

“MINIMIZE DEFECTS OF PRODUCTS TO IMPROVE QUALITY” BY STATISTICAL QUALITY CONTROL TOOLS IN GARMENT

(Case study: SHINTS ETP Garment Plc.)

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ABSTRACT

This paper work makes an assessment on quality related problems in SHINTS garment industries in order to develop an applicable quality improvement tools, so that the performance of sewing section will be improve. Primary and secondary data will used to collect the raw data and analyze to identify quality- related problems of the sector using interviews, personal observations and review of previous research works. The problems identified in each production department will manipulate using Pareto chart, fishbone diagram and control chart and the solution will propose for the problems stated. Finally base on the propose solution and discussion from the case analysis, the conclusion and recommendation will give.

Keywords: Defects, Improve, SQC tools, Sewing section

INTRODUCTION

1.1 Back ground of the study area and the company

Global competition, crying off profit margin, customer requirement for high quality product at near to the ground cost and other economic factors set in motion the manufacturer to reduce their production cost without concession of quality in order to stand up in business area. Defect or wastages reduction is the initial step to reduce production cost as well as improve the quality. Higher quality comes with the reduced cycle time by reducing alternation.

Quality is one of the core competences of any organization. Delivering a good quality product in this competitive market is above all a question of existence. There are different company exist in Ethiopia Due to lack of proper and scientific principles most of Ethiopian

industries suffers from competing in global market. The main problem in those companies is demonstrated by a product having poor quality. Among the company exist in Ethiopia the one is garment industry, quality control in the garment industry is a big challenge for existing and it maintained from the initial stage to the stage of final finished garment.

The big garment exists in Ethiopia the one is SHINTS. SHINTS ETP Garment Plc. is a shin textile solutions own by Korean based factory located in Bole Lemi industrial parks in Addis Ababa. It has more than three years since the company starts production and exports its products to USA, Europe, and some other countries all around the world. Shin textile solutions are leading manufacturing experts in the functional and high technical garments industry. SHINTS focused on making best functional and technical garments **in the extreme sports areas.**

1.2 Types of Product produce in the company

There are different important types of products in our case company as mentioned below:-

1) V720353J-NAUTICA Men's (P2019)

2) POLYCONCEPT

- ✓ 19534maxsonsoft shell jacket
- ✓ 99534(w) maxson soft shell jacket
- ✓ 12501stinson soft shell vest
- ✓ 92501(w) Stinson soft shell vest
- ✓ 12937karmine soft shell jacket
- ✓ 92937(w)karmine soft shell jacket



3) TORAY

- ✓ Peloton240full zip
- ✓ Peloton240full zip hoodie
- ✓ Peloton240 vest
- ✓ Tiburon shorts
- ✓ Tiburon snap shirt
- ✓ Tiburon pant
- ✓ Insulated snap shirt

4) TRANGO WORLD

- ✓ Sudadera broye
- ✓ Sudadera junga
- ✓ Sudadera kura

5) Pet tent

6) Wolf launch

7) Schoffel

8) Nautica

1.3 Production process of the company Shints ETP garentment plc

There are different kinds of process flow chart, but we would try to map the varies activities that occurs in SHINTS ETP Garment PLC, for mini level operation flow as the following process flow chart;

- Macro level structure of the over-all company flow show including management up to operation level
- Mini level structure that show on operation level
- Micro level focuses on production level the selection only one activity

