January 2013. Vol. 1, No.4 ISSN 2305-8269

International Journal of Engineering and Applied Sciences

www.eaas-journal.org

Elimination of Non Productive Activities is a Must in Cost and Time Savings in the Sewing Section of Apparel Industry

[1]Md. Mazedul Islam
[1]Adnan Maroof Khan
[2]Prof. Dr. Md. Zulhash Uddin

Department of Textile Engineering, Daffodil International University, Bangladesh[1]
Faculty of Textile Chemical Processing Engineering & Applied Science, Bangladesh University of Textiles[2]
mazed@daffodilvarsity.edu.bd ; maroof215@gmail.com ; zulhashdr@yahoo.com

Abstract

For any industry cost and time related to production and quality management or wastages reductions have important impact on overall expenditure. Internal cost spent by a corporation and reserves made by eliminating internal throughput time or redraft or any type of surpluses are important for management to keep the industry economically sound and safe. Emphasizing on it steps has been taken to investigate and eliminate wastages, that is, non productive activities in sewing section in order to save time and cost and lessen internal process time. In this work, an approach to a more knowledge-based and integrated process planning and control is presented. The outcome of this observation reflected that an industry may gain higher productivity and profitability by eliminating non productive activities. A general overview over this development is given in this paper.

Keywords *- Costs, Elimination, Lead time, Operation, Productivity, Profitability, SMV.*

1. Introduction

Generally in an industry more focus is given on profit. Though there are different costs involved in cost reduction internally spent by an industry through finding wastages, avoiding and improving faulty work would end in vast reserves [1]. Prolific actions emphasis on any action that customer is ready to pay for. Non productive activities designate that the customer does not ponder as adding value to his product (for example, waiting time, inspection time, zigzag movement due to improper lay out, improper line balancing, no proper planning, improper machine use, sharing of working instruments, absence of operators, workers' fatigue etc.) [2]. One of the ways to decrease wastages can be elimination of non productive activities that can result in drop in time, cost, and lead time. As it is acknowledged that time is money, if additional time is mandatory in a product or service extra money is involved. By responding faster to make a product as per customer demand, the company can capitalize less money and more savings. Therefore, a study was carried out in the garment industry named Opex & Sinha Textile Group located at Mirpur, Dhaka, Bangladesh, [5] and Viyellatex Group located at, Tongi, Gazipura, Gazipur, Bangladesh, [3] at sewing section to identify non productive actions so as to eradicate them for saving time, cost and improve internal throughput time.

2. Materials and Methods

Fabric consisting of five different styles (same garments design having color variation only) to produce 500 nos. of garments in each style was considered. Stop watch technique was used to study the time essential in each steps of process involved in sewing section and also preliminary and concluding time was noted. Total time required for the procedure is the sum of differences between initial and final time of each phase involved. Both for including and excluding non productive activities, SMV for each style was calculated. A typical experimental data of operational breakdown with variable SMV output is given below. The steps considered in the process are given below.

International Journal of Engineering and Applied Sciences

www.eaas-journal.org

Fig.1 General overview of the garments sewing section of Viyellatex Group

Fig. 2 Front & back view of long sleeve t-shirt (men's wear)

International Journal of Engineering and Applied Sciences

www.eaas-journal.org

Table 1: Experimental Garments Sewing Operational Breakdown and SMV Variation for Including & Excluding

GENERAL PRODUCT SPECIFICATION			
BUYER	G-STAR	STYLE NO #	84301
ITEM	LS T-SHIRT	FACTORY	VIYELLA TEX
FABRIC QUALITY	1X1 RIB,100% COTTON	QUANTITY	20, 000
GSM	200	TARGET SMV	17.75
WASH TYPE	NORMAL WASH	TARGET/HR	83 PCS

