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ANALYSIS OF AN EFFECTIVE QUALITY CONTROL SYSTEM: A STUDY ON WOVEN GARMENTS

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ABSTRACT

The broad range of ready-made garments sector has resulted in the creation of a market to earn foreign currency and multi-dimensional scope of employment along with branding for our country Bangladesh. The research findings indicate that quality problems occur not due to complex issues rather due to more straightforward quality reasons. Further, the research reflects the necessity of quality control system implementation with quality control tools, proper set up of efficient human set-up and finally the mindset to achieve improved quality standards. The result shows the quality failure patterns of a woven bottom apparel industry. Furthermore, by researching the relationship of root-cause and corrective action plan, it becomes evident that no quality control system is beyond improvement and limitations. After the analysis, a conclusion is ended with some recommendations that can strengthen the loopholes and weaknesses in the practiced quality system of Sterling Group.

KEYWORDS

Quality Control, Woven, Garments, Root Cause Analysis, Traffic Light System

INTRODUCTION

Bangladesh is earning foreign currency mostly by the ready-made garment sector (Islam and Haque, 2018). Sterling Group is one of the pioneers in this sector on whom the study is conducted. They started their journey in 1984 and is serving their valuable apparel customers with best quality products in due time and with reasonable price (*STERLING // HOME*, 2018). They have a massive work-force of approx. Twelve thousand employees and capable of producing around 1,90,000 dozen pcs of goods per month. The sister concerns of Sterling Group are; Sterling Creations Ltd.

- Woven bottom garment manufacturing unit, Sterling Apparels Ltd. - Woven bottom apparel producing unit, Sterling Denim Ltd. - Woven denim garment manufacturing unit, Sterling Laundry Ltd. – Woven washing unit, Sterling Styles Ltd. - Woven bottom apparel manufacturing unit and Bando Design Ltd. - Woven bottom apparel manufacturing unit. This study is about the quality control system of woven bottom garments. Quality control is a technical process where product quality and standard confirmed by the quality control team. Quality control is a bundle of activities for maintaining and establishing products quality and standard. Generally, the actions of quality control are done after the production process (Noor Ahmed Raaz, 2016). The systems required for programming and synchronizing the efforts of the various groups in an organization to maintain the necessary quality (Silberschatz, Galvin and Gagne, 2014) as such Quality Control is seen as the agent of Quality Assurance or Total Quality Control (V. Alagulakshmi, K. Subhathra, 2017). The broad objective of this study is to evaluate the quality findings of Sterling Group and its products.

OBJECTIVES

The prime concern of this study will be to find out the root cause of those quality issues and also to find out the corrective action plan to improve the overall quality situation of Sterling Group. Once the above analysis is done, there will be some basic recommendation to strengthen the quality assurance system of Sterling Group which will also reflect the correct action plan for this study. The specific objectives of the study are-

- To describe the quality control system of the Sterling Group.
- To evaluate the quality control system of Sterling Group and review the significant quality findings.
- To identify the failures of the quality control and set a corrective action plan for those.
- To recommend some suggestions to overcome the problem.

METHODOLOGY

In Sterling Group, Traffic light system is used as a quality control tool. This system is more effective in controlling the floor quality than other quality tools because of its visual communication. In Sterling Group garment manufacturing units, three different color cards are placed in each operator's place. Green indicates that quality meets the customers Standard. Yellow means that a minor fault has been found and caution is required. Red means that the quality standard does not meet the customers' standard requirement. At the same time, it measures operators' performance level in quality. All the operators like to be presented good operator in their work-place. They concentrate on quality aspect during stitching garments. So, traffic light system in Sterling Group is designed to flag the problem at the source and allow immediate corrective action rather than all potentially defective products to continue to be manufactured.

This research is exploratory research in nature which starts with quality findings of Sterling Group and its products. Gradually this study will find out the causes of the quality failures and analyze the root causes of them. All data are Primary Data & collected from direct observations i.e., inspections before goods shipment.