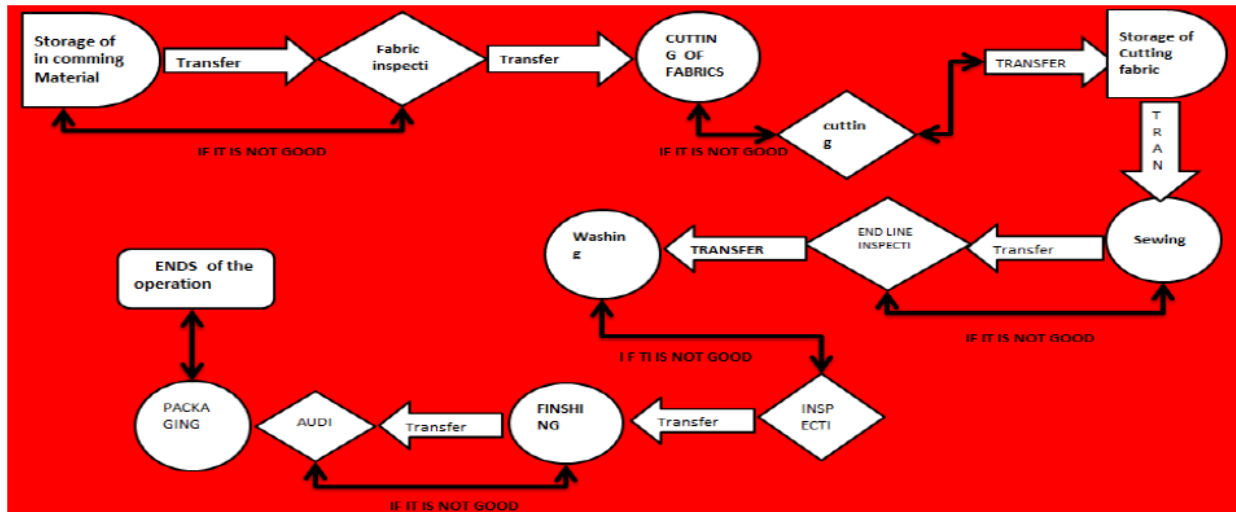


Chart 1:- The type of production process and quality inspection area in the company

Production flow sewing

For study selected products:- Tiburon Snap Shirt

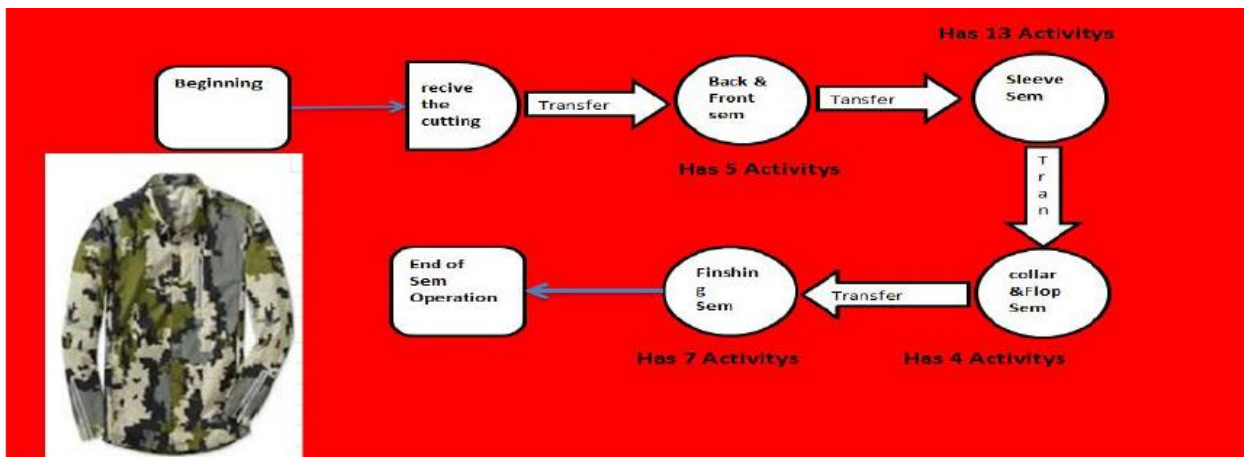


Chart 2:- production process of Tiburon Snap Shirt

1.4 Quality inspection section exist in the company

1.4.1 Fabric inspection

Fabric tests: - Shrinkage, Strength, Pilling test, Fastness: washing, light, perspiration etc

