

Effect of time and motion study on productivity in garment sector

Mst. Murshida Khatun

Daffodil International University, Dhaka, Bangladesh

Email: murshida@daffodilvarsity.edu.bd, murshidatex05@gmail.com

Abstract- The productivity in garment sector depends on many factors. Time and motion study is very important factor that control the productivity of garment sector. In garment sector to make the shipment in exact time it is very necessary set a target for sewing section. The total work of the sewing section is completed by different operator. So without a standard target it is impossible to reach the goal. To set a standard target time and motion study is mandatory. This paper represents the time and motion study practice used in garment sector. By making the time and motion study an assumption of total time needed for any particular product or garment can be made, that is really important to make the delivery of the product to the buyer on exact time.

Index Terms- time study, motion study, productivity and allowance.

1 INTRODUCTION

A work measurement technique for recording the times and rates of working for the elements within specific conditions, and for analyzing the data so as to determine the time necessary for carrying out a job at a defined level of performance. Time study evolved from the work of Taylor and was the original work measurement technique [6]. Motion study is a technique of analyzing the body motions employed in doing a task in order to eliminate or reduce ineffective movements and facilitates effective movements. By using motion study and the principles of motion economy the task is redesigned to be more effective and less time consuming [1]. Productivity can be defined as the ratio of output in a period of time to the input in the same period time. Productivity can thus be measured as:

$$\text{Productivity} = \frac{\text{Output (In period of time)}}{\text{Input (In the same period)}}$$

In simple terms productivity is the quantitative relationship between what we produce (output) and the resources (inputs) which we used [4].

2. EXPERIMENTAL

2.1. Time and Motion Study

2.1.1 Time Study

Time study chart:



**TURAG GARMENTS & HOSIERY MILLS
LTD.
IE & PLANNING DPT.**

Line 8
Item Girls T-shirt

Style 335858
Buyer E/F

Date 15/06/2013

Total Manpower
43

Sl. No	Process name	M/c name	Cycle time					Avg. time	Allowance	Total time
			1	2	3	4	5			
1	Front part mark for dart	H/W	16	18	16	15	15	16	15%	18
2	Dart make-1	S/N	124	123	120	122	122	122	15%	141
3	Dart make-2	S/N	120	124	122	124	118	122	15%	140
4	Dart make-3	S/N	104	106	106	105	108	106	15%	122
5	Dart make-4	S/N	96	98	100	99	98	98	15%	113
6	Mock servicing	O/L	12	12	14	13	12	13	15%	14
7	Mock top seam	S/N	21	23	22	24	23	23	15%	26
8	Mock tack at front neck	S/N	18	18	20	19		19	15%	22
9	Mock overlock at front neck	O/L	12	11	12	14	13	12	15%	14
10	Shoulder join	O/L	25	27	24	23	25	25	15%	29
11	Neck round servicing	O/L	48	50	49	50	48	49	15%	56
12	Neck round servicing	O/L	62	65	65	64	63	64	15%	73
13	Neck round t/s with label	S/N	56	57	56	58		57	15%	65
14	Neck round t/s with label	S/N	55	58	56	58		57	15%	65
15	Lace join at back neck	S/N	26	28	29	27	30	28	15%	32
16	Lace join at front neck (bottom)	S/N	17	18	20	19	29	21	15%	24
17	Lace tack at front neck (right)	S/N	29	26	30	26	29	28	15%	32
18	Lace tack at front neck (left)	S/N	24	25	24	24	23	24	15%	28
19	Lace round tack at front shoulder point	S/N	28	27	30	35	31	30	15%	35
20	Narrow tape join at back neck	S/N	30					30	15%	35
21	Narrow tape join at back neck	S/N	25	26	25	27		26	15%	30
22	Care label join	S/N	24	23	25	24		24	15%	28
23	Armhole binding	F/L	30					30	15%	35
24	Armhole binding	F/L	22	20	24			22	15%	25
25	Khara tack at binding close	S/N	22	24	23	22		23	15%	26
26	Side seam-1	O/L	44	47	46	48	45	46	15%	53
27	Side seam-2	O/L	29	32	30	30		30	15%	35
28	Side seam-3	O/L								
29	Chap tack	S/N	10	10	12			11	15%	12
30	Body hem	F/L	26	25	25	24	25	25	15%	29

Table no 1: Time Study Chart

Target without Rating & Rating Factor:

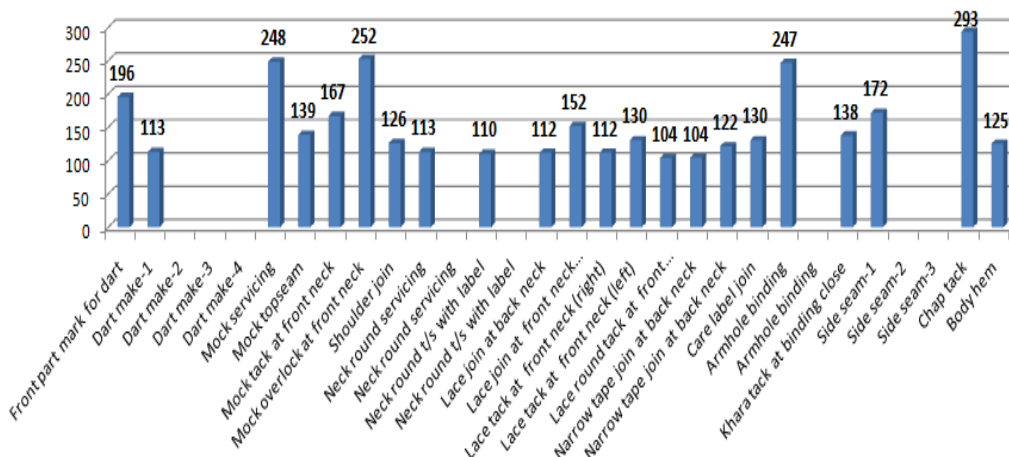


Figure 1: Target without Rating & Rating Factor

Graphical representation of production/hr:

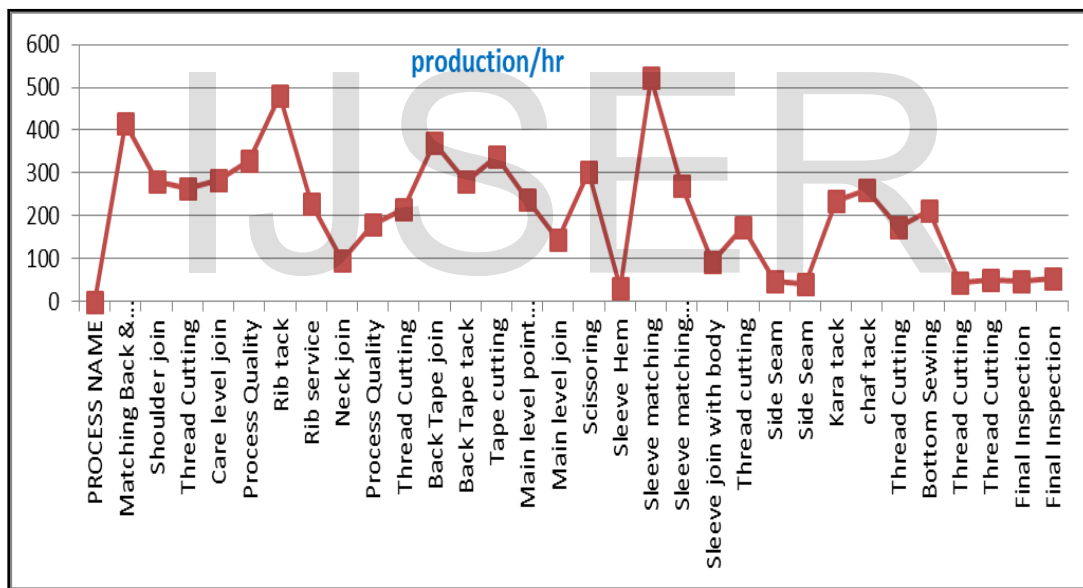


Figure 2: Graphical representation of production/hr

From the graph it is clear that for different parts production different time is needed. Most time is needed for sleeve hem joining and lowest time is needed for thread cutting and in side seam.

Standard Minute Value (SMV)

Standard minute value is the standard time, to complete any given task by using best possible methods at standard level of performance. To estimate SMV we have to analyze the garment

carefully and check different factors that affect the SMV. SMV of a product varies according to the work content or simply according to number of operations, length of seams, fabric types, stitching accuracy needed, sewing technology to be used etc

Standard minutes (SMV) of few basic products have been listed down with its SMV range according to work content variation. In actual cases garment SMV may go outside of the limit depending the above factors.

