Reprint **ISSN 1997-2571 (Web Version)**

Journal of Innovation & Development Strategy (JIDS)

(J. Innov. Dev. Strategy)

Volume: 6 **Issue: 1** **April 2012**

J. Innov. Dev. Strategy 6(1):54-62(April 2012)

PRE-FEASIBILITY STUDY OF DOUBLE SHIFTING IN GARMENTS INDUSTRY OF BANGLADESH

M.I. ISLAM, A.B.M.S. DOULAH AND I. FARZANA

GGF
Nature is Power

An International Scientific Research Publisher
Green Global Foundation©
Publication and Bibliography Division
100 Leeward Glenway
Apartment # 1601
M3c2z1, Toronto, Canada
E-mails: publication@ggfagro.com, editor@ggfagro.com
http://ggfagro.com/ejournals/current issues

JIDS** issn 1997-2571, HQ:19-10 central place, saskatoon, saskatchewan, s7n 2s2, Canada

ISSN-1997-2571 (Online)
J. Innov. Dev. Strategy 6(1):54-62(April 2012)

PRE-FEASIBILITY STUDY OF DOUBLE SHIFTING IN GARMENTS INDUSTRY OF BANGLADESH

M.I. ISLAM[1], A.B.M.S. DOULAH[1] AND I. FARZANA[2]

[1]Department of Textile Engineering, Ahsanullah University of Science & Technology, Dhaka, Bangladesh; [2]Fashion Design & Technology, Shanto-Mariam University of Creative Technology, Dhaka, Bangladesh.

Corresponding author & address: Md. Imranul Islam, E-mail: imuislam07@yahoo.com
Accepted for publication on 11 March 2012

ABSTRACT

Islam MI, Doulah ABMS, Farzana I (2012) Pre-feasibility study of double shifting in garments industry of Bangladesh. *J. Innov. Dev. Strategy.* 6(1), 54-62.

Bangladesh's garment industry has been at the heart of the country's export boom ever since the first factory opened in 1976. The industry has grown dramatically over the past 35 years, and today accounts for 78.97% of Bangladesh's total exports. There are now 4,825 garment factories in Bangladesh employing over three million people. Though day by day, garments orders are increasing but production are not increasing simultaneously. To cope up with this increasing order, it is required to increase production. If it can be applied double shift in the garments industry, not only it is possible to increase production but also it reduces production cost and less production cost ensures profit maximization. Again, double shift is a means of reducing overtime as well as working stress for a long time that has correlation with quality products, low production cost & buyer satisfaction. That's why double shifting is so important for our RMG sector to compete with world RMG market. By this study, the Garments productivity increases, overhead cost reduces significantly and therefore ensuring the feasibility of double shift.

Key words: *double shifting, feasibility, garments, garments production cost, overtime*

INTRODUCTION

Bangladesh earned a dizzying success in the manufacture & export of apparels in the world. In some categories of products, Bangladesh secured top position in terms of export in volume & value. Though its economy & society has a large number of shortcomings, still Bangladesh occupied a significant place in the export of apparels because of the hard labor of workers, off the clock work by female workers to achieve shipment target, hard labor of entrepreneurs, minimum labor cost, minimum energy cost, availability of labor & government rules & regulation in favor of exports (Kashem 2006). The country has accumulated export earnings from few millions to billions US dollars over a period of one and half decade time (Biswas 2006). Bangladesh yearly earns a huge amount of foreign currency (US $ 17,914.46 Million, for FY2010-11) by exporting garments product instead of total export by currency (US $ 22,924.38 Million). It occupied 78.15% of total export of Bangladesh (Awal 2005). Textiles have been an extremely important part of Bangladesh's economy for a very long time for a number of reasons. The textile industry is concerned with meeting the demand for clothing, which is a basic necessity of life. Currently, the textile industry accounts for 45% of all industrial employment in the country and contributes 5% of the total national income (Kashem 2008). Currently, Bangladesh is securing 3rd place in the world apparel export with 4.50% export coverage. It was 5th in last year with 3.40% coverage and the growth rate is 25%. As other competing countries like China, Vietnam, India and Pakistan are facing higher costs of production; Bangladesh is becoming more popular with the buyers for affordable prices of garment items. This sector of the industry has spent the last few years considering how it can organize its production so that garments are made efficiently and a satisfactory quality standard but with as short a throughput time as possible (Carr and Latham, 1994). This has generated an increasing requirement for flexible machinery, multi-skilled operators and lateral thinking about the actual methods of assembly that are used for garments.

