Research Article

Quality improvement in readymade garments industry by traffic light system

Abstract

Consumers, manufacturers, and retailers worldwide are becoming conscious about high quality products at minimum cost. But plenty of apparels are becoming waste which increases the cost of production. As resources are decreasing but increasing costs of the products. Effective apparel waste management is needed to ensure the profit. Reducing such waste can be profitable options for the manufacturers as well as the buyers. Considering this matter, a project work is done in a ready-made garment manufacturing industry to improve the quality of the products through using a traffic light system. A traffic light system was implemented to minimize the defect rates of production. The study shows that the average defect rates were dropped from 4.13 to 1.25 pieces of a line for daily eight hours of production. By implementing this system, the defect rates are minimized and the monthly production is also increased and it clearly depicts that the monthly capacity before implementing the traffic light system was equivalent but the defective production was more whereas, after implementation, the defective production was negligible.

Keywords: acceptable quality level, defects, quality assurance, quality control, traffic light system

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Introduction

The apparel industries are moving swiftly due to globalization,[1] fast fashion,[2] and the volatile market situation.[3] To adopt this condition, the apparel industries take various steps to keep their business continuing.[4] The main challenges of textile industries are the improvement of quality, timing, high labor standards, and developing domestic input base due to this globalization and fashion trends and volatile market situation.[3–6] The apparel industries always try to fulfill these criteria, but it is difficult to attain such the right product at the right time.

Various implementations have already existed in this marketplace such as Lean,[7] 5S, Six Sigma, Total Quality Management,[8] etc. whose main aim is to reduce unnecessary waste known as non-value product in the textile sector. In reality, the quality problem is also a great problem for the garment industries and where humans do the main fault and the additional fault is the method which is organized through humans.[9] If we keep these humans' work in control, we can remove most of the additional wastes which increase the production cost and diminish delay time.

There is a technique to fade all the obstacles in the implementation of lean manufacturing. That will support the object of elasticity and reduce the entire cost through teaching workers, boosting productivity, diminishing production lead time, reducing process flow chart for various operations scientifically also decreasing reworks.[7,10] Applying Lean is the most powerful tool for eliminating wastage from any organization. Lean deals with a small processing system which gives the consumer a good output. It increases labor productivity, cut throughout time, and cut errors, cut injuries.[1] It has some guidelines to apply this rule which assists to adopt that company and keeps a good impact on value stream management where all employers try to do their best work as their work performance is visible also they try to become value stream champions.[11]

The implementation of these systems keeps a great impact in the RMG sewing sector, such as meeting consumers want in time through reducing waste and lessening that process, reducing rework rate, generating multi-skilled operators providing full support to that of processing.

Many of researches have already existed on the quality management system where researchers have highlighted quality improvement. Only a quite paper has worked on the traffic light system. Some researchers used the traffic light system and analyzed the benefit of a company.[12] Other researchers also implemented the traffic light system for identifying the root causes of quality problems.[9]

There is a necessity for the topic because there are no proper systems that can be followed on the sewing floor. After obtaining the result, we have assured whether that method can increase production, quality, or not.

Materials and methodology

Materials and machinery

Fabric and others materials: Sewing line manufacturing parts checking materials were needed:

a. Fabric

b. Sample

c. Measurement tape

Below materials are needed for applying the traffic light system:

i. Traffic light system

ii. Green, Red, Yellow color light

iii. Marker pen (color-green, red, yellow)

iv. Hard board

v. Pencil

vi. Eraser

vii. Paper etc.

Machinery

For making a shirt below machines are needed:

a) Plain machine (1N2TLS, 2N4TLS)

b) Multi-needle chain stitch machine (2N4TCS, 4N8TCS)

c) Over lock machines (2N3TOL, 3N4TOL)

d) Double chain stitch machine (2N4TCS)

e) Button hole machine (BH)

f) Button attach machine (BA)

g) Fusing machine etc.

Methods

The methodology deals with finding the problems to eradicate them with the course of the traffic light system.

Identification of the problem

The subject company, the KDS IDR LTD, situated in Mohora Industrial Area, Chandgaon, Chittagong was failed to deliver seven of the last sixty shipments to respective buyers. After inquiry, it was found out that the main reason for this shipment delay was faults done in the sewing line resulting in overtimes; loss of manpower and capital, and most importantly, time. As an endeavor to solve the crisis, the traffic light system was endowed.

The basic required activities of the traffic light system and their procedure to conduct this project are as follows:

Study the present altercation rate and method

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Convince the authority of the crisis and offer Traffic light system

↓

Implementing the traffic light

↓

TLS manual to be hanged in front of every machine

↓

Continuation of the process for five consecutive days

↓

Analysis of the outcome

Implementation phase:

a. It was observed via shipment records that sewing alone is the main cause of delay.

b. So the authors emphasis on the sewing floor. From several options, the authors have chosen to enhance the improvement of quality and productivity.

c. At first, the authors discussed with the factory manager about the implementation of a traffic light system.

d. Then authors knocked on the floor manager and line quality personnel regarding the option.

e. On the first day, the authors collected data from Line-I without implementation.

f. The authors arranged 3 colors light red, green, and yellow.

g. Then the authors set up the lighting system on the quality checking table in front of the sewing Line-I.

h. The authors start implementation after setup traffic lighting system and collected the next five days of data.

Results and discussion

Defective garments (Before implementation)

The map of outputs per hour and defects is presented in Table 1. The defected pieces rate is shown higher in the pieces of production per hour, while one-line production is recorded hourly.

Table 1 Daily per hour checking pieces and defective pieces (Before implementation)

Hours	Per hour production	Checked pieces	Defect pieces	Remarks
1st	150	8	5	🟥
2nd	180	9	4	🟥
3rd	200	10	2	🟨
4th	200	10	5	🟥
5th	210	12	6	🟥
6th	190	10	4	🟥
7th	180	9	2	🟨
8th	190	10	5	🟥
	Average		4.13	

Table 1 alludes that without an implemented traffic light system, a large number of defects produced. The Quality controller checked these pieces at the edge of the line. While the quality controller noticed a defective item, they kept it aside from the acceptable outcome. These faulty items passed for correcting defects through the line following lot were out of the line addition the new cost as well as high rate alteration.

Defective garments (After implementation)

A month plan is designed for the individual worker as well as attached to the machine. The quality controller has inspected a package of five pieces produced on every two hours' basis and analyzes the plans thoughtfully. Red suggested for more than two defective pieces, yellow used for a defective item, and green indicated zero defects.

The supervisor also checked the schedule when the quality controller finished a cycle of the line at that point, rounding the line. If any red was detected, the operator has been informed about the work. Authority analyzed that of format at the end of the month and rewarded the best accolade of performers.

Table 2 presents the number of defected pieces after the implementation traffic light system. Analyzing the table, it is clear that a large number of yellow and green colors existed in the remarks section expressing the number of defects reduced significantly.

Table 2 Daily total checking pieces and defective pieces (After implementation)

Hours	Per hour production	Checked pieces	Defect pieces	Remarks
1st	160	8	4	🟥
2nd	190	10	2	🟨
3rd	195	10	2	🟨
4th	200	10	1	🟨
5th	205	11	1	🟨
6th	190	10	0	🟩
7th	185	9	0	🟩
8th	190	10	0	🟩
		Average	1.25	

The Figure 1 illustrates the comparison between before implementation and after implementation of the traffic light system. From the graph, it has been observed that after the implementation of the traffic light system, the number of defects reduces, also at 6 to 8th hours no defects determined. Comparing Table 1 and Table 2, it was declared that the average defect rates decreased indicating a successful sewing line than before.

Five days' traffic light system analysis

A substantial improvement in the quality parameter of the products has been observed in Figure 2. The number of defective hours which were also called red signal hours was high on the first day. However, the number of defective hours decreased by increasing the day for recognizing the root problems of defects (Table 3).
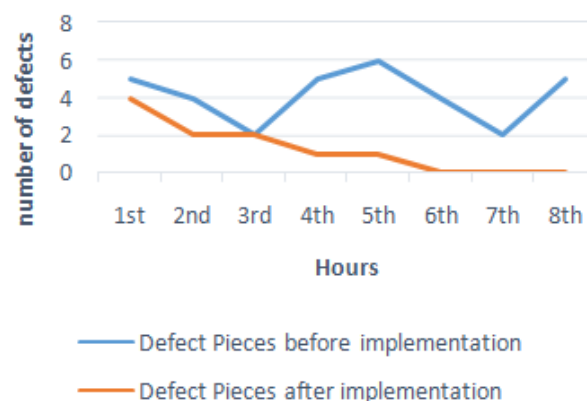

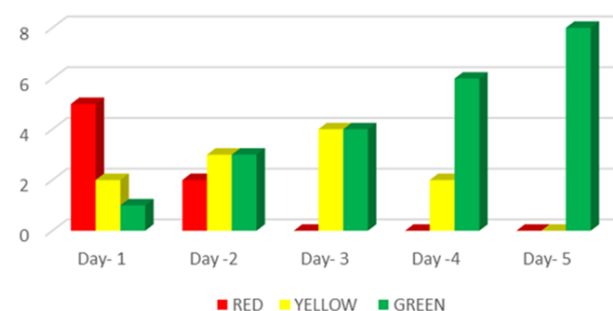**Figure 1** Defects pieces before and after implementation.

Figure 2 Five days' traffic light system diagram.

Table 3 Five days' traffic light system chart

KDS IDR LTD.					
Hour	Day-1	Day- 2	Day- 3	Day-4	Day -5	Remarks
1st	🟥	🟥	🟨	🟨	🟩	20% Improvement
2nd	🟥	🟥	🟨	🟨	🟩	20% Improvement
3rd	🟥	🟨	🟨	🟩	🟩	40% Improvement
4th	🟥	🟨	🟨	🟩	🟩	40% Improvement
5th	🟥	🟨	🟩	🟩	🟩	60% Improvement
6th	🟨	🟩	🟩	🟩	🟩	80% Improvement
7th	🟨	🟩	🟩	🟩	🟩	80% Improvement
8th	🟩	🟩	🟩	🟩	🟩	100% Improvement

As it was implemented before final inspection, the root causes such as skill-less workers, the monotony of work, and lack of competition with other workers were easily identified by the quality controller. By fixing that of the problems, a green production line was achieved where the defects rate was in control.

Conclusion

Traffic light system is a system, benefits to enhance the quality of the output through decreasing the charge including strengthening the supply chain performance. A garment manufacturing company can implement this system to obtain more extra profit without increasing resources and fulfill the profit margin. This study shows that the defective rate dropped from 4.13 to 1.25 of a line daily production. Implementing this system for a month, it will maximize not only the quality but also the production of the industry. Every monthly capacity of production of the company will increase with such the quality of the outcome. Consequently, the traffic light system operates as raising the quality and production saving lead time, and makes better the supply chain performance.

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Conflicts of interest

The authors have showed no conflicts of interest regarding the publication of this paper.

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