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TRIPLE BOTTOM LINE (TBL) DEMONSTRATION PROJECT IN SOUTH EAST ASIA

(CONRACT No 2001/125)

XP/NAS/01/003

FINAL REPORT
NO
THE IMLEMENTAION OF THE TBL DEMONSTRATION PROJECT
IN
SRI LANKA

PREPARED
BY
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SMALL AND MEDIUM ENTERPRISE DEVELOPERS

CONTENTS

Executive summery

Implementation of UNIDO Triple Bottom Line (TBL) demonstration project in South Asia was launched on 26th March 2001 with the training workshop for the representative from Sri Lanka, India and Pakistan. Small and Medium Enterprise Developers (SMED), a project of the Federation of Chambers of Commerce and Industry of Sri Lanka (FCCISL), undertook implementation of the project in Sri Lanka.

Firstly, a seminar was held to brief the industrialist on the TBL concept and what gains they could achieve when the concept is implemented. Immediately after the seminar six factories were selected with the consent of the top management and a Memorandum of Understanding (MOU) was signed between selected industries and SMED.

The selected factories fall in to four sectors of industries namely, Textile, Apparel, Rubber and Confectionary. One Dyeing & Finishing Industry and Handloom Factory are the two factories selected under textile sector. Two Garment manufacturing industries; one large one small constitute the Apparel Sector. Other two are: an industry manufacturing foam rubber mattresses and a biscuit manufacturing industry.

In each factory a TBL team, consisting of senior managers, supervisors and workers, was formed and they were briefed about the work they have to perform. Firstly, they were requested to collect the basic information about the factory, the financial and social indicators and the health and safety situation of the factory. This was done through a set of questionnaires. Secondly, the TBL team with the assistance of the other employees of the factory carried out a TBL audit. This audit was done by studying the inputs at each unit of the production process and waste generated at each such unit. During the audit the teams also noted the problems due to health, safety and ergonomic factors.

Based on the information collected through the audit, brainstorming sessions were conducted at each factory to generate options. Participants at these sessions selected few options to be implemented during the specified period of the demonstration project. Following are the options implemented by the relevant factories during the TBL project implementation period

1. Textile Sector

a) Textile Dying and Finishing Industry.

S/No	Options implemented	Gains and improvements achieved
1	Selling of all recyclable waste such as polythene, cartons and paper	Money to be used for workers' welfare
2	Correct the supply chain to suit the production process in order avoid re dying of materials incurring high cost.	Extra cost of re dying (SLR 85,000 per batch) is saved

b) Handloom Export Industry

S/No	Options implemented	Gains and improvements achieved
1	Selling of all recyclable waste such as polythene, cartons and paper	Money to be used for workers' welfare
2	Rewiring of the lighting system to enable the workers to switch off lights when not required	Savings in electrical energy

2. Apparel sector

a) Large scale Garment manufacturing industry

S/No	Options implemented	Gains and improvements achieved
1	Selling of all recyclable waste such as polythene, cartons and paper	Money to be used for workers' welfare
2	To off the lighting system when not required.	Reduction in lighting bill
3	Appointment of safety committee and safety officer	Improvement of awareness through training programme.
4	Change in attitudes/ Reduction of absenteeism by counselling.	Enhancement of productivity through improved morals and reduction in absenteeism.

b) Small scale Garment Manufacturing Industry

S/No	Options implemented	Gains and improvements achieved
1	Selling of all recyclable waste such as polythene, cartons and paper	Money to be used for workers' welfare
2	Increase the space by modifying the building (Constriction work is in progress)	Better work environment for workers

3. Rubber Sector.

a) Natural foam rubber manufacturing industry

S/No	Options implemented	Gains and improvements achieved
1	Selling of all recyclable waste such as polythene, cartons and paper	Money to be used for workers' welfare
2	Control of latex waste	Latex waste is already brought down to 8% and 33% of the money saved were distributed among the workers. This has improved the labour relation and further reduction is expected in the future.
3	Improvement of the boiler performance and to control waste of steam	Reduction in the cost of fuel

4. Confectionery sector

a) Biscuit manufacturing company

S/No	Options implemented	Gains and improvements achieved
1	Bulk handling system for the palm oil is under construction	Estimated gain is SLR 600,000 per annum

This organisation was the last to complete the brainstorming session. Therefore, there is delay in implementing the low cost options.

Apart from the monitory gains the organisations achieved through the implementation of TBL concept, a remarkable improvement in the labour relation was seen through out the implementation process. This improvement on the social bottom line definitely will boost the productivity in all six factories in the years to come.

FINAL REPORT OF THE TRIPLE BOTTOM LINE DEMONSTRATION PROJECT IN SRI LANKA

1. Introduction

Sri Lanka is an Island situated in the Indian Ocean. It is predominately an agricultural based country. But it is changing the course from agriculture to industry through a very slow development process since the British Colonial Rule.

British colonial rulers who governed the country for nearly 150 years, introduced alien plants namely tea and rubber to Sri Lanka in the latter part of the 19th century. This paved the way for tea and rubber processing industries to establish in Sri Lanka. Both these industrial sectors were developed mainly to process raw tea and latex before being exported for further processing and blending in European Countries.

However, after gaining independence in 1947 the Government of Sri Lanka started developing the industrial sector for manufacturing consumer goods for local consumption and for export as well. Handloom Industry is one such industry, which the government willingly supported after the independence. Unfortunately when this industry was well developed, the power loom industry was given the fillip by the subsequent governments, which came to power. As a result the handloom industry was neglected leaving several hundreds of workers out of employment. After several decades, the power loom industry too has suffered similar set back. This set back is mainly due to reduction in import duty on textile and failure on the part of industrialists to adapt new technology to improve quality of textile and productivity of the industry.

After 1977 the Government of Sri Lanka adopted the free trade policy. With this policy change, several export promotion zones were developed to attract foreign investors. Controlling and administration of these zones were vested with Greater Colombo Economic Commission (GCEC). Subsequently, GCEC, which was established to look after the export Promotion Zones, were given powers to operate Island wide. With these powers the organisation was renamed as Board of Investments of Sri Lanka (BOI).

Apparel industry is the main industrial sector developed under BOI. This industry is widely spared through out the country and is the main foreign exchange earning industry now in Sri Lanka. Majority of establishments in this sector comes under BOI and works on quota system controlled by the Ministry of Industrial Development. Foreign buyers are very stringent with this industry on compliance with the international requirements. Some industries selected for TBL demonstration project also come under BOI. Therefore, these industries will have the benefits of the TBL project for them to be in par with the requirements of the international buyers.

The project was first launched on 26th March 2001 with the training workshop for the representatives from Sri Lanka, India and Pakistan. This workshop was followed by a seminar for the selected industrialists who volunteered to participate in the UNIDO TBL demonstration project in South Asia. SMED selected six factories for the project after signing a Memorandum of Understanding (MOU) with them.

2. Industries Selected for the TBL Project.

When the project was initially planned, UNIDO was interested in implementing the project mainly in the textile sector. Unfortunately due to the above-mentioned problems in the textile sector, we were forced to select a spectrum of industries for the TBL project. They are: Textile, Apparel, Rubber and Confectionery. Following are the six factories selected for the TBL Project.

1. Textile Sector:

a) Oacinic Knitters (Pvt) Ltd., # 4, Kandawala Mawatha, Ratmalana

b) Kandygs Handloom Export Ltd., # 24, Yahampath Mawatha, Maharagama

2. Apparel sector

a) Orient Garment (Pvt) Ltd, # 78 B, Polgasovita Road, Mathagoda.

b) Marie De Classique Attire (Pvt) Ltd, 1/12, 1st Lane, Saman Mawatha, GalawilaWatta, Homagama.

3. Rubber sector

a) Richard Pieris Natural foam Ltd, Export Promotion Zone, Biyagama, Mawana.

4. Confectionery Sector

a) Ceylon Biscuit Ltd, High Level Road, Makumbura, Pannipity.

3. Methodology

Firstly a team, consisting of sectional heads of the factory and representatives from the supervisory and operatives, was formed at each factory. The teams were requested to collect basic data on each of the selected factories and the indicators for two bottom lines, financial and social through questionnaires. Beside this, a questionnaire for health and safety audit too was used to check on the existing situation within the factories. Since the sample of factories were limited to six these questionnaires were not pre-tested.

Information on the environmental bottom line was gathered through quantifying the waste generated at each unit in the production process. For this purpose the team was directed to prepare a process chart and to carry out a TBL audit.

After completion of the audit a brainstorming session was held at each factory to generate options. For this session, production floor workers too were requested to participate.

Finally, teams were directed to select few of the options, to be implemented within the Project period.

4. Basic data of Selected Factories

S/No.	Name of the factory	Nature of the Factory	Number of Employees	Product Manufactured	Output	Export percentage
01	Richard Piries Natural Foam Ltd	Public Limited Company	226	Foam Rubber Mattresses	98 MT	97
02	Orient Garment (Pvt) Ltd	Private Limited Company	1145	Jackets/coats Pants Non Quota Subcontract	398286 Nos. 244962 Nos. 202755 Nos. 252450 Nos.	100
03	Marie de Classique Attire (Pvt) Ltd	Private Limited Company	97	Readymade Garments	317210 Nos.	97
04	Oacinic Knitters Ltd	Private Limited Compay	65	Polyester Poly/Cotton 100% cotton	1644961.48Kilos 407823.65 Kilos 291727.25 Kilos	90%
05	Kandygs Handlooms Export (PVT) Ltd	Private Limited Company	118	Handloom Fabrics Readymade items	55973 meters	2.22 5.8
06	Ceylon Biscuit Ltd	Private Limited Company	908	Biscuits Chocolate Wafers	14778 MT 381 MT 659 MT	7.4

5. Financial Bottom Line

Information required for calculation of initial Financial Indicators were gathered and indicators were calculated using the formulae presented to us by Mr. Rodney Stares, UNIDO expert. Summery of the calculated indicators are tabulated below for easy reference.

