



**Daffodil**  
*International*  
**University**

Faculty of Engineering  
Department of Textile Engineering

**Study on increasing productivity by work study in garment  
industry**

**Course Title:** Project (Thesis)  
**Course Code:** TE-4214

**Submitted to:**

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of  
**Bachelor of Science in Textile Engineering**

Advanced in Apparel Manufacturing Technology

**Fall-2020**



# DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Kazi Rezwan Hossain, Lecturer, Department of TE**, of Daffodil International University. We also declare that neither this project nor any part of this project have been submitted elsewhere for award of any degree.

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.....

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.....

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## ACKNOWLEDGEMENT

First of all, we are grateful to Allah who gives us sound mind & sound health to accomplish completion of this Process successfully.

We are also grateful to our supervisor **Kazi Rezwan Hossain, Lecturer, Department of Textile Engineering, Faculty of Engineering, Daffodil International University**. His endless patience, scholarly guidance, continual encouragement, energetic supervision, constructive criticism, valuable advice, reading many inferior drafts and correcting at all these stages have made it possible to complete this project.

We would like to express our heartiest gratitude **Mominur Rahman Head (In charge), Dept. of Textile engineering** for his kind suggestion and also the other faculty members and the staff of TE Department of Daffodil International University.

We would like to give special thanks to the supervisors, technicians, operators and all other staff of **Dhaka Fareast Ltd.** who were the most cordial and helpful to us during internship.

Finally, we would like to express a sense of gratitude to my beloved parents and friends for their mental support, strength and assistance throughout to complete this Project (Thesis).



# LETTER OF APPROVAL

To

The Head

Department of Textile Engineering

Daffodil International University,

Dattapara, Ashulia, Savar, Dhaka

**Subject:** Approval of Project (Thesis) Report of B.Sc. in TE Program

Dear Sir,

I am just waiting to know you that, this Thesis Report titled as **“Increase Productivity in Garments Industry by Work Study”** has been prepared by the students bearing **ID 171-23-4971 & 161-23-4590** is completed for final evaluation. The whole report is prepared based on the factory data with required belongings. The students were directly involved in the Thesis activities and the report become vital to spark of many valuable information for the readers.

Therefore, it will be highly appreciated if you kindly accept this report and consider it for final evaluation.

Yours Sincerely

A rectangular box containing a handwritten signature in black ink that reads 'Rezwan'.

Kazi Rezwan Hossain

Lecturer

Department of Textile Engineering

Faculty of Engineering

Daffodil International University



## ABSTRACT

We completed our thesis project on Study on Increase Productivity in Garments Industry by Work Study. This paper clearly explains how to increase the Productivity in Garments section through Work Study. In-line garments Productivity report, Machine Layout report, Capacity study, Production study, Line balancing, Motion study, Method study, 5S method. This project based on the different types of Study in sewing line. In the textile industry, Productivity is basically increase by sewing line faultless production. This Project is done by **Dhaka Fareast Limited**. In this Factory sewing section has 1 floor only. Average daily production capacity of 7,500 pieces of knit garments with gents, ladies and kids items. Knit unit with a production capacity of 7000 pieces knitted garments per day, the number of line 12, the number of M/C 340, the number of manpower 1650. In this report we also focus on important of Production capacity, how to control sewing faults and increase productivity apparel industry and how to produce defect less quality product. In our project, we have investigated sewing line production report, hourly production report and quality control reports from sewing input to output of finishing section. From the analysis of the reports, we can find how to increase productivity in apparel industry based on work Study such as Operation Breakdown, Machine Layout report. Capacity study, Production study, Line balancing, Motion study, Method study, 5S method, etc.



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# **Chapter-01**

## **Introduction**



## **1.0 Background of the study:**

Now days the world is rapidly changing and becoming challenging day by day. There are very close interrelation exists between production and productivity. In this sector each and every minute is so important and countable also more important in production, because the time is converted as money. Productivity is very important. The authority of production unit is always accent to increase their productivity. Because the profit counted depends on the productivity in Garments industry. Any organization have two best elements product quality and productivity. The textile industry readymade garments are produced in bulk production. The Customers are buy their garments in easy way by following their claim. The Customers select their cloths in unique style, design color and which on the basis of different types of fabrics. When the selection of raw materials is best then the readymade garments production is start.

## **1.1 Objective of the study:**

- I. To know that how to increase productivity in the garments industries.
- Ii. To know how the production is actually done and also hoe the productivity is increased.
- Iii. To know about the various step of productivity.
- Iv. To know about, work study, machine layout, capacity study, motion study, method study, 5s method, etc.

## **1.2 Methodology:**

- Textile factory (Dhaka Fareast Limited)
- Practical knowledge achieve from the factory
- Knowledge from factory supervisor
- Hand book
- Internet
- Knowledge form our honorable teachers.



### **1.3 Importance of the Study:**

More Input more output. If we increase input then we can more output the readymade garments industries. Now day's world is rapidly changing day by day also fashion in changing. In same wave all the factory rearranged with the buyer reputation and requirement. The high reputed garments have the high class foreign buyer such as ZARA, Epic Sports, H&M, and Walmart etc. Every garments can't get this buyer because they have some extra reputation and requirements. In this requirement the Productivity (quality product) is one of the most important topic. Time consuming and timey product delivery is basic rule and regulation. If the factory maintain and fulfill the buyer requirement then the highly reputed buyer buy the finished goods from this factory. So timely Productivity is more valuable and important.

### **1.4 Limitations:**

- Input and output problem.
- Short time to discuss on this topic.
- Lack of report: the factory follow normal hand report.
- Lack of time: timely complete the total process but it should needed at list five month or more but where we get three month only.
- There was no guideline man or advisor for us. But the factory operators and floor in QC and manager help us.
- Lack of unwilling person: In this factory some of the person who know many things and idea but they was not willing to share their knowledge for some restriction and there busyness.