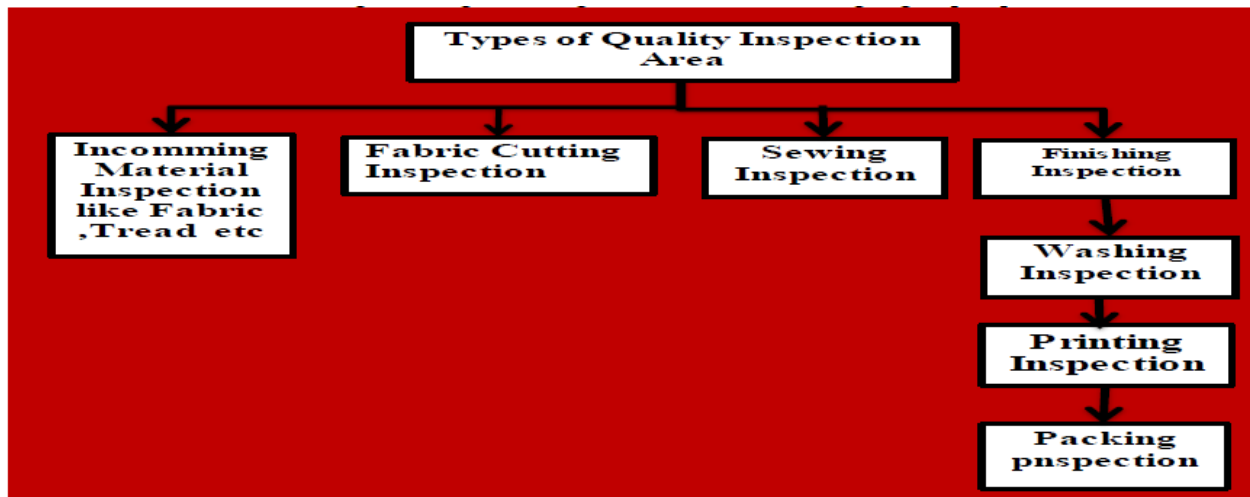


Chart 3:- Types of inspection in the company



Figure 1: Fabric department

1.4.2 Cutting Inspection process



Figure 2: Spreading and cutting flow process

Types of defects existing in cutting section

Spreads problem, Markers problem, Numbering problem, Miss ordering, Bundles problem and bundles mixing



Figure 3: Spreading and cutting section

1.4.3 Finishing Inspection process

- ❖ Finishing is the last stage of garment production where garment gets its final look.
- ❖ In this department each garment undergoes different finishing processes.
- ❖ It undergoes for quality check for several number of time which sets the garment free from defects.
- ❖ Buyer specifications and instructions are strictly maintained.
- ❖ Thread cutting: Uncut threads affect the presentation of finished and packed

garments. Therefore, it is necessary to cut and trim the loose and uncut threads.

- ❖ Seam ironing: Ironing of garments using steam ironing tables with vacuum boards.
- ❖ Final finishing: The entire garment is finished using various finishing equipment

1.5 Types of statistical quality control tools mostly applicable in the company

Check sheets: - Data collection tool generally used in the preliminary stages of a study of a quality problem Data often entered by worker as check marks in a given category like:-

- ♣ Process distribution check sheet - data on process variability
- ♣ Defective item check sheet – types and frequencies of defects on the product
- ♣ Defect location check sheet - where defects occur on the product

A Check sheet is a paper form on which items to be checked have been printed already so that data can be collected easily and concisely. Its main purposes are to make data-gathering easy and to arrange data automatically so that they can be used easily later on.

Histogram is Bar graph that shows frequency data and provides the easiest way to evaluate the distribution of data. The company use histogram

- ❖ For to show the distribution of daily production defects in line
- ❖ For to give management control of the general line production

1.6 Problem Statement

Defects or wastage reduction is the initial step to reduce production cost as well as improve the quality of products/ services. There are four Major sections under Garment Company that are suffering by different defects such as Fabric, Cutting, Sewing, and Finishing sections. Among those sections the sewing section highly suffering from rework due to the existence of different defects.