GARMENT PRODUCTION SYSTEMS

The choice of best apparel production system will depend on the product and policies of the company and on the capacities of manpower (Solinger 1988). Where style changes are frequent and lot sizes small, it may be advantageous to use skilled labour who can make whole garment and use one of the whole garment system. As the lot size increases it is advisable to use section production system (Cooklin 2005).

a) Whole garment production system
b) Section or Process System - Group System
c) Progressive Bundle System - Batch System
d) Straight-line or 'Synchro' System
e) Unit Production System (UPS)
f) Quick Response Sewing System

Evaluation of production systems:

Any production system has four primary factors, which make up the system.

Processing Time + Transportation Time + Temporary Storage Time + Inspection Time = Total Production Time.

Processing time is sum total of working time of all operations involved in manufacture of a garment. Transportation time involves the time taken to transport semi-finished or finished garments from one department to another or from one operation/machine to another. Temporary storage time is time during which the

garment/bundle is idle as it waits for next operation or for completion of certain parts. Inspection time is time taken for inspecting semi-finished garments for any defects during manufacturing or inspecting fully finished garments before packing. The main aim of any production system is to achieve minimum possible total production time. This automatically reduces in-process inventory and its cost. The sub-assembly system reduces temporary storage time to zero by combining temporary storage time with transportation time (Absar 2001).

PRE-FEASIBILITY

A pre feasibility study is defined as an evaluation or analysis of the potential impact of a proposed project or program (Bhattacharya 1997). A feasibility study is conducted to assist decision-makers in determining whether or not to implement a particular project or program. The feasibility study is based on extensive research on both the current practices and the proposed project/program. The feasibility study will contain extensive data related to financial and operational impact and will include advantages and disadvantages of both the current situation and the proposed plan. The extensive research, conducted in a non-biased manner, will provide data upon which to base a decision. Feasibility studies aim to objectively and rationally uncover the strengths and weaknesses of the existing business or proposed venture, opportunities and threats as presented by the environment, the resources required to carry through, and ultimately the prospects for success. In its simplest term, the two criteria to judge feasibility are cost required and value to be attained. As such, a well-designed feasibility study should provide a historical background of the business or project, description of the product or service, accounting statements, details of the operations and management, marketing research and policies, financial data, legal requirements and tax.

SHIFTING:

Shifting is an employment practice designed to make use of the 24 hours of the clock. The term "shifting" includes both long-term night shifts and work schedules in which employees change or rotate shifts. A related yet different concept, the work shift, is the time period during which a person is at work. “Shift work refers to a job schedule in which employees work hours other than the standard hours of 8 a.m. to 5 p.m. or a schedule other than the standard workweek - Monday through Friday in the United States”. “In general, the term ‘shift work’ is quite vague and includes any organization of working hours that differ from the traditional diurnal work period; sometimes it is a (sic) synonymous of irregular or odd working hours”. Most studies on shift work classify shift workers as anyone working outside regular daytime hours (i.e. between approximately 7 a.m. and 6 p.m., Monday through Friday). Under these definitions, shift workers include all people working evening shift, night shift, rotating shifts, split shifts, or irregular or on-call schedules both during the week and on weekends” (Institute for Work & Health, n.d.). “The standard workday unfolds during an 8-5 timeframe. We consider shift workers to be individuals who work nonstandard hours” (Sharma 2006).

