Visual Management and Technical Furniture for the development of garments manufacturing process focusing cutting section

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Abstract— Traditional Cutting section activities in maximum garments industries are facing different problem like low productivity, longer production lead time, high rework and rejection and high non value added work etc. Most of the researchers are trying to develop a new layout for improving the efficiency of cutting section. in this study the author tries to develop the new theme that not only the layout can improve the efficiency of cutting section but also visual Management and technical furniture can play a vital role for improving the efficiency of cutting section. So, the author recommends some visual management system such as Cutting Manual, Super visor rating, SQDC Board Defect library etc. This research paper also propose some recommendation such as Expandable Cutting table, Fabric relaxation Rack, Input rack, Box for cutting machine, stand for marker paper, SMV data bank etc to improve the performance of cutting department. This all recommendation is already applied in Babylon Garments Industries of Bangladesh. The results are satisfactory then before.

Index Terms— Lean Manufacturing, Management, Kiezan, VSM, 5S

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1 INTRODUCTION

IN order to remain competitive all over the world, an industry needs to upgrade its technology, rationalize costs of production, improve product quality and speed of delivery, maintain high labour standards, and develop a domestic input base (World trade organization Secretariat 2004). As a result most of the garment industries of Bangladesh geared themselves to face these challenges by redefining, redesigning and improving their production systems. Within this context, they implemented different methodologies which were practiced by different manufacturing sectors in different countries.[3] **Lean manufacturing** or lean production are reasonably new terms that can be invented to Jim Womack, Daniel Jones and Daniel Roos in their book, *The Machine that changed the world* [1991]. In the book, the authors examined the manufacturing activities exemplified by the Toyota Production System. **Lean manufacturing** *is the systematic elimination of waste*. All these objectives will ultimately formulate one core objective of providing an enhanced customer satisfaction while eliminating the waste activities of manufacturing. Lean manufacturing is yet to be spread widely in the Bangladesh apparel industry. [5] The theory of lean manufacturing needs to be adapted accordingly to suit the particular industry in concern. This is because it is difficult and misleading to use the lean experience (activities and performance indicators) in another industry as a reference point. The economic, cultural and social background of the Toyota Company, [2] where lean manufacturing

was developed and is practiced extensively, is largely different from that of companies in Bangladesh. Therefore, this research focuses on how lean practices are introduced and practiced

and how well the objectives are achieved in the selected case company focusing Cutting section.

Firstly the paper presents a review of literature on lean manufacturing with reference to fundamentals and approaches of lean implementation suggested by previous researchers. Then the methodology adopted by the case company and how it was implemented are discussed. Finally, the improvements gained by the case company with respect to the set KPIs and how the impact in company culture is discussed in the results section.

2 RESERCH OBJECTIVE

The cutting section is the heart of Garments Manufacturing Process. In present time, the authorities of different garments factories don't take care of this section. As results huge amount of time has required to receive the fabric from the storage, to cut the fabric and to deliver the fabric in to the sewing section. Ultimately, the production of cutting section is decreasing day by day. As results, the production of sewing section also decreasing day by day. Most of the researcher tries to improve the production of sewing section. But we have to realize that the production of sewing section is indirectly depends on cutting section. Not only the development of facility layout but also the Visual management and technical furniture can solve this problem. So, the main objective of this study to giving realization about those terms that are indirectly depends on the improvement of efficiency of cutting section.

3 MATERIAL AND METHOD

3.1 Material

The author investigates about the efficiency of cutting section of the case company named Babylon garments of industries of Bangladesh. By investigating those following department the author tries to improve the efficiency of cutting section by applying the lean tools and technique. For clear under-

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standing I am giving the total summery of Babylon garments industries limited of Bangladesh.

