REJECTED SHIPMENTS REDUCED SALES: GLOBAL CONUNDRUM FOR PUNJAB'S APPAREL MANUFACTURERS

Meeta Gawri
Asst. Professor, HOD,Fashion Marketing and Management Dept., NIIFT,Mohali

Dr Prabhdip Brar
Chairperson,UIFT&VD, Punjab University, Chandigarh

Abstract -While each order of apparel is unique for the apparel manufacturing industry of Ludhiana Punjab, the main concern being focused upon in the issue of bringing down the volume rejection and defects. Currently the industry sees lot of rejected garmentsshipment after shipment. Most units termed these garments as rejected. Constant reworks are common.The occurrence of defects and consequent rewords hampers the smooth production rate. The resultant poor quality products have an adverse impact on the entire industry and economy.

With the current industrial scenario where global competition is intense there is only one component of product finesse that gives a manufacturer an edge over other rivals. This is the component of quality. The provision of quality products ensures customers satisfaction. It promotes sales and in an incentive for constant improvement for the workers and manufacturer alike.

The garments manufacturing industry is a large and most export oriented field in India besides having a huge domestic market as well. Manufacturing cost of products in the apparel industry depend on quality to a large extent. Asknitwear industry is labor incentive there is vast scope of improvement by applying a scientific approach. Qualityinspection is anon value added activity but it is essential for the evaluation of the occurrence and perpetuation of defects and reworks.

Key Words: apparel, manufacturing, industry, garments, rejected, reworks, competition, knitwear, defects

Introduction

Total quality management or TQM is a people focusedmanagement system. It aims at the Japanese concept of 'Kaizen' or continual improvement incustomer satisfaction. The Statistical Process Control or SPC is a technique used withinthe TQM framework for reducing variations in the processes that are dealt with everyday. It is a technique for controlling, managing, analyzing and improving the performance of the manufacturing unit by eliminating the causes of variation. These may be enumerated as tool wear, operator error, errors in measurements, useof improper raw materials etc. The SPC approach aims to control the quality characteristics on the basis of testing quality on methods, machines, products and equipment. The SPC tool implementation is applied on a strategy which is using the seven basic tools enumerated below:

(i) Pareto Chart: Usually a tool that is used to display different categories of problems in a graphic representation. This enables them to be properly prioritized.
(ii) Cause-and-Effect Sheet: This data input organizes and displays the relationships between the different causes and effects that are being examined. The cause and effect sheet also helps to organize the brainstormingprocess taking place among the personnel and the inspector
(iii) Scatter Diagram: This form of diagram is used to discover and describe all possible cause-and effect relationships.
(iv) Flow Chart: This is a type of diagram which represents the workflow or process. It shows the step wise description of various kinds of defects and their order of occurrence by connecting them with arrows.
(v) Histogram: This is a snapshot of the many variations of a product or the results obtained after the product has passed through a process.
(vi) Check sheets: These are passed through charts for gathering data. When the check sheets are designed clearly they are most helpful in gathering accurate and relevant data. The check sheets allow thedata to be easily read and used.
(vii) Control Charts: These control charts are graphical devices. They aid in the process control. They make it easy to identify points and processes which pose the threat of going constantly out of control.

There is a virtual cut throat fight for survival against competition in terms of manufacturing costs versus selling price. The gap between the two is reducing day by day in the competitiveglobal market. The apparel manufacturingindustries are currently trying to develop production systems using new implementation tools to maintain speedy productiondespite the rapid changes of trendsof apparel products amongst consumers.

The main area for coming at par with the world market requirements was the detection of defects and focusing on their eradication. To reinforce this assumption, the task of evaluation of select apparel manufacturing was under taken by the researcher. However, at the very outset it is necessary to take cognizance of the inspection process that was put in place for conducting the research

