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PROJECT

ON

TRIPLE BOTTOM LINE DEMONSTRATION PROJECT IN SOUTH ASIAN COUNTRIES

KARNATAKA (INDIA)

FINAL REPORT

(XP/RAS/01/003)

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Karnataka Cleaner Production Centre, India

(December, 2001)

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EXECUTIVE SUMMERY

Implementation of UNIDO Triple Bottom Line (TBL) demonstration project in Karnataka was launched on November 2001 with an Awareness Programme for the Textile and Garment Units to brief the industrialist on the TBL concept and what gains they could achieve when the concept is implemented. Later on another in-house Training Programme on TBL for the interested industries was held in December 2001. Immediately after the workshop through plant visits, discussions with management of industries.

The selected industries are from Textile sector. These two units were selected from textile sector located at Bangalore, Karnataka. One of these units namely M/s K. Mohan & Company. This unit is an 100% export oriented unit (EOU). The other unit namely M/s Arvind Fashions Ltd. produces garments (Denim Trousers & shirts) from fabric are suppliers to the local market.

The detailed studies in the selected two industries were undertaken by Karnataka Cleaner Production Centre (KCPC) during December 2001. In all the two selected demonstration units a TBL team was formed consisting top management, middle management, supervisors, workers and KCPC consultants. The team undertook TBL audit including detailed batch wise field studies during which an assessment was done with respect to the technological, financial, environmental, safety and social aspects inter linked with the production process.

During assessment, the unit operations were observed and samples of wastewater were collected at the end of various unit operations and were analysed for relevant parameters.

Based on the assessment, a brainstorming exercise was conducted by the TBL team members to analyse the cause of generation of the various waste streams and for each cause a variety of Cleaner Production opportunities were identified by the team. These opportunities are being analysed economically, environmentally along with the social responsibilities to convert them into implementable TBL solutions. These TBL solutions were further short listed during brainstorming sessions considering their techno-economical feasibility, environmental viability, related safety, ergonomic and social aspects. These short-listed TBL solutions were discussed with the management for implementation. Trials were made for short term TBL solutions with high profits for implementation. The implementation of these options is underway.

It is anticipated that through implementation of TBL solutions industries, apart from the reduced cost of production and improved quality, would improve the shop floor work environment and increase safety of workers. This would lead to healthy employer and employees relations and higher productivity.

Final Report of the Triple Bottom Line (TBL) demonstration project in Karnataka, India

Introduction:

The fashion industry world wide, dedicated, as it is to emotional and often aspiration factors in arriving at marketing decisions, has rarely embraced a quantitative approach to decision making. Indeed, a rational emphasis is often suspect in an industry committed to placing to attractive exterior above the some what imperfect bodies willed to us by nature. However complexities now being increasingly faced by the fashion industry, both in consumption and production, demand a more rational and systematic approach.

Indian garment industry has displayed an exceptional growth record by Indian Standards the boom in garment exports during the seventies and eighties has led to a sharp increase in their share in total exports from 2% in 1970-71 to 17% in 1992-93. Now the Rs.20,000/- crore plus value of exports that the clothing industry in India accounts for annually is spread over 35,000 ready made garment manufacturing units involving over 3.5 million people.

Small units running 50-60 machines account for a large portion of these units. Even though the Government of India has accorded a very high priority to this sector. It is necessary at this stage to review our strengths and weaknesses. Strong cotton bases, cheap labour, low capital investment, ability to cater to small and diversified demands are some of the quoted strength of our industry.

Lack of modernization, low productivity of labour, limited fabric base, lack of trained staff, infrastructure, high cost of capital are few of the very evident weaknesses in our country from the garment industry's perspective.

