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COMPARATIVE STUDY ON THE PERFORMANCE OF SEWING LINE OF AN APPAREL INDUSTRY BEFORE AND AFTER EXECUTION OF 5S PHILOSOPHY

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ABSTRACT

Ahmed Ullah ANM (2022) Comparative study on the performance of sewing line of an apparel industry before and after execution of 5S philosophy. *J. Innov. Dev. Strategy.* 13(1), 12-16.

This article represents the implementation of 5S philosophy- one of the major lean tools where comparative study of an apparel sewing line is observed to find the changes of productivity and efficiency. Lean originates in Japan in 1930 at Toyota industries which is also known as Toyota Production System (TPS) and implemented in Japanese Industries since 1980`s. 5S means Seiri (sort), Seiton (set in order), Seiso (shine), Seiketsu (standardize) and Shitsuke (sustain). The goal of 5S is to increase productivity by reducing non-value added products-muda, work place organized in a better manner, the fewer search, transport and waiting time reduces so save working time which can be used value adding activities leads to better productivity, more profitability as a result and it will give advantages over competitors. In this work, the production data of a knitted basic T-Shirt line have been taken and evaluated results in two phases; in first phase data have been collected from sewing line without implementing 5S method and in the second phase implemented 5S method for the same line to observe the improvement.

Key words*:5S philosophy, basic T-shirt, work study, apparel manufacturing, productivity*

INTRODUCTION

Bangladesh Ready Made Garments (RMG) industries have emerged as a promising sector since 1980s. It has grown in popularity and has made a considerable economic contribution to the country. The apparel industries solely account more than 80% of total export earnings of the country which includes knit and woven sectors (Zaman and Zerin, 2017; Lee *et al.* 2013; Mottaleb and Sonobe, 2011; Knutsen 2004). Now-a day's business and technology are running at a faster movement and continuous improvement is needed for survival and 5S is designed to create high performance. It is proved that in manufacturing, 5S philosophy work for the improvement of productivity and reduced wastages. In recent days Bangladesh RMG industries face challenges, like: insufficient inputs from the local market, insufficient focus on the product and market, the poor performance of the backward linkage industries (Haque *et al.* 2020), meet the shipment date, assembled the products in time, best method of production process. Apparel industries all over the world faced a great deal of negative impact like Bangladesh due to the economic recession back in 2008. And because of this low cost garments had been urged by most consumers. Then renowned apparel brands have been forced to cut down the prices to keep their products in the market. They have been shifted their vendors to low cost worker base countries like Bangladesh to keep the competition worldwide. Any manufacturing industry aims to manufacture items as quickly and cheaply as feasible in order to thrive in the competitive market. In some instances, it has been noted that, certain industries are resistant to change since they have operated traditionally for a long time (Afsana *et al.* 2017). It is known to us that, the withdrawal of the Multi Fiber Agreement in 2005 brought about significant changes for the apparel industry (Islam *et al.* 2013). To meet the global challenges, it is really vital to keep the production process in such a way that will not incorporate any types of waste and non-value added process. The terminology is not that much unfamiliar to the manufacturers but they lack in consciousness about the strategic advantages that can be found while 5S philosophy is used in apparel production. The 5S method can be applied to all aspects of a garments industry, including production, logistics, maintenance, administration to reduce the losses, systemize tasks and tools and organizes the work place (Bartnicka 2018). Figure 1 shows the 5S philosophy.

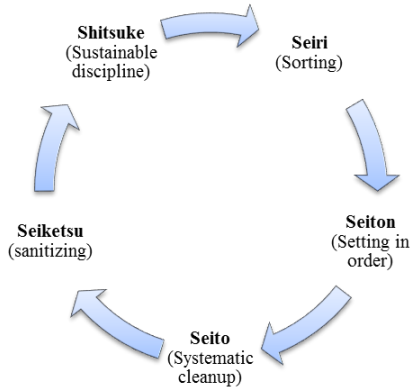

Fig. 1. 5S philosophy

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The phases of 5S:

- Seiri (sort): Unnecessary items will not remain in the work place.
- Seiton (set in order): Everything should be in its place.
- Seiso (shine): Clean outside and inside i.e. keep the floor and machine always workable condition.
- Seiketsu (standardize): Visualize the 5S standard in the workstation.
- Shitsuke (sustain): Continue to follow the standard until the best one.

