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Contrivance of 5s System to Effectuate Higher Productivity in Apparel Industries

By Jaglul Hoque Mridha, A.M. Riasat Alam, Tanvir Mahmud
& Tanvir Ahmed

Northern University Bangladesh

Abstract- Bangladesh is the second largest exporter of readymade garment (RMG) products in the world after China. Above 80% of its total export earning is contributed by the RMG sector which has a huge impact on the economy of the country. At present this RMG sector is facing many threats and challenges to hold its flourishing position because of the entrance of new competitors both in the national and international market. To overcome these challenges continuous improvement is required to a great extent. This paper experiments execution of 5S approach to a production scenario in a garments industry. 5S method should be improved to ensure ergonomics in the workplace, to reduce defects and increase cleaning and productivity growth. It is one of the fundamental tools to intensify continuous improvement process in organizations and represents a transformation in 5 steps of a job, which is characterized by maximum efficiency at the micro level and minimum loss. Any company applying the 5S methodology will have reduction of different types of waste, efficient workflow due to lesser machine breakdowns, lower defect rates, reduced inventory and effective problem visualization, visible and swift results in an efficient way.

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CONTRIVANCE OF 5S SYSTEM TO EFFECTUATE HIGHER PRODUCTIVITY IN APPAREL INDUSTRIES

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Contrivance of 5s System to Effectuate Higher Productivity in Apparel Industries

Jaglut Hoque Mridha^α, A.M. Riasat Alam^ο, Tanvir Mahmud^ρ & Tanvir Ahmed^ω

Abstract- Bangladesh is the second largest exporter of readymade garment (RMG) products in the world after China. Above 80% of its total export earning is contributed by the RMG sector which has a huge impact on the economy of the country. At present this RMG sector is facing many threats and challenges to hold its flourishing position because of the entrance of new competitors both in the national and international market. To overcome these challenges continuous improvement is required to a great extent. This paper experiments execution of 5S approach to a production scenario in a garments industry. 5S method should be improved to ensure ergonomics in the workplace, to reduce defects and increase cleaning and productivity growth. It is one of the fundamental tools to intensify continuous improvement process in organizations and represents a transformation in 5 steps of a job, which is characterized by maximum efficiency at the micro level and minimum loss. Any company applying the 5S methodology will have reduction of different types of waste, efficient workflow due to lesser machine breakdowns, lower defect rates, reduced inventory and effective problem visualization, visible and swift results in an efficient way.

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I. INTRODUCTION

The apparel industries in Bangladesh are mainly export-oriented. Knit and woven garments are the main products. During the past two decades, the success of readymade garment exports from Bangladesh has exceeded the most optimistic standards. In terms of country employment, foreign exchange earnings and its contribution to real GDP, this RMG sector has rapidly gained immense importance. To sustain this rapid growth and satisfy customer demand, the companies need to create some new work practices instead of traditional practices. Applying LEAN techniques like the 5S system can result in improved productivity, cost savings, and workflow efficiency.

a) Objectives:

- To identify the 5S principles in Apparel Industry to find out the desired Productivity & Improve efficiency in Production line of apparel Industry.

Author α ρ: Lecturer, Department of Textile Engineering, Northern University Bangladesh. e-mails: jaglut.mridha92@gmail.com, riasat.alam@gmail.com, tanvirmahmud002@gmail.com

Author ω: Merchandiser, Hameem Group, Bangladesh. e-mail: tanvir.butex.tem.38@gmail.com

- To identify the factors influencing in Productivity in Apparel Industry.
- To analyze the effect of 5S Principles on Apparel Productivity.
- To contemplate the pursuance in terms of manufacturing and environmental key performance indicators namely productivity, efficiency, quality, work in progress among 5S initiated and non- 5S initiated apparel units.
- Elimination of waste like and create an action plan for continuous improvement.

II. LITERATURE REVIEW

5S is a simple tool of the LEAN management for organizing your workplace in a clean, efficient and safe manner to enhance productivity, visual management and to ensure the introduction of standardized working of an organization.

The 5 phases are:

- Sort (Seiri)– "When in doubt, throw it out".
- Straighten (Seiton) –"A place for everything, and everything in its place".
- Shine (Seiso) – "The best cleaning is to not need cleaning".
- Standardize (Seiketsu) – "See and recognize what needs to be done".
- Sustain (Shitsuke) – "The less self-discipline you need, the better".