Financial Indicators	RPNF Ltd	Orient Garments (Pvt) Ltd	Marie De Classique Attire (Pvt) Ltd	Oacinic Knitters	Kandygs Handlooms Exports Ltd	Ceylon biscuit Ltd
1. Pure Financial Measures Earnings Before Interest and tax Average capital employed over the year	35.2%	6.6%		11%	0.345	34.38%
2. Resource Productivity Measures **2.1. Overall Productivity Measures**						
a. Value added x 100 Value of input	190%	18.3%	33.13%	35.38%	263.5%	65.56%
b. Value added x 100 Value of Standard Output	161 per unit	3051.77	23.7	14.04%	14688%	2448.96
2.2. Labour Productivity Measures						
a. Value added x 100 No. Employees	1597545	34455.21	171177.38	53751.66	74687	571899
b. Value added x 100 Total Std Year	--	142781.11	57059.13	194124.88	-	

c. Value added x 100 Total wage bill	1551	77.2	230.17	115.28	207.7	847.82
2.3. Capital productivity						
Value added x 100 Average Capital Emplyed	148	18%	3358.95	4. 54	238.48	78.46
2.4. Energy Productivity						
Value added x 100 Kw. Hr of Energy	323	108.14	608.76	180.20	379.22	1.184
3. Resource utilisation measures **3.1 Plant Utilization**						
a. Average % Utilisation under current operating regions	55%	98	58.82%	?	?	86.62
b. Average % utilisation of plant compared to technical maxima	37%	?	41.18	?	?	49
3.2. Labour force utilisation a. ~~Worker days lost~~ x 100 Total Days worked	0.11	4530.74	0.41	33.33	10.92	0.197
b. Overtime hours x 100 Total hours worked	39	10.8	1.8	0.5	3.2	21.19
4. Resource stability or turnover measure 4.1 Labour force stability a. Labour turnover rate =No of workers leavening during the period / Av number of employees	8%	0.52	0.48	0.8	0.36	4.44
b. Labour retention rate = No workers started at the year present at the end/ Av No of employees	*(.6%	0.28	0.14		0.62	97
4.2. Stock (Inventory) turnover	6 Times	31days	?	?	2.07	8.5
4.3. Av age of capital equipment	3.5 years	1 year	16	18 years	17 years	12-15 yrs

6. Social Bottom Line

Social issues	RPNF Ltd	Orient Garments (Pvt) Ltd	Marie De Classique Attire (Pvt) Ltd	Oacinic Knitters	Kandygs Handlooms Exports Ltd	Ceylon biscuit Ltd
Hours of work	45 Hrs per week. Overtime is paid at 1.5 times the wage	45 Hrs per week. Overtime is paid at 1.5 times the wage	45 Hrs per week. Overtime is paid at 1.5 times the wage	45 Hrs per week. Overtime is paid at 1.5 times the wage	45 Hrs per week. Overtime is paid at 1.5 times the wage	45 Hrs per week. Overtime is paid at 1.5 times the wage
Compensation and Benefits	Wages are higher than the stipulated minimum 7days casual 14 days annual leave Employees provident fund and employees trust fund and gratuity are the retirement benefits provided	Wages are higher than the stipulated minimum 7days casual 14 days annual leave Employees provident fund and employees trust fund and gratuity are the retirement benefits provided	Wages are higher than the stipulated minimum 7days casual 14 days annual leave Employees provident fund and employees trust fund and gratuity are the retirement benefits provided	Wages are higher than the stipulated minimum 7days casual 14 days annual leave Employees provident fund and employees trust fund and gratuity are the retirement benefits provided	Wages are higher than the stipulated minimum 7days casual 14 days annual leave Employees provident fund and employees trust fund and gratuity are the retirement benefits provided	Wages are higher than the stipulated minimum 7days casual 14 days annual leave Employees provident fund and employees trust fund and gratuity are the retirement benefits provided
Freedom of Association	Recognised Union	Worker council	No union but good labour relations	No union but good labour relations	No union but good labour relations	Recognised Union
No safety policy & organisation Health & safety	They have a Safety policy and person responsible for safety High heat and noise	No safety policy & organisation High heat at the ironing section	No safety policy & organisation Factory is under construction. Therefore, work area is somewhat congested.	No safety policy & organisation Heat and humidity is high.	No safety policy & organisation Smoke at the dying section.	No safety policy & organisation Heat is high and poor ventilation
Harassment and Abuse	Freedom from harassment is guaranteed Employees are free to complain against any harassment	Freedom from harassment is guaranteed Employees are free to complain against any harassment	Freedom from harassment is guaranteed Employees are free to complain against any harassment	Freedom from harassment is guaranteed Employees are free to complain against any harassment	Freedom from harassment is guaranteed Employees are free to complain against any harassment	Freedom from harassment is guaranteed Employees are free to complain against any harassment
Discrimination	No discrimination on grounds of race, religion,	No discrimination on grounds of race, religion,	No discrimination on grounds of race, religion,	No discrimination on grounds of race, religion,	No discrimination on grounds of race, religion,	No discrimination on grounds of race, religion,

	cast etc.	cast etc.	cast etc.	cast etc.	cast etc.	cast etc.
Use of child labour	No child labour	No child labour	No child labour	No child labour	No child labour	No child labour
Use of forced/bonded labour	No forced/bonded labour	No forced/bonded	No forced/bonded	No forced/bonded	No forced/bonded	No forced/bonded

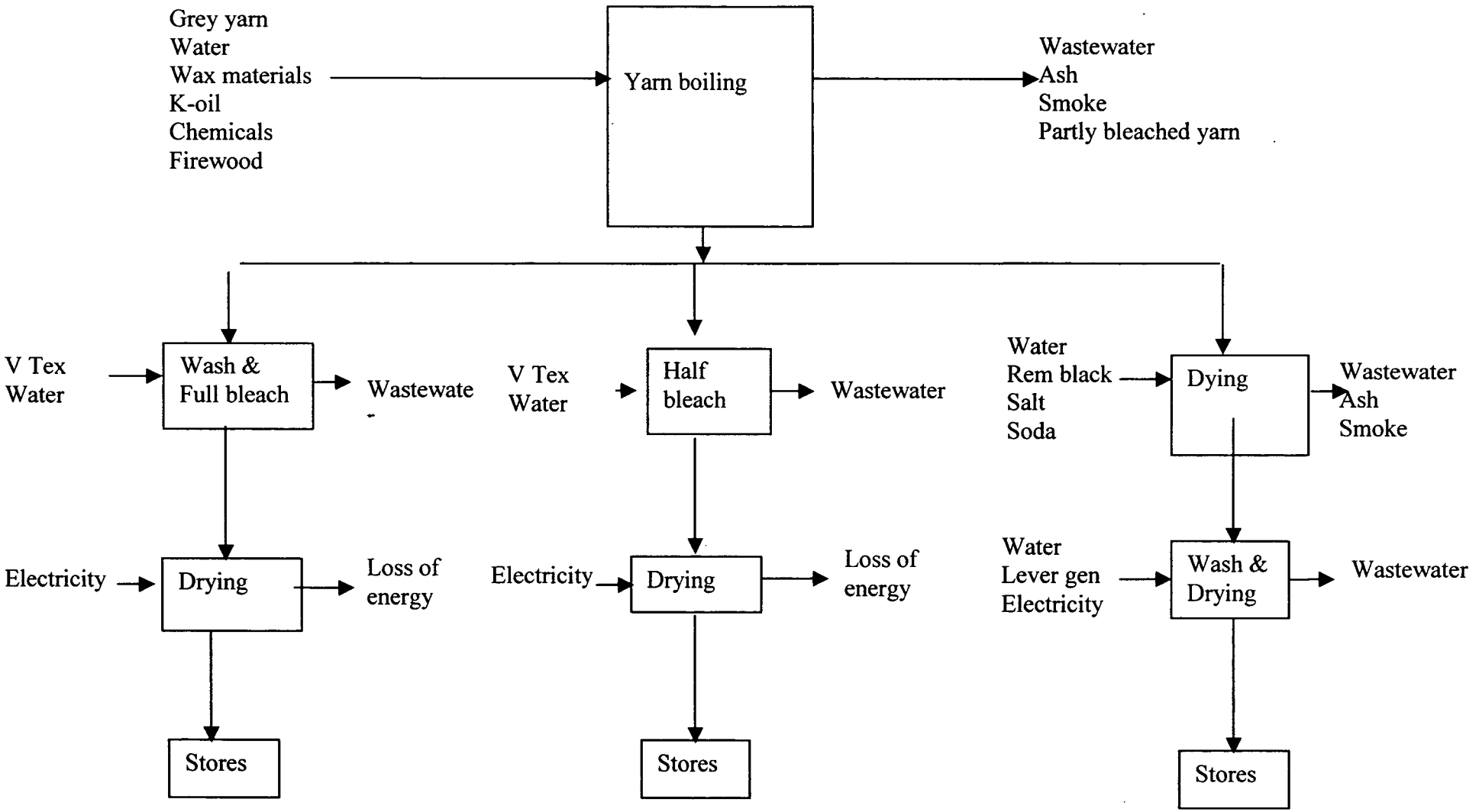
7. Environmental Bottom line

Pollutants	RPNF Ltd	Orient Garments (Pvt) Ltd	Marie De Classique Attire (Pvt) Ltd	Oacinic Knitters	Kandygs Handlooms Exports Ltd	Ceylon Biscuits Ltd
Emissions	Emissions from the boiler (Generally within the acceptable level)	Emissions from the boiler (Generally within the acceptable level)	No emissions	Emissions from the boiler (Generally within the acceptable level)	Smoke from dye section.	Emissions from the boiler (Generally within the acceptable level)
Solid Waste	Cut pieces of foam rubber (Action is taken to reduce the quantities after brainstorming sessions)	Paper, cut pieces of materials and packing materials are the solid waste generated. They are generally reused or sold out for recycling	Paper, cut pieces of materials and packing materials are the solid waste generated. The are generally reused or sold out for recycling	Only packing materials, especially polythene which generally sold for recycling	Cut pieces of cloth and packing materials. These items are sold for recycling.	Spillage of flour and other raw materials and spilled biscuits are the main solid waste generated. Suggestion for minimisation is expected at the brainstorming sessions.
Liquid waste	Wash water Normally directed to the central treatment system. (Steps are taken to reduce waste of latex after the brainstorming sessions)	Not significant	Not significant	Effluent containing dyes and chemicals are discharged to the municipality drain without any treatment. Hardly space is available within the premises for a treatment system. Minimisation of liquid waste is considered through CP.	Effluents containing dyes and chemicals are directed to a soakage pit without treatment. Solution to this problem is envisaged at the brainstorming sessions	Not significant