SAMPLING DESIGN

The population for this research is total 04 non-denim bottom supplier where total numbers of quality personnel like QC, QA, Line manager, PM, RQS, GPQ are about 50 and number of production unit also 04. The sample units are Sterling Creations Ltd., Sterling Apparels Ltd., Sterling Styles, and Bando Design Ltd. Purposive sampling method has been used to obtain targeted research result from sample units. Three non-denim woven bottom production units of Sterling Group were selected as similar sub-groups to identify quality factors and reasons for failure. This sampling method can be said as homogenous purposive sampling.

RESULT & DISCUSSION

Three styles from three running woven production units were inspected, and the quality of those products have been analyzed to evaluate the result. The styles were Kanta Trousers, Mini Superstretch Trousers, and Spearmint Shorts. The survey was conducted for the styles on May- June 2017. The number of faults according to AQL 2.5 was recorded, and the root causes and their preventive actions were evaluated.

Kanta trousers (*Figure 1*) are semi-dress lady's trousers with only fake back welt pockets of cotton-polyester-elastane materials of the H&M brand. All solid color-ways garments were considered for this analysis. In *Table 1*, the result of the survey with this style is shown, and the frequency of the faults are calculated. The graphical representation of the

frequency of faults for this style is plotted in *Figure 2*.

Figure 1: Kanta Trousers

Table 1: Faults and frequency of faults for style "Kanta Trousers"

Quality Issues	No. of Faults	Frequency
Measurement	2	9%
Ironing	2	9%
Press marks	2	9%
Poor pressing	2	9%
Mixed shade	4	17%
Dirty spot	1	4%
Uncut threads	8	35%
Uneven stitch	2	9%
Total	**17**	**100%**

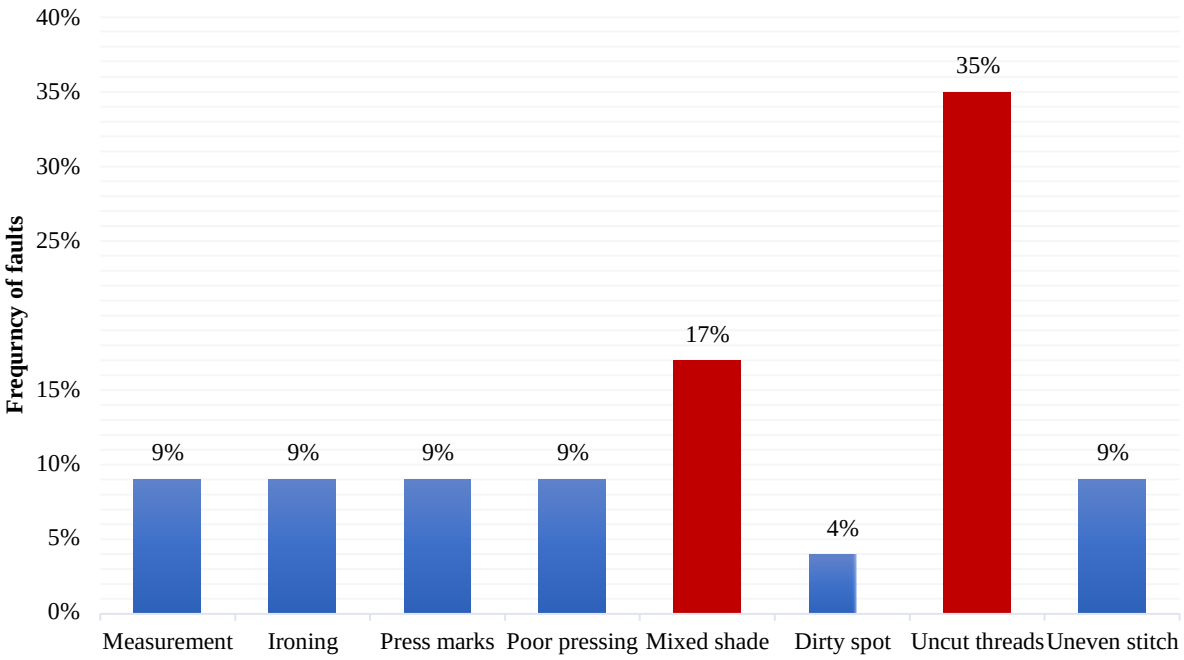

Figure 2: Frequency of faults in Kanta Trousers production

The graph shows easily that two significant faults (mixed shade, and uncut threads) occurred in the production of this style affect the quality mostly. So if concerns are taken in these faults about