The system creates an environment where all objects are easier to find and any deviation from the normal situation becomes apparent by visual management methods. In the same time, 5S techniques maintain quality, promote a significant costs reduction by eliminating the losses and provides the best framework for progress throughout the organization.

These five phases of 5S system has a great impact in reducing the seven deadly wastes or MUDAS of an organization. These seven deadly wastes are:

- Defect
- Inventory
- Processing
- Waiting
- Motion
- Transportation
- Overproduction

III. METHODOLOGY

This section describes different areas related to the study and also the tools and techniques used in this study. It is a basic technique to enhance workplace appearance and give a pleasant work environment.

During our research on the project, we have visited some renowned garments manufacturing companies named Epyllion Styles Ltd. There we have met with the authority to perform our research on the 5S system. There we follow some of the steps to implement the research work:

- Discussed with the top management about the ways they follow to implement 5S system in their apparel industry.
- Used survey method and questionnaire method to collect necessary data and information from the IE department for the research work.
- Made effective analysis and survey of each department to gather some valuable data and photos which is needed for the project research work.
- Made some search from these company's web sites to collect necessary information, comparable data etc.
- All the necessary task were done for the project work during the time period from June to August, 2016.

a) Data collection and analysis

The five concepts, which have to be checked, introduced and implemented in the workplace by the garments industries, where we have made our research are:

- i. *Seiri (Sort)*
 - Take some photos which are needed to analyze the study.
 - Segregate wanted & unwanted materials in all Zones.
- ii. *Seiton (Set in Order)*
 - Identify all materials by Name/Number/Colour code, etc.
 - Design a suitable storage place/parking slots and fix the place for storing each item depending on the frequency of usage
- iii. *Seiso (Shine)*
 - Prepare cleaning schedule for all zones covering.
 - The areas of cleaning
 - The items of cleaning
- iv. *Seiketsu (Standardise)*
 - Make a list of the various activities of 5S for implementation.
 - Follow the significant guidelines for floor marking in the industry.
 - The following things to be standardized.
- v. *Shitsuke (Sustain)*
 - Monitor all the activities of 5S continuously.
 - Create work discipline with the help of employees working in the particular area in order to suit the requirement

b) Case study

We have found some problems in different sections of the garments industry and found some actions required to solve the issues which are given below in the table:

Problems	Sample Dept.	Stores	Cutting	Stitching	Finishing	Packing	Office Area	Action Required
Unnecessary Items	Yes	Yes	No	Yes	Yes	Yes	Yes	Seiri
Leftover Present	Yes	Yes	Yes	Yes	Yes	Yes	No	Seiri
Rejection On Floor	No	Yes	Yes	Yes	No	Yes	No	Seiri
Floor Marking	Partial	No	Partial	Partial	No	No	No	Seiton
Labels	No	No	No	No	No	No	No	Seiton
Trolleys	Partial	Yes	No	Partial	No	No	No	Seiton
Sub Store	No	No	No	No	No	No	No	Seiton
Visual Controls	No	No	No	No	No	No	No	Seiton
Pathways Defined	No	No	No	No	No	No	No	Seiketsu
Racks And Bins	Yes	Yes	No	No	No	Yes	Yes	Seiton
Dust And Stains	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Seiso
Visible Sops	No	No	No	No	No	No	No	Seiketsu
Workers Training Over 5s	No	No	No	No	No	No	No	Shitsuke
Files Arrangement	No	No	No	No	No	No	No	Seiton

We divided the whole space available into six zones and then we identified the unwanted materials in those zones using red tags. After removing those

unwanted items from the zones, can save 51.21 m² space. Table 1 Shown the improvement in saving space on the factory floor.

Table 1: Zone wise saving space

Zone	Space saving (m ²)
Zone 1	0.06
Zone 2	3.1
Zone 3	2.83
Zone 4	0.69
Zone 5	21.39
Zone 6	23.14
Total saving space	51.21 m²