Figure 2 shows the flow process chart of an Apparel manufacturing.

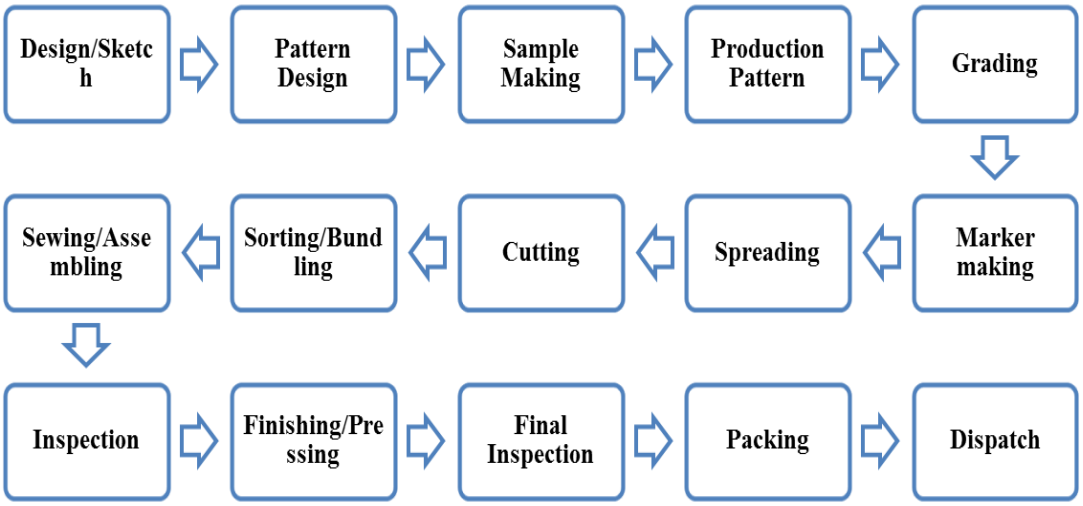

Fig. 2. Flow process of garments manufacturing

METHODOLOGY

For comparing productivity, data was collected from normal & improved (after implementation of 5S philosophy) line respectively of the same machine of sewing floor of the apparel industry. Data has been taken from same Operator and with same products. Study is done with stopwatch to calculate standard time for each operation. To do this, a basic T-Shirt line was selected for the purpose because operations differ from style to style and it is difficult to correlate all these operations of individual styles. To get better results, each operation time is taken for 5 cycles, and the average value has been placed for analysis. It may be mentioned here that, the performance rating is taken as 90%.

During the implementation of 5S Philosophy the sewing floor was re-arranged. Main label, size label attaching and neck top stitching is done by a single operator assisted by a helper. In traditional method, these activities are performed by three separate operators with three machines. So, after implementation of 5S principle the number of machines and operators are reduced.

Between sleeve tuck Operator and side seam Operator there was a pillar for which distance between the operators were higher. Cut pieces were transferred to side seam Operator manually. In new/improved system a trolley was introduced between the Operators. As a result the delivery time was reduced.

In traditional line of the factory, the pencil for marking have to be searched and that would take time and sometimes pencil got missing and a new pencil has to be collected from the store room. Hence, it requires extra time. But after implementation, marking pencil has been tied with the Operator's table and there is no chance of missing and reduce the searching time.

Where necessary introduction of trolleys makes transportation easier and faster that makes less waiting time.

DATA COLLECTION AND ANALYSIS

To observe the effects of implementing 5S, at first data were collected from a basic T-shirt sewing line (without 5S tools) and is shown in the table 1. And in next phase again data were collected from the same line after implementation of 5S and is shown in table 2. In both the cases allowances were assumed as 20%.