Sl.no	products	SMV(Average)	SMV(Range)
1	Neck T-shirt	8	6 to 12
2	Polo shirt	15	10 to 20
3	Pormal full sleeve shirt	21	17 to 25
4	Pormal Trouser	35	25 to 40
5	Sweat shirt(Hooded)	45	27 to 50
6	jacket(suit)	95	75 to 135

Table 2: SMV value of some basic product

From the above table it is seen that various product has various standard minute value. SMV range is higher for jacket and lower for neck T-shirt.

Allowances

Before it is possible to complete and issue that standard time for a job, it is necessary to add to the basic time certain allowances.

The reason for adding these allowances is that the work study engineer has only been considering the productive work of the operator and has not taken into account the periods of rest that are required by the operator to enable the operator to recover from the energy expended, nor the time that he/she needs to allow attention to personal needs.

To get the standard time, a proper allowance must be added consisting the working conditions. While deciding the quantum (generally in terms of percentage) of allowance to be added to the normal time, following types of allowance are considered:

1. Machine allowances
2. Relaxation allowance
3. Interference allowance
4. Process allowance
5. Special allowance

Machine allowances – This covers

- Thread cone or tube change
- Thread and needle breakage
- Adjusting tension
- Small problems in machine

The following chart shows the allowance value for different kind of machines.

Machine Type	Allowance %
DNL	17.5
SNL/BH	12.5
DNC/50L	9.0
SNC/30L	7.5
BS/BT	5.0
Other	2.0

Table 3: Machine allowances

For different machine allowance is varied according to machine requirements.

Relaxation allowance

People are not machines and they need to go the toilet, scratch, blow their nose, etc. Relaxation and fatigue allowances are provided to give the operator/ worker the opportunity to recover from the effort of doing his/her work, and to allow for attention to personal needs. The relaxation and fatigue allowance is given to every operation. Recommended allowances for personal and fatigue allowances in the sewing trade are set at 11% for sitting jobs and 13% for standing.

Interference allowance

When one worker is attending more than one machine, then interference is the time for which one or more machine units remain idle while the operator is occupied with the work on other machine units. The allowance provided to compensate this idleness due to interference is known as interference allowance.

Process allowance

This is an allowance provided to compensate for enforced idleness during a process. This includes loss of time due to:

- (i) no work
- (ii) Power failure
- (iii) Faulty material
- (iv) Faulty tools or equipments

Contingency allowance

A contingency allowance should not be greater than 5% and should only be given in cases where the work study officer is absolutely satisfied that they are justified. The contingency allowances should be expressed as a percentage of the basic time.

Special allowance

These allowances are decided as a policy matter of management. These are allowed for activities which are normally not a part of the operation cycle but are essential for satisfactory performance of work. These include for the following items:

- (i) Start up
- (ii) Cleaning
- (iii) Shut down
- (iv) Set up
- (v) Dismantling allowance
- (vi) Change over
- (vii) Reject allowance
- (viii) Excess work allowance
- (ix) Learning allowance
- (x) Training allowance
- (xi) Implementation allowance
- (xii) Small batch allowance
- (xiii) Tool changing and regrinding

2.1.2 Motion Study

The Goals of Motion Study

- (i)Improvement
- (ii) Planning / Scheduling (Cost)
- (iii)Safety

Classification of body movement

Operators use their body for different operations, and spend their maximum time. The motion time is long but sewing time is short. So, body movement is classified by 5 divisions. They are as below:

1. **Knuckle:** only finger is used for this movement
2. **Wrist:** using hand and finger
3. **Elbow:** For arms, hand and finger.
4. **Shoulder:** Upper arm, forearm hand and finger.

Data collection and analysis for motion study

sl.no	operation	cycle time(sec)					avg.
		1	2	3	4	5	
1	pocket zipper join	67.91	68.11	81.50	65.13	93.13	75.13
2	arm hole top seam	20.73	27.17	24.93	26.18	23.13	24.42
3	zipper join	29.23	24.34	23.12	32.23	25.13	27.45
4	hood servicing	23.24	22.34	25.23	28.27	22.18	24.10
5	hood tack	44.52	46.34	48.17	46.23	43.12	46.56

Table no 4: work without any motion (minimum work place)