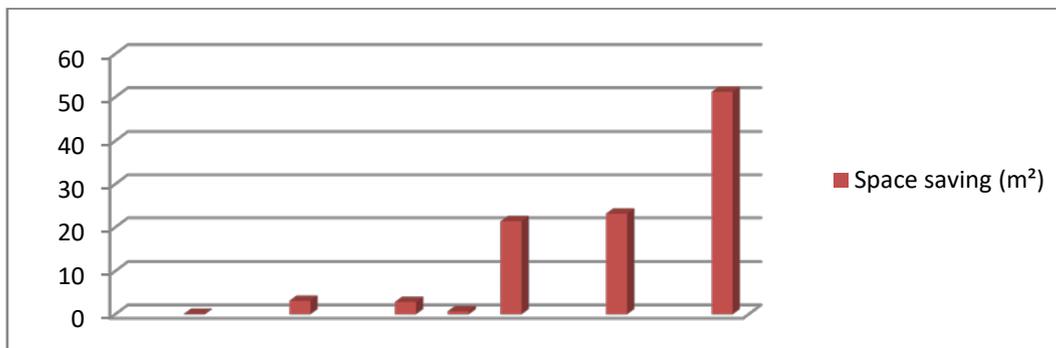


Figure 1: Different zone wise saving of space in square meter

In zone 1, save no space due to the removal of small quantities of items from that zone which occupied a little space. Allocate all store rooms to zone 5 and zone 6. Found the most unwanted items in those store rooms. A comparatively a massive amount of space

had been saved from zone 5 and zone 6. This saving space resulted in an additional cost savings of 4764.09US dollars or 376363.11 Taka, which is shown in a table.

Table 2: Zone wise saving cost

Zone	Total cost (USD)	Total cost (BDT)
Zone 1	12.58	993.82
Zone 2	162.08	1204.32
Zone 3	123.67	9769.93
Zone 4	21.32	1684.28
Zone 5	3455.91	273016.89
Zone 6	988.53	78093.87
Total saving cost	4764.09	376363.11

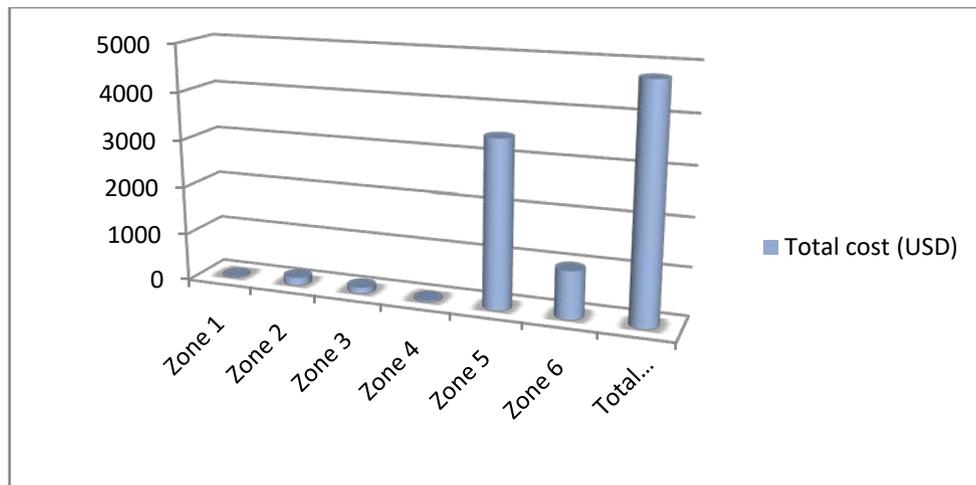


Figure 2: Zone wise total cost (USD)

Set in order was also applied in the fabric store. Before the implementation of 5s, there was no sequence of arranging the racks for storing fabrics. But during the study period, racks were rearranged according to the order volume of the buyer. Fabrics of higher quantity ordered were placed in initial racks while fabrics of lower

quantity ordered were placed in last racks so that fabrics could be delivered with least delivery time. Rack allocation was subjected to change each month with change of buyer and order quantity. This resulted in a reduced movement of 22.95%. Table 3 gives a clear representation of this scenario.

Table 3: Rack allocation for buyers (Before and after set in order)

Buyer Order	Quantity(piece)	Rack (before)	Rack(after)
M&S	15630	1,2	12
H&M	35500	3	4,5,10
C&A	60000	4,5,6	1,2,3
Celio	12000	7	11
RAW	25000	8	9
S.Oliver	30000	10	8
River Islands	15000	9,12	6,7