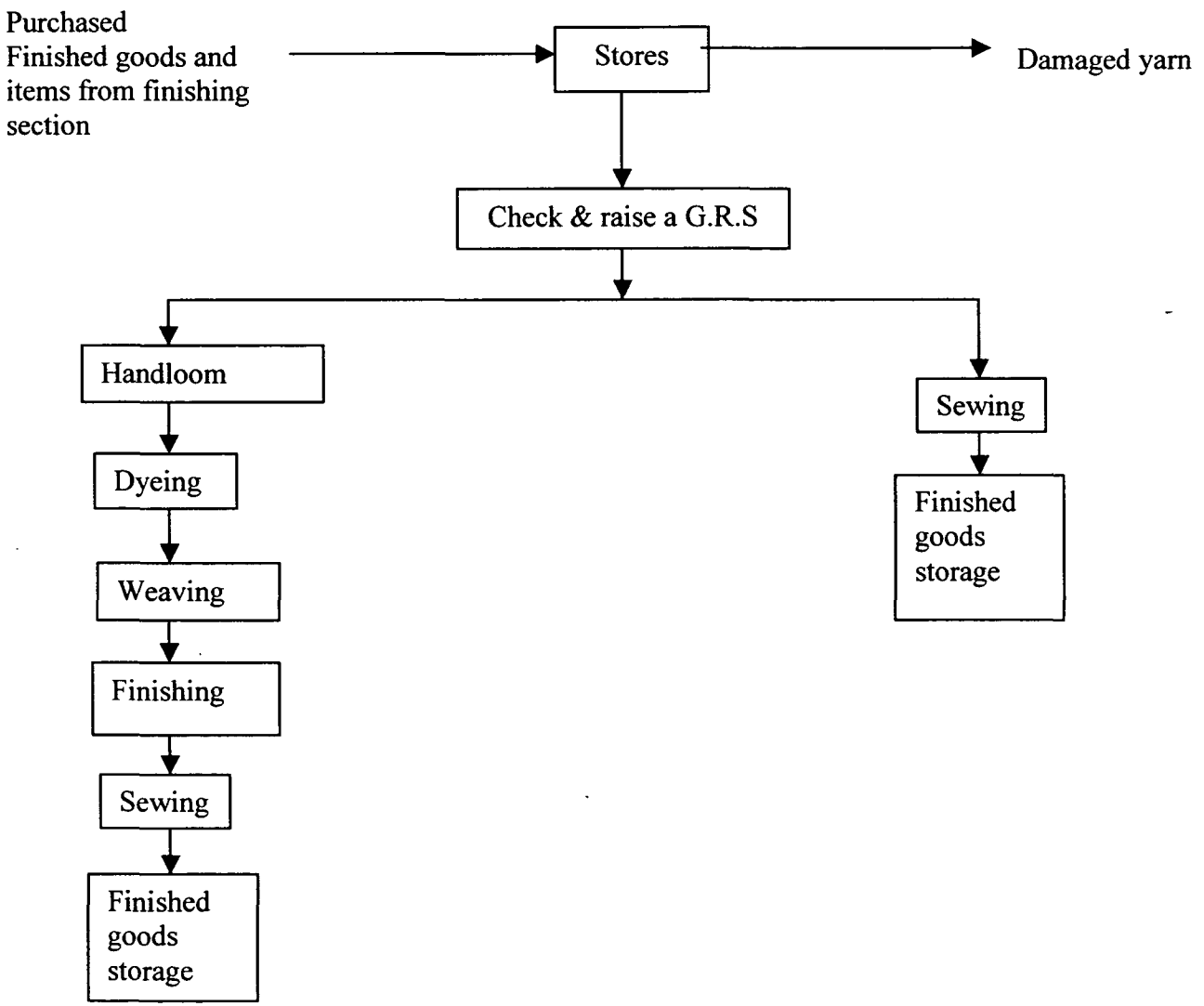
8. Brainstorming Sessions

Brainstorming sessions were conducted with all the TBL teams of the selected factories. In certain situations extra people, especially the members of the workforce were invited to participate at the sessions. In most of the sessions their participation brought in very good options. Following tables detail out the Process flow diagrams indicating waste generated at each stage of the process and options generated at the brainstorming sessions.

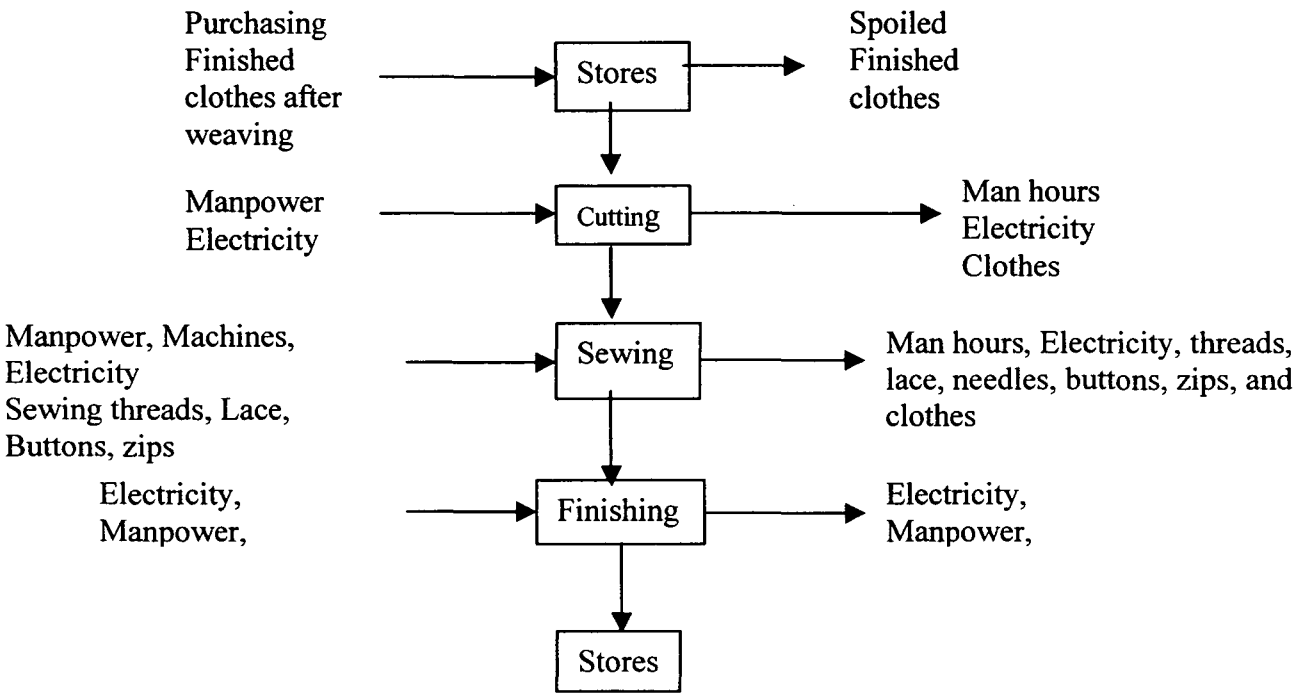
8.1. Kandygs Handloom Export (Pvt) Ltd
Dye Section Flow Chart