Figure 4: Sewing Section

By using quantitative method of existing data

Table 5:- Quantitative defect rate of different sections

S/N	Sections	# of defects weekly	% of defects-rate	% Cumulative
1	Cutting section	600	11%	11%
2	Sewing section	2956	53%	64%
3	Finishing section	1666	30%	94%
4	Fabrication	311	5.6%	100%
	Total defectives	5533		

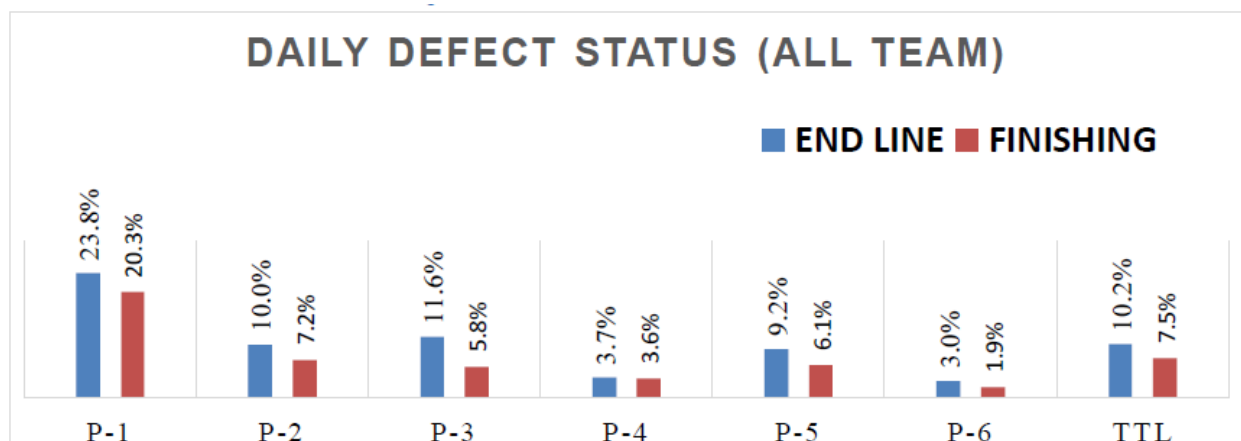


Chart-1- Histogram show daily line wise defect status

1.7 Research questions

- What will the major frequency occurrences of defects of company products?
- What will the root cause factors for the defects that occurs the company products?
- What will the appropriate quality control tools used to identify and analysis the main cause of products by reducing or eliminating the faults/defects?
- How to fulfill or satisfy the customer requirement?

1.8 Objectives of the study

1.8.1 General objective of the study

The general objective is to investigate the defects in the sewing section and propose a solution how to minimize the defects in sewing section by using statistical quality controls tools.

1.8.2 Specific objective of the study

In order to achieve the general objective which stated above, the following specific objectives are will employed.

- ❖ It will identify and measure the frequency of occurrence of the critical defects;
- ❖ It will assess the contributing factors for each defect
- ❖ It will maintain improvements using appropriate quality control tools.
- ❖ It will satisfy customer

1.9 Methodology

In order to assess the quality related problems of the company, primary and secondary data collection methods, such as questionnaires, interviews, personal observations and review of companies' daily production record will use to collect the raw data.

And also in order to analyze the collected data, the mathematical tools and techniques employed in statistical quality control, like Excel spreadsheet, QM for windows software, Pareto chart, cause and effect diagram, and control chart are some of the methods that will use in this paper.

1.10 Expected outcome of the study

The benefits of this research that will give for the company and other firms are mentioned as below:-

- ❖ It will increase the quality of products/services by identifying and analyzing the major root cause of the problem
- ❖ It will enhance the daily production out-put of the line to achieve the daily target of the line by minimizing reworks that will occur in the line.
- ❖ By using this research the company will obtain recognition in organization.
- ❖ For other researchers also will use as a guide line

1.11 Scope of the study

The scope of this paper work will focus on SHINTS Textile Company for minimizing the defects in the different sections (fabric, cutting, sewing, and finishing sections) so that overall activities of the companies affecting the rework at the same time the quality of the product are under control.

1.12 Limitations of the study

For this research work there wills some limitations like:-

- ✓ Time;
- ✓ Finance
- ✓ Lack of data availability and
- ✓ Transportation.

1.13 Organization of the study

This study will organize in five chapters.

