Wednesday 17th November KATHMANDU

- 11.00 NEPAL BUREAU OF STANDARDS AND METROLOGY

Met with, Mr Prabhat Kumar (contact details: Singh-pksinghl@hotmail.com, +977 9841268197)

They only test for fibre length and diameter at present. They have a fully computerised OFDA machine for fibre micron. They also have a microscope for fibre identification and purity testing.

They need help to procure more testing equipment and staff training. They would also like ITC to help them obtain international accreditation.

- 14.30 NEPAL LIVESTOCK SECTOR INNOVATION FUND

Met with, Dr Prabhakar (contact details: pathak-drppathak@yahoo.com +977 9841227192) and Dr Umesh

Brief of discussion:

Farmers are mainly interested in meat production from their goats, and can earn 45,000NPR(US\$380) per goat. Each goat produces approximately 200gm Pashmina each year. Current market price \$40/Kg=\$8/goat. Not a lot compared to meat price, but the Pashmina is an additional income, not a replacement income. Farmers prefer black goats, as they think they produce better meat. I cannot comment on this point, but worth investigating, as some lighter coloured goats would be good for lighter shades. Allowing more fashionable colours.

Many goats are lost to predator attacks from snow leopards and other wild animals. The conservation authorities will allow open roof pens to corral animals at night. In many other Pashmina origins, farmers keep large dogs to defend their goats from predators. Farmers need to dip their animals yearly to eliminate parasites. I think it is possible to spray the goats for this. Which avoids the cost and possible land contamination of using dips.

There is a breeding herd of 30 White Bucks and 270 Does in Upper Mustang. This should be investigated, for possible support and expansion. Goat owners have difficulty recruiting herders. This is a problem face in all Pashmina origins. As younger generations want to be in the cities, not the countryside.

Current initiatives:

The Ministry are teaming up with The World Bank to sponsor projects in the Pashmina Sector. They already have 30 Business Plans approved for the Mustang area. Most for fibre growth and 2 for Pashmina processing. The maximum project budget is US\$200,000. 50% will be a grant from the World Bank, 30% loan from commercial banks and 20% provided by the farmers themselves.

- 16.30 Factory Visit

Met with, MrVijoy Dugar BHAKT, the factory belongs to one of the NPIA members and was previously a weaving factory. It could be available at reasonable cost to convert into a Pashmina dehairing factory. Situated in 2 floors and not very large area. Would only be suitable for a small-scale processing unit.

→ Thursday 18th November

- 11.00 MOICS

Met with Mr Durga Pd. Bhusal, advisory to local company Gayatri Pashmina Inc- Mr Vivekanand Mishra, to start a processing of dehair and potentially process 6Tons of Pashmina per year, based in Kathmandu. Nepal farmers comb goats communally and help each other at harvesting times

30,000 goats died from a PPR virus last year, in the Mustang region. This year 45,000 goats have been vaccinated against the disease, and a further 25-30,000 have been treated by medication. Total number of Pashmina goats in Mustang is estimated at 75,000 heads.

- 13.00 NPIA Team Members

Discussion brief:

Met with Mr Mishra of Gayatri Pashmina and Mr Dugar and other members. They were very appreciative of the new information and knowledge they had acquired and look forward to new project developments in the future.

- 15.30 US Aid

Met with Mr Jason Seuc (Economic Growth Director), Mr Lynn Schneider (Economic Growth Deputy Director) Mr Sujana Piya (program Specialist, Water, Agriculture, Social, Environmental and Economic Development)

Fascinated by the project Pashmina in general. Not sure if they would become a major player but would be interested to contribute as a Technical Assistance, Training, Grant Partnerships with Private Sector, Finance through "Development Finance Corporation" who have taken over from "OPIC".