Figure 1: Research Process

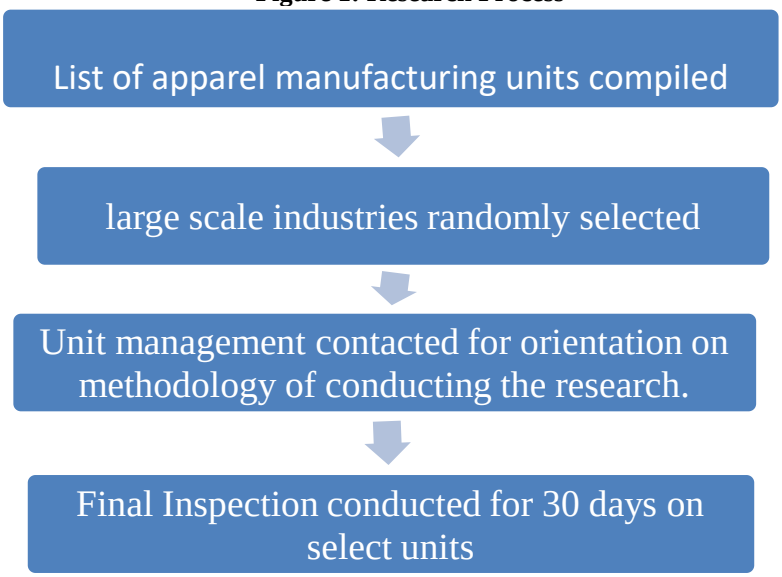
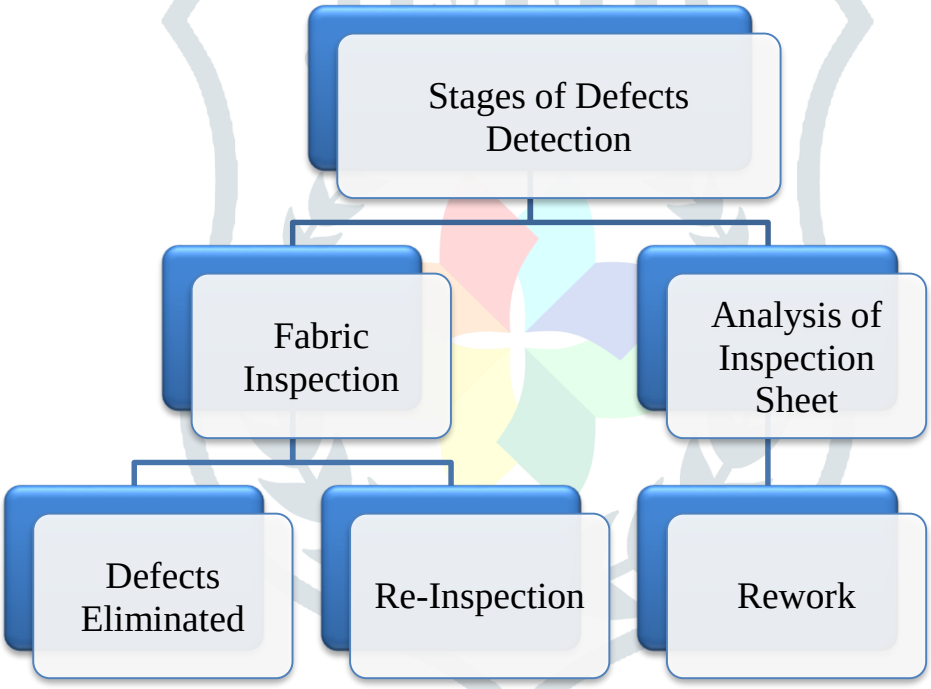


Figure 2: Defect Detection



On conducting the inspection at the apparel manufacturing units it was apparent that most units were conducting inspection in-house but there was a need for more specific, targeted inspection procedures. It was observed that a training needs assessment was required to be conducted at several levels. The Table No. 1 gives the salient features of the training requirements of these units.

Table No. 1: Training Requirements

1	Audiences	Quality checkers and specific operators
2	Goals	Introduce process control and problem solving
3	Contents	Basic quality control tools, control charts with construction and interpretation.
4	Time Frame of Task	Implementation of Quality Control Process to attain near Zero Defect Status.
5	Duration	Two weeks of hands-on training

Methodology and Contemporary Studies

The present paper looks into the costs incurred by manufacturers when they encounter defects and are constrained to indulge in a non-productive activity like reworks for which the consumer is most unwilling to pay. However, Uddin (2014) argues that defects minimization is the first condition of reducing production costs and improving the quality. This process tends to reduce the cycle time by reducing reworks and ultimately resulting in higher productivity. The study taken up for this paper study uses the DMAIC methodology of Six Sigma for minimizing the defects rate in a given garment factory. This is a systematic approach. It aims at defects minimization through the five phases of DMAIC methodology. These are namely define, measure, analyze, improve and control.

OjasviSrivastva (2015) presented the misgivings that most products of the garment industry have a short lifespan. New designs and newer-products are harbingers of newer defects. Even after knowing the products very well defects end up finding their way to the finished products lots. While the Ishikawa diagrams are known and widely used tools for fixing the problem. It was found that the major reason for the occurrence of these defects is largely human incompetency. Machines, having high levels of efficiency aside, it is the humans operators who feel fatigue, boredom, complacency etc. they tend to make mistakes. All of this drastically puts hurdles in the performance levels resulting in defects and anomalies.