In Karnataka there are about 600 garment units, of which 60% are located in Bangalore. So 60% of state garment units are located in Bangalore. And all these come under small and medium scale sector. Women in major workforce involved in these units, 80% of workforce in all garment units in Bangalore have women as their workers. Some garment units which are small in nature use traditional type of machines and equipments without inadequate safety and infrastructure. Washing of garments is done without taking measures to control pollution load to environment. Hence there is good potential for improvements in existing methods and procedures. Hence environmental benefits and financial improvements can be shown. As 80% labour force is women, there is tremendous amount of potential to relate productivity to social issues.

As garment units are export oriented, buyers code of conduct is also a driving force for TBL approach acceptance.

1. Selection of the units for detailed studies based on CP potential and social issues involved, two garment units in the textile sector, Bangalore were selected for TBL studies. An MOU has been signed between the selected units and KCPC.

The name and address of the industries selected are as follows:

1. M/s. K. Mohan Company
   SLV Unit
   Singasandra, Hosur Road
   Bangalore

2. M/s. Arvind Fashions Ltd.,
Bommasandra Industrial Area
Hosur Raod, Bangalore

Basic Data on Selected Unit

BASIC DATA ON SELECTED FACTORIES

Sl.No.	Name of the factory	Status of factory	Number of Employees		Product Manufactured	Output	Export %	
			Perm.	Contract *			Direct	Indir.
1	M/S K. Mohan & Company	Proprietor ship	975	-	Readymade Garments	2000 garments per day	95	5
2	M/S Arvind Fashions Ltd.	Private Limited	445	60	Readymade Garments (denim products	2500-3000 garments per day	20	Nil

FINANCIAL BOTTOM LINE

Measure	M/S K. Mohan & Company	M/S. Arvind Fashions Ltd.
1. Pure Financial Measures		
Earnings Before Interest and tax (EBIT) x 100 / Average capital employed over the year		
2. Resource Productivity Measures		
2.1 Overall productivity measures		
a Value added x 100/ Value of inputs		
b Value added x 100/ Value of Standard Output		
2.2 Labour productivity measures		
a. Value added x 100/ No. Employees		
b. Value added x 100/ Total Std Year		
c. Value added x 100/ Total wage bill		
2.3 Capital Productivity measures		
Value added x 100/ Average Capital Employed		
2.4 Energy Productivity		
Value added x 100/ Kw. Hr of Energy		

3. Resource Utilization Measures		
3.1. Plant utilization		
a. Average % Utilisation under current operating conditions	85%	85%
b. Average % utilisation of plant compared to technical maxima	90%	90%
3.2 Labour force utlization		
a. Worker days lost x 100 /Total Days worked	8%	7%
b. Overtime hours x 100/ Total hours worked	Nil	11%
3.3 Shift work pattern		
a. No. of Shifts worked	1	1
b Basic shift length (hours)	8	8
c. Overtime worked (hours)	Nil	2
4. Resource stability measures		
4.1 Labour force stability		
Labour turnover rate =No of workers leaving during the period / Av number of employees for same period	3%	4.5%
b. Labour retention rate = No workers who started the period present at the end/ Av No of employees for same period	97%	95.5%
4.2 Stock (inventory) turnover		
No. of times /pa	-	-
4.3 Average age of capital equipment		1
Age in Years	6	6

SOCIAL BOTTOM LINE

SOCIAL ISSUES	M/S K. Mohan & Company	M/S Arvind Fashions Ltd.,
Hours of work	Strictly 8 hours a day	As per the employment terms 8 hours a day but some times it extends to maximum of 2 hours over time.
Compensation and Benefits	15 days earn leave and 20 days casual leave for permanent staff only Benefits and compensation is covered as per ESI-PF regulations	Leave entitlement for the employees is not mentioned in any formal contract but depends upon the discretion of the management Benefits and compensation is covered as per ESI-PF regulations Advance loans to the workers are provided based on their service period.
Freedom of Associa.	No union but satisfactory labour relations	No union but good labour relations
Safety Policy & Organisation	No formal safety policy exists but general guidelines are issued at the time of induction. Safety equipments such as mask and metal glows are provided.	No formal safety policy exists. Safety equipments such as mask and metal glows are provided
Health & Safety Issues	Noise level is more. Health center with a permanent Doctor and nurse and creache are provided for workers	Cases will be referred to ESI Free medicines are provided to the workers.
Harassment and Abuse	Freedom from harassment is guaranteed Employees are free to contact HRD Manager against any harassment	Freedom from harassment is guaranteed Employees are free to contact HRD Manager against any harassment
Discrimination	No discrimination on grounds of race, religion, caste etc.	No discrimination on grounds of race, religion, caste etc.
Use of Child Labour	No child labour	No child labour
Use of forced/ bonded labour	No forced /bonded labour	No forced /bonded labour