52% faults may be reduced. Now in case of the second style (Mini Superstretch Trousers), the above considerations are taken. Mini Superstretch (*Figure 3*) Trousers are casual five pocket lady's trousers with twill fabrication of cotton-polyester-elastane. All solid color-ways are considered for this analysis. The style got garment wash on it. In *Table 2*, the result of the survey with this style is shown, and the frequency of the faults are calculated. The graphical representation of the frequency of faults for this style is plotted in *Figure 4*.

Table 2: Faults and frequency of faults for style "Mini Superstretch Trousers"

Figure 3: Mimi Superstretch Trousers

Quality Issues	No. of Faults	Frequency
Waistband uneven shape	1	5%
Loop slanted	7	33%
Bottom hem roping	3	14%
Pleat at front pocket	1	5%
Broken stitch	2	10%
Joint stitch	1	5%
Bottom hem width uneven	1	5%
Label attach mistake	1	5%
Uncut threads	4	18%
Total	**21**	**100%**

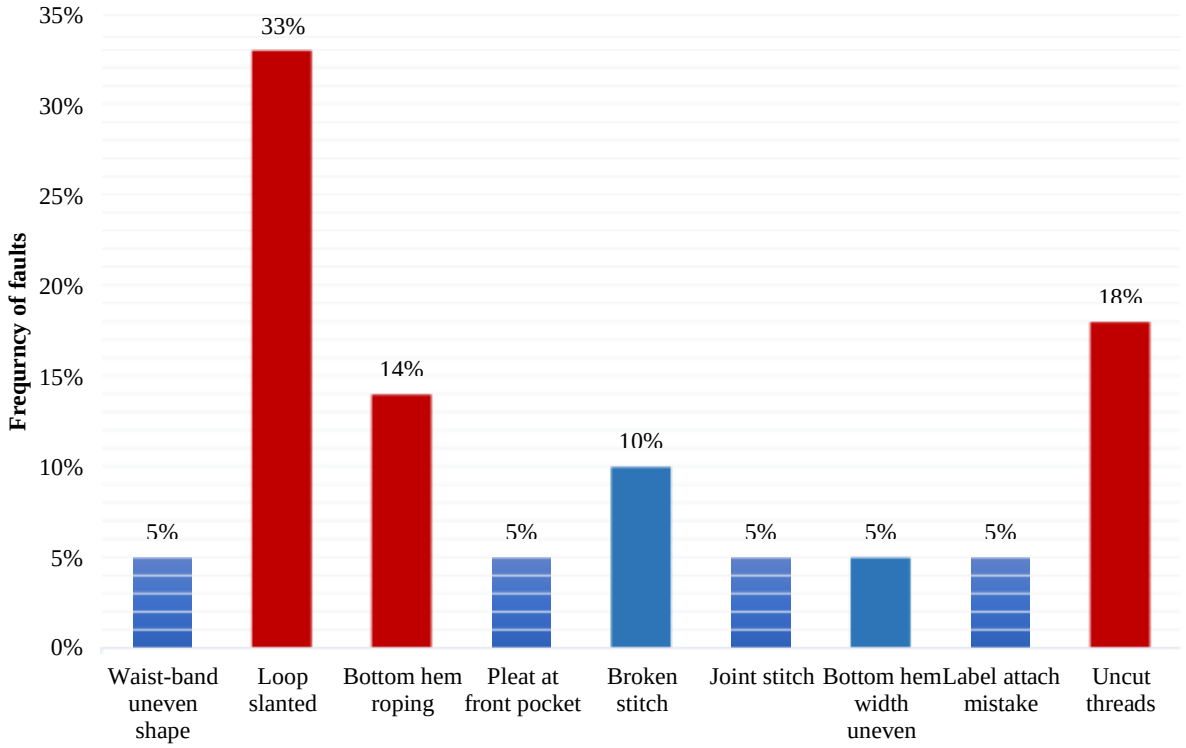

Figure 4: Frequency of faults in Kanta Trousers production

The graph shows that three major faults (loop slanted, bottom hem roping and uncut threads) occurred in the production of this style affect the quality mostly. So if concerns are taken in these faults about 63% faults may be reduced. Now in case of the last one style (Spearmint Shorts), the above considerations are taken. Spearmint Shorts (*Figure 5*) are casual five-pocket ladies shorts with twill fabrication of cotton-elastane material. All solid color-ways are considered for this analysis. The style gets 3D effects in front with garment wash. In *Table 2*, the result of the survey with this style is shown, and the frequency of the faults are calculated. The graphical representation of the frequency of faults for this style is plotted in *Figure 6*.