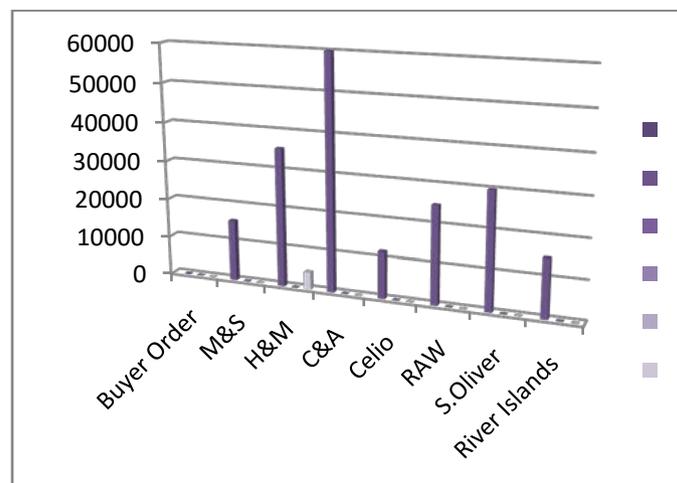


Figure 3: Different buyers and their order quantity

The same experiment done in the accessories store; a new layout was proposed and implemented based on the average quantity required/day. This

experiment also resulted a reduction in overall movement of 27.13%. The previous and new allocation of the accessories in the store is shown in table 4.

Table 4: Rack allocation for accessories (Before and after set in order)

Items	Average quantity required/day (bag)	Rack(before)	Rack(after)
Thread	3340	1,2,3	10,11
Wash elastic	70	4,5,6,7	1,2,3
Elastic tape	90	8,9	4,5,6
Button	800	10,11	7,8
Zipper	426	12	9,10,11
Organic fabric	215	13,14	12,13,14

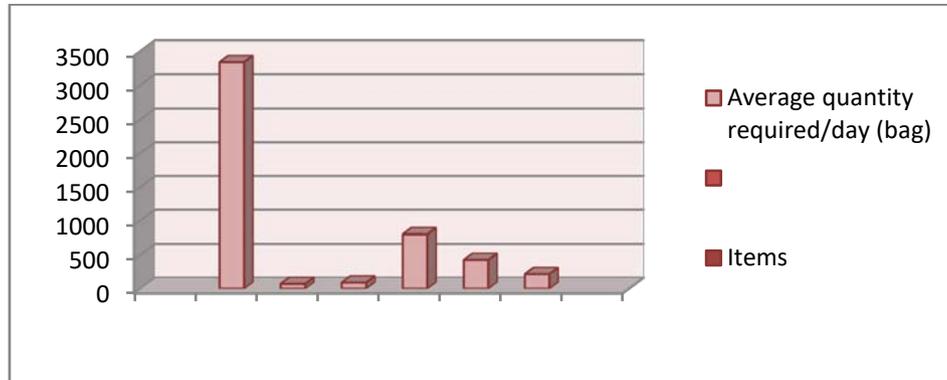


Figure 4: Rack allocation for various accessories

c) Time Consuming Analysis

Time utilization took each time the personnel or staff needed the tools or any item from the inventory places. To know how long it carry looking for the different sizes of tools before running 5S, Table 1 used

to collect time in looking for a different amounts of threads. Table 2 is the data collection chart used for looking for sewing section. This data collected by the average number of 2 cycles.

Table 5: Time consumption in looking for threads of different sewing machine before 5S

Thread of various machines	M/C 1 (sec)	M/C 2 (sec)	M/C 3 (sec)	M/C 4 (sec)	M/C 5 (sec)	M/C 6 (sec)
Staff 1	50 sec	110	50	74	65	50
Staff 2	45 sec	115	65	70	69	35
Staff 3	40 sec	110	60	85	61	51
Staff 4	50 sec	125	55	65	60	50
Staff 5	35 sec	111	70	60	62	55
Staff 6	44 sec	115	75	75	75	30
Staff 7	40 sec	130	65	70	67	45
Staff 8	42 sec	125	62	65	60	40
Total(average)	43	117	62	70	64	119