# **Chapter-02**

## **Literature Survey**

## 2.1 Work Study

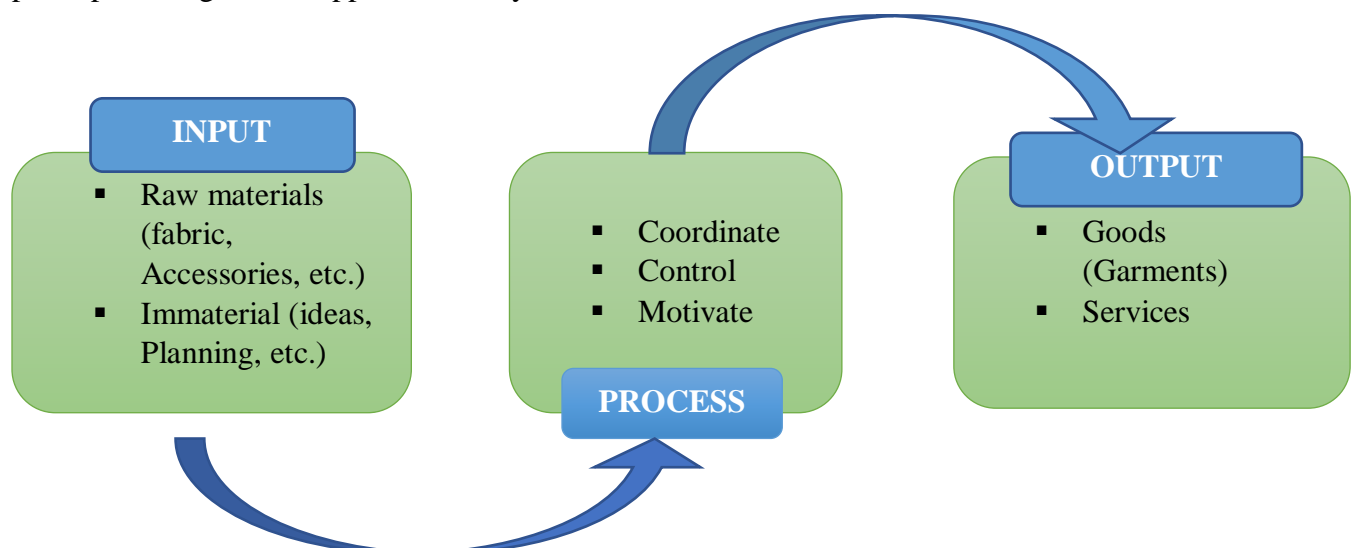
It is a branch of engineering study which is used to eliminate process and waste of time, money, materials, energy, operators, working hours, machine time, and other resources that do not generate value. Like the other manufacturing industry. Work study is now widely used in textile and apparel industry. Textile and garment industry have to face heavy challenges due to various factors including global competition, production costs increase, less efficiency as well as productivity, labor attrition, etc. For overcoming those challenges work study knowledge and formulas are frequently used in apparel manufacturing industry. In this article we have given some important and popular terms and formulas of work study increasing the productivity. We have also given some examples for which everybody can easily understand.

## 2.2 Productivity:

Simply we can say that the relation between input and output is called productivity. The apparel manufacturing industry output is pieces of finished goods. In the industrial scenario financial evaluation is output and input of production. Take the help of productivity apparel industry can easily control different type of efficiency such as labor, worker, operator, system, factory, machine, transport, etc. Productivity also refers to raw materials stored, fabric inspection, consume wastage, workers working efficiency, quality control, and finally right time shipment.

We can easily say  $\text{productivity} = \text{Input} / \text{Output}$

Every business as like Textile industry, has a goal and this is Profit. Productivity is the main thing of every Textile industry, where profit or loss is included. This sector is totally concerned with the profit percentage of an Apparel Industry.



**Fig: 2.2** Steps of Production



## **2.1.1 Production VS Productivity:**

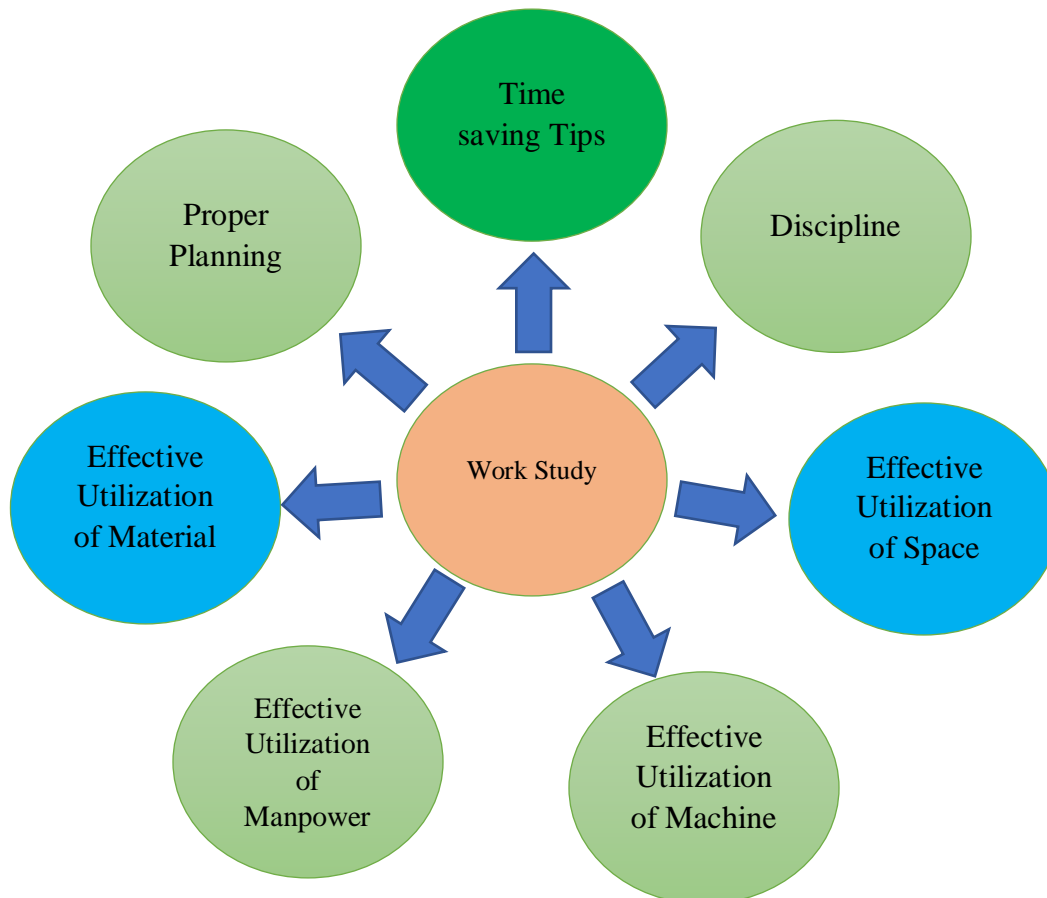
Generally production is refers to convert activities resources into product/services where productivity is connected with how especially products or services are produced. Production increase by the many sustainable policies and we will discuss and describe these bellow.