Table 1. The performance of normal line (Before implementation)

Sl.	Operation	Machine	Avg. observe time (Sec)	Rating factor	Basic Time (Sec)	Basic Time (Minute)	Standard Minute value (SMV)	Hourly Prodn. (Pcs)
01	Back and front part machining	Manual	18.4	90%	16.56	0.28	0.33	181
02	Main label, Size label attaching and Neck Top stitching	Plain	20.0	90%	18.0	0.30	0.36	167
03	Shoulder Joint	O/L-4T	20.2	90%	18.18	0.30	0.36	165
04	Shoulder Top stitching	F/L-3T	14.0	90%	12.6	0.21	0.25	238
05	Neck/Rib rolling	Plain	9.2	90%	8.28	0.14	0.17	362
06	Neck/Rib joint	O/L-4T	10.6	90%	9.54	0.16	0.19	314
07	Label Position Marking	x	x	x	x	x	x	0
08	Neck piping	Plain	9.2	90%	8.28	0.14	0.17	362
09	Piping Top stitching	Plain	11.2	90%	10.08	0.17	0.20	298
10	Sleeve Hemming	F/L -3T	11.2	90%	10.08	0.17	0.20	298
11	Sleeve matching	Manual	5.8	90%	5.22	0.09	0.10	575
12	Sleeve joint	O/L-4T	28.6	90%	25.75	0.43	0.51	117
13	Arm hole top stitching	F/L -3T	31	90%	27.9	0.47	0.56	108
14	Sleeve Tuck	Plain	8.2	90%	7.38	0.12	0.15	407
15	Side seam with care label	O/L - 4T	28.4	90%	25.56	0.43	0.51	117
16	Bottom hemming	F/L -3T	15.6	90%	14.04	0.23	0.28	214
	Total				**224.1**	**3.74**	**4.48**	

Table 2. The performance of improved line (After implementation)

Sl.	Operation	Machine	Avg. Observed time	Rating Factor	Basic Time (Sec)	Basic Time (Min)	SMV	Hourly Production
1	Back and Front Part Matching	Manual	17	90%	15.30	0.255	0.306	196
2	Main Label, Size label attaching and Neck top Stitch	Plain	15	90%	13.50	0.225	0.27	222
3	Shoulder Joint	O/L-4T	19.5	90%	17.55	0.2925	0.351	171
4	Shoulder Top Stitching	F/L -3T	12.5	90%	11.25	0.1875	0.225	267
5	Neck/Rib Rolling	Plain	8	90%	7.20	0.12	0.144	417
6	Neck/Rib Joint	O/L-4T	9.5	90%	8.55	0.1425	0.171	351
7	Label Position Marking	Manual	8.1	90%	7.29	0.1215	0.1458	412
8	Neck Piping	Plain	8.9	90%	8.01	0.1335	0.1602	375
9	Piping Top Stitch	Plain	10	90%	9.00	0.15	0.18	333
10	Sleeve Hemming	F/L -3T	10	90%	9.00	0.15	0.18	333
11	Sleeve matching	Manual	5.6	90%	5.04	0.084	0.1008	595
12	Sleeve join	O/L-4T	27	90%	24.30	0.405	0.486	123
13	Arm hole Top Stitch	F/L -3T	30	90%	27.00	0.45	0.54	111
14	Sleeve tuck	Plain	7.5	90%	6.75	0.1125	0.135	444
15	Side seam with care label	O/L-4T	27	90%	24.30	0.405	0.486	123
16	Bottom Hemming	F/L -3T	14.8	90%	13.32	0.222	0.2664	225
	Total				**207.36**	**3.459**	**4.1508**	