- Chapter one introduction part of the document, such as back ground of the study and company, statement of the problem, Research questions, objectives of the study, significance of the study, Scope of the study and Limitations of the study.
- Chapter two: it will deals about the literature review which mainly constitutes the theoretical and empirical reviews, conceptual framework model of the study and research hypothesis.
- Chapter three: it will describe the research methodology apply to conduct the study. It

also tries to address the research design employed, Target population and sample, data source and collection instrument, validity and reliability, data analysis procedure and ethical consideration.

- Chapter four: it will deals about data analysis and interpretation of the results and
- Lastly Chapter five: it will present summary of the study such as, conclusion and recommendations.

LITERATURE REVIEW

2. Introduction

2.1 Definition of Quality

Quality is an important issue in the modern competitive business world. Like the ‘theory of relativity’ quality is sometimes expressed as a relative concept and can be different things to different people (Gopal, K. 2002)

2.1.1 Factors Affecting Quality

- ❖ Men, Materials and Machines
- ❖ Manufacturing conditions
- ❖ Management policy for quality level
- ❖ Production methods and product design
- ❖ Packing and transportation

2.2 Quality Control

Quality control can be defined as that Industrial Management technique by means of which product of uniform acceptable quality is manufactured.

Quality control consists of developing, designing, producing, marketing and servicing products and services with optimum cost effectiveness and usefulness, which customers will purchase with satisfaction. (www.orgstatistical.quality)

2.3 Statistical Quality Control (SQC)

A Quality control system performs inspection, testing and analysis to conclude whether the quality of each product is as per laid quality standard or not. It’s called “Statistical Quality Control” when statistical techniques are employed to control quality or to solve quality

control problem. SQC makes inspection more reliable and at the same time less costly. It controls the quality levels of the outgoing products. SQC is the term used to describe the set of statistical tools used by quality professionals. Statistical quality control can be divided into three broad categories (www.orgstatistical.quality)

2.4 Quality Improvement

Inspecting every product is costly and inefficient, but the consequences of shipping non-conforming product can be significant in terms of customer dissatisfaction (Marilyn K and Robert F). As a result, the underlying aim of quality improvement is to ensure in a cost efficient manner that the product shipped to customers meets their specifications. Higher product quality is required for a company to become more competitive, both locally and in international trade Improved quality increases productivity, hence, many world-class firms and nations use quality as a powerful competitive tool (Adedeji B. Bandiru and Babatunde J.Ayeni). Continuous improvement of quality is needed since there are competition pressures and customer needs are a moving target.

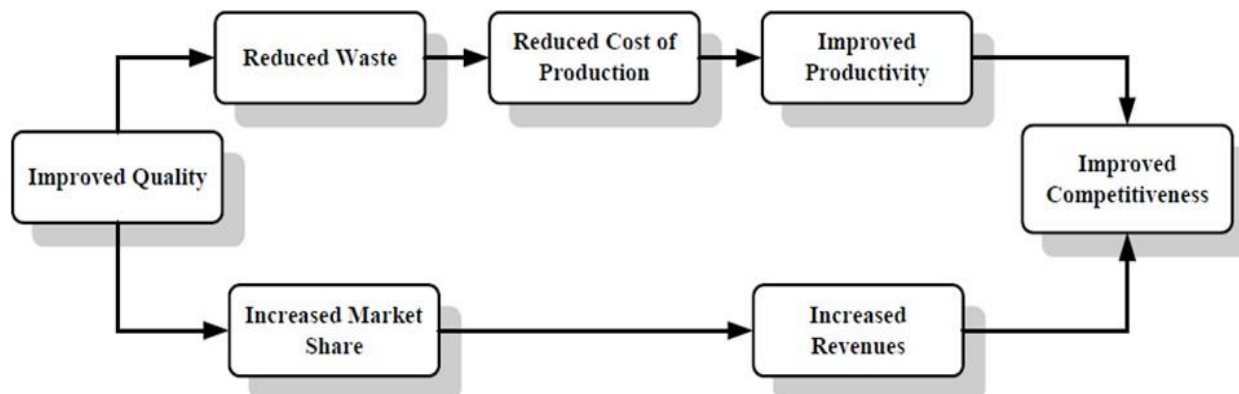


Chart 3:- Quality and Competitiveness

Therefore, quality goals must keep shifting to respond to the changes that keep coming over the horizon

i.e. new technology, new competition, threats, and opportunities. The Deming's plan-do-check-act (PDCA) cycle is the most widely used tools for continuous improvement.