8.2. Kandygs Handloom Export (Pvt) Ltd
Factory Flow Diagram



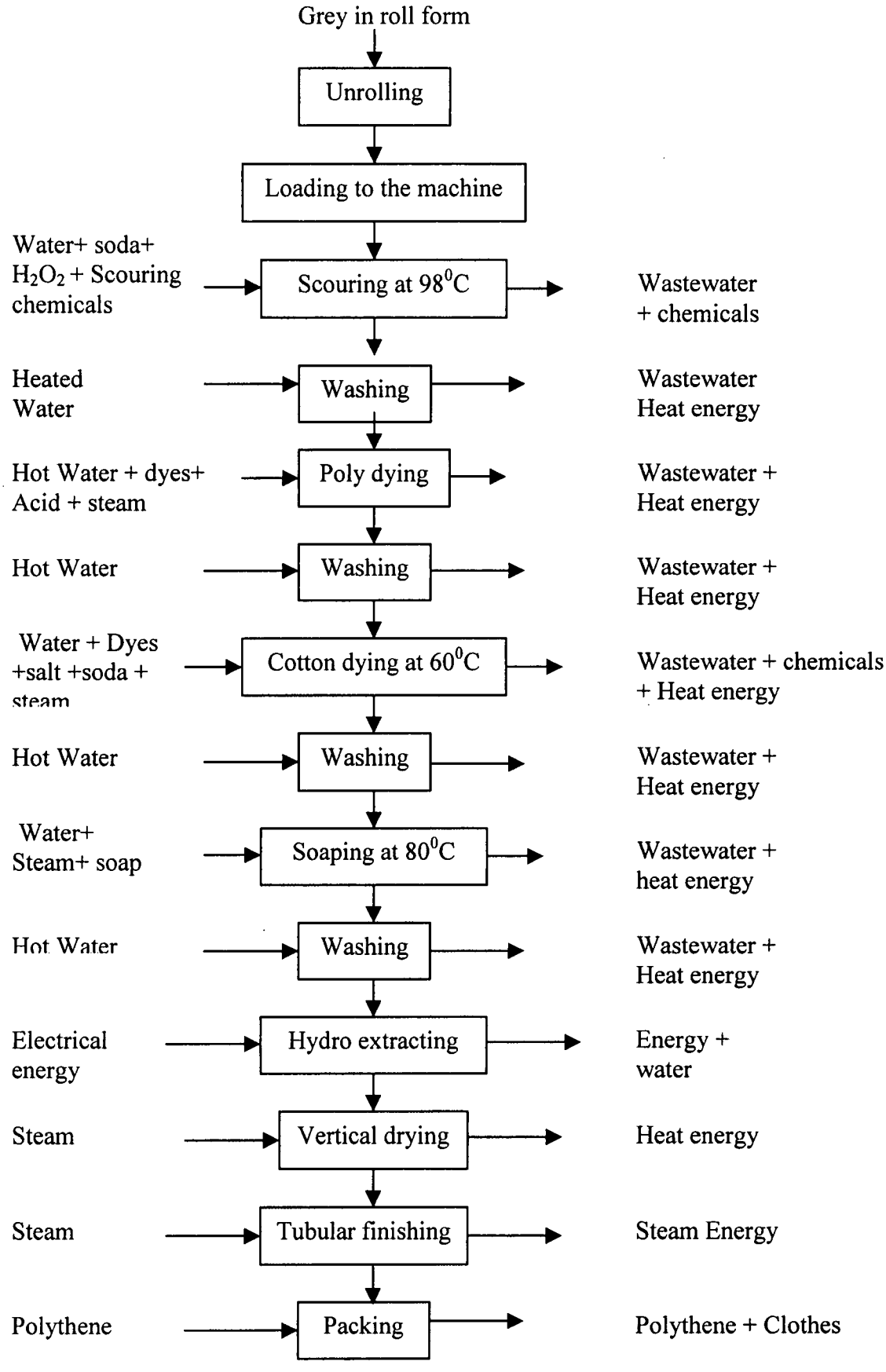
8.3. **Kandygs Handloom Exports (Pvt) Ltd**
Sewing Section Flow Diagram



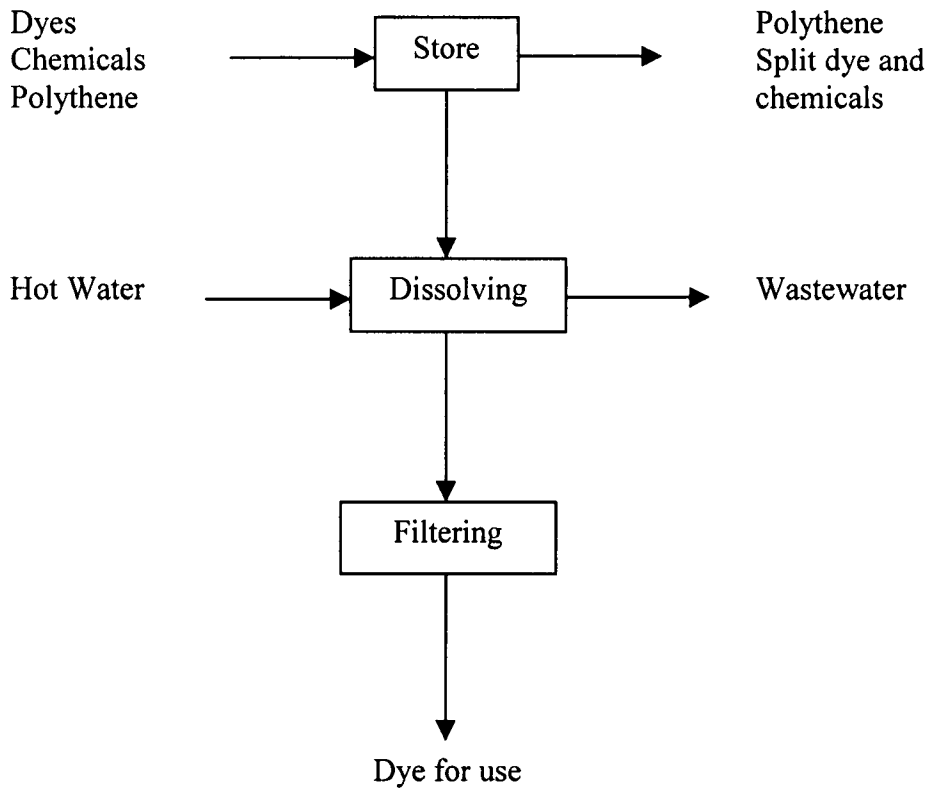
8.4. Findings Of The Brainstorming Session At Kandygs Handloom Export (Pvt) Ltd

S/No	Problem	Solutions
1	**Loss of electrical energy on lighting**	8.□. Off the light during intervals 2. Electrical wiring should be properly laid with facility for switching lamps separately **3. Tube-bulbs of small diameter to be used with German chokes in the future**
2	Knots on threads creates problems when weaving	Use of Knotting device
3	**Improper dying due to disarranged hanks of thread**	**Stocks to be handled in an orderly manner**
4	**Mechanical faults on machines**	**Proper maintenance to be implemented**
5	**Loose beams make problems when weaving**	**Placement of paper for separation of thread to be done methodically**
6	Marks on threads due improper dying and oil	1. **Dying process should be improved** 2. After maintenance, oiling points should be cleaned of excess oil
7	Smoke within the dye section	Heating system has to be improved
9	**Spoiling of the materials due dirt on the floor of the sewing section**	**Floor to be carpeted**
10	**Lack of proper training for some workers**	**Initiate Training programmes for such workers**
11	**Improper quality check when taking over of subcontract jobs**	**Proper instruction should be given to the person who takes over such items**
12	Discharge of untreated effluent	Treatment system to be installed

8.5. Oacianic Knitters
Process Flow Diagram



8.6. Oacinic Knitters Dye Preparation



Quantities and prices of input materials

Material		Quantity (kg/month)	Price (Rs/kg)
Monopole (Soaping and wetting)		200	
Soda ash		600	25/-
H_2O_2		1200	40/-
Acetic acid		1200	75/-
Formic acid		400	62/-
Sol. Dyes	Light col	100	550/-
	Dark col	1500	
Int. dyes	Light col.	75	680/-
	Dark col.	1000	
Calatec		50	110/-
Polythene		50	107/-

Water = 600,000 Liters/day
Grey roll = 100,000 kg/month

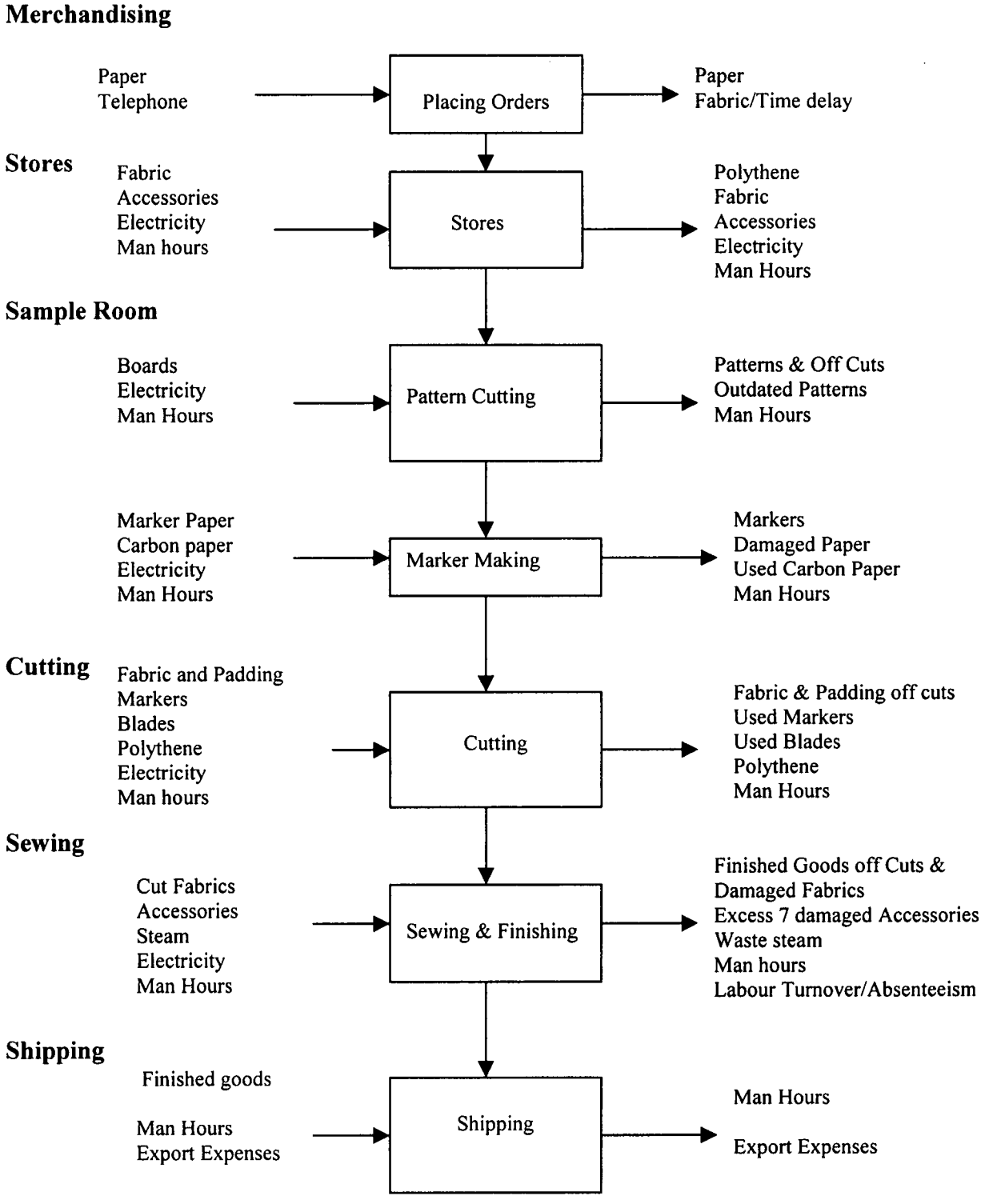
- Water is taken from the wells and therefore it has to be pumped and treated before using. These costs should be added as the cost of water.