Non Productive (NP) Activities

Sl. No	Operational Breakdown	SMV including NP Activities	SMV excluding NP Activities	No of operator	M/c
1	In side yoke iron	0.616	0.556	2	M
2	Position mark + yoke match	0.622	0.510	2	M
3	Yoke join with back part + top stitch	1.211	1.110	2	LS
4	Main label+ loop position mark	0.301	0.258	1	M
5	Main label mark +joint +loop joint	0.654	0.580	1	LS
6	Front + back part match	0.358	0.328	1	M
7	Shoulder joining	0.276	0.250	1	OL
8	Shoulder top+ shoulder cut mark	0.611	0.532	2	FL
9	Care label make +join	0.437	0.410	1	LS
10	Neck binding + cut	0.499	0.452	1	FL
11	Neck binding in tack	0.195	0.180	1	LS
12	Neck 1-16top after binding	0.256	0.250	1	LS
13	Neck binding finished top	0.207	0.195	1	FL
14	Quality check for (1-13) operations	0.950	0.750	1	M
15	Laid on panel iron	0.580	0.520	1	M
16	Laid on panel mark	0.591	0.556	1	M
17	Shoulder laid on panel join	0.758	0.510	1	LS
18	Shoulder panel top stitch	0.580	1.10	1	LS
19	Sleeve panel match	0.452	0.258	1	M
20	Sleeve panel join	0.908	0.580	2	OL
21	Sleeve panel top +sleeve pair	0.630	0.328	1	FL
22	Sleeve & body match	0.431	0.250	1	M
23	Sleeve tack at armhole	0.655	0.530	1	LS
24	Sleeve join +body turn	0.862	0.410	1	OL
25	Quality check for (15-24) operation	0.850	0.655	1	M
26	Arm hole zigzag top stitch+ side top	0.954	0.440	2	FL
27	Sleeve opening tack	0.375	0.180	1	LS
28	Side seam join	0.851	0.250	1	OL
29	Bottom hem tack +body turn	0.471	0.195	1	LS
30	Bottom hem +edge cut	0.622	0.520	1	FL
31	Patch label join +position mark	0.722	0.440	1	LS
32	Top stitch security tack+ thread cut	0.513	0.652	1	LS
33	Sleeve 1-4 tack + thread cut	0.662	0.551	1	LS
34	Overall sewing quality check	2.200	1.450	2	M
Total		18.86 min	16.60 min	41	

International Journal of Engineering and Applied Sciences

www.eaas-journal.org

2.1 Calculation of SAM or SMV through Time Study

Step 1**:** Select one operation for which you want to calculate SAM.

Step 2**:** Take one stop watch. Stand by side of the operator. Capture cycle time for that operation. (cycle time – total time taken to do all works needed to complete one operation, i.e. time from pick up part of first piece to next pick up of the next piece) [9, 13] Do time study for consecutive five cycles. Discard if found abnormal or non value added time in any cycle. Calculate average of the 5 cycles. Time you got from time study is called cycle time 13]. Convert this cycle time into basic time by multiplying cycle time with operator performance rating. [Basic Time = Cycle Time X performance Rating]

Step 3**:** Performance rating. Now you have to rate the operator at what performance level he was doing the job seeing his movement and work speed. Suppose that operator performance rating is 80%. Suppose cycle time is 0.59 minutes. Basic time = (0.59 X 80%) = 0.472 minutes

Step 4**:** Standard allowed minutes (SAM) = (Basic minute + Bundle allowances + machine and personal allowances). Add bundle allowances (10%) and machine and personal allowances (20%) to basic time [13]. Now you got Standard Minute value (SMV) or SAM. SAM= (0.472+0.0472 +0.0944) = 0.616 minutes.

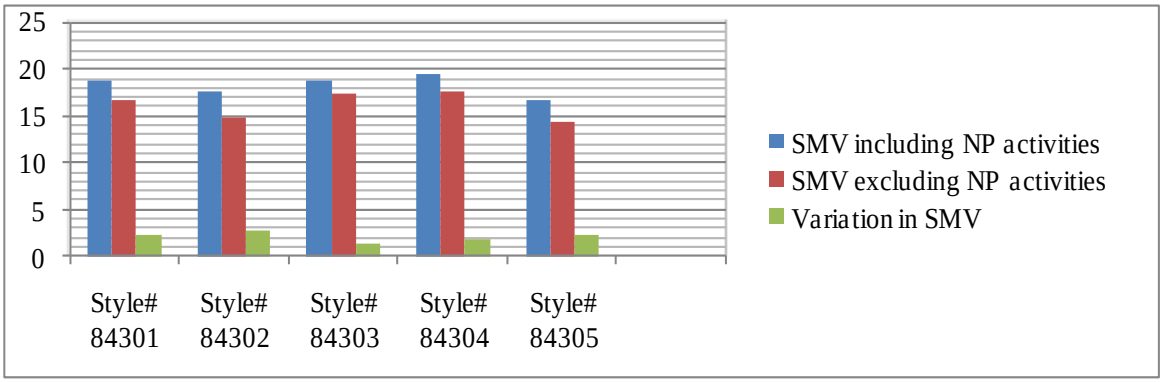
Similarly, for all the operation related to the above garments style standard allowed minute or SAM was calculated. The approximate value of SAM both for excluding and including non productive time are 18.86 min & 16.60 min respectively. Productive and non productive activities in each steps wherever found was identified for the above process for each style and the SMV or SAM in minutes were noted. Finally the ultimate SMV variation was calculated [13].