Figure 5: Spearmint Shorts

Table 3: Faults and frequency of faults for style "Spearmint Shorts"

Quality Issues	No. of Faults	Frequency
Skip stitch	1	5%
Loop slanted	3	15%
Joint stitch	2	10%
Dirty spot	6	30%
Poor fly shape	1	5%
Uncut threads	5	25%
Foreign yarn	2	10%
Total	**21**	**100%**

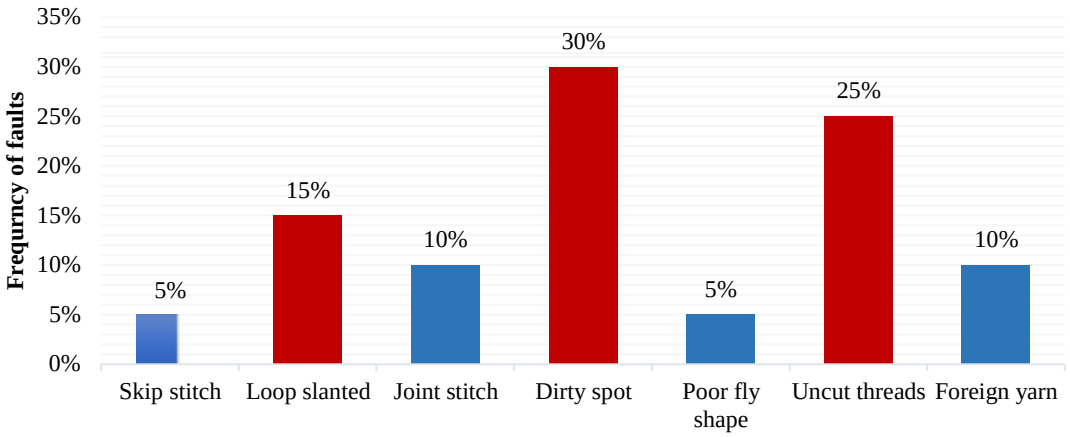

Figure 6: Frequency of faults in Kanta Trousers production

The graph shows easily that three major faults (loop slanted, dirty spot and uncut threads) occurred in the production of this style affect the quality mostly. So if concerns are taken in these faults about 70% faults may be reduced.

Now the summery of the faults occurred for the three styles are taken and plotted to evaluate the analysis of faults in the production line. Mostly occurred faults are identified in the line, and CAPA (Corrective and Preventive Action) plan is made for the line to enhance the quality level. The summarized analysis is shown in *Table 4* and the graphical representation in *Figure 7* below-

Table 4: Faults in the woven production line

Quality Issues	No. of Faults	Frequency
Skip stitch	1	2%
Loop slanted	5	11%
Joint stitch	2	5%
Dirty spot	4	9%
Poor fly shape	1	2%
Uncut threads	6	14%
Foreign yarn	2	5%
Waistband uneven shape	1	2%
Bottom hem roping	3	7%
Pleat at front pocket	1	2%
Broken stitch	2	5%
Bottom hem width uneven	1	2%
Label attach mistake	1	2%
Measurement	2	5%
Ironing	2	5%
Press marks	2	5%
Poor pressing	2	5%
Mixed shade	4	9%
Uneven stitch	2	5%
Total	**44**	**100**