8.7. Findings Of The Brainstorming Session At Oacinic Knitters

S/No	Problem	Options
1	Cooling waste water to meet the national requirement by: a) Adding good water at room temperature. b) Keeping within the machine till it cool down to the required temperature	a) To circulate water through long length of pipe line. b) Install cooling tower at the premises.
2	Heat energy lost through the scouring machines.	Insulate the surface of the machine.
3	Re-dying of the materials when it is not matching with the customer's requirement. Reasons: incorrect information about the materials given by the customer (loss is roughly Rs. 85,000. per month).	To have better liaisons with the customer to get the correct information
4	Use of coconut oil instead of white oil by the knitters affects the dying process	Advise the customer when supplying the materials for dying.
5	Untreated waste water let to inland water ways	Waiting for the common treatment system since the space is not adequate.

After the brainstorming session management has discussed on 3 and 4 above with the supply chain and has come to an agreement to settle the problems.

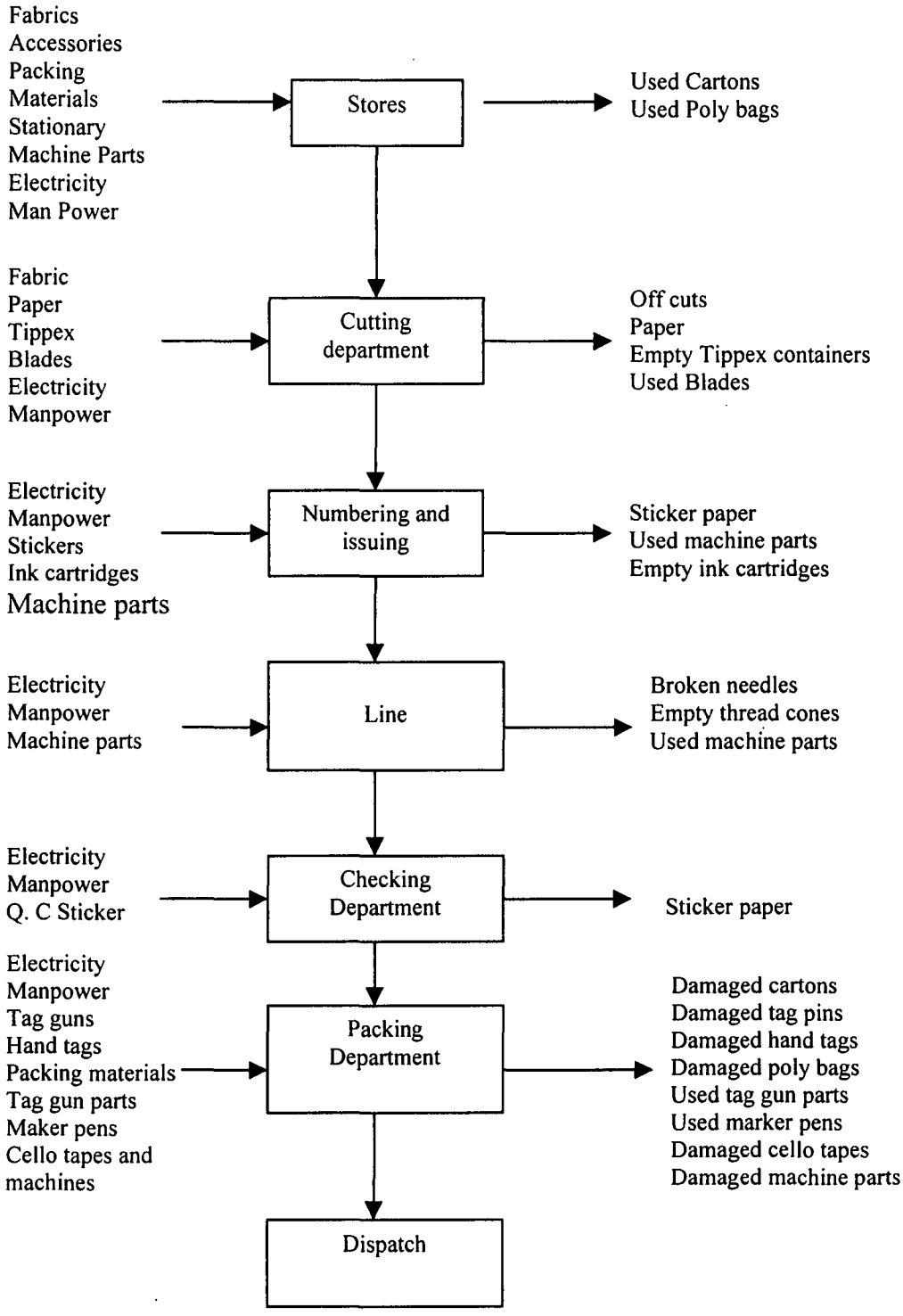
8.8. Orient Garment (Pvt) Ltd
Process Chart



8.9. Findings Of The Brainstorming Session At Orient Garments (Pvt) Ltd

S/NO.	PROBLEM	OPTIONS
1	Off cut at the cutting table	a. Improve cutting table with automatic spreader and a suction table b. Improve the skill level of the spreaders c. Improve the clampers d. Lay the fabric before 12 hours
2	Used cutting blades	Sell used blade
3	Poor quality treads	a. Check with light b. If quality is poor inform the suppler
4	Waste paper	a. Sell waste paper to Paper mills
5	Polythene waste	Arrange a person to buy.
6	Old patterns	Some will be sold And some will given back to cutting Dept.
7	Telephone, Electricity and water	a. Electrical lighting: off when not required b. Use of Telephone and water already reduced.
8	Health & Safety	a. Safety committee already appointed b. Conduct an awareness programme
9	Attitudes/Absenteeism	a. Induction programme to be improved b. Introduction of a system to control absenteeism

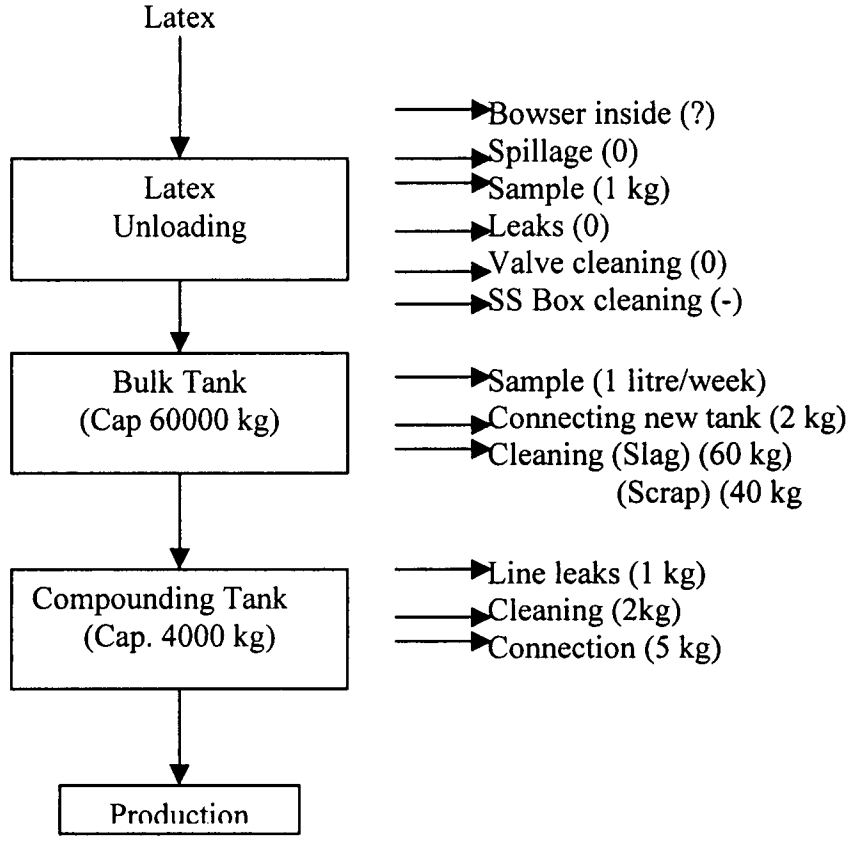
8.10. Marie De Classique Attire (Pvt)
Process Chart