According to Varun (2015)monitoring of production and quality management or reduction of reworks have major implications for the quality improvement in the garment industry. He advocates the application of Pareto analysis and Cause and Effect diagrams with the main purpose being to reduce the defects, minimize the rejection and possibly eliminate reworks. The DMAIC methodology is introduced and implemented in most garment units of the industry. The presence of defects percentage is compared before and after the implementation of corrective actions. The assembly line of corrective measures is through Suppliers, inputs, process, output and customers define, measure, analyze, improve and control that is SIPOC+DMAIC. The objective is to improvethe supply chain management. These facts were ascertained on the basis of the field work conducted by the researcher in Ludhiana.

Patil (2017) on the other hand listed the operational wastages in the apparel manufacturing process as being top surface rework, printed label rework, knitting faults, dyeing faults, cutting errors, sewing mistakes reworks, pinholes etc pertaining to fabrics and other forms of reworks.

Upasham(2016) discusses the quality improvement of within the garment industry by applying tools like the checklist, Fishbone or Ishikawa diagram and control charts. The main purpose being to reduce the defects, it would also minimize the rejection and reworks rate. The study aimed at providing a framework that would help identify, quantify and eliminate defect sources on the basis of which the defects are determined. Once the defects are identified the corrective actions are performed. The defective percentage is then compared for obtaining a before and after picture. The objective is that the outcome improves the process performance of the critical operational processes. The derivation is that an industry can gain higher productivity and profitability with improved quality product by minimizing rework activities. This in turn minimizes costs and improves upon the internal throughput time.

Figure 3: Methodology Outline: A Flowchart

Data Collection and Analysis

The researcher conducted a 30 days analysis of the defects detection during the final inspection stage of the sampled apparel manufacturing units in Ludhiana Punjab. The listing of the daily volume of defects detection conducted as also the magnitude of defects detected is shown in Table No. 2.

Table 2: 30 Day Defect Collection Listing

Days	Checked pieces	Defectives
Day 1	150	20
Day 2	150	32
Day 3	150	19
Day 4	150	28
Day 5	150	30
Day 6	150	16
Day 7	150	12
Day 8	150	29
Day 9	150	24
Day 10	150	20
Day 11	150	16
Day 12	150	22
Day 13	150	28
Day 14	150	18
Day 15	150	17
Day 16	150	27
Day 17	150	31
Day 18	150	33
Day 19	150	30
Day 20	150	22
Day 21	150	18
Day 22	150	20
Day 23	150	16
Day 24	150	20
Day 25	150	19
Day 26	150	23
Day 27	150	39
Day 28	150	21
Day 29	150	17
Day 30	150	24
	Total = 4500	Total = 691

Commonly Detected Defects

At the final inspection stage there are identified some common defects that were found after the data collection had been done over a period of 30 days on a number of randomly selected units. These defects have been segregated on the basis of the section they were established to have occurred in.

I. Fabric Defects
(i) Thick & Thin Lines
(ii) Contaminations
(iii) Snarling
(iv) Dark or Light Horizontal Lines (due to the different in dye pick up)
(v) Barriness

II. Machine Room Defects
(i) Droped Stitches
(ii) Broken Ends
(iii) Oil stain
(iv) Barriness
(v) Spiraled

III. Printing Defects
(i) Shade variation
(ii) Color fading
(iii) Dyeing patches

(iv) Misprint
(v) Crease or rope Marks

IV. Sewing Defects
(i) Skip stitches
(ii) Open seam
(iii) Weave stitches
(iv) Wrong label attach
(v) Wrong attachments of pocket and patches

V. Knitting Defects
(i) Holes
(ii) Drop Stitches/ Laddering
(iii) Pulled Loose Yarns
(iv) Barre
(v) Needle Lines

VI. Finishing Defects
(i) Wet Squeezer Marks
(ii) Curling
(iii) Fold Marks
(iv) Skewing
(v) High Shrinkage
(vi) Surface Pilling

All these defects were discussed in detail with unit personnel. Using the analytical methods the major defects were charted on the basis of Pareto Charts. These results are depicted in Table No. 3.

Table 3: Major Defects Analysis from Pareto Chart

Sr. No.	Analytical Tool Used	Defect Type
1	Pareto Chart	Open Seam Hole
2	Pareto chart	Skip Stitches
3	Pareto Chart	Open Seams
4	Pareto Chart	Uncut Threads

On the basis of the defects detailed brainstorming sessions were held with the personnel of the apparel manufacturing units and an analysis was conducted. In the final consideration the most common four defects found repeatedly in the units are shown in Table 4. The unit personnel themselves were able to suggest these remedial actions after considering all possible causative factors.

Table 4: Defect and Remedial Action

Sr. No.	Defect Type	Remedial Action
1	Open Seam Hole	Operator asked to check the machine
2	Skip Stitches	Close monitoring
3	Open Seams	Operator asked to check the machine
4	Uncut Threads	Operator to be Trained and give strict instructions

These are just a few defects. The process is indicative of the remedial actions that can be taken by the apparel manufacturing unit to ensure defects diminishing in the long run.