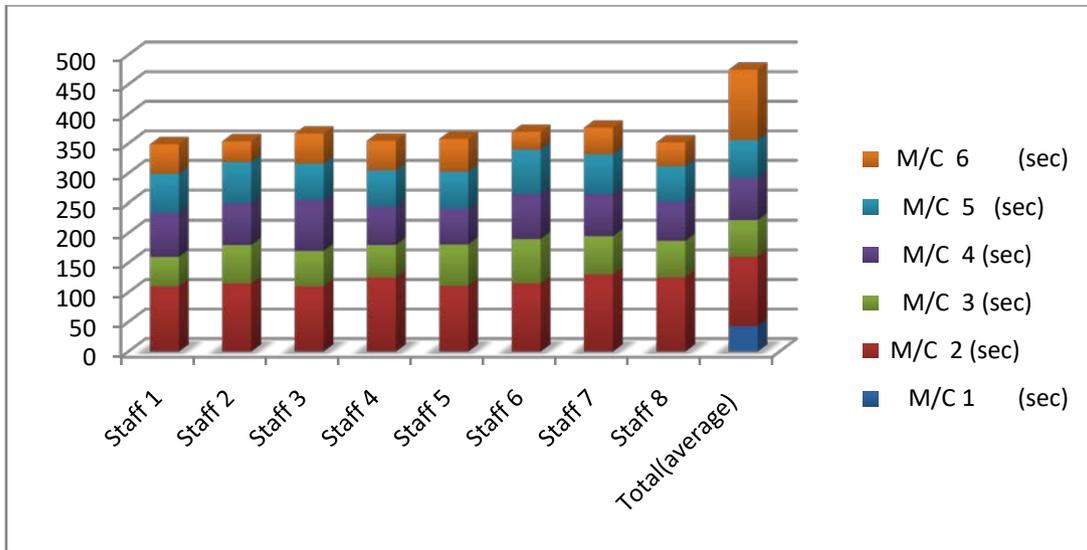


Figure 5: Time consumption to collect threads of different items of different sewing machines before implementing 5S

Table 6: Time consumption in looking for threads of different sewing machine after 5S

Thread of various machines	M/C 1 (sec)	M/C 2 (sec)	M/C 3 (sec)	M/C 4 (sec)	M/C 5 (sec)	M/C 6 (sec)
Staff 1	15 sec	30	15	33	25	20
Staff 2	13 sec	35	12	30	23	18
Staff 3	12 sec	25	25	28	28	22
Staff 4	18 sec	40	23	42	33	21
Staff 5	15 sec	25	22	30	33	29
Staff 6	18 sec	28	27	32	35	29
Staff 7	15 sec	42	28	38	25	21
Staff 8	12 sec	25	30	35	39	15
Total(average)	14	31	22	33	30	21

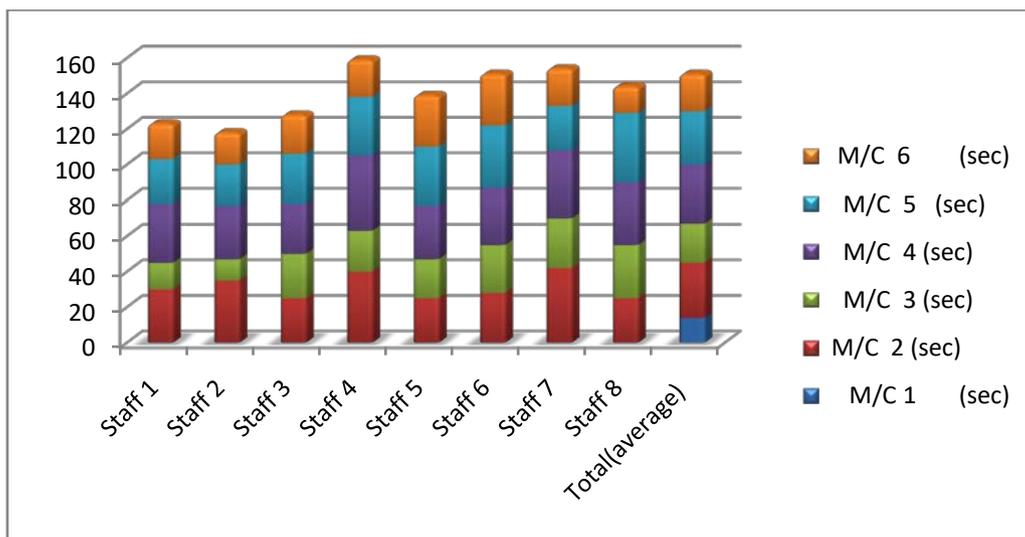


Figure 6: Time consumption to collect threads of different items of various sewing machines after implementing 5S

IV. RESULTS AND DISCUSSIONS

After the implementation of 5S, from the proposed improvement proposal, 51.21-meter square space was saved, which resulted in a cost savings of 376363.11 Taka. Overall reduced movement of almost 25% was achieved in the fabrics and accessories room resulting in more than a 13% increase in multifactor productivity.