## **2.1.2 General factors to Improve productivity in apparel sector by work study:**

In apparel manufacturing some general factors are considered for higher productivity, these are-

- All the materials available in time.
- Used modern technology.
- Computerization of all departmental work.
- Standardizing the design.
- Innovation of design.
- Make daily office schedule.
- Communicate to other.
- Machine maintenance properly.
- Make sure 100% attendance level.
- Selection of efficient worker.
- Trained the all employees and operators.
- Preparing a better plan.
- Choose best way for better production.
- Setup right and specific machine lay-out.
- Motivating the employee and worker in any critical situation.
- Using capacity and motion study regularly.
- Create working environment.
- Practice team work.
- Choose Right persons for right positions (Manager, PM, APM, Supervisors)

### 2.1.3 Productivity Improvement Technique Flow chart:



### 2.2 Step of Increase Productivity:

Productivity is the mother expectation of any Industry (garments). It measures the efficiency and effectiveness. It is measured by both of input and output. The productivity increases by many techniques and steps.

#### The step of increase productivity-

- Machine layout.
- Capacity study.
- Production study.
- Line balancing.
- Motion study.
- Method study.
- 5s method



# **Chapter-03**

## **Methodology**





## 3.1 Work Study

Work study is that the study through which minimum utilization of man, machine, and materials is feasible. Work study is defined as the body of data concerned with the analysis of the work methods and the equipment utilized in performing employment, the planning of an optimum work method. With increasing complexities of the Technological world, got to simplify the work system has been increasing day by day, we had increased Work motion also as productivity by applying Process eliminating system, Layout Change system, Motivation to the operator and worker, by changing working environment, WIP and Buffering system etc. Work study is a neighborhood of data that addresses the matter of labor simplification with the essential objectives of- **“Productivity Enhancement, Human Comfort & Safety”**

### 3.1.1 Objectives of work study:

- To analyze this method of doing employment, systematically so as to develop a replacement and better method.
- To measure the work content of employment by measuring the time required to try to the work for a professional worker and hence to determine civil time.
- To increase the productivity by ensuring the simplest possible use of human, machine and material resources and to realize highest quality product/service at minimum possible cost.
- To improve operational efficiency
- To reduce waste through standardization of labor elements of employment.
- To improve labor efficiency.

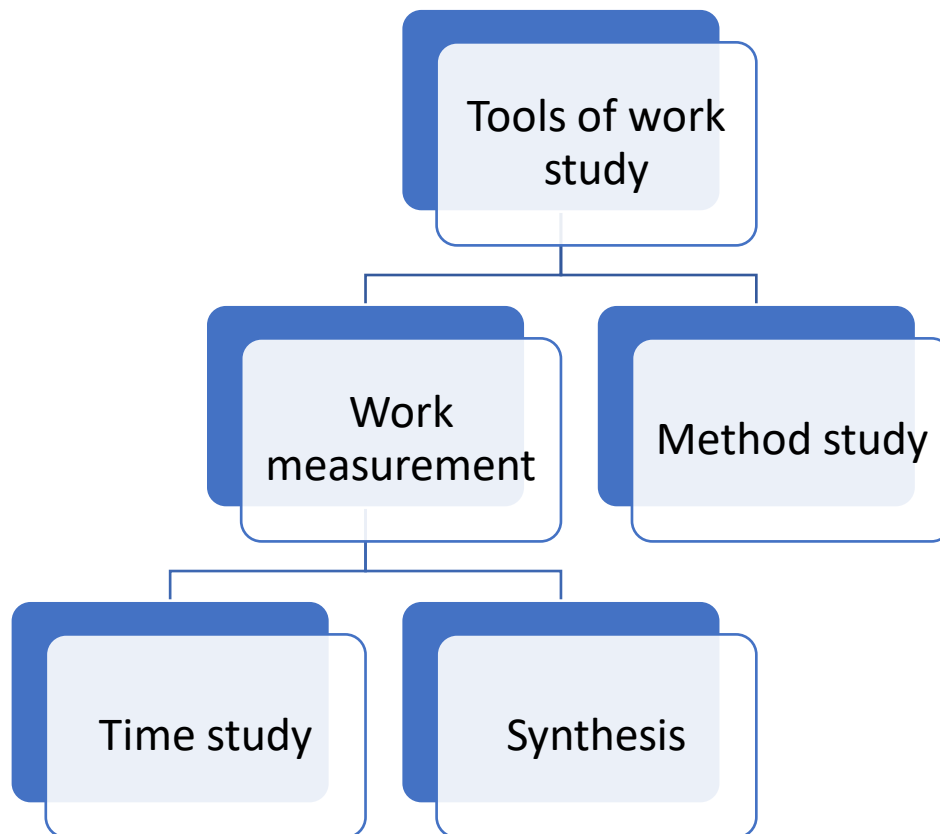
### 3.1.2 Importance/purpose of work study:

- To scale back surplus work or excessive work or the non-productive time.
- Systematic study wherever no factors of production is unnoted.
- Lower price.
- Minimum use of resources.
- Increase profitableness.
- Increase productivity.
- Reduce time.
- To establish the most effective technique.
- Make work easier.
- Increased productivity and operational potency.
- Reduced producing prices.
- Improved work place layout.

- Better men coming up with and capability coming up with.
- Fair wages to staff.
- Better operating conditions to staff.
- Improved work flow.
- Reduced material handling prices.
- Provides a customary of performance to live labor potency.
- Better industrial relations and worker morale.
- Basis for sound strategy.
- Provides higher job satisfaction to staff.

### 3.1.3 Tools of work study:

The basic tools of work study are-





### 3.1.4 Basic procedure and flowchart of work study:

- **Select:** The work or process to be studied.  
↓
- **Record:** Which is suitable method for implementation.  
↓
- **Examine:** Analysis the process.  
↓
- **Develop:** Develop the most economic method.  
↓
- **Measure:** Count the quantity of work involved in the method.  
↓
- **Define:** Why this method is used.  
↓
- **Install:** The method is installed.  
↓
- **Maintained:** New standard practice by proper control procedure.

### 3.1.5 Result Expectation:

- 1 Time reduction of transportation
2. Designed work-station ergonomically
3. Proper tracking of production & quality
4. Visual management in the production floor



## 3.2 Method Study:

### 3.2.1 Concept of Method Study:

Method study is largely conducted to alter the work or operating ways and should go towards higher productivity. It's continually fascinating to perform the requisite perform with desired goal minimum consumption of resources. Technique signifies however a piece is to be done.