Once the solutions had been implemented the progressive outcomes were shared with the owners and managers of the textile industry. The defects were identified and examined in detail and finally analyzed to determine the causes as well as to ensure that they are consequently reduced. The main challenge was to withstand the imperfections and refining the system continuously. For thispurpose a control plan was prepared.

It was observed that the management should have taken initiatives on the following mandatory activities after the implementation of Six Sigma Programme. The operators of textile industry must be given training on a continuous basis on the specific issue of quality.

- The management must attempt to give incentives for obtaining high quality performance.
- The use of good quality threads, needles and other garment accessories is a special input.
- The total focus should be on preventing defects rather than correcting any or all defects.
- The apparel manufacturing units should develop a proper Quality Management System to ensure optimum production.

Strategic Conclusions and Recommendations

In a world of competitive apparel manufacturing, it is essential that the export oriented apparel manufacturing industry of Punjab needs to literally pull up its sock to be able to make any sales leave alone profits.

According to the data analysis, the Punjab apparel industry is still showing a high rejection rate at the final inspection stage of garments. It was observed that a majority of the rejection rate is due to the defects like holes, skipped stitches, open seams etc. Many of the defects were discussed and analyzed during brainstorming sessions and it was found that a large proportion could have been avoided easily. The cleaning and maintenance system especially in the machine section as well as other section needs to be tightened to effectively reduce the dust in the machines and work surfaces, in fact in the entire work area.

It was quite a decisive fact that the defects existence has tended to influence the financial performance of these manufacturing units by over 70 per cent. The presence of defects lowers the image of the unit and its total production potential. These defects are also responsible for the defected pieces or reworked pieces being sold at lower prices. In some cases these defects result in the products virtually becoming cleaning rags, which result in huge losses to the company. The study conducted by this researcher helps identify the source of detected defect's causes. It shows that it is effectively possible to affix the responsibility on a particular part of the process so that it is possible to take the recommended remedial action for overcoming the critical defects.

The significant outcome of the studies is that the observed rejection rate is very high and has been evaluated to be way beyond the unit's quality target. To improve quality,it is but necessary that the manufacturing units focus on reducing the rejection rate. The study addresses the critical causes of defects to improve the quality based on the following recommendations: The units have to increasingly focus on the critical identified fabric defects. Their respective causes are determined to improve the quality of the products.

- A major recommendation is that the standard operating procedures (SOPs) be put in place and used because it's the best prevention tool to minimize defect rate. It raises efficiency of processes of production and it also keeps the machines healthy.
- An effective vacuum sucker equipment should be in place, especially in the knitting machine section to have an effective cleaning system.
- The units need to monitor machine operations, machine cleaning, yarn related faults, and yarn storages to ensure the improvement of product quality.

Sustained market research is essential to ensure that the units are aware of the latest trends in manufacturing. The unit owners must also keep abreast of the latest government sanctions on domestic and international markets.

References

- AkanshahUpasham. "Minimization defects in the sewing department leading to quality improvement", *National Institute of fashion technology*, May 2016 pp 2-59.
- Finison, L.J., Finison, K.S. and Bliersbach, C.M., The useof control charts to improve healthcare quality. *Journal of Healthcare Quality*, 1993, Vol. 15 No. 1, pp. 9-23.
- Mitra, A, Fundamentals of Quality Control and Improvement,Second Edition. New Delhi, India: *Pearson Education Inc, 2002*.
- OjasviSrivastava., "garment defects analysis remedies and introduction to machine learning at a retail chain". *National Institute of fashion technology* May 2015 pp 6-18.
- Omar, M. H., "Statistical Process Control Charts forMeasuring and Monitoring Temporal Consistency ofRatings", *Journal of Educational Measurement*, vol. 47(1),pp.18–35, 2010.
- Uddin S.M. "Minimization of defects in the sewing section of a garment factory through DMAIC methodology of six sigma". *Research journal of engineering sciences*, vol. 3 September 2014, pp 21-26.
- Varun. "Enhancing the operational effectiveness of sewing segment in garment industry by DMAIC approach", *international research journal of engineering and technology*, June 2015 vol.2, pp 840-847.
- Nuti Mehta, "implementation of quality management system in Raymond made-to-measure", *National Institute of fashion technology*, May 2015.
- W.K. Wonga, "stitching defects detection and classification using wavelet transform and BP neural network", *Expert system application*, May 2012
- Md. Mohibul Islam, "Statistical quality control approach in typical garment manufacturing industry in Bangladesh". *Proceeding of 9th Asian business research conference*, December 2013, pp 1-13.