3. Results & discussion

Table 2 shows the total SMV taken for each garment to complete the process of operation and the same table shows SMV segregation of productive and non productive activities.

Table 2. Variations of SMV for Non Productive (NP) Activities in Sewing Section for Different Styles**.**

Style No.	SMV (min) including NP Activities (A)	SMV (min) excluding NP Activities (B)	Variation of SMV due to non productive activities (A-B) = (C)
84301	18.86	16.60	2.26
84302	17.50	14.70	2.80
84303	18.75	17.25	1.50
84304	19.50	17.60	1.90
80205	16.60	14.30	2.30



International Journal of Engineering and Applied Sciences

www.eaas-journal.org

Fig. 3 Style-wise SMV variations due to productive & non productive activities

These non productive time are due to waiting, inattention of operators, no proper identification, zigzag movement due to inappropriate lay out, no proper planning, improper machine use, sharing of working instruments, absence of operators, workers' fatigue, less experienced workers, poor machine performance, no standard operation followed by operator, Machine break down, imbalanced line (WIP control), continuous feeding to the line, quality problem, individual operator performance level, operators absenteeism, etc [11, 15].

Below table 3 shows the style-wise costs of productive and non productive activities in sewing section. As per the factory information, the unit CM costs for each garments in sewing section was taken into consideration to calculate the overall productive and non productive activities cost in terms of SMV, CM & production rate and consequent cost savings in ultimate factory expenditure. During the experimental observation, total productive and non productive times were identified separately and costs related to each time also calculated. Finally, cost savings for non productive activities time in terms of total time (both for including and excluding non productive time) required to finish the job were calculated.

3.1 Formula for production estimation

Daily production = Total man minutes available in a day/SAM X Average Line efficiency Total available man-minutes =Total no. of operators X Working hours in a day X 60%, [13]

Suppose, SAM of the garment is 18.86 minutes, a line of 41 operators, works at 8 hours shift / day. Line works at average 60% efficiency.

So, Total available man minutes = 41 X (8 X 60) = 19680 minutes

Daily estimated production = 19680 /18.86 X 60% = 626 pieces/day (For SMV 18.86 min.)

So, per hour production = 626/8 = 78 pieces/hour

Again, daily estimated production = 19680 /16.60 X 60% = 712 pieces/day (For SMV 16.60 min.)

So, per hour production = 712/8 = 89 pieces/hour

From the above calculation it is easily observed that due to SMV variation for including and excluding NP activities, variation in daily estimated production is (712-626) = 86 pieces. And variation in hourly production is (89-78) = 11 pieces approximately.

Table 3: Style-Wise Production Rate Variation at Variable SMV

Style No.	SMV (min) including NP Activities (A)	Output/hour at 60% efficiency	SMV (min) excluding NP Activities (B)	Output/hour at 60% efficiency	Variation in SMV (A-B) = (C)	Variation in output/hour (D)
84301	18.86	78	16.60	89	2.26	11
84302	17.50	84	14.70	101	2.80	17
84303	18.75	79	17.25	86	1.50	07
84304	19.50	76	17.60	84	1.90	08
80205	16.60	89	14.30	104	2.30	15
Total	91.21	406	80.45	464	10.76	58
Avg	18.24	81	16.09	93	2.15	12

In Viyellatex Group per day (8 hr shift) average CM cost for the above experimental style is considered as $21.60 per dozen or $1.8 per piece. From the table 3, it is clearly observed that due to SMV variation for including and excluding non productive activities the sum of SMV is 10.76 min for which estimated production variation is 58 pieces per hour for the above five styles in five production line. The table also indicates that due to non productive activities about 2.15 min extra SMV is required on average for which equivalent production loss per hour is