### **Methods area unit same to be integral a part of work accomplishment and meaning of-**

1. However well our ways utilize the restricted offered resources like workforce, machines, materials and cash.
2. However our ways physically have an effect on production output of the unit.
3. The standard of output obtained by application of our ways.

Motion study is associate degree analysis of the flow and process of fabric and also the movements of men through or at varied work stations. So analyses the human activities that conjure an operation. Whereas technique study has been outlined as “systematic procedure for the assessment of movements created by men, materials and machines in activity any work or operation”.



### **3.2.2 Scope of Method Study:**

**The task of labor simplification and compatible work system style issues the followings:**

- (i) Layout of work and dealing areas or work stations.
- (ii) Operating conditions i.e. technology etc.
- (iii) Handling distances (material movement)
- (iv) Tooling and instruments used.
- (v) Quality standards to be achieved.
- (vi) Operators and operations in achieving the assembly targets.
- (vii) Materials to be used.
- (viii) Power needed and obtainable.
- (ix) Work cycle time.
- (x) Operating processes.

**All these factors are associated with methodology study and attainable enhancements might be:**

- (a) Short term and
- (b) Future (Long term).



### 3.3 Motion Study

Motion study is a business efficiency technique. It is a part of method study and is one of the oldest branches of work study. Every work consists of some motion. These motions are widely used in workplace to organize a better method of performing a job.

- Eliminating unnecessary motions.
- Simplifying necessary motions.
- Then establish the most favorable motion sequence for maximum efficiency.

#### 3.3.1 The important objectives of the motion study are:

1. To develop the process of doing work
2. To develop the design of work place layout
3. To find out the best way of doing a job
4. To ensure reduced health hazards
5. To eject the unnecessary human movements
6. To have perfect utilization of material, machines and workers
7. To train the individual worker with standard method.

#### 3.3.2 Procedure for Motion Study:

**Motion Study will be performed within the following steps:**

**Step 1:** Hack the operation of the job:

**Step 2:** Question details of the job:

**Questions square measure asked on the subsequent 5 points:**

- i. Purpose
- ii. Place
- iii. Sequence
- iv. Person
- v. Means



### **Step 3: Develop a replacement method:**

Before finalizing the new methodology the subsequent facts ought to even be thought over throughout the motion study:

- i. Elimination:
- ii. Combine:
- iii. Rearrangement:

**For example, in a very works the most sequence of operations was:**

- a) Collecting.
- b) Storage.
- c) Review.
- d) Dispatching.

**In this sequence, review was allotted before dispatching and also the defective parts were being sent back for correction.** It will be avoided if review is allotted before storage, then the sequence will be rearranged as follows:

- a) Collecting.
- b) Review.
- c) Storage.
- d) Dispatching.

### **Step 4: putting in the new method:**

For putting in the new methodology, the subsequent procedure is followed:

- i. The new methodology should get the approval from the supervisors, staff and management.
- ii. Then the staff should be trained to figure in line with the new methodology.
- iii. Observe the put in methodology till it runs satisfactory.



### **Step 5: Maintain the new method:**

For maintaining the new methodology the subsequent steps square measure advised:

- a) Employment instruction sheet ought to lean to the employee.
- b) Regular checks ought to be done to match what's really being done against the duty instruction sheet.
- c) Choice and coaching of persons should be done in line with the duty specifications for this new methodology.

## **3.3.3 Simplification**

### **3.3.3.1 The work will be simplified by:**

- a) Victimization material handling instrumentation.
- b) Taking helpful work by each hands.
- c) Victimization jigs and fixtures.
- d) Inserting the materials, tools and instrumentation at correct operating place.

### **3.3.3.2 Recording Techniques – Charting:**

Recording is that the second step within the basic procedure for technique Study simply once the choice of a specific work for study, the relevant info relating to numerous processes, scrutiny And transportation with reference to an existing technique or a replacement technique should be recorded properly. Therefore, for economical recording the charts are developed.

#### **The following details ought to lean within the chart:**

1. The present and projected technique ought to be shown
2. It ought to possess adequate description of all the activities concerned within the technique.
3. The precise reference concerning the start and finish of the activities ought to lean.





4. It ought to justify the abbreviations and devices.
5. It ought to depict the time and scale followed.
6. It ought to possess the date of preparation of the chart.

## **3.4 Machine layout**

By making of readymade garments, production is the process chain system in the apparel industry. In this process the sewing machines are mainly depends on garments industry. The first priority for increasing the production is machine layout. IE officers and mainly production manager setup the machine layout. The different garments item need to different machine layout. This is the mainly sewing machine arrangement. Which is useful to making better amounts of garments goods in shortest time with less garments defects.

### **3.4.1 Product-based and Process-based layout:**

The arrangement of sewing machine depends on whether the layout is product based / process based. Most companies are mainly follow product based layout while few knitwear manufactures companies are follow process based layouts. When similar types of garments are made by similar types of machines are grouped together is occurred by process-based layout. Similar working trained operator setup by efficiency increased purpose.

Two line of sewing machine setup are most commonly used in sewing section. Middle point setup a base table for carry the garments parts, sewing raw materials. Now we can describe some machine layout for increasing productivity.



### 3.4.2 Advantage of Machine Layout:

- Reduce Production cost.
- Reduce number of worker.
- Consume number of handling.
- Lower investment required.
- Full monitoring easily.
- Flexible.
- Consume machine or tool replacement cost.
- Eliminate waste of raw material consumption.
- Improve production quality.
- Finish production on estimate time.
- Better supervision.
- Reduce overhead cost.
- Increase utilization of machine.
- High products variety.
- Reduce initial capital investment, etc.

### 3.4.3 Sewing Line Layout:

We did a study on the garments sewing line. Study was three Layout systems of Garments Manufacturing. One is Straight Line layout which is currently running in our facility and another two proposed Layout 'Zig-Zag Layout' and Cellular Layout. If you want to know about these three Layout systems of the sewing process, here this article will be very useful for better understanding.