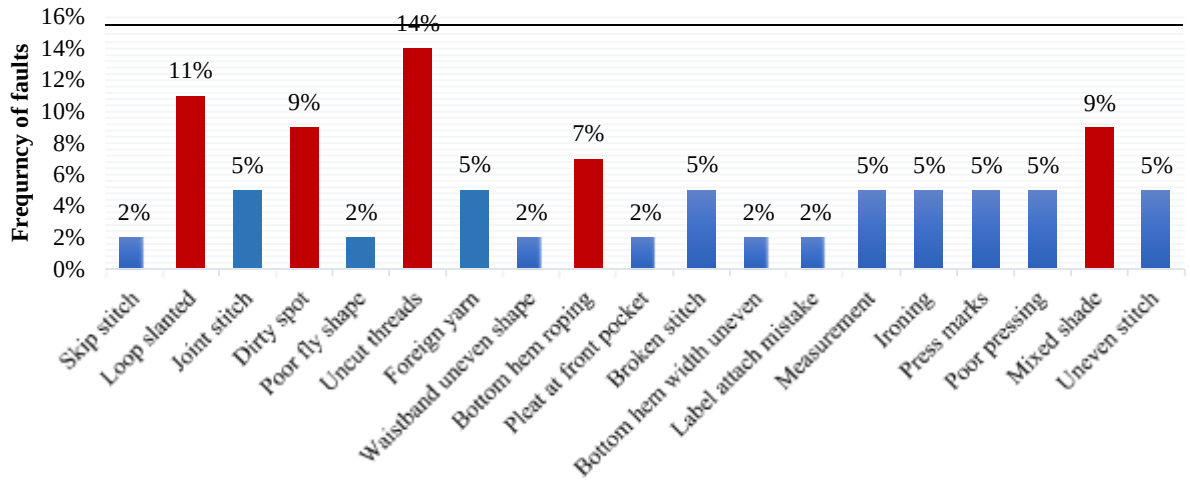

Figure 7: Fault frequency in the woven production lines

From the graphical analysis, five major faults are identified which causes about 50% affection on the quality of the woven production line. Now the root causes (RCA) and their corrective and preventive analysis (CAPA) is done on the faults to improve the efficiency of the line. *Table 4* below presents the RCA and CAPA of the faults. Then the faults are categorized by the factors like the man, machine, material or method to cause the faults, and the major factor is found out to take necessary actions from the Root Cause Analysis Meeting by the industry management.

Table 5: RCA and CAPA of faults in the woven production lines

Major Faults	RCA	Factor of fault				CAPA
		Man	Machine	Material	Method	
Loop slanted	▯ Operator inefficiency ▯ Lack of implementing the proper sewing method ▯ Due to poor quality following up	3			2	▯ Sort out defective garments. ▯ Increase the checking at the end of the sewing line. ▯ Provide adequate training to the operators. ▯ Increase supervision at the finishing. ▯ Improve quality inspection system.
Dirty spot	▯ Due to Operator carelessness. ▯ Mishandling.	2	1		1	▯ Establish preventive maintenance ▯ Improve supervision ▯ Clean machine correctly twice in a day ▯ Keep workplace and clean

Bottom hem roping	• Operator inefficiency • Improper thread tension at the bottom hem • poor follow up both in sewing & finishing section	2			1	• Train the operation correctly and check the thread tension to ensure the subjective error is controlled • Improve supervision at both the sewing and finishing quality checkpoint
Mixed shade	• Improper follow-up during in-house inspection • Poor follow up in both sewing & finishing section	2		1	1	• Ensuring that the packing operation is conducting properly • Strict instruction for in-house inspection of the core materials
Uncut thread	• Operator inefficiency • Improper trimming • Improper finishing • Poor follow up in both sewing & finishing section	4			2	• Sort out all the defective garment & conducted trimming properly • Provide adequate training to the operators • Provide thread cutter to every operator • Start regularly checking system to check process wise trimming
Total number of affecting factor		13	1	1	7	
Frequency of the factor in faults		59%	4.5%	4.5%	32%	

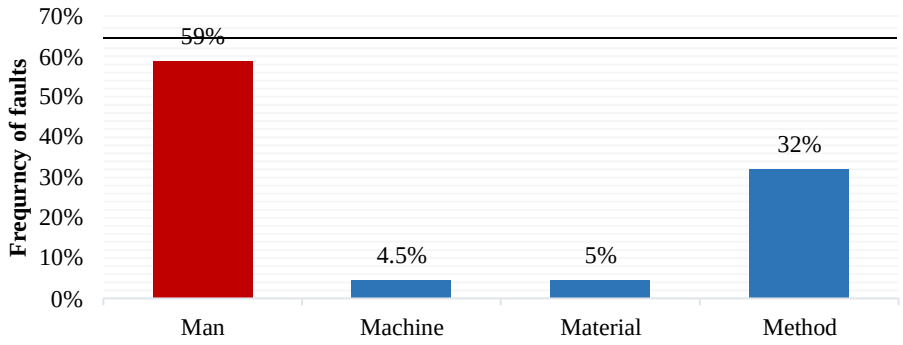

Figure 8: Frequency of factors in faults in the production lines

From the above quality finding and root cause analysis, it is found that the most common problem for all products is due to human-related issues and secondly on the methods which are also set by a human. Therefore, the question can be settled more effectively as the parameter is controllable here. To rectify the issues, the below routines is suggested to follow in three critical areas mentioned below-

1. An active monitoring system: Regularly and closely monitoring is an essential part of the work for quality control team. This step is necessary and related to develop the method even further. Auditing should be done in a regular interval in various stages of the product lifecycle. There should be RQS (Referred Quality System) and Quality Assurance Team in supplier province who will arrange a point to point follows up on the Predefined Check List from the early stage to final product and report to Quality Control team supervisor. Top management of the company should propose this predefined checklist to emphasis and Quality Assurance team should have proper authority to take action.
2. Understanding the complexity: Based on performance history and various inspection reports Quality Assurance Team of production offices should take proactive measures to understand the complexity of the product before making the orders. So quality control team can quickly determine the frequency of audits and audit interval period for a particular period in advance. They can also select which production unit would be self-reliant who will conduct an initial, inline and final inspection by the in-house quality assurance team and RQS of suppliers. It will reduce the additional workload and increase the confidence and ownership of production people and secure the product as well.
3. Arranging training for the garment operators: As per the analysis of the root cause analysis of the garment quality issues, it can be easily understood the primary roots of the problems are related to the human. Therefore, the necessity of skilled workforce realized without having any shortcuts and other alternatives. The experienced workers are the skilled workers mostly, and they must be nurtured for a more extended period of the time as they are the base of the skilled work-force. At the same time, frequent and regular training programs need to be arranged to increase the skill for the proper and new workers. Worker migration needs to be reduced as much as possible to make this effort fruitful.

To improve the quality of products means Sterling Group has to improve the quality of its products from production by controlling and setting the benchmark of quality standards for their own and with the help of its production people. Production people along with quality responsible mainly are responsible for driving various strategies to improve the quality.

CONCLUSION

This study based on only four woven garments suppliers of Sterling Group, not all suppliers in non-denim supply chain and time was a limitation which is uncontrollable. In spite of that, it can be concluded by saying the that quality is not a matter of compromise. With this report survey, it can be done for other more prominent groups and pioneer like Sterling to improve the quality to a substantial extent. At present in the competitive arena, this research methodology can help to the future path of zero defects and obtain 100% customer perceived demand. This study can help other industries to find the real causes of quality failure and also can support the quality researchers to develop some more quality management tools for further quality improvement practice.

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