International Journal of Engineering and Applied Sciences

www.eaas-journal.org

approximately 58 pieces. So, we can calculate the average production loss in terms of total factory

The average variation in production/hour / line is 12 pieces

The average factory earning loss or cost savings / hour/line is $1.80 x 12 = $21.6

The average variation in production / day / line is 12 x 8 = 96 pieces

The average factory earning loss or cost savings / day / line is $1.80 x 12 x 8 = $172.8

The average variation in production/month / line is 12 x 8 x 26 = 2496 pieces

The average factory earning loss or cost savings / month / line is $1.80 x 12 x 8 x 26 = $4492.8

The average variation in production / year / line is 12 x 8 x 26 x 12 = 29952 pieces

The average factory earning loss or cost savings / year / line is $1.80 x 12 x 8 x 26 x 12 = $53913.6

Similarly, if this figure is considered in terms of total factory economy then a huge amount of factory earning loss could be saved easily that may have an important impact on overall factory economy. For example, from the above experimental data analysis we can estimate the earning figures for any factory as big as Viyellatex Group having 80 production lines that may save $4313088/year (80 lines x $53913.6). Earning loss $4313088/year, what a big amount they are losing!

4. Recommendations to reduce non productive activities

Some of the recommendations provided to reduce non productive activities time are,[14, 16] proper production planning, effective application of industrial engineering, well trained operator, proper layout plan, minimum rework, smooth running of sewing machine, proper line balancing, right time oiling to the sewing machineries, ensuring quality production, sufficient numbers of working aids can be provided for smooth working, stickers can be used for identification, manual counting is not required, correct shade variation, length, width of the fabric should be issued by proper identification, proper allocation of manpower is necessary, books to note down production to be given as one common book is used, proper quality checking, minimum waiting time, inspection time, reduced zigzag movement etc. These recommendations were suggested to the sewing section.

economy that is the way of costs savings for the industry.

5. Conclusion

The suggestive tools developed in this article cover a comprehensive series of aspects in minimizing cost and time in the sewing section of apparel industries by ensuring quality production. It was observed that time was saved and cost related to time was utilized properly (reduced by eliminating non productive activities).The study clearly indicates that by eliminating non productive activities in the sewing section time as well as cost are saved which have an important impact on overall factory economy. This paper also will aid industry in the development of apparel production quality and production rate by minimizing non productive activities.

References

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

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

[3] (viyellatex group)(n.d.). Retrieved december 2012, from viyellatex group: http//www.viyellatexgroup.com

[4] Shahidul, M. I. and Syed Shazali, S. T. Dynamics of manufacturing Productivity: Journal of Manufacturing Technology Management Vol. 22 No. 5, 2011, p. 664-678

[5] (Opex Group) (n.d.). Retrieved december 2012, from viyellatex group: http//www.opexgroup.com

[6] Productivity Development Team, ed. Cellular Manufacturing: (Portland, .Oregon: Productivity Press, 1999**).**

[7] (Sepal Group)(n.d.). Retrieved december 2012. From sepal group http//www.sepalgroup.com

[8] (n.d.). Retrieved nov 2012, from Clothing Study:http//www.online/clothingstudy.com

[9] (n.d.). Retrieved dec 2012, from MBM Garments: http//www.mbmgarments.com

[10] (n.d.). Retrieved nov 2012, from fiber 2 fashion: http//www.fiber2fashion.com

International Journal of Engineering and Applied Sciences

www.eaas-journal.org

[11] [Saroj Bala, Factors Influencing Costing of Woven Fabrics, *The Indian Textile Journal, June 2003*
[12] Dr P Khanna: *Work study, time and motion study*, Dhanpat Rai and Sons, New Delhi, (pp 21).
[13] Pojasek, Robert B. "Five S: A Tool That Prepares an Organization for Change." Environmental Quality Management (Autumn 1999) 97-103.
[14] Productivity Development Team, Just-in-Time for Operators (Portland, Oregon Productivity Press, 1998)
[15] Romm, Joseph J. Lean and Clean Management: How to Boost Profits and Productivity by Reducing. Pollution (New York: Kodansha International, 1994)