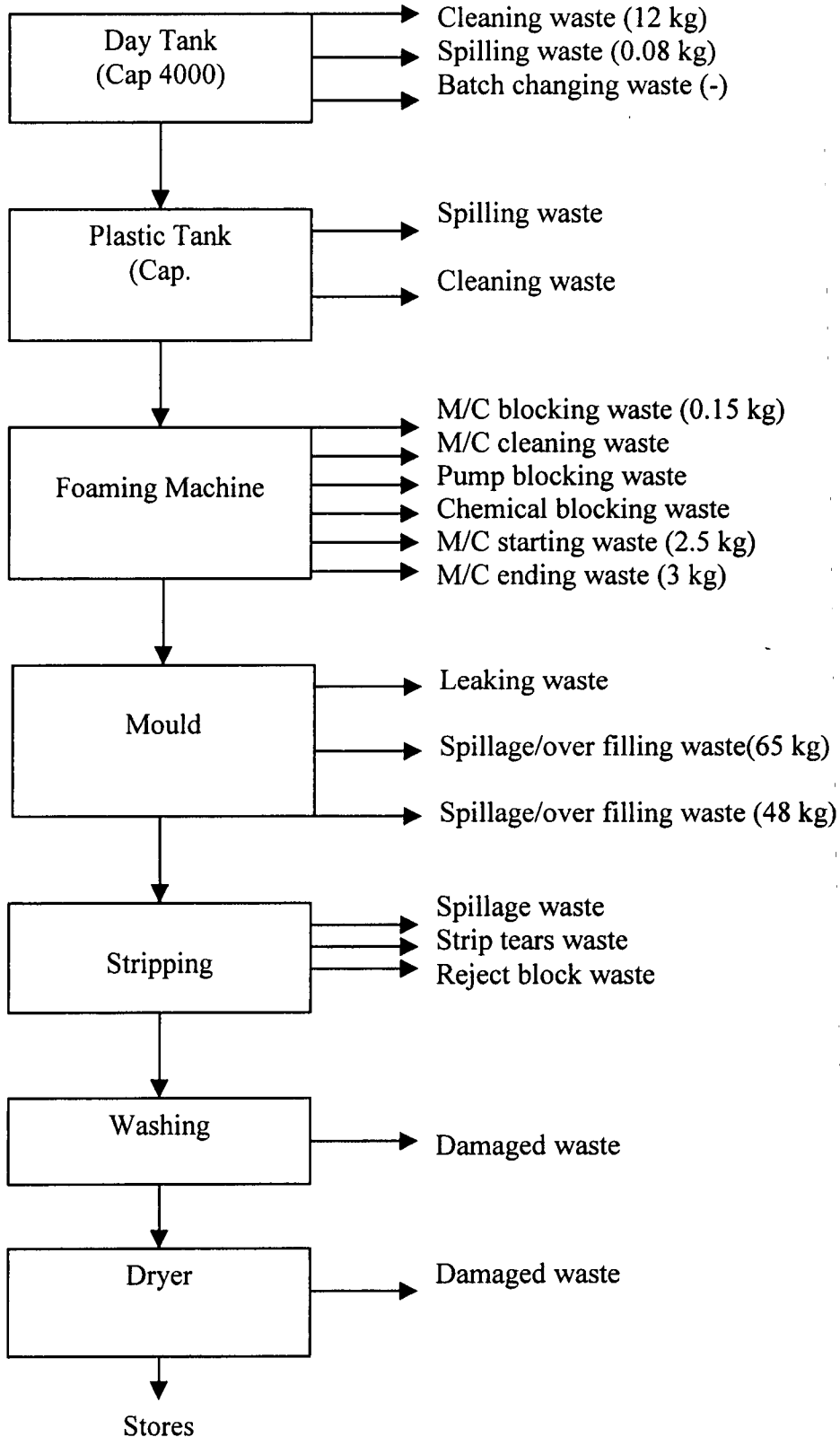
8.11. Findings Of The Brainstorming Session At Marie De Classique Attire (Pvt) Ltd

S/No	Problems	Solutions
1	**Stores** 1. Lack of space 2. Used Cartons and poly bags 3. Used cones.	1. Once construction work is competed this could be solved 2. To reuse cartons as bins wherever it is necessary and the rest to be sold out 3. Cones can be reused
2	**Cutting Dept.** 1. Lack of workers 2. Difficulties in laying and tracing 3. Disposal of used newspaper and "tipex" containers.	1. Workers to be trained and promoted 2. Laying and tracing to be improved in the future using new technology 3. Used newspapers are already sold for recycling. Explore the possibility of selling empty "Tipex" containers for recycling
3	**Issuing and Numbering** 1. Sticker paper 2. Used Ink cartridges 3. Numbering the damaged materials	4. Sticker papers to be collected and to sell for recycling 5. Explore the possibility of selling the ink cartridges 6. Workers should be trained to detect damaged materials
4	**Line** 1. Wastage of thread 2. Empty thread cones	1. Workers to be instructed in the proper way of cutting off the thread. 2. Empty cones to be sold for recycling.
5	**Checking Department** 1. Sticker papers	1. Collect as waste paper for recycling.
6	**Packing Department** 1. Damaged cartons 2. Damaged packing materials	1. Cartons to be sold for recycling 2. Polythene too to be sold for recycling

8.12. Rechard Peiris Natural Foam Ltd
Compounding Process Chart & Latex Waste



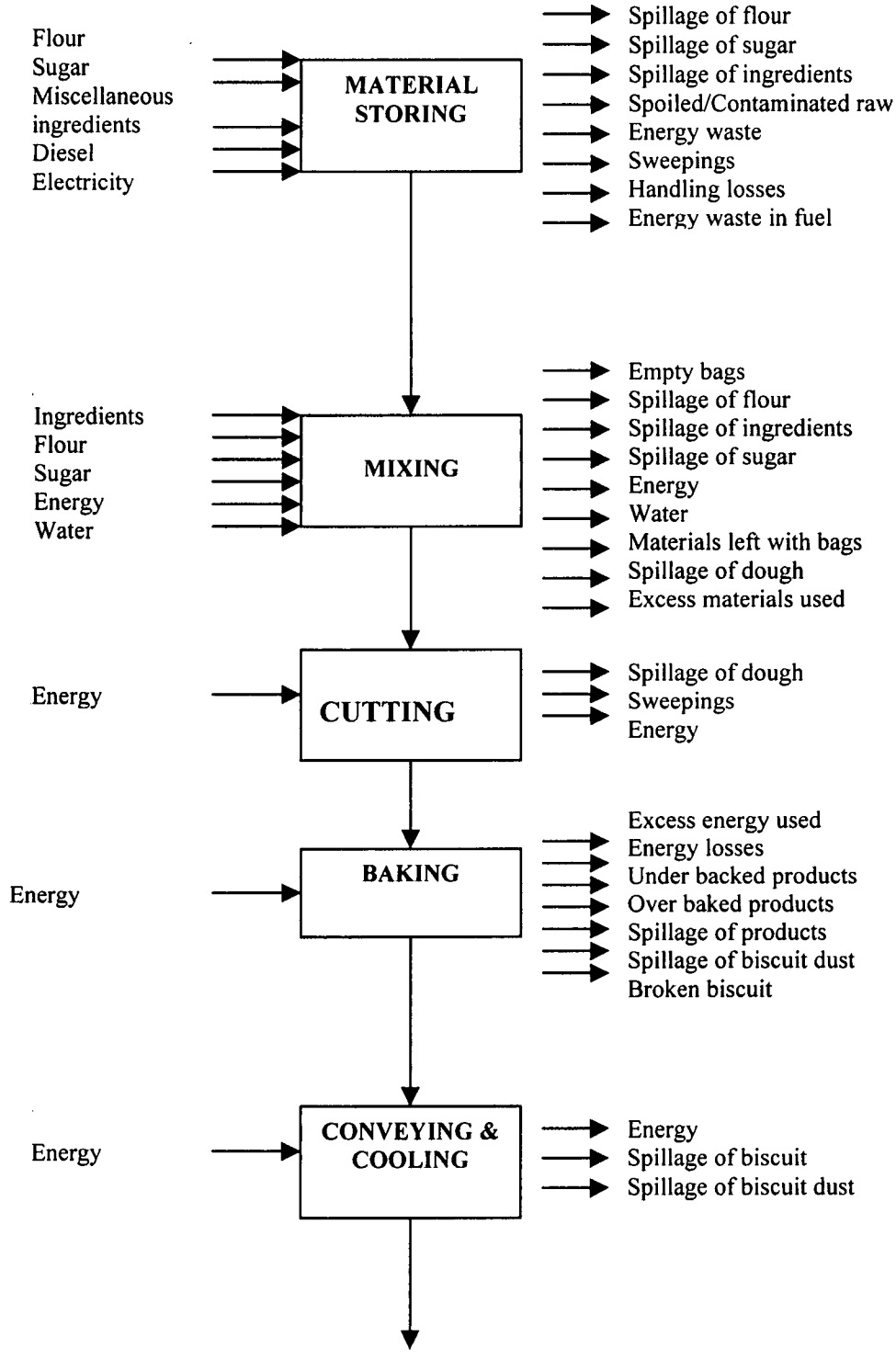
8.13. Richard Peiris Natural Foam Ltd
Production Process Chart & Latex Waste

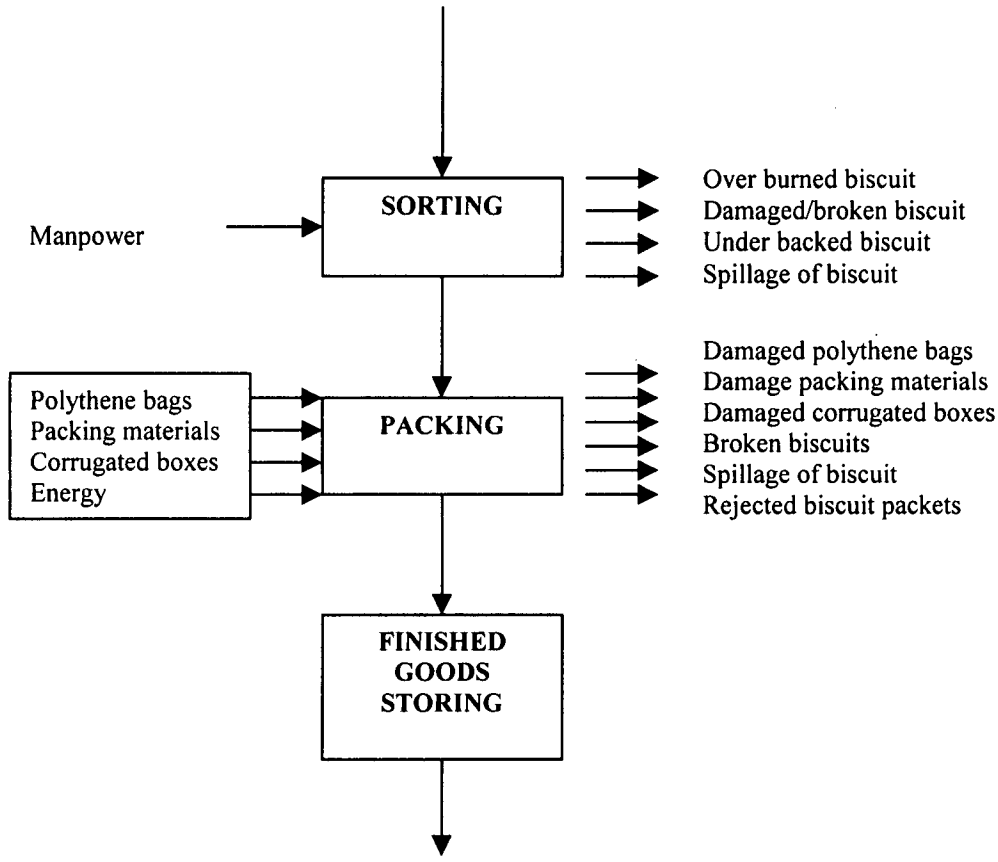


8.14. Richard Peiris Natural Foam Ltd
Findings Of The Brain Storming Session

Problems	Options
Unsuitable raw materials	Improve the quality of latex and dispersion
Blockage of machines and slipping of chains from the wheels	Proper maintenance
Overfilling and incomplete filling	Proper training of workers. Carry out experiments on mould filling.
Use of damaged moulds	Repair the moulds or discard such moulds.
Fluctuation of steam supply	Automatic control of temperature. R & D on changing of wet heat to dry heat.
Problems in "Gel Time"	Control of temperature of latex.
Problems in the removal of mattresses from the moulds	Cleaning of moulds. Control of temperature. Application of wax to be done properly. Improve the methods of powdering the moulds.
Wastage of latex	**Weekly study of wastage of latex and to minimise such waste.** **Train workers under experienced people.**
Steam wastage and boiler efficiency	**Tune and adjust the Boilers for maximum efficiency.**