TABLE 1
Summery of Babylon garments industries limited

Total department	Babylon Garments ltd-1	Babylon Garments ltd-2	Babylon Dresses ltd
Manpower (Worker)	41	41	41
Supervisor	1	1	1
In charge	1	1	1
Deputy Manager	1		
Assistant Manager	1		
Assist. Quality Manager	1		
Cutting table	3	3	4
Cutting table Measurement	25.9m/1.75m (L/W)	25.24m/2.20m	25.10m/1.87m
Numbering table	2	2	1
Straight knife cutting m/c	5	5	5
End cutter m/c (round knife)	1	1	1
Band knife	2	1	1
Drill m/c	1	1	-
Fabric relaxation m/c	1		

From the table 1 we can see that the Babylon garments industries limited are divided into 03 (Three) cutting sections or floors.

3.2 Method

After studying the previous 5 (Five) years data, the author tries to identify the problem of cutting section. in previous 5 (five) years data shows that the efficiency of cutting section was not satisfactory. The Babylon garments industries have a strong IE (Industrial Engineering) team. They have already developed a good facility layout for cutting section. After All of this improvement the efficiency of cutting section was not good. When, the authors investigate all of reason of this problem. The author has reached a decision. The author recommends some visual management system and technical furniture for the development of cutting section of garments manufacturing process

4 RESULTS AND DISCUSSIONS

The improvement of the exiting status can be divided into 3 development section. Those are stated as below: be formatted by IJSER production staff in the same order provided by the author.

FACILITY LAYOUT DESIGN

Design & develop cutting layout

Develop visual management.

Design &develop technical furniture.

In this case company design and development of cutting section layout have already done. Here, I am trying to discussed the rest of the 02 (two) parts.

4.1 Develop visual management

Visual Management systems enable factory workers to be well informed about production procedures, status and other important information for them to do their jobs as effectively as possible. Large visual displays are generally much more effective means of communication to workers on the factory floor than written reports and guidelines and therefore should be used as much as possible. When it comes to improving compliance with a process, visual presentation helps the team better understand a complicated process including the correct sequence of events, the correct way to perform each action, internal and external relationships between actions, and other factors. These visual tools may include the following: [1]

1. *Visual Displays* - Charts, metrics, procedures and process documentation which are reference information for production workers. For example, trend chart of yield performance, % variation of defect rate, month-to-date shipping volume status, etc.

2. *Visual Controls* – Indicators intended to control or signal actions to group members. This may include production status information, quality tracking information, etc. For example, color-coded panel for temperature or speed setting control limits that help an operator quickly identify process is out of the control range. Kanban cards are another example of visual controls.

3. *Visual process indicators* – These communicate the correct production processes or flow of materials. For example, this would include the use of painted floor areas for non-defective stock and scrap or indicators for the correct flow of materials on the factory floor.

Here, I am giving some recommendation to increase the productivity of cutting section. When I have gone to Babylon Group of industries for researching on cutting section the visual management system was absent in this factory. So, for total improvement of this cutting section I have developed some visual management system in this factory. Because, I believe visual management is one of the important part for increasing productivity of overall Factory. Here, I have developed the cutting manuals Board, supervisor rating Board, SQDC Board set up, Defect Library etc. My Development is given by picture in below:

4.1.1 Cutting manuals

Problem without this section: Without this section practices the worker will take more time to complete a process.
Objectives:

  01. Save the time.

  02. Make the worker multi skilled.

  03. Improve the worker efficiency

  04. Improve the sections efficiency.

Fig. 1. Cutting manuals

4.1.2 Supervisor Rating

Problem without this section: Without this section practices the worker efficiency will reduce.
Objectives:

  01. Improve the worker efficiency.

  02. Improve the sections efficiency.

  03. Make the worker competitive.

Fig. 2. Supervisor Rating

4.1.3 SQDC Board

Problem without this section: Without this section practices the worker working time will extend. They will take more time to solve any type of problem. If we can set up a SQDC Board it will help to identify the previous problem.
Objectives:

  01. Save the time from total working hours.

  02. Improve the TQM.

  03. Make the shipment perfect.

  04. Meet the buyer's requirement.

Fig. 3. SQDC Board

4.1.4 Defect Library

Problem without this section: Facing Defect in garments is a natural scenario. From the previous record of this case company, they face same type of defect in every month. So, they had to solve the same type. If we can build up a defect library, the solving time will reduce.
Objectives:

  01. Save the time from total working hours.

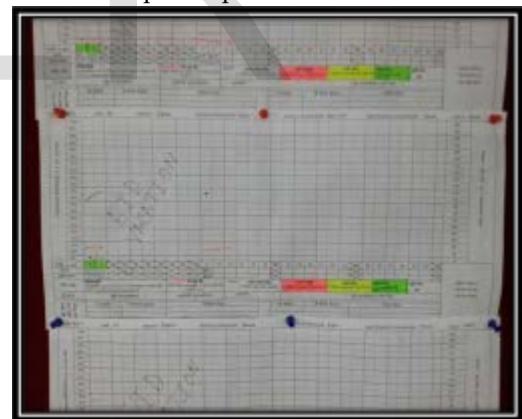 02. Improve the TQM and TDP%.

  03. Make the shipment perfect.

Fig. 4. Defect Library

4.2 Design & Develop technical furniture

4.2.1 Expendable cutting table

This section is very important for total improvement of cutting section. I have told that space is very major problem for Babylon Group of industries. So, to reduce this problem, I am recommending some technical furniture for using in cutting section. All proposed technical furniture are developed by CAD. This is only the recommendation for the factory. I hope, all of this technical furniture will save more space than before. Because, all of my proposed furniture takes less space than before. This not only for Babylon group of industries but also all over the garments factory of Bangladesh.

Fig. 5. Proposed Expandable cutting table (By CAD)

Advantages of Expendable Cutting table:
1. Expendable Cutting table Takes low space.
2. Sectional Worker can work flexibly.
3. The fabric of different width can cut by using this table (Folded/Can Extent).
4. Every industry will meet the buyer compliance.
5. Production will increase.

4.2.2 Fabric Relaxation rack

When the fabric comes from the dyeing and finishing, the fabric remains a slightly hot. In dryer, stenter and compactor heat is applied on fabric. So moisture is removed from the fabric and it is not in actual condition. But if we keep the fabric in normal temperature and pressure for a certain time, the fabric absorbs moisture from the atmosphere and regains its original nature. This process is called fabric relaxation. Another cause of fabric relaxation is to maintain the dimensional stability of produced garments. When the fabric is being processed in different finishing machines, it goes under certain heat and pressure to give it proper shape. But when the heat and pressure is being withdrawn, the shape may change. So, if the dimension is became stabilized before cutting, no chance of strain in garments. So relaxation is very necessary before Cutting.
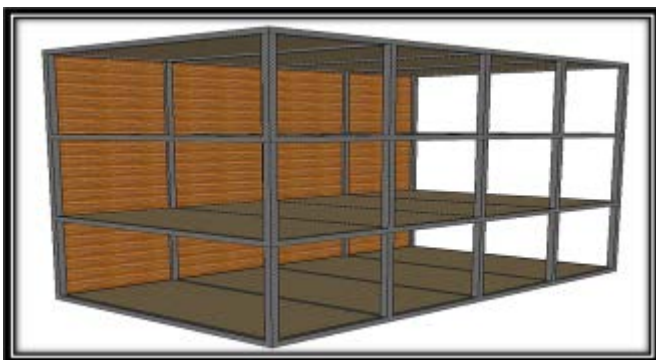

Fig. 6. Proposed Fabric Relaxation rack (By CAD)

Advantages of Fabric Relaxation Rack:
01. Huge amount of Fabric can relax at a time.
02. Further problem can reduce.
03. Cutting can be smooth because of using this Rack.