After the implementation of 5S on the factory floor, it resulted in average labor productivity from 3.46 to 7.66. This experiment showed an overall improvement of 45.17%. Labor productivity calculated for one month period before, and after the implementation of 5S and the result shown in the following figure:

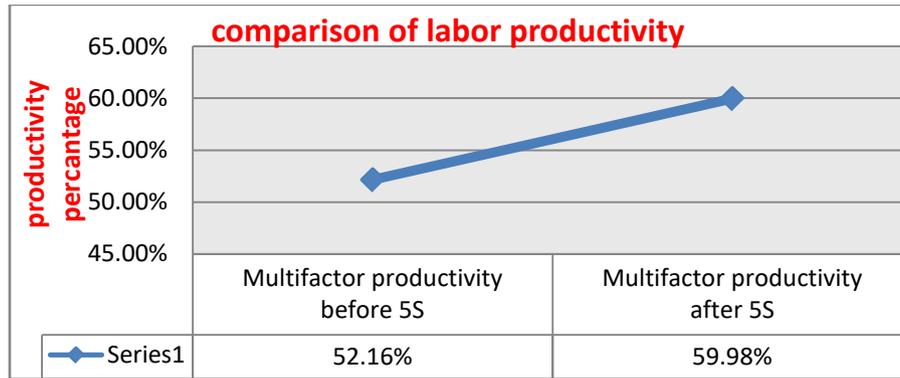


Figure 7: Comparison of labor productivity

Material productivity remained almost constant over the study period though it slightly peaked after the implementation of 5S. Average material productivity increased from 2.69 to 2.92 over the study period and resulting in a more than 15 % increase in multifactor productivity. Before the implementation of the 5S system, the multifactor productivity of EPYLLION STYLES LTD. was 52.16%, and after the implementation of 5S, the multifactor productivity assumed 59.98%.The reason behind it was that implementation of 5S during

the study mainly focused on making tools and materials more easily accessible to workers, which enhanced labor productivity rather than trying to reduce the wastage and material cost.

This slight increase in material productivity came as by the implementation of 5S as labor productivity became significantly high after the application of 5S in the factory it had a positive impact on the multifactor productivity of the factory. The result shown in the following figure:

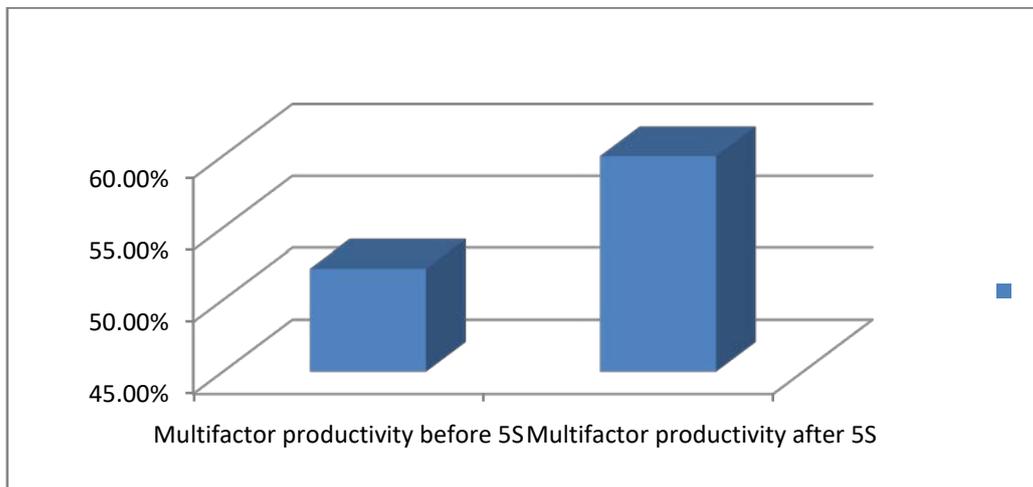


Figure 8: Comparison of multifactor productivity

V. CONCLUSION

The above activity performed on some of the renowned garments factories, and through 5S Japanese principles, some great results come in very short period. It is required to continue the audit activity on a regular

basis and allocated resources and budget to maintain the 5S. The 5S committee needs to propagate the philosophy to every employee by training and awareness program, and a continuous improvement activity is required to enhance the production and reduce the wastages. It can also be a part of the yearly

appraisal. The Japanese 5S System is a very essential system for ensuring systematic discipline. Moreover, this is a world-wide acceptable formula which helps in a great deal in solving the managerial level problems. 5S can be considered a philosophy, a way of life, which can raise morale and create a good impression to customers and enhance efficiency. 5S is a proven methodology and gives remarkable results all over the world. Bangladesh's industry needs to adopt it as an initial step toward modern management approaches.

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