Rotating shifts Vs Fixed Shifts:

In 24 hours operations, usually the area of most concern when discussing schedules is the difference between rotating shifts and fixed shifts. Fixed shifts are when a worker comes to work at the same time every day, rotating shifts are when the shift time changes through the course of the management plan and each worker enjoys all available shifts prevailing in the production plan.

Shift Patterns:

- Three-shift system

Time	Sat	Sun	Mon	Tues	Wed	Thur	Fri
06:00–14:00	**Shift 1**	**Shift 1**	**Shift 1**	**Shift 1**	**Shift 1**	**Shift 1**	Off
14:00–22:00	**Shift 2**	**Shift 2**	**Shift 2**	**Shift 2**	**Shift 2**	**Shift 2**	Off
22:00–06:00	**Shift 3**	**Shift 3**	**Shift 3**	**Shift 3**	**Shift 3**	**Shift 3**	Off

- Continental shift

Time	Sat	Sun	Mon	Tues	Wed	Thur	Fri
06:00–14:00	**Shift 1**	**Shift 1**	**Shift 1**	Off	Off	Off	Off
14:00 to 22:00	Off	Off	Off	**Shift 1**	**Shift 1**	Off	Off
22:00–06:00	Off	Off	Off	Off	Off	**Shift 1**	**Shift 1**

- Split shift

Time	Sat	Sun	Mon	Tues	Wed	Thur	Fri
10:00–14:00	**On**	**On**	**On**	**On**	**On**	**On**	Off
14:00–17:00	Off	Off	Off	Off	Off	Off	Off
17:00–21:00	**On**	**On**	**On**	**On**	**On**	**On**	Off

- DuPont 12-Hour rotating shift

Week	Fri	Sat	Sun	Mon	Tues	Weds	Thurs
1	**Nights**	**Nights**	**Nights**	**Nights**	Off	Off	Off
2	**Days**	**Days**	**Days**	Off	**Nights**	**Nights**	**Nights**
3	Off	Off	Off	**Days**	**Days**	**Days**	**Days**
4	Off	Off	Off	Off	Off	Off	Off

- Earlies & lates

Time	Sat	Sun	Mon	Tues	Wed	Thur	Fri
08:00–16:00	**Shift 1**	**Shift 1**	**Shift 1**	**Shift 1**	**Shift 1**	**Shift 1**	Off
15:00–23:00	**Shift 2**	**Shift 2**	**Shift 2**	**Shift 2**	**Shift 2**	**Shift 2**	Off

- 12-Hour rotating shift

Week	Time	Sat	Sun	Mon	Tues	Wed	Thur	Fri
1	09:00–21:00	**Shift 1**	**Shift 1**	**Shift 1**	**Shift 1**	**Shift 1**	**Shift 1**	Off
2	21:00–9:00	**Shift 2**	**Shift 2**	**Shift 2**	**Shift 2**	**Shift 2**	**Shift 2**	Off
3	09:00–21:00	**Shift 2**	**Shift 2**	**Shift 2**	**Shift 2**	**Shift 2**	**Shift 2**	Off
4	21:00–9:00	**Shift 1**	**Shift 1**	**Shift 1**	**Shift 1**	**Shift 1**	**Shift 1**	Off

RESEARCH METHODOLOGY

a) Study on the apparel orders, manufacture & export status based on database/information from BKMEA, BGMEA & EPB publications.
b) Select an apparel industry having single shift to introduce double shift as a trial basis.
c) Study the current financial status to determine production cost per piece.
d) Study the financial status to determine production cost per piece for double shift production after double shift implementation.
e) Study the physiological & psychological behavior of night shift worker & their acceptability towards double shift.
f) Optimize the double shifting through reducing limitations.