Environmental Bottom Line

Pollutants	M/s. K. Mohan & Co.	M/s. Arvind Fashions
Emissions from boiler	Emissions from the boiler are with in acceptable level	Emissions from the boiler are with in acceptable level
D-G set	Emissions from the boiler are with in acceptable level	Emissions from the boiler are with in acceptable level
Indoor air Quality	--	--
Solid waste	1. ETP sludge, 2. metal pieces like needles all are sold to scrap dealers 3. Cuttings of fabric and residual waste piece of threads. 4. Waste piece of threads fabric is given to toy making units (i.e., to women NGOs)	1. ETP sludge 2. metal pieces like needles all are sold to scrap dealers 3. Cuttings of fabric and residual waste piece of threads
Liquid waste	Wash water from hydro extraction goes to ETP for treatment. Garment wash water is treated in ETP and used for secondary purposes like gardening and for agricultural purpose	Wash water from hydro extractor goes to ETP for treatment. Garment washed waste water which consists of dye (due to denim wash) is treated in ETP and discharged into Sewers
Basis	Per 2000 pieces of garment produced per day	Per 2000 pieces of garment produced per day
Quantity of composite waste water (in cum)	100 m^3	200 m^3
PH	8.43	8.65
COD (mg/l)	188	320
TDS (mg/1)	4400	5600
TSS	16	53
BOD (mg/1)	58	120

Generation and Evaluation of Triple Bottom Line (TBL) solutions and its anticipated benefits with regard to technical environmental, financial and social aspects

Based on the cause analysis, input output balance, literature survey and brain storming among team members and experts following TBL solutions are generated. These solutions are evaluated considering technical, environmental, financial and social aspects for their implementation. The same are mentioned in the table below:

For M/s K. Mohan & Company, Bangalore

Sl.No.	TBL Solutions	TECHNICAL IMPACTS					ENVIRONMENTAL IMPACTS				FINANCIAL IMPACTS				SOCIAL IMPACTS			
							Change in Pollution Load (kg/batch)			Change in Volume of waste generat.					Required Social Changes to Implement the Option		Total Social Benefit	
		Equipment Required	Man power Req.	Production Quality	Energy Consumption	Re-source Consumption	COD	BOD	TDS		Investm. (Rs./year)	Environmental Cost (Rs/year)	Savings (Rs/year)	Pay back Period	Ranking*	Requirement	Employee's benefit	Employer Benefit
1	Introducing automatic CAD cutting machine in cutting section replacing manual cutting *	Automatic cutting machine	-	Improves	Reduced because no lighting required	Saving in electricity and brown paper consumption	-	-	-	Fabric solid waste will be reduced by 10% & brown paper consumption by 35 kgs / day	1.25 crores	NQ	8-10 %	3 years	2	Shifting of existing cutting master to the Department of CAD design by giving appropriate training	Accidents due to manual cutting machine will be reduced	Savings in cutting cos
2	Replacing existing tube lights of 40 watts with 28 watts fluorescent tube lights with a chrome reflectors	Fluorescent lamps & chromium reflectors	Nil	Nil	Reduction by 50%	-	-	-	-	-	7,78,500/-	Nil	4,15,584	21 mths	3	Nil	Improved illumination	Reduced rejection
3	Replacing existing needle guards with modified operator friendly needle guards*	Aluminium wires	Nil	No effect	Nil	-	-	-	-	NQ	10,000	NQ	NQ	NQ	3	Nil	Workers fingers are protected	Workers safety
4	Avoiding of dummy stitching for trouser pockets*	Nil	Nil	No effect	Reduce one operation	Savings in energy	-	-	-	Extra thread waste avoided	Nil	Nil	Minimum savings	NQ	2	Shifting a person from removal of dummy stitching section to	Time of the worker can be saved	Efficient us of manpowe and reduce operation