### 3.4.4 Layout Plan of Different sewing line:

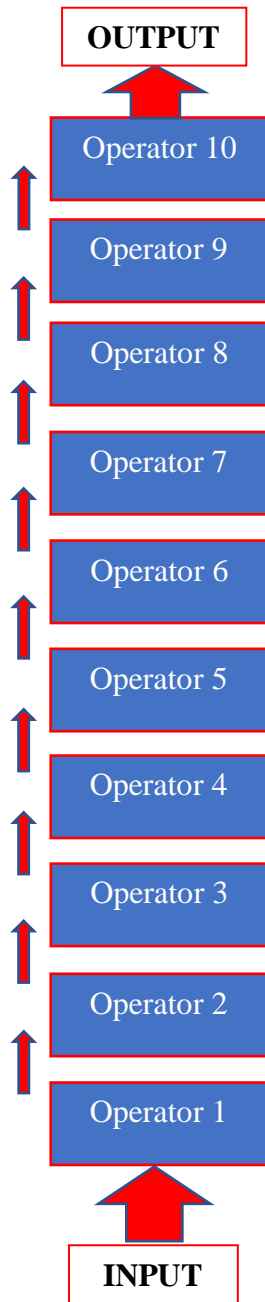


Fig: Current Straight Line Sewing Layout

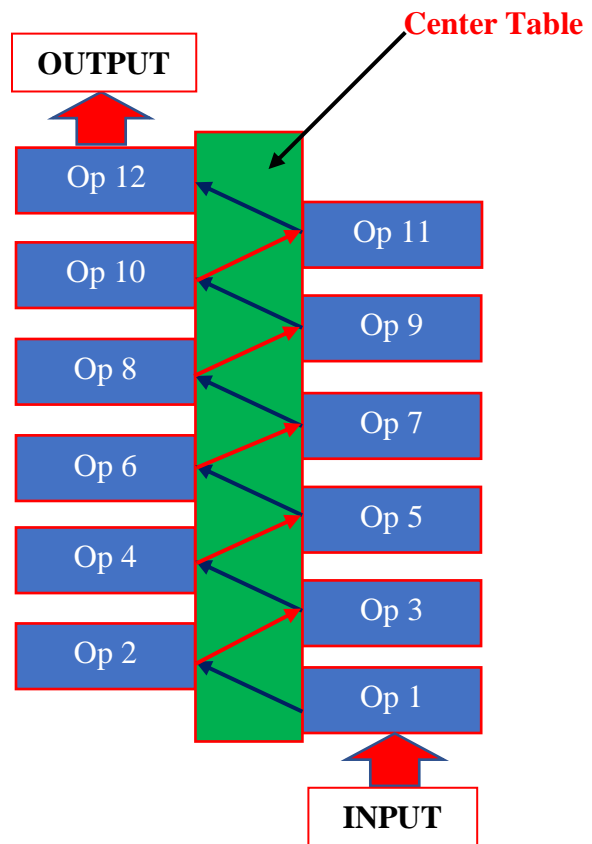
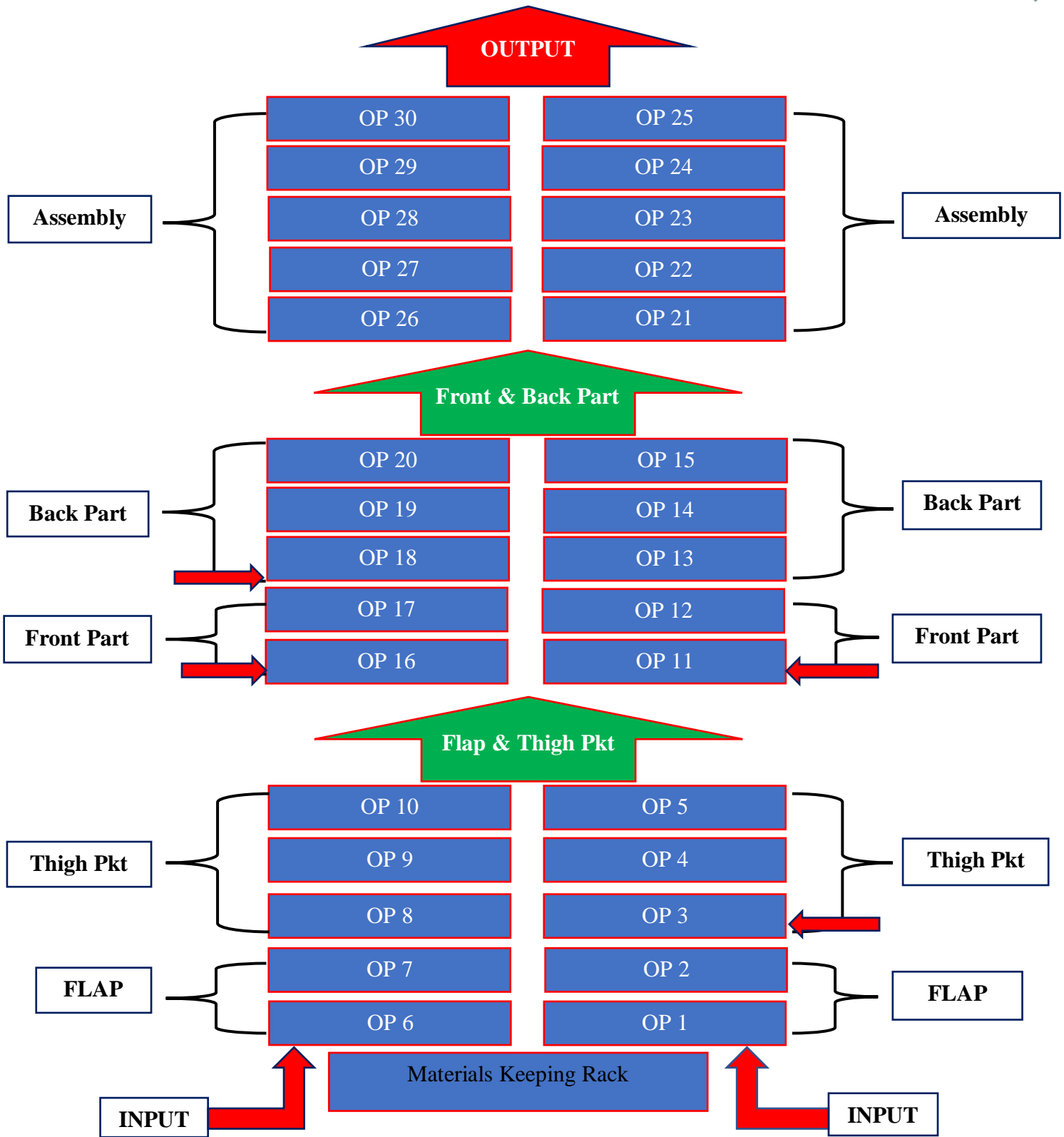