DATA

Costing calculation for single shift

Working days in month = 26
Working shift = 10 hr/day
Total working time in minute = (10 × 26 × 60) min = 15,600 min
Total number of line = 6
Let, life time of machines = 10 years

Table 1. Cost of Machines

Machines	No. of m/cs	Unit Price (Tk.)	Total Price (Tk.)	Cost of m/c per month (Tk.) (Price/10*12)	Cost of m/c per min (Tk.) (Monthly cost/15,600)	Machine Cost/Hr (Tk.)
Sewing m/c	240	20,000	48,00,000	40,000	2.56	153.85
Cutting m/c	3	30,000	90,000	750	0.05	2.88
Steam boiler with 6 irons	1	6,00,000	6,00,000	5,000	0.32	19.23
Other equipments			4,00,000	3333.33	0.21	12.82
Total			**58,90,000**	**49,083.33**		**188.78**

******Machine depreciation is calculated with straight line method for 10 years

Maintenance cost:

Average Maintenance Cost: 500 Tk/month (per machine)
Boiler Maintenance cost: 10,000 Tk/month
Total Maintenance cost: (500 x 243 + 10,000) = 1,31,500 Tk.
Maintenance Cost/minute: 1,31,500/15600 = 8.43 Tk.
Total Maintenance Cost/hour: 8.43 X 60= 505.77 Tk.

Table 2. Monthly salary of Employees

Department	Types	Salary per Month (Tk.)	No. of employees	Salaries of employee (Tk.)
Administration	Director	60,000	1	60,000
	General Manager	40,000	1	40,000
	Accounts officer	20,000	2	40,000
	Administration Officer	15,000	4	60,000
	HR Executives	15,000	2	30,000
	Security In Charge	10,000	1	10,000
Sewing	Production Manager	20,000	1	20,000
	Line Chief	16,000	6	96,000
	Supervisor	6,642	21	1,39,482
	Sewing operator	2,870	257	7,37,590
	Swing Helper	2,000	278	5,56,000
Cutting	Cutting In Charge	20,000	1	20,000
	Fabric Cutting Unit	2,400	45	1,08,000
	Fabric Spreading & Marker unit	2,400	16	38,400
Finishing	Finishing In Charge	20,000	1	20,000
	Packaging & Pressing Unit	2,000	18	36,000
	Cartoning Unit	2,000	7	14,000
	Loader	2,000	4	8,000
	Inspection Unit	2,400	16	38,400
	Spot removing unit	2,000	2	4,000
Others	Cleaner	2,000	6	12,000
	Technician/Electrician	10,000	2	20,000
	Security Guards	2,000	6	12,000
Total			**698**	**21,19,872**

Total salary per hour: (2,119,872x60/15,600)= 8,153.35 Tk

Utilities Expense:

Electricity bill/month = 1,55,622 Tk.
Electricity bill/minute = (1,55,622/15,600) = 9.98 Tk.
Electricity bill/hour = (9.98 × 60) = 598.55 Tk.
Water supply bill/month = 14,200 Tk.
Water supply bill/minute = (14,200/15,600) = 0.91 Tk.
Water supply bill/hour = (0.91 × 60) = 54.62 Tk.
Gas bill/month = 27,258 Tk.
Gas bill/minute = (27,258/15,600) = 1.75 Tk.
Gas bill/hour = (1.75 × 60) = 104.84 Tk.
Total utility Expense/hr: (**598.55+54.62+104.84) = 758.01 Tk**

Rent Expense:

Floor Rent/month = 90,000 Tk.
Floor Rent/minute = (90,000/15,600) = 5.77 Tk.
Floor Rent/hour = (5.77 × 60) = 346.15 Tk

Table 3. Monthly Other Expenses

Department	Cost/Month (Tk.)	Cost/minute (Tk.)	Cost/Hr (Tk.)
Tiffin Cost	1,85,120 (7,120 x 26)	11.87	712
Communication Expense (Phone, Fax)	35,000	2.24	134.61
Office vehicle running expense	30,000	1.92	115.38
Drinking water cost	13,000	0.83	50
Buyer Entertainment Cost	10,000	0.64	38.46
Administrative Cost	1,00,000	6.41	384.62
Total	**3,38,120**	**23.4**	**1,435.07**

** Furniture & Fixture cost and Professional fees (Legal, Audit) are not included as they are constant cost regardless the number of shift

Total Expense per Hour:

188.78 + 505.77 + 8153.35 + 758.01+ 346.15 + 1435.07 = **11,387.13 Tk.**

Production Calculation For Single Shift :

Production Per Shift: 6000 pcs

Production Per Hour: 605 pcs (Schedule time)
Production Per Hour: 580 pcs (over time)
Production cost Per Pcs= (11,387.13/605) =18.82 Tk. (schedule time)
Production cost Per Pcs= (11,387.13/580) = 19.63 Tk. (over time)

Costing calculation for double shift
Working days in month = 26
Working shift = 10 hr/day
Total working time in minute = (20 × 26 × 60) min = 31,200 min
Total number of line = 6
Let, life time of machines = 7 years

Table 4. Cost of Machines

Machines	No. of m/cs.	Unit Price (Tk.)	Total Price (Tk.)	Cost of m/c per month (Tk.) (Price/7*12)	Cost of m/c per min (Tk.) (Monthly cost/31,200)	Machine Cost/Hr (Tk.)
Sewing m/c	240	20,000	48,00,000	57,142.86	1.83	109.89
Cutting m/c	3	30,000	90,000	1,071.43	0.03	2.06
Steam boiler with 6 irons	1	6,00,000	6,00,000	7,142.86	0.23	13.74
Other equipments			4,00,000	4,761.90	0.15	9.16
Total			**58,90,000**	**70,119.05**		**134.85**

******Machine depreciation is calculated with straight line method

Maintenance cost:
Average Maintenance Cost: 1,000 Tk./month (per machine)
Boiler Maintenance cost: 20,000 Tk./month
Total Maintenance cost: (1,000 x 243 + 20,000) = 2,63,000 Tk.
Maintenance Cost/minute: 2,63,000 /31,200 = 8.43 Tk.
Total Maintenance Cost/hour: 8.43 X 60= 505.77 Tk.

Table 5: Monthly salary of Employees

Department	Types	Salary per Month (Tk.)	No. of employees	Salaries of employee (Tk.)
Administration	Director	60,000	1	60,000
	General Manager	40,000	1	40,000
	Accounts officer	20,000	4	80,000
	Administration Officer	15,000	8	1,20,000
	HR Executives	15,000	4	60,000
	Security In Charge	10,000	2	20,000
Sewing	Production Manager	20,000	2	40,000
	Line Chief	16,000	12	1,92,000
	Supervisor	6,642	42	2,78,964
	Sewing operator	2,870	514	14,75,180
	Swing Helper	2,000	556	11,12,000
Cutting	Cutting In Charge	20,000	2	40,000
	Fabric Cutting Unit	2,400	90	2,16,000
	Fabric Spreading Unit	2,400	32	76,800
Finishing	Finishing In Charge	20,000	2	40,000
	Packaging & Pressing Unit	2,000	36	72,000
	Cartoning Unit	2,000	14	28,000
	Loader	2,000	8	16,000
	Inspection Unit	2,400	32	76,800
	Spot removing unit	2,000	4	8,000
Others	Cleaner	2,000	12	24,000
	Technician/Electrician	10,000	4	40,000
	Security Guards	2,000	12	24,000
	Total		**1394**	**41,39,744**

Total salary per hour: (41,39,744 x 60/31,200) = 7961.05 Tk.

Utilities Expense:
Electricity bill/month = (1,55,622 × 2) = 311,244 Tk.
Electricity bill /minute = (311,244/31,200) = 9.98 Tk.
Electricity bill /hour = (9.98 × 60) = 598.55 Tk.
Water supply bill/month = (14,200 × 2) = 28,400 Tk.
Water supply bill/minute = (28,400/31,200) = 0.91 Tk.
Water supply bill/hour = (0.91 × 60) = 54.62 Tk.
Gas bill/month = (27,258 × 2) = 54,516 Tk.
Gas bill/minute = (54,516/31,200) = 1.75 Tk.
Gas bill/hour = (1.75 × 60) = 104.84 Tk.

Total utility Expense: (**598.55+54.62+104.84) = 758.01 Tk.**

Rent Expense:
Floor Rent/month = 90,000 Tk.
Floor Rent/minute = (90,000/31,200) = 2.88 Tk.
Floor Rent/hour = (2.88 × 60) = 173.08 Tk.

Table 6. Monthly Other Expenses

	Cost/Month (Tk.)	Cost/minute (Tk.)	Cost/Hr (Tk.)
Tiffin Cost	3,69,200 (7120+7080) × 26	11.83	710
Communication Expense (Phone, Fax)	50,000	1.60	96.15
Office vehicle running expense	50,000	1.60	96.15
Drinking water cost	25,000	0.80	48.08
Buyer Entertainment Cost	20,000	0.64	38.46
Administrative Cost	1,50,000	4.81	288.46
Total	**664,200**	**21.29**	**1,277.31**

** Furniture & Fixture cost and Professional fees (Legal, Audit) are not included as they are constant cost regardless the number of shift

Total Expense per Hour:
(134.85+505.77+7,961.05+758.01+173.08+1,277.31) = **10,810.07 Tk.**

Production Calculation For Double Shift :
Production Per Shift: 12,000 pcs
Production Per Hour: 1,210 pcs (Schedule time)
Production Per Hour: 1,160 pcs (over time)
Production cost Per Pcs = (10,810.07/1,210) = 8.93 Tk. (schedule time)
Production cost Per Pcs = (10,810.07/1,160) = 9.32 Tk. (over time)

RESULTS

For Single Shift:
Total Machine Cost/hr= 188.78 Tk.
Total Maintenance Cost/hour= 505.77 Tk.
Total salary per hour= 8,153.35 Tk.
Total utility Expense= 758.01 Tk.
Floor Rent/hour= 346.15 Tk.
Total other cost/hour = 1,435.07 Tk.
Total Expense per hour = 11,387.13 Tk.

Production cost per piece = 18.82 Tk (schedule time)
Production cost per piece = 19.63 Tk. (over time)

For Double Shift:
Total Machine Cost/hr = 134.85 Tk.
Total Maintenance Cost/hour = 505.77 Tk.
Total salary per hour = 7961.05 Tk.
Total utility Expense = 758.01 Tk.
Floor Rent/hour = 173.08 Tk.
Total other cost/hour = 1277.31 Tk.
Total Expense per hour = 10,810.07 Tk.

Production cost per piece = 8.93 Tk. (schedule time)
Production cost per piece = 9.32 Tk. (over time)

From this research, it has been found that the production cost per garment is 18.82 BDT during scheduled time for single shift, the production cost per garment is 19.63 BDT during over time for single shift, the production

cost per garment is 8.93 BDT during scheduled time for double shift and the production cost per garment is 9.32 BDT during over time for double shift. Here, it has been identified that the piece basis production cost is reduced more than 50% in double shift against single shift for both schedule time and over time.

FINDINGS & ANALYTICAL BENEFITS OF DOUBLE SHIFTING

i. **Assurance of quality improvement:** With the long working hour, the quality of garments is subjected to deteriorate. The improvement of quality is ensured by double shifting as the span of each shift in double shifting is 8-12 hours (with an hour food break).
ii. **Surety of on time delivery:** On time shipment (OTS) is confirmed through Double shifting as the volume of daily production is increased.
iii. **Competitive rates:** Lower production cost which confirms lowest product price among competitors is comprised with Double shifting.
iv. **Cost efficiency:** Profit maximization, the consequences of lowest manufacturing cost is dealt with Double shifting.
v. **Good relationship with buyers:** Maintaining OTS & quality improvement, double shifting is enhanced good relationships with buyer.

PROPOSED DOUBLE SHIFT

Week	Time	Sat	Sun	Mon	Tues	Wed	Thur	Fri
1	09:00–20:00 (With Overtime)	**Shift 1**	**Shift 1**	**Shift 1**	**Shift 1**	**Shift 1**	**Shift 1**	Off
2	21:00–08:00 (With Overtime)	**Shift 2**	**Shift 2**	**Shift 2**	**Shift 2**	**Shift 2**	**Shift 2**	Off
3	09:00–20:00 (With Overtime)	**Shift 2**	**Shift 2**	**Shift 2**	**Shift 2**	**Shift 2**	**Shift 2**	Off
4	21:00–08:00 (With Overtime)	**Shift 1**	**Shift 1**	**Shift 1**	**Shift 1**	**Shift 1**	**Shift 1**	Off

For Day Shift:
Launch break: 13:00 – 13:45 pm
Tiffin break: 17:00 – 17:15 pm

For Night Shift:
Dinner break: 1:00 – 1:45 am
Tiffin break: 5:00 – 5:15 am

Note:
08:00 – 09:00 am: Allocated time for shift rotating & cleaning.
20:00 – 21:00 pm: Allocated time for shift rotating & cleaning.
** All other breaks time will be used for cleaning.

RECOMMENDATION

Considering the cost effectiveness, double shifting can be utilized with the below provisions:

i. **Security:** Provision of a safe and secure working environment, especially for women workers in night shifts. Also adequate security is needed in factory premises.
ii. **Child care facilities:** Provision of child care adapted to the needs of the employees at or near the place of work.
iii. **In house training & motivation:** In house training is needed to motivate the night shift workers & let them know how to cope with day shift & night shift work. It is also helped them to adjust with changing sleeping pattern. Provision to employees of professional advice and training on the health, safety and social effects of shift work, personal coping strategies and standard operating procedures that apply to specific shifts.
iv. **Entertainment:** Additional entertainment is needed for night shift workers. It can be done through playing songs in the floor.
v. **Employee–Employer satisfaction:** Positive feedback from the employer is highly recommended for initiating double shift. It is advised to do consultation with employees, their families and unions in the design of rosters, including all arrangements for monitoring and changing rosters. Also need adequate supervision, including regular contact with shift workers in isolated situations.
vi. **Canteen & rest facility:** Provision of rest areas and suitable meal facilities adapted to shift schedules.
vii. **Transport facilities:** Arrangements to ensure shift workers do not face transport difficulties, particularly night shift workers.
viii. **Adequate sleeping confirmation:** Assistance with modification of employees' homes to minimize noise, light, heat and other distractions, so adequate sleep is possible.
ix. **Expert advice:** Expert advice on the effects of the work environment and working hours on fatigue and alertness.

x. **Roster formulation:** Formulation of rosters which do not result in excessive night work, excessive working hours, and inadequate rest breaks and/or breaks between shifts.

xi. **Breaks during shifts:** It should at least include:
   a) on 8 hour shifts, one meal break of at least 30 minutes, plus two shorter breaks totaling at least 30 minutes
   b) on 10 hour shifts, two meal breaks of at least 30 minutes each, plus two other short breaks totaling 20 minutes
   c) on 12 hour shifts, one meal break of 45 minutes and another of at least 30 minutes, plus two or more shorter breaks totaling a minimum of 30 minutes.
   d) The maximum amount of time an employee should work without a break is 2.5 hours.
   e) All breaks should be taken away from the work station. Breaks at the work station are of poorer quality and do not provide adequate rest. Most people would eat at least two meals during a 10 to 12 hour period of wakefulness.

xii. **Breaks between shifts:** Breaks between shifts should not be less than 12 hours. On rosters with extended shifts, this minimum break (12 hours) should be alternated with a break of at least 24 hours.

xiii. It is recommended that shifts do not start between midnight and 6 am. This is to ensure an opportunity for adequate night rest.

DRAWBACKS OF PROPOSED SHIFT

It has been identified, shift workers face below health and social effects:

- **Health and safety effects**

• Changes in natural body rhythms
• Ongoing sleep problems
• Increased physical and mental fatigue
• Concentration difficulties
• Increased risk of accidents
• Increased exposure to hazardous substances, noise and manual handling risks
• Increased risk of heart disease
• Menstrual problems and difficulties during pregnancy
• Disturbed eating patterns and poor diet
• Gastrointestinal disorders and gastric and duodenal ulcers
• More colds and other respiratory illnesses
• Stress
• Mood changes
• Irritability and/or anger
• Anxiety and depression
• Use of alcohol and other drugs to overcome effects of shift work
• Nutritional inadequacies due to poor eating patterns

- **Family and social effects**

• Isolation from family activities
• Lack of contact with partners
• Reduced interest in sex
• Reduced contact with school-age children
• Higher rates of marriage breakup
• Reduced friendship networks
• Loss of access to education, sports etc.
• Exclusion from community, social and cultural events
• Irritability and anger in personal relationships

LIMITATION

- It has been considered production/hr will be as same for day and night.
- All the calculations of double shift have been done theoretically.
- Lack of on field research paper.
- Data have been collected from only one factory.
- Inconsistent quality has been ignored. There may be quality variations between day shift & night shift
- Advised provisions may relate with increasing production cost which is not considered in the hourly production cost in double shifting.
- Extended working hour reduce productivity than that of double shift which require further research to explain.
- It is recommended to “All breaks and pauses should be increased in number and duration compared to day shifts” which we can’t follow in our project.

- Work which is physically or mentally demanding, monotonous or requires high vigilance can lead to fatigue which will be worsened by night work. Bonus or incentive schemes or other pressures to achieve productivity are not suitable for night work.

CONCLUSIONS

In accordance with steep growth rate in garments export in Bangladesh, the industries are not expanding due to infrastructure, capital, and energy limitation. On the other hand, Bangladesh's manpower is booming regardless the situation. It is an industry that is more labor intensive and thus plays a critical role in providing employment for people. Again, the basic needs of the garments market are competitive prices, acceptable quality standards, quick response and short delivery times. So, it is high time to implement double shifting in our garments industry in order to secure our place as well as keep the growth rate in apex through utilizing lower manpower & energy cost. The RMG industries of Bangladesh should be aware of the importance of the use of double shifting .Though most of industries of Bangladesh practices single shift, there are some advantage for double shift than single shift like the payment the factories spend for over time, they able to continue double shift with the almost same amount of payment as they have to pay double basic for over time.

REFERENCES

Absar S (2001) Problems Surrounding Wages: The Readymade Apparels Sector in Bangladesh, *Labor & Management Journal*, Volume 2, Number 7, Asia Pacific Press, ISSN 1443-6698, ISBN 0731536851.

Awal MA (2005) *"Bangladesh strategy in Post MFA environment"*, A proceeding on world textile exports, Beijing p 12-14.

Bhattacharya D (1997) "Women and Industrial Employment in Bangladesh: Challenges and Opportunities in the Era of New Technologies" A Research Report, Bangladesh Institute of Development Studies (BIDS) p 6-9.

Biswas M (2006) *"Post MFA senario and its impact on garment export from Bangladesh"*, A proceeding on world textile exports, India p 34-44.

Carr H, Latham B (1994) *The Technology of Clothing Manufacturing*, 2nd Edition, Blackwell Scientific publications, Oxford, 1994, ISBN: 0-632-03748-2.

Cooklin G (2005) *Introduction to Clothing Manufacture*, 2nd Edition, Blackwell publishing, Oxford, ISBN: 0-632-05697-5.

Kashem MA (2006) *Garments & Technology*, Gronthonir Prokashani, Bangladesh p 18-23.

Kashem MA (2008) *Garments Merchandising*, Lucky-One Traders, Bangladesh, p 31-33.

Sharma SP (2006) *Night Shift for Women: Growth & Opportunity*, A Research Study conducted by The Associated Chambers of Commerce & Industry of India (ASSOCHAM) p-11-12.

Solinger J (1988) *Apparel Manufacturing Handbook, analysis, principles and practice*, Bobbin Media corporation, USA p 11-14.