																extra thread removal section		
5	Preventing steam leakages	Insulation material	Nil	Quality of the steam increases	Reduces	Fuel savings	-	-	-	CO_2 emission reduces	5000	Nil	1,70,000	4 days	1	Nil	Heat in the floor shop decreases	Providing healthy environme to the workers
6	Preventing air leakage	Insulation material	Nil	Uniform compressed air at workstation	Energy consumption reduces	Saving in electricity	-	-	-	Reduced GHG emission	1000	-	81,000	One week	1	Nil	Sound pollution decreases due to reduction in hissing sound	Providing reduced noise leve environme
7	Providing steam traps before header	Steam traps	Nil	Dry steam instead of wet steam	Reduces	Fuel savings	-	-	-	CO2 Emission reduces	4500	-	42,000	One Month	1	Nil	NO blame on worker due to wet steam staining	Does not have to blame workers
8	Providing Mid day meals*	Caterer	Nil	Improves	Nil	Nil	-	-	-	Food waste increases	NQ	NQ	NQ	NQ	2	Nil	Will get food at concessional rate	Absenteei m will be reduced
9	Production incentive scheme*	Nil	Nil	Quality improves	Nil	No effect	-	-	-	-					1	Motivation and group behavioural activity to be encouraged	Maximize the out put	Higher productivit
10	Providing Rain water harvesting system	Filter with rain water collection system-	Nil	No Effect	No effect	Saving in soft water used	-	-	-	-	20,000-	Nil	30,000	8 months	3	To change the mind set of operator of boiler section	Nil	Savings i water consumpti
11	Condensate recovery	Piping requirements	Nil	No effect	Reduces	Savings in fuel consumption	-	-	-	Quantity of waste water generation reduces Load on ETP reduces	15,000	12,000 (Treatment &Pumping cost)	34,617	6 months	2	To make them aware about value of condensate to Iron section operator	Nil	Savings i Fuel & wat consumpti

NOTE- * Details are given in Annexure –1

- **Ranking: 1 = Essential**
- **2 = Marginal;**
- **3 =Nil**

For M/s. Aravind Fashions Ltd.

Sl.No.	TBL Solutions	TECHNICAL IMPACTS					ENVIRONMENTAL IMPACTS				FINANCIAL IMPACTS				SOCIAL IMPACTS			
							Change in Pollution Load (kg/batch)			Change in Volume of waste generat.					Required Social Changes to Implement the Option		Total Social Benefit	
		Equipment Required	Manpower Required	Production Quality	Energy Consumption	Re-source Consumption	COD	BOD	TDS		Investment (Rs./year)	Environmental Cost Rs/year	Savings Rs/year	Payack Period	Ranking*	Requirement	Employee's benefit	Employer's Benefit
1	Earmarking space for keeping fabric rolls on racks #	Name plates with date of arrival & lot number	Nil	Nil	No effect	Saves time	-	-	-	-	Very negligible	-	NQ	NQ	1	Training of manpower	Easy to identify the fabric	Saves time in identifying
2	Replacing existing short steel plates with single steel plate used for marking on fabric #	Table length steel plate(1 for each table)	Nil	Neat cutting quality improves	No effect	Saves fabric	-	-	-	Reduces volume of fabric waste	Rs. 5000 for 3 pieces	-	NQ	NQ	2	Training needed	Easy for marking	-
3	Providing pocket setting machine #	Pocket setting machine	Nil	Improves	Reduces	Fabric & energy saving	-	-	-	Saves fabric	Rs. 5,00,000	Nq	-	-	2	Training needed	Easy for operation	Better quality
4	Providing accurate length and size aluminium pieces instead of small pieces # for easy ironing	Aluminium pieces	Nil	Improves	No effect	No effect	-	-	-	-	Very negligible	NQ	NQ	NQ	1	Nil	Easy and accurate ironing	Reduced reject
5	Providing ironing station between stitching section#	Ironing stations	Extra person	Improves	Increases	Increases	-	-	-	-	Rs. 5,000 per line such for 4 lines	NQ	NQ	NQ	2	Nil	Easy for operator who is working on sewing machine	Possible reduction in rejection rate