Fig: Proposed Zig-Zag Sewing Layout



**Fig: Proposed Cellular Sewing Layout (Basic Pant)**



### 3.4.5 Straight Line Layout system Vs Cellular and Zig-Zag Layout system:

Serial No.	Category	Straight Line Layout System	Cellular Layout System	Zig-Zag Layout System
1	Type of layout	Overhead material movement	Group or cell wise complete part material movement	Zigzag material movement
2	Sitting arrangement	Wooden stool without any backrest	Rotating chair with backrest	Rotating chair with backrest
3	Utilization of machine	26-28 machine/line	42-50 machine/line	38-40 machine/line
4	Line width	Conventional- 6 feet 8 inches	Need width extension= 7 feet 2 inches	Need width extension- 7 feet 2 inches
5	Wire arrangement	Conventional electrical connection as well as lighting	Re-arrangement as per line layout and generally hidden wire connection is used	Re-arrangement as per line layout
6	Air compressor	Conventional air compressor line	Modern air compressor and vacuum is used	Modern air compressor re-arrangement as per line layout
7	Bundle keeping basket	No bundle keeping basket	Used bundle keeping basket for every cell as well as every work station	Used bundle keeping basket for every work station
8	Thread trimming	Manually done by scissor or cutter	Used auto trimming facility in every machine so that use of helper become optimal	Used auto trimming facility in every machine so that use of helper become optimal
9	Bundle size	Big bundle size, typically 50 to 60 PCs	Bundle size is used of about 10 to 20 pcs	Bundle size need to resize in 10 to 20 pcs
10	Tracking & monitoring	Difficult to tracking & monitoring production & quality	Best way to tracking & monitoring production & quality	Easy to tracking & monitoring production & quality
11	Transportation time	Material transportation time is more	Material transportation time is less	Material transportation time is less

Table: Straight Line Layout system Vs Cellular and Zig-Zag Layout system

### 3.5 Capacity Study

Capacity is the maximum production rate in working time or fixed time. All the factory have their fixed capacity. Factory production capacity is defined by available raw materials, amount of machine and working per hours per day calculation. In this study must follow efficiency of workers.

In apparel manufacturing technology ‘Capacity Study’ is one of the most important study used for production section by buyers. This study is done by IE officer take different operators five capacity work on one hour production for measure efficiency rate of the each operators.

Types of production capacity-

- **Maximum Capacity:** In this capacity the total hours available under normal conditions in a given period of time.
- **Potential Capacity:** There are maximum capacity adjusted for efficiency.
- **Committed Capacity:** Previous total hour allocated for production during a fixed time period.

#### 3.5.1 Efficiency, Capacity & Production Improvement:

Here SMV=4.06 min.

**Before Improvement of Capacity:**

Sl No	Op. Name	Op. ID	Process Name	M/c Type	C1	C2	C3	C4	C5	Avg CT	Pcs/Hr	10% Allowance Capacity
1	X	xx	Shoulder Jnt	O/L	9	9	11	10	11	10	360	324
2	Y	yy	Slv Jnt	O/L	35	39	36	37	39	37	97	87+64=151
3	A	aa	Slv Jnt	O/L	48	53	51	54	47	51	71	
4	Z	zz	Bottom Hem	F/L	13	15	13	14	14	14	257	231

Table: Efficiency, Capacity & Production Improvement

## 3.6 Efficiency improve by 5S Implementation:

### 3.6.1 Principle of 5S Implementation:

Key principles behind 5S implementation can be summarized as follows:

1. Recognition of waste
2. Standard processes
3. Continuous flow
4. Pull-production
5. Quality at the Source
6. Continuous improvement
7. Customer focus
8. Value
9. Perfection

### 3.6.2 Workplace Organization-5S:

The 5 'S's are some rules for organization of workplace which aim is to organize each worker's work area for maximum efficiency.





❖ **First S stands for: Sort (Seiri)**

Sort means what is needed and what is not needed so that the things that are frequently needed are available nearby and as easy to find as possible. Un-used things should be relocated or discarded.

❖ **Second S stands for: Set in Order (Seiton)**

Set in order means the arrangement of essential things in order for easy access. The objective of 'Set in order' is to minimize the amount of motion required in order for workers to do their jobs.

❖ **Third S stands for: Shine (Seiso)**

Shine means keep machines and work areas neat and clean to eliminate problems associated with un-cleanliness.

❖ **Fourth S stands for: Standardize (Seiketsu)**

Standardize means making the first 3S's a routine practice by implementing clear procedures for sorting, straightening and scrubbing.

❖ **Fifth S stands for: Sustain (Shitsuke)**

Sustain – Keep it up the process and Promote, communicate and train in the 5S's to ensure that it is part of the company's corporate culture.

### 3.6.3 Benefits of 5S's:

- ✓ Insures safety
- ✓ Better working environment
- ✓ Proper utilization of space
- ✓ Reduction of quality problems
- ✓ Lower the costs
- ✓ Increased customer satisfaction
- ✓ Good discipline in workplace etc.





### 3.6.4 After Improvement of Capacity:

Sl No.	Operator Name	Op ID	Process Name	M/c Type	C1	C2	C3	C4	C5	Avg CT	Pcs/Hr	10% Allow. Capacity
1	X	xx	Shoulder Jnt	O/L	8	9	7	8	8	8	450	405
2	Y	yy	Slv Jnt	O/L	32	30	33	35	34	33	110	99+77=176
3	A	aa	Slv Jnt	O/L	40	42	44	43	42	42	86	
4	Z	zz	Bottom Hem	F/L	11	11	12	14	12	12	300	270

Table: After Improvement of Capacity

### 3.6.5 Process & Man power Elimination:

We had increased Work motion as well as productivity by applying Process eliminating system, Layout Change system, Motivation to the operator and worker, by changing working environment etc.

We had eliminate some process in sewing line as like C/F zipper and placket joint. Sleeve tab and cuff joint etc.

### 3.6.6 The development is shown in a table below:

Day	Total Worker (B)	Total Process	Elimination of Process	Worker decrease	Total worker (A)	Effi. (B) %	Effi. (A) %	Production (B) pcs	Production (A) pcs
1 <sup>st</sup>	42+3	42	C\F zipper and Placket	1	41+3	60	65	269	285
2 <sup>nd</sup>	41+3	41	Pocket rolling and attach	1	40+3	65	70	285	299
3 <sup>rd</sup>	40+3	40	Trimming doing by operator at the process end	2	40+1	70	72	299	307 & Reduce helper cost

**N.B - Here, B= Before and A= After**

Table: 3.6.6 The development table



## 3.7 Line Balancing:

To make the flow of the garments according to the line potential by raising each operator's capacity equally.

### 3.7.1 The Objectives of line balancing in a sewing line are as follows.

Line balancing is the main part of work study and as well as garments production. The certain properties of balancing lines are transfer of process automatically through a line.

- Regular material flow;
- Maximum utilization of man power and machine capacity;
- Minimum process times;
- Minimize waste times;
- Minimizing workstations;
- Maximum outputs at the desired timed;
- Agreed quality maintenance of the garments;
- Reduce production costs.

### 3.7.2 Importance of Line Balancing:

- To Increase productivity
- To remove bottleneck
- To make the flow smooth
- To reduce waiting time
- To utilize the skill properly

### 3.7.3 Steps in Line Balancing:

Now-a-days, commonplace Minute price (SMV) is employed as a tool for the road equalization, production management and also the estimation of potency.

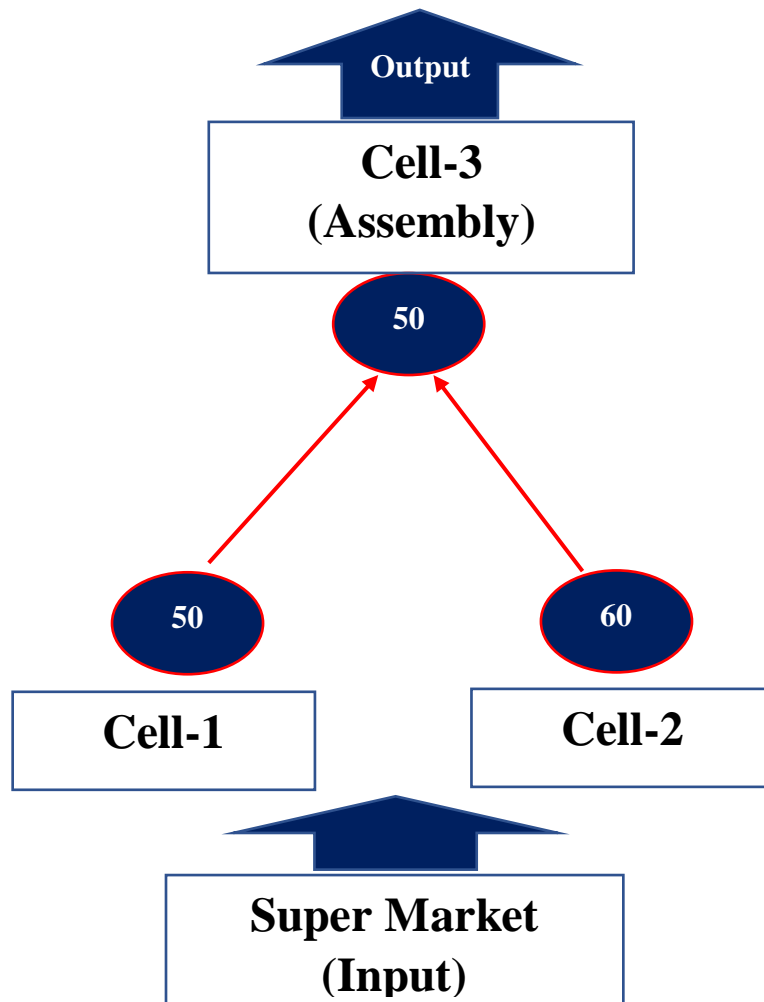
- ❖ Design the digital computer
- ❖ Check the machine rate
- ❖ Check the SPI
- ❖ Make the tactic commonplace
- ❖ Remove inessential motion
- ❖ Find out highest & lowest capability operator (with similar megahertz Setup)
- ❖ Divide the work.



### **3.7.4 Steps needed to improve efficiency:**

- Conducting time-and-motion study and correcting faulty motions.
- Hourly operator capability check.
- Use very best line layout.
- Best work station layout.
- Reduce line setting time.
- Improve line equalization
- Using of work aids, attachments, guides, correct pressure foots and folders.
- Continuous feeding to the stitching line.
- Feed fault free and precise cut pieces to line. .
- Training to stitching operators.
- Setting individual operator target.
- Eliminate loss time.
- Use of motor vehicle trimmer textile machine.
- Inline quality review at regular interval.
- Operator motivation.
- Ensure PIB system.

### 3.7.5 Line Balancing in WIP process with Buffering Management:



If **Cell-1** production is 50 pcs per hour and **Cell-2** production is 60 pcs per hour, the ultimate production will be 50 pcs and sometimes absent of worker and operator production can be decreased. So it will be a loss project.

We can solve this problem by buffering management process. Buffering means the extra work should be done for next day. It is one kind of bottle neck create system. So we can solve the problem in absence of 1-2 operators by the help of IE operators and buffering pcs. If we do this way, our production will be increased.

Here given an example for the better understanding which we done in factory practically:-

Suppose we did the 150 pcs buffer for 3 hours in previous 2 or 3 days. Then in the absence of an operator if our additional IE operators or jumpers produce 20 pcs garments per hour then how we will meet our target? As we know the efficiency and capacity of an IE operator or jumper is less than the regular operator.

So,

Production will be such way-

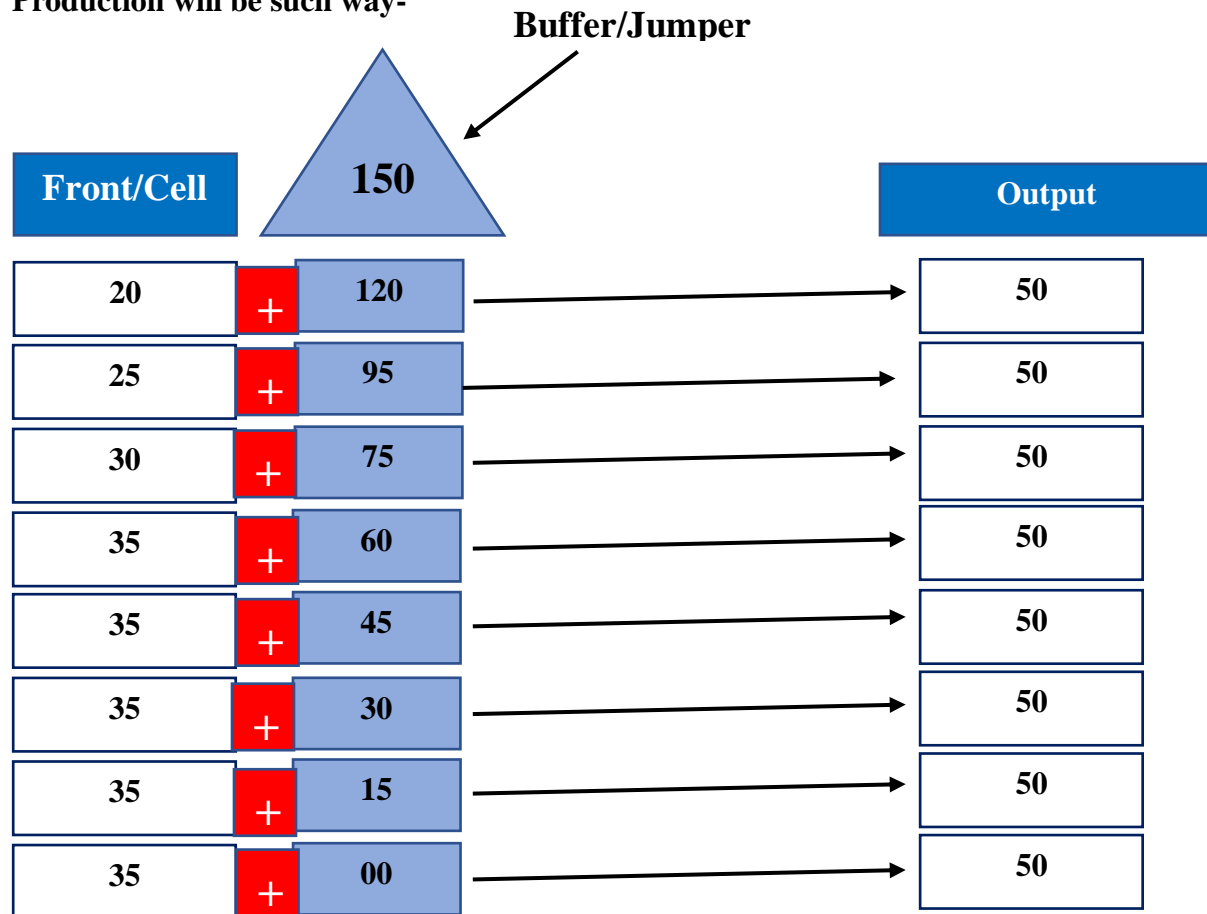


Fig: Line balancing with Jumper/Buffer

### 3.7.6 Line Balancing by balancing Cycle Time and SMV:

Cycle Time & SMV before Balancing:

Line Potential 82 Pcs	Before Balance		
	Cycle Time	SMV	Capacity
Op X	0.60	0.75	100
Op Y	0.90	1.00	67

Table: Cycle Time & SMV before Balancing



### Methodology (Balance Cycle Time):

- ❖ Free time of X  $= 60 - (82 \times 0.60) = 10.80 \text{ min}$
- ❖ X's Capability to support  $= 10.80/0.90 = 12 \text{ pcs}$
- ❖ Add support pcs with Y's production pcs  $= 67+12 = 79 \text{ pcs}$
- ❖ Calculate % pcs of support  $= 12/79 = 0.1519$
- ❖ Calculate Cycle Time factor / Capacity factor  $= 0.90 \times 0.1519 = 0.1367$
- ❖ Add capacity factor with X's Cycle Time  $= 0.60 + 0.1367 = 0.74 \text{ min}$
- ❖ Subtract capacity factor from Y's cycle time  $= 0.90 - 0.1367 = 0.76 \text{ min}$

### Methodology (Balance SMV):

- ❖ Free time of X  $= 60 - (82 \times 0.60) = 10.80 \text{ min}$
- ❖ X's Capability to support  $= 10.80/0.90 = 12 \text{ pcs}$
- ❖ Add support pcs with Y's production pcs  $= 67+12 = 79 \text{ pcs}$
- ❖ Calculate % pcs of support  $= 12/79 = 0.1519$
- ❖ Calculate SMV factor  $= 1.00 \times 0.1519 = 0.1519$
- ❖ Add SMV factor with X's Cycle Time  $= 0.75 + 0.1519 = 0.90 \text{ min}$
- ❖ Subtract capacity factor from Y's cycle time  $= 1.00 - 0.1519 = 0.85 \text{ min}$



### 3.7.7 Cycle Time & SMV after Balancing:

Line Potential <b>82 Pcs</b>	Before Balance			After Balance		
	Cycle Time	SMV	Capacity	Cycle Time	SMV	Capacity
Op X	0.60	0.75	100	0.74	0.90	82
Op Y	0.90	1.00	67	0.76	0.85	78

Table: Cycle Time & SMV after Balancing

Here we had got much production than previous by taking some process development steps that we can see the table.



# **Chapter-4**

## **Results & Discussions**





## 4.1 Result & Findings:

1. Increase efficiency with standard time & method analysis
2. Reduction of loss time and increase production:
3. Increase production with quality
4. Achieve the factory monthly efficiency of 60% from its existing 50%
5. Plan to achieve 65 % efficiency in cutting dept. from existing 55%.
6. Maintain the end line re work below 3 % from its existing 6%.
7. Maintain the end line re work below 5 % to improve the quality.
8. Forecast to be reduce the wastage.
9. Proper utilize of elements such as (man, machine, materials, and money).

## 4.2 Discussion:

First we have set our targets. To achieve this, work study have to be used by different methods. According to the plan the operation is to be started. To create a Basic Pant of normally 25 to 30 processes have to be run. Here some of the processes are made of bottleneck, for which our production capacities are much lower, then increased the capacities, more capable operators, some lines have to be shared with the line on which the bottleneck was created. To create the operation balance of that process we have studied the capacity, motion, process, layout plans etc. With this sharing, it is possible to increase production capacities and productions a lot.



# **Chapter-5**

## **Conclusion & References**



## 5.1 Conclusion:

After complete this thesis we can learn many important thing and the process how the garment are produced. Also how to increase productivity in garments section. By doing this thesis we think that thesis is so much helpful for our future engineering and corporate life. Compatibility to my analysis we can learn and gain knowledge theoretical and practical in those few years. But In this sector the theoretical and the practical knowledge is totally different. This sector need real life knowledge. When our internship is going on the factory, we can see every process in face to face which increase our knowledge in high level. I think it very short time for us to gain practical knowledge it should be around 5 months. Finally I said all the members of Dhaka Fareast ltd. was so much helpful. When we asked any question they never show the unwillingness. That's why the training period was so real life and enjoyable. Finally we can say this thesis will helpful for our future engineering life.



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