4.2.3 Input rack

After cutting the fabric lay we generally put the Cake in the table. We generally use Color Tape method to identify different sizes Cake. So, sometime it is so difficult to identify the required Cake in single or short time for input Man. So, the production will hamper. To reduce this problem I recommend for using the Input Rack in Cutting section. This Rack has a great advantage for increasing the total productivity of cutting section.
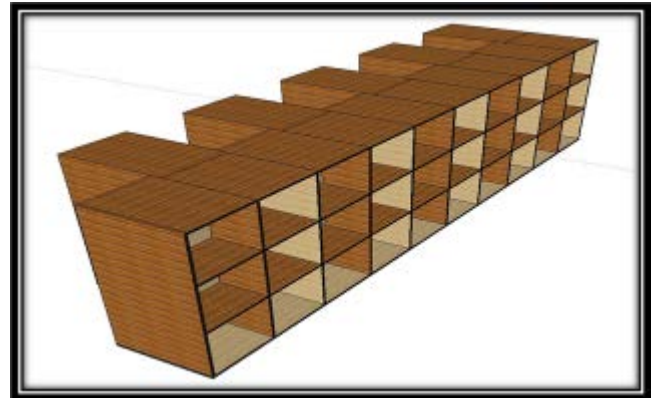

Fig. 7. Proposed Expandable cutting table (By CAD)

Advantages of Input Rack below:
01. This Rack is designed by CAD for at least 06 sizes.
02. We can preserve 06 sizes parts at a time.
03. If we want to increase the number (Stickering every Box).
04. Time will saves for total production.
05. Ultimately, lean tools will implement.

4.2.4 Box for cutting m/c and rack for bend knife m/c

After cutting the fabric lay, the cutting machine (such as Bend Knife Machine, Round Cutting machine) is putting in the table. So, the efficiency of the machine will decrease. So, to reduce this problem I recommend different Box system that can be used after working hour. After working hour, the environment will neat and clean.

Fig. 8. Proposed Rack for Band knife Cutting Machine (By CAD)

Fig. 9. Proposed Box for Cutting Machine (By CAD)

4.2.5 Marker Paper Stand

This also a important part of Cutting section. We know, marker is very important factor for cutting. If we use the marker paper stand to hold the marker paper the space will saves and also the marker paper will save. Here, I recommend Set up the marker paper stand to saves the space and improve the production also.

Fig. 10. Marker Paper Stand

4.2.6 SMV Data Bank

For Final recommendation here I am giving a SMV Data Bank which can be followed for data Collection. This Data Bank will help you to identify the individual SMV for each operation. So, I am showing now the SMV Data Bank Format which can be followed by Every Garments Industry of all over the world.

TABLE 2
Proposed SMV Data Bank
Given in below

5 RESULT ANALYSIS

After implement ting those recommendation in Babylon Garments ltd of Bangladesh, we can compare the efficiency% before and after implantation of lean tools and methodology specially on cutting section. In below, the table 03 shows this comparative statement.

TABLE 3
Comparative statement of the efficiency of Cutting section

Seri-al no	Month (Before) 2013	Effi-ciency% (Before)	Month (After) 2014	Efficien-cy%(Afte r)	Variation%
01	May	35.45%	January	48.04%	-12.59%
02	June	33.77%	February	43.88%	-10.11%
03	July	35.07%	march	45.05%	-9.98%
04	August	35.02%	April	45.00%	-9.98%
05	September	31.45%	May	41.72%	-10.27%
06	October	33.25%	June	43.15%	-9.90%
07	November	32.35%	July	41.40%	-9.05%
08	December	34.25%	August	44.11%	-9.86%
Grand Total (Average)	33.82625 %	Average	44.04375 %		-10.2175%
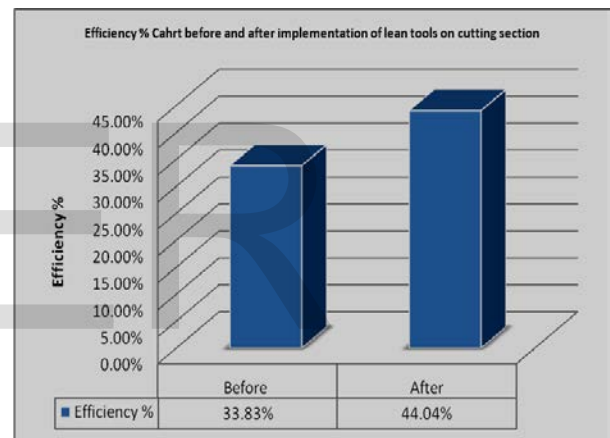
Graph 01. Comparative statement before and after lean tools implementation on cutting section

Form this graph 01 it is clear that the effect of lean tools and methodology on cutting section. In Cutting section the lean tools had apply. But the efficiency was average **33.83%.** After applying the lean tools on cutting section the Efficiency is average **44.04%.** The variation is **-10.2175%.** So, it is Cleary proved that the total productivity of factory has increased.

6 CONCLUSION

The thesis work was on Study and Implementation of Lean Manufacturing in tolls and technique in a Garment Manufacturing Industry focusing cutting section. The suggestive tools developed in this article play a vital role and cover a series of aspects in Maximizing efficiency and reworks in the cutting section of apparel industries by ensuring quality production.[4] It is evident that the case company has achieved remarkable success performance in a short period of time with the chosen lean tools where other companies in the sector could use this as a benchmark. Hence, the prevailing situation

encourages the organization to further proceed on the lean journey to expand its horizons of competitiveness.

ACKNOWLEDGMENT

REFERENCES

[1] Shahram, T. and Cristian, M (2011,) the Impact of Lean Operations on the Chinese Manufacturing Performance. Journal of Manufacturing Technology Management Vol. 22 No. 2, 223-240.

[2] Bheda, R., Narag, A.S. and Singla, M.L. (2003) Apparel Manufacturing a Strategy for Productivity Improvement, Journal of Fashion Marketing and Management, Volume 7.No1,12-22

[3] Bisen, V. and Srivastava, S. Production and Operation Management. Lucknow, India Global Media, (2009), p. 175.

[4] Feld, M.W. Lean Manufacturing: Tools, Techniques, and how to use them. Boca Raton, London: The St. Lucie Press, 2000

[5] Kumar, S. A. Production and Operations Management. Daryaganj, Delhi, India: New Age International,2008, p. 217-220

TABLE 2
Proposed SMV Data Bank

Serial no	Process type	Operation name	Operation Description	Man/machine	SMV	Capacity	Videos
1	Cutting preparetion	Marker requisition & fabric requisition					
2							
3							
4		Fabric brings from store					
5							
6							
7		Fabric relaxation					
8							
9							
10	Table pre-paretion	Marker spreading for table measurement					
11							
12							
13		Spike fitting					
14							
15							
16		1st lay spreading & gum tape attach					
17							
18							
19	Fabric spreading	Fabric Spreading					
20							
21							
22		Clamp adjust for fabric cut					
23							
24							
25	Marker placement	Marker Spreading to top of the fabric layes					
26							
27							
28		Clam attach					
29							
30							
31		Marker space , gum tape attach & grouping					
32							
33							
34		Drill mark					
35	Cutting	Cutting					
36							
37							
38		Sorting & bundling					
39							
40							
41	Interlining	Interlining spreading					
42							
43							
44		Interlining cutting					
45							
46							
47		Interlining bundling					
48							
49							
50	Numbering big parts	Upper part					
51							
52		Lower part					
53							
54		Facing (pair)					
55							
56		Back part					
57							
58		Yoke (pair)					
59							
60		sleeve L & R (pair)					
61							
62		Pocket					
63	Numbering small parts	Sleeve placket L & R (Pair)					
64							
65		Gainball L & R (pair)					
66							
67		Flap L & R (pair)					
68							
69		Cuff 4 pcs					
70							
71		Collar 2 pcs					
72							
73		Band 2 pcs					
74	Secssoring	Back part hem seissoring					
75							
76		Back part armhole & neck seissoring					
77							
78		Yoke seissoring (pair)					
79							
80		Upper lower devived					
81							
82		Upper lower neck matching					
83							
84		Upper lower bottom matching					
85	Relay+Block cutting	Front facing					
86							
87		Neck yoke					
88							
89		Upper part					
90							
91		Lower part					
92							
93		Sleeve					
94							
95		Back part					
96							
97	Relay+Band knife	Yoke					
98							
99		Sleeve placket L & R (Pair)					
100							
101		Facing upper & lower Pair)					
102							
103	Replace parts cutting	Front Upper lower (pair)					
104							
105		Back part					
106							
107		Sleeve L & R (pair)					
108							
109							