6	Avoiding dummy stitching *	Nil	Nil	No effect	Reduces	Saving in electricity	-	-	-	Reduces thread waste	Nil	Nil	NQ	NQ	2	Nil	One operative reduces	Reduces cycle time
7	Use of formic acid instead of acetic acid in washing	Nil	-	No effect	-	Saving in chemical consumption	NQ	NQ	NQ	-	Nil	Reduction in pollution load	Savings per batch Rs.3.40	Less than 6 month	3	NQ	Nil	Nil
8	Reducing blow down frequency	Nil	-	No effect	Reduces	Savings in fuel consumption	Nil	Nil	Decrease	Nil	Nil	Reduction in pollution load	-	-	2	Nil	Nil	Nil
9	Reducing pressure at ironing station #	Nil	-	-	Reduce	Saving in fuel consumption	Nil	Nil	-	-	-	-	-	-	1		Reduce risk of accident	Workers are protected good environmen
10	Covering the steam louvers #	Fibre glass covers	Nil	No effect	-	Saving in fuel consumption	-	-	-	Decreases	Rs.5,000/- per machine	-	Rs. 3,000/- per year	1 ½ year	1	Nil	Reduces accidents	Workers are protected
11	Insulating thermic fluid carrier pipe or stinters	Insulating material	-	-	Reduces	Saving fuel consumption	-	-	-	-	-	-	-	-	-		Working environment will be cooler	Provides good health environmen
12	Providing Rain water harvesting system *	Filter with rain water collection system-	Nil	No Effect	No effect	Saving in soft water used	-	-	-	-	40,000	Nil	5,00,000	Less than 15 Days	3	To change the mind set of operator of boiler section	Nil	Purchase o water from tankers minimizes
13	Providing Glass case to sand blasting machine#	Glass cover	Nil	Improves	No effect	No effect	-	-	-	-	25,000	NQ	NQ		2		Reduces risk of Silicosys	Providing good Working Environmen

NOTE -# Details are given in Annexure –2

*** Details are given in Annexure –1**

Ranking:

1 = Essential

2 = Marginal

3 = Nil

CONCLUSION

The study undertaken in both the demonstration units has resulted in generation of about 24 TBL solutions. The analysis of the TBL solutions indicated that they are not only financially and environmentally attractive but in many cases does result in improving social conditions/issues like reduced accidents, reduced noise levels, better work environment, reduced absenteeism, increased workforce motivation etc. The management of the demonstration units is also interested and willing to implement the identified TBL solutions.

It is anticipated that through implementation of TBL solutions industries, apart from the reduced cost of production and improved quality, would improve the shop floor work environment and increase safety of workers. This would lead to healthy employer and employees relations and higher productivity. By implementing these options they are meeting the buyers specifications.