8.15. Ceylon Biscuits Ltd
Process Flow Diagram & Waste Generated




SORTING
Manpower
Over burned biscuit
Damaged/broken biscuit
Under backed biscuit
Spillage of biscuit
Polythene bags
Packing materials
Corrugated boxes
Energy
PACKING
Damaged polythene bags
Damage packing materials
Damaged corrugated boxes
Broken biscuits
Spillage of biscuit
Rejected biscuit packets
FINISHED GOODS STORING

8.16. Ceylon Biscuits Ltd
Quantification And Costing Of Wastes

WASTE STREAM	QUANTITY (PER ANNUM)	COST (PER ANNUM)
Flour spillage at stores	1,600 kg	Rs. 24,000
Flour left over with bags	23,987 kg	Rs. 359,805
Flour spillage at mixing section	41,520 kg	Rs. 622,800
Sugar stuck with bags	218 kg	Rs. 6,048
Sugar spillage at grinding	10,380 kg	Rs. 290,640
Biscuit spillage at grinding	4,500 kg	Rs. 405,000
Spoiled biscuit during storage	20,000 kg	Rs. 180,000
Palm oil loss	15,000 kg	Rs. 600,000
Dough spillage	228,420 kg	Rs. 456,840
Biscuit spillage in factory	272,000 kg	Rs. 1,360,000
Total		Rs. **4,305,133**

8.17. Findings Of The Brainstorming Session At Ceylon Biscuits Ltd

1. Stores

1.1. Reasons for waste generation and other problems at unloading point.

a) Damage to bags due to use of hooks while handling.
b) Aggravation of this situation due to movement of bags several times within the stores and factory.
c) Contamination of stocks due accumulated dirt on bags.
d) Accidents due to handling of materials

Options

a) Designing the bags with a place to insert the hooks.
b) Use of a conveyer system to unload and transport bags.
c) Use of bulk handling system.

1.2. Waste of ingredients

a) Wastage of Palm oil while handling
b) Storage of items such as coco powder in unsuitable places

Options

a) Introduction of bulk handling method for Palm oil.
b) Organisation of cool dry place for storing items such as coco powder.

1.3. Present condition and irregularities at the stores.

a) Insufficient space within the stores
b) Production increase without considering the availability of space within the stores.
c) Use of available space for other purposes.
d) Disposal of waste through the food stores.

e) Disposal of sweepings through tender procedure without inquiring what the buyers are doing with such sweepings.

Option

a) When increasing production, availability of space should be considered.
b) Disposal of waste to be done through some other route other than through stores.
c) Sweepings to be disposed in such a way so that it could not be used for human consumption.

2. Mixing section

a) Spillage of ingredients when weighing
b) No proper place for storing ingredients.
c) Wastage of water due to washing off of spilled sugar
d) High heat within the section.
e) No proper ventilation within the section.

Options

a) Mechanize handling of materials.
b) Dispensing systems to be introduced wherever possible to control spillage.
c) Provide a proper storage for ingredients.
d) Improve ventilation to reduce heat.

3. Cutting Section

a) Spillage of dough after cutting.

Option

a) Adjust the conveyer and rollers to control the spillage

4. Baking Section

a) Excessive heat within the section.
b) Insufficient ventilation.
c) Insufficient space between machinery.
d) Improper maintenance of insulation of the ovens
e) Waste due to over baked and under baked biscuits. Reasons for this are:
    1. Feeding of biscuit before reaching the required temperature.
    2. In case of power failures delay in starting the machines.
    3. Non-employment of skilled operators.

Options

a) Improve ventilation within the section
b) Maintain the ovens properly
c) Check the temperature of the ovens frequently
d) Employ skilled operators

5. Conveying and cooling

a) Heat from biscuits getting transfer to the work environment
b) Restriction of flow of air through the window due to clogged mesh on the window

Options

a) Cover the conveyer and take off the heat through an exhaust system
c) Clean the mesh of the windows at least once a week (Once a week cleaning is a legal requirement)

6. Sorting and packing

a) Excessive work load due to over heated and under heated biscuits
b) Damage of biscuits due to fast handling! Competition between groups
c) Packing of biscuits in to damaged polythene packets
d) Spillage of biscuits on the floor
e) Employment of untrained temporary workers
1) Shortage of workers at some points
g) Insufficient room for workers

Options

a) Baking section to control over-heated and under-heated biscuits
b) Employ trained workers! Conduct training programmes
c) Targets for competition to be based on production with zero damage
d) Employ adequate number of workers
e) Arrange the work environment to make sufficient room

7.Maintenance section

a) Delay in carrying out maintenance work
b) Shortage of workers for maintenance work
c) Waste due to increase of machine speed

Options

a) Arrange for planned maintenance
b) Plan to employ production workers for maintenance work
c) Speed of machines to be controlled at the designed speeds

8. Incinerator

a) Incineration of sailable items because they carry the name of the organisation

Option

a) Shred the cartons and packages so that waste could be sold out. This will further save the fuel used at the incinerator. Cost of the shredder could be recovered within a short period

9. CONCLUSIONS

All 6 factories participated very enthusiastically in the implementation of the TBL project. The workers and their trade unions gave fullest support for the project and this paved the way for better labour relation in all factories. The other achievements gained by the factories are given below.

1. Textile Sector:

a) Oacinic Knitters (Pvt) Ltd., # 4, Kandawala Mawatha, Ratmalana

At the brainstorming session it was revealed that certain customers who supply materials for dying did not give correct information on the chemicals they used in processing the material. Therefore, in some situations they had to re dye the material incurring nearly SLR 85,000. To overcome this situation the option arrived at was to discuss with the supply chain and to request the customers to use the white oil instead of the coconut oil they used in the process. These customers agreed on this suggestion and there by the company is now saving extra cost they had to incur.

Money from the sale of waste papers and polythene are now used for the welfare of the employees.

Heat loss to the work environment through un-insulated machine surfaces was considered a problem and decision was taken to insulate such machine.

Since the company do not have adequate space within the premises they are unable to construct a treatment system. However, they are waiting for the common treatment system, which is to be constructed in the near future by the Government.

b) Kandygs Handloom Export Ltd., # 24, Yahampath Mawatha, Maharagama

This factory too decided to use the income, generated through sale of paper and polythene waste, for welfare of the employees.

Other option they implemented was the renewing of the electrical wiring system to facilitate switching off of lights when not required.

They are planning to modernise the dyeing system to minimise the use of water and then to install a treatment system for the effluents. For this they need financial support. SMED has undertaken to design the treatment system and to find a financial organisation that could support them

2. Apparel sector

a) Orient Garment (Pvt) Ltd, # 78 B, Polgasovita Road, Mathagoda.

This factory was relocated few months before the implementation of the project. Therefore the labour turnover indicated in the tables shows incorrect situation. At the brainstorming session many of the problems highlighted come within the social sector. This is generally common to the apparel sector. Attitude of the workers and absenteeism were taken as an important issue. As options for these problems they appointed a counsellor and introduced a system to control

absenteeism. This has already given positive result. Apart from that they too decided to use the income from sale of waste materials for workers welfare. Other option that they successfully implemented was cost cutting on the use of telephone, electricity and water.

b) Marie De Classique Attire (Pvt) Ltd, 1/12, 1st Lane, Saman Mawatha, GalawilaWatta, Homagama.

This industry is one of the smallest factories selected for the TBL project. During the project implementation period they were engaged in a building expansion project. Therefore, implementation of some of the important options such as introduction of suction table at the cutting department had to be postponed due financial restrictions.
They too took up the option of using the income from sale of general waste for workers' welfare. Lack of space was highlighted as one of the main problems in the stores section and this will be automatically solved once the construction work is over.

3. Rubber sector

a) Richard Pieris Natural foam Ltd, Export Promotion Zone, Biyagama, Mawana.

This industry had lot of options on the production process. Since some of the options highly technical matters, which involves high cost they opted mainly to control waste on latex and to improve the efficiency of the boiler and to control waste on steam during the implementation period. This was done very successfully. In the first attempt to minimise the Latex waste they were successful in bringing down the waste to 8%. One-third of the money saved on latex waste was distributed among the workers as recognition of the good work done by them on waste minimisation. This resulted in minimising the waste in the next month to 6%. They have decided to proceed with the other options in the future.

4. Confectionery Sector

a) Ceylon Biscuit Ltd, High Level Road, Makumbura, Pannipity.

This factory was the last to complete the brainstorming session. Therefore, up to now they were unable to implement any of the options. However, they have decided to go for the bulk handling system of palm oil, which is considered as a major problem at the brainstorming session. They have agreed to go ahead with the implementation of the other options in the future.

Even though there were some drawbacks due to certain administrative problems in some of the industries, the implementation of the project in Sri Lanka can be considered as a success. Apart from the financial gains, the improvement in the labour relations in all the factories can be considered as a great achievement

LABOUR LAWS APPLICABLE TO INDUSTRIES AND BUSINESS ENTERPRISES IN SRI LANKA

1. **Factories Ordinance 45 of 1942**
   An ordinance to makes provisions for Health, Safety & Welfare for workers in factories

2. **Shop & Office Employees Act No.19 of 1954**
   An Act for the regulation of employment, hours of work, remunerations etc of persons employed in shops and offices

3. **Employment of Women, Young Persons and Children Act**
   An Act to regulate employment of women, young persons and children

4. **Maternity Benefits Ordinance 32 of 1941**
   This Ordinance provides for payments of benefits and other matters incidental to employment before and after confinement

5. **Industrial Dispute Act No. 43 of 1950**
   This Act provides for the prevention, investigation and settlement of industrial disputes

6. **Termination of Employment Act No. 45 of 1971**
   An Act to regulate the termination of employment

7. **Workmen's compensation Ordinance 19 of 1935**
   Provides for the payment of compensation to workmen who are injured in the course of their employment

8. **Wages Board Ordinance No. 27 of 1941**
   An Act for the regulation of employment, hours of work, remunerations etc of persons employed in factories

9. **Employees provident Fund Act No. 15 of 1954**
   An Act to provide for the payment of superannuating benefits to persons employed in the private and corporate sector

10. **Employees trust Fund Act No. 46 of 1980**
    This Act provides for non-contributory benefits to employees on retirement

11. **Payment of Gratuity Act No. 12 of 1983**
    An Act to provide for payment of gratuity by employers to their workmen

12. **Trade Union Ordinance No. 14 0f 1935**
    This Ordinance provides for the registration and control of trade unions

GENERAL STANDARDS FOR DISCHARGE OF EFFLUENTS INTO INLAND SURFACE WATERS

No.	Determinant	Tolerance Limit
1.	Total Suspended Solids (TSS), mg/l, max	50
2.	Particle Size of Total Suspended Solids aperture size 850 microm	Shall pass sieve of
3.	pH Value at ambient temperature	6.0 to 8.5
4.	Biochemical Oxygen Demand-BOD_5 in 5 days, :20^0C, mg/l, max	30
5.	Temperature of Discharge Section of the	Shall not exceed 400C in any Stream within 15m down stream from the effluent outlet
6.	Oils and greases, mg/l max	10.0
7.	Phenolic Compounds (as phenolic OH) mg/l max	1.0
8.	Cyanides as (CN), mg/l max	0.2
9.	Sulfides, mg/l max	2.0
10.	Flourides, mg/l max	2.0
11.	Total residual chlorine, mg/l max	1.0
12.	Arsenic, mg/l max	0.2
13.	Cadmium total, mg/l max	0.1
14.	Chromium total, mg/l max	0.1
15.	Copper total, mg/l max	3.0
16.	Lead, total, mg/l max	0.1
17.	Mercury total, mg/l max	0.0005
18.	Nickel total, mg/l max	3.0
19.	Selenium total, mg/l max	0.05
20.	Zinc total, mg/l max	5.0
21.	Ammonincal nitrogen, mg/l max	50.0
22.	Pesticides	Undetectable
23.	Radio Active Material	
	a. Alpha emitters micro curie/ml	10^{-7}
	b. Beta emitters micro curie/ml	10^{-4}
24.	Chemical Oxygen Demand (COD), mg/l max	250

All efforts should be made to remove colour and unpleasant odour as far as practicable.

These values are based on dilution of effluents by at least 8 volumes of clean receiving water. If the dilution is below 8 times, the permissible limits are multiplied by 1/8 of the actual dilution.

The above-mentioned General Standards shall cease to apply with regard to a particular industry when industry specific standards are notified for that industry.

TOLERANCE LIMITS FOR INDUSTRIAL EFFLUENTS DISCHARGED ON LAND FOR IRRIGATION PURPOSE

No.	Determinant	Tolerance Limit
1.	Total Suspended Solids (TSS), mg/l, max	2100
2.	pH Value at ambient temperature	5.5 to 9.0
3.	Biochemical Oxygen Demand-BOD_5 in 5 days, :20^0C, mg/l, max	250
4.	Oils and greases, mg/l max	10.0
5.	Chloride (as Cl), mg/l max	600
6.	Sulphate(as SO_4), mg/l max	1000
7.	Boron (as B), mg/l max	2.0
8.	Arsenic (as As), mg/l max	0.2
9.	Cadmium, (as Cd), mg/l max	2.0
10.	Chromium (as Cr), mg/l max	1.0
11.	Lead (as Pb), mg/l max	1.0
12.	Mercury (as Hg), mg/l max	0.01
13.	Sodium adsorption ration: (SAR)	10 to 15
14.	Residual Sodium Carbonate, mol/l, max	2.5
15.	Radio Active Material	
	a. Alpha emitters micro curie/ml	10^{-9}
	b. Beta emitters micro curie/ml	10^{-5}

TOLERANCE LIMITS FOR INDUSTRIAL AND DOMESTICE EFFLUENTS DISCHARGED INTO MARINE COASTAL AREAS

No.	Determinant	Tolerance Limit
1.	Total Suspended Solids (TSS), mg/l, max	
	a. For process waste waters	150
	b. For cooling water effluents	Total suspended matter
	content of influent cooling water plus 10 per cent	
2.	Particulate sixe of –	
	a. Floatable Solids, max	30mm
	b. Settlable solids, max	850 micro m
3.	pH range at ambient temperature	6.0 to 8.5
4.	Biochemical Oxygen Demand-BOD_5 in 5 days, at 20^0C, mg/l, max	100
5.	Temperature, max	45^0C at the point of discharge
5.	Oils and greases, mg/l max	20.0
6.	Residual Chlorine , mg/l max	1.0
7.	Ammonical Nitrogen, mg/l max	50.0
8.	Chemical Oxygen Demand (COD), mg/l, max	250
9.	Phenolic compounds (as phenolic OH), mg/l max	5.0
10.	Cynides (as CN), mg/l max	0.2
11.	Sulphides(as S), mg/l max	5.0
12.	Flourides (as F), mg/l max	15
13.	Arsenic (as As), mg/l max	0.2
14.	Cadmium, (as Cd), mg/l max	2.0
15.	Chromium (as Cr), mg/l max	1.0
No.	**Determinant**	**Tolerance Limit**
16.	Copper (as Cu), mg/l, max	3.0
17.	Lead (as Pb), mg/l max	1.0
18.	Mercury (as Hg), mg/l max	0.01
19.	Nickel (as Ni), mg/l max	5.0
20.	Selenium (as (Se), mg/l, max	0.05
21.	Zinc (as Zn), mg/l, max	5.0
22.	Radio Active Material	
	a. Alpha emitters micro curie/ml	10^{-8}
	b. Beta emitters micro curie/ml	10^{-7}
23.	Organo – Phosphorus compounds	1.0
24.	Chlorinated hydrocarbons (as Cl), mg/l, max	0.02

Note 1: All efforts should be made to remove colour and unpleasant odour as far as practicable.

Note 2: These values are based on dilution of effluents by at least 8 volumes of clean receiving water. If the dilution is below 8 times, the permissible limits are multiplied by 1/8 of the actual dilution.

TOLERANCE LIMITS FOR EFFLUENTS FROM RUBBER FACTORIES DISCHARGED INTO INLAND SURFACE WATERS

No.	Determinant	Tolerance Limit	
		Type I Factories*	Type II Factories**
1.	pH Value at ambient temperature to 8.5	6.5 to 8.5	6.5
2.	Total Suspended Solids (TSS), mg/l, max	100	100
3.	Total Solids, mg/l, max	1500	1000
4.	Biochemical Oxygen Demand-BOD_5 in 5 days, at 20^0C, mg/l, max	60	50
5.	Chemical Oxygen Demand (COD), mg/l, max	400	400
6.	Total Nitrogen, mg/l, max	300	60
7.	Ammonical Nitrogen	300	40
8.	Sulfides, mg/l, max	2.0	2.0

**** Type I Factories - Latex Concentrate***
***** Type II Factories – Standard Lanka Rubber; Crape Rubber, Ribbed Smoked Sheets***

Note 1: All efforts should be made to remove colour and unpleasant odour as far as practicable.

Note 2: These values are based on dilution of effluents by at least 8 volumes of clean receiving water. If the dilution is below 8 times, the permissible limits are multiplied by 1/8 of the actual dilution.

TOLERANCE LIMITS FOR EFFLUENTS FROM TEXTILE INDUSTRY DISCHARGED INTO INLAND SURFACE WATERS

No.	Determinant	Tolerance Limit
1.	pH Value at ambient temperature	6.5 to 8.5
2.	Temperature, ^{0}C, max	40 measured at site of the sampling
3.	Total Suspended Solids (TSS), mg/l, max	50
4.	Biochemical Oxygen Demand-BOD_5 in 5 days, at 20^0C, mg/l, max	60
5.	Chemical Oxygen Demand (COD), mg/l, max	250
6.	Oils and Grease, mg/l, max	10.0
7.	Phenolic compounds (as phenolic OH), mg/l, max	1.0
8.	Sulfides, mg/l, max	2.0
9.	Chromium total, mg/l max	2.0
10.	Hexavalent chromium, mg/l, max	0.5
11.	Copper total, mg/l, max	3.0
12.	Zinc total, mg/l, max	5.0
13.	Ammonical Nitrogen	60
14.	Chloride (as Cl), mg/l, max	70

Note 1: All efforts should be made to remove colour and unpleasant odour as far as practicable.

Note 2: These values are based on dilution of effluents by at least 8 volumes of clean receiving water. If the dilution is below 8 times, the permissible limits are multiplied by 1/8 of the actual dilution.