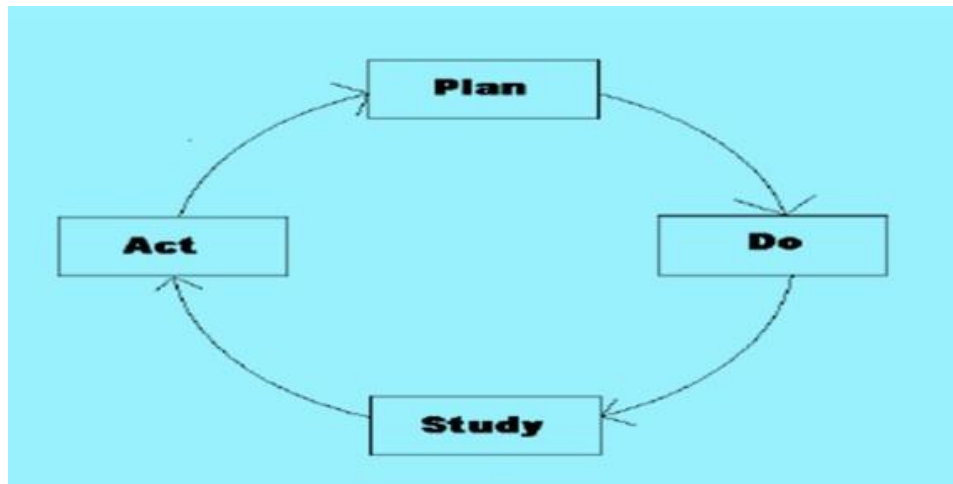


Figure 5: Deming's PDCA cycle

Plan: Identify an opportunity and plan for change.

Do: Implement the change on a small scale.

Check: Use data to analyze the results of the change and determine whether it made a difference.

Act: If the change was successful, implement it on a wider scale and continuously assess the results. If the change did not work, begin the cycle again.

Crosby's approach to quality improvement is based upon what he describes as the four 'absolutes' of quality, namely:

Definition - understanding that quality means conforming to the requirements.

System - the approach to be adopted should focus upon prevention rather than inspection.

Performance standard - the organization should strive for zero defects rather than adopt acceptable quality (defect) levels.

Measurement - the true measurement of quality is the cost of non-conformances.

2.5 Quality Control Tools

The key process monitoring and investigating tools include:-

- ❖ Pareto charts: - which is the big problem?
- ❖ Cause and effect diagrams: - what causes the problems?

- ❖ Histograms: - what does the variation look like?
- ❖ Check sheets: - how often is it done?
- ❖ Flow charts:-can the variation be represented in a time series?
- ❖ Scatter diagrams: - what are the r/ships b/n factors?
- ❖ Control chart: - which variations to control and how?

Pareto Diagram is a bar graph used to arrange information in such a way that priorities for process improvement can be established. Pareto diagram is used to display the relative importance of data and to direct efforts to the biggest improvement opportunity by highlighting the vital few in contrasts to the useful many.

A Cause-and-Effect Diagram is a tool that helps identify, sort, and display possible causes of a specific problem or quality characteristic. The diagram graphically illustrates the relationship between a given outcome and all the factors that influence the outcome. It is used when we need to identify the possible root causes, the basic reasons, for a specific effect, problem, or condition, sort out and relate some of the interactions among the factors affecting a particular process or effect and analyze existing problems so that corrective action can be taken.

A Scatter diagram is used to study the relation of two corresponding variables i.e. a quality characteristic and a factor affecting it, two related quality characteristics, or two factors relating to a single quality characteristic.

A Control chart is a graphical method for displaying control results and evaluating whether a measurement procedure is in-control or out-of-control.

2.6 Defect: - it is a nonconformity that is serious enough to significantly affect the proper usage of the products. And also there are different defects in garment industry, such as fabric defects, cutting, sewing, and finishing defects are the major faults/defects