Annexure 1

Options 1:

Introducing automatic CAD cutting machine, earlier cutting was done in the following way. Layers of fabrics are laid over this brown paper is laid exactly fitting the size of fabric. Then with the help of standard templates marking is done on brown paper. Then cutting master will manually cut the fabric according to marking. This requires high illumination at the working point and lot of dust is generated. By introducing automatic CAD cutting machine all these problems will be solved. Only problem is relocation of existing cutting master and markers. They should be trained in handling machine and also can be put on to a job of quality checking.

Options 3:

Needle guards are standard part of sewing machine. But this is hampering easy flow of fabric during sewing operation. Hence introduction of modified needle guards, which workers themselves designed it.

Options 4:

During sewing operation dummy stitches are provided to cover the opening of pockets before washing. This is a precautionary measure taken to avoid damage due to heavy washing by public stones. Though pockets are covered we find sand dust and small pieces of stones inside pocket, which indicates stitches are non-effective. Hence avoiding dummy stitching will help in avoiding unnecessary operations viz stitching and removal of dummy stitches.

Option 5:

Providing mid day meals:

Workers leave their houses at 7 AM to reach factory at 8 AM. Most of them are women workers, hence they are not able to prepare food within time. As they cannot be offered to pay for food in Hotels, they just take light eatables, which is affecting concentration of workers during working especially in the afternoon. Absenteeism was also more during afternoon session. Introduction of mid-day meals at subsidised rate helped workers to remain at the work place and improved their concentration on work. Absenteeism has reduced from 13% to 5 to 8%.

Option 6:

Production Incentive Scheme:

Earlier workers were given production targets on hourly basis. That was leading to extra hours of working and over time. When production incentive scheme was introduced, not only are they achieving target within time but also increased production by 20%. For this increase in production workers are given an additional 10% of basic salary at the middle of the month.

Annexure 2

Option 1:

Earlier as and when, they receive fabric, they used to keep fabric rolls on racks. Every time workers have to search for that particular colour and type of fabric before it is going for quality check. Hence earmarking of space for particular fabric and putting plates with date of arrival and batch number will help worker in identifying the fabric very easily.

Option 2:

Earlier after laying cloth, they were using three short steel scales for marking before cutting, which was leading to incorrect alignment thereby to improper cutting of fabric. Hence it was recommended that scale with size equal to width of table would avoid this wastage of fabric.

Option 3:

Earlier while preparing pockets they used to keep 3/8" allowance for margin for easy ironing. Then extra margin (3/8" – 1/8") is removed. By introducing pocket setting machine, automatically with help of different types of dyes, pockets with are made in less time. Allowance only 1/8" is kept now for this machine. So by introducing this machine, accurate size, shape, pockets are produced. Rejection rate has been reduced and it is very fast in nature.

Option 4:

Earlier small pieces of standard size templates were given to iron station workers for ironing. As the length of fabric was more than the template, it was difficult for workers to fold it and iron it. Hence it was recommended to provide full-length template for easy ironing purpose.

Option 5:

Earlier during sewing operation, operator used to fold and then stitch the fabric. This was time consuming and workers were not able to concentrate on both job of folding and stitching. It was recommended an ironing station before stitching to fold and iron. This was helping stitching workers to do his job properly and rejection rate was reduced.

Option 6:

Reducing steams pressure: The workers in this section were under the impression that more the steam pressure accurate the ironing would be. As a precautionary measure they have set the pressure of 5 psig. It was recommended to reduce pressure.

Option 7:

Steam louvers are the equipment, which forcedly spray steam over trousers. This helps in reducing rigidity of fabric and for easy folding. This is open process. It was found in one case that due to pressure trouser was ripped through and steam was about to hit a person standing near the machine. Hence to avoid accident and to collect the condense it was recommended to cover with fibreglasses.

Option 8:

In sand blasting machines, workers used to wear heavy protective equipments to protect themselves. They had to wear for 8 hours such a heavy garment. To avoid inconvenience it was recommended to make partition with glass or fibre glass to prevent direct contact of sand and worker. This will also avoid heavy wearing of garments.