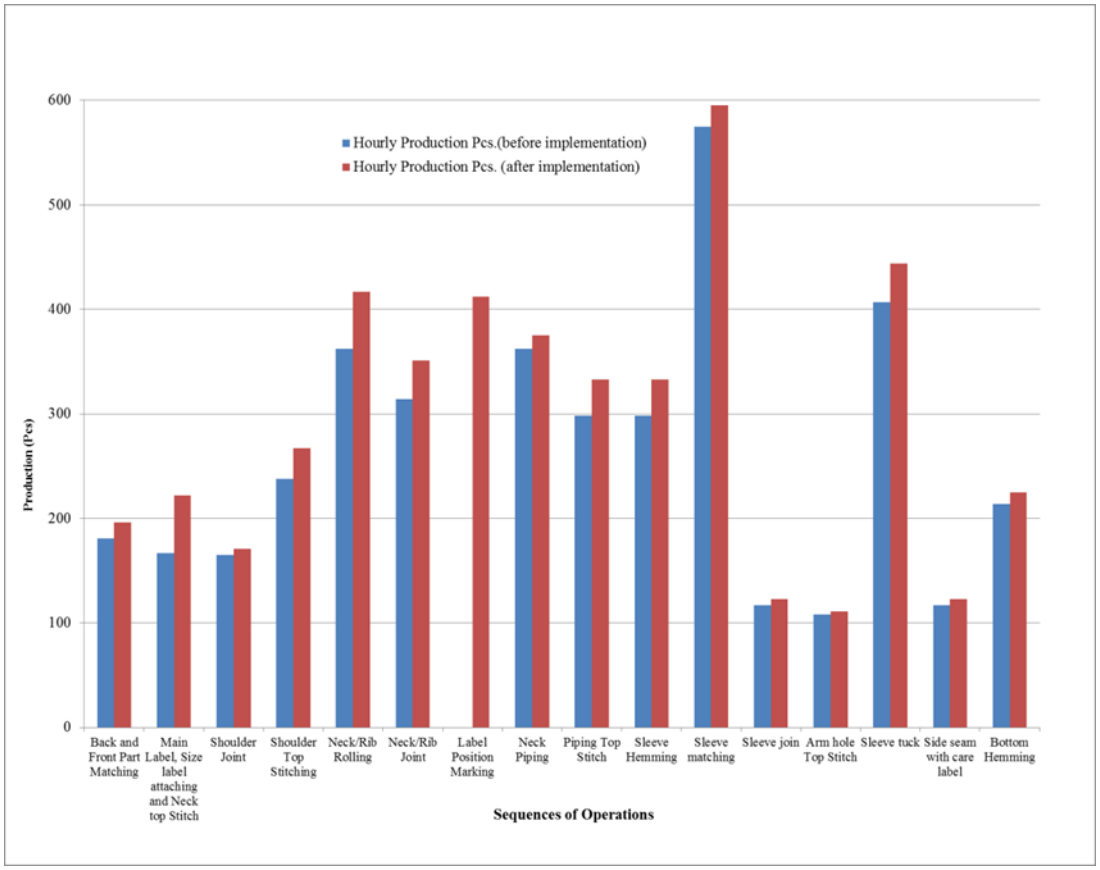

Fig. 3. The comparison before and after implementation of 5S philosophyfor a basic T-shirt sewing line.

RESULTS AND DISCUSSION

From the above tables and figure, it is clearly shown that, Basic time (Seconds) in normal line was 224.1, Basic time (Minutes) was 3.74 and Standard Minute Value (SMV) was 4.48. After Implementation of the 5S philosophy Basic time (Seconds) in improved line was 207.36, Basic time (Minutes) was 3.459 and Standard Minute Value (SMV) was found 4.1508. So, considerable improvement was observed by using 5S philosophy. The improvement process increased production, labor productivity, machine productivity and thus enhanced the line efficiency.

CONCLUSION

Traditionally operated sewing lines are facing problems like unnecessary operations, wastages, rejection, poor line balancing etc. These problems can be eradicated with 5S (Sort, Set in order, Shine, Standardization and Sustain) method and making the working environment totally visualized. This research is based on a model of Basic T-shirt sewing line for increasing productivity. The 5S philosophy is a continuous improvement method; thereby, its implementation helps the company to minimize the wastages, enhance quality products. The exchanges of activities between the Operators & Helpers show a significant improvement of reducing waiting time, less number of workers causing higher productivity. 5S philosophy contributes to the productivity of both workers and the company. To achieve better quality and cost effective production, standard operation procedure (SOP) was followed. By implementation of 5S expected productivity and efficiency can be obtained.

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