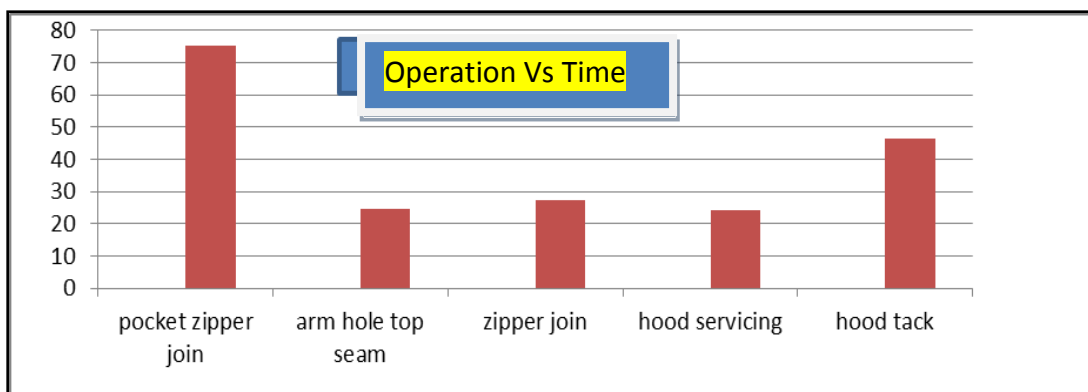


Figure 3: Operation Vs Time

sl.no	operation name	cycle time/sec					Aveg.
		1	2	3	4	5	
1	pocket zipper join	68.75	70.23	83.50	67.45	97.73	78.54
2	arm hole top seam	22.34	31.17	26.86	25.71	26.13	26.33
3	zipper join	31.12	26.72	25.17	34.17	27.33	29.73
4	hood servicing	25.33	24.52	27.23	30.23	24.12	28.34
5	hood tack	46.23	48.23	50.23	46.65	44.75	49.35

Table no 5: work with motion (maximum work place)

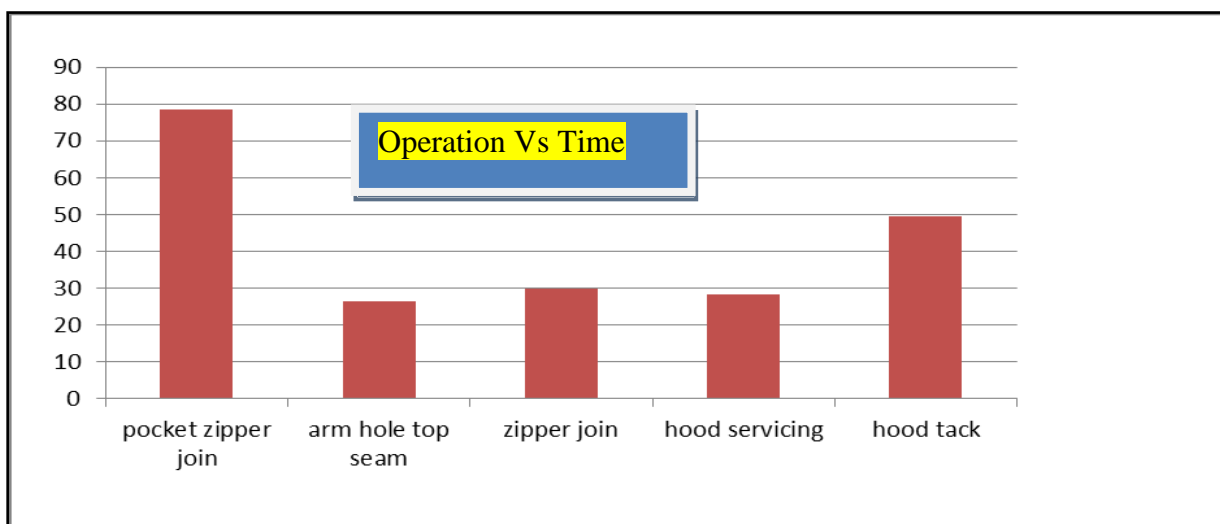


Figure 4: Operation Vs Time

The above the figure represents the relation between operation and time. It is seen that highest time is needed for pocket zipper joining and lowest time is needed for arm hole top seam.

3. CONCLUSION

From the above discussion, it is clear that a standard can be maintained in the garment sector to get the maximum production by using the time properly. Different time is needed to sew the different parts of a garment. As a result time variation is must. Since garments are made with the help of different operator, time limitation must be given to achieve the target production. To set a standard target for different product time and motion study is mandatory. By making the time and motion study target production can be achieved. As a result shipment of a particular product can be made in exact time and there would be no delay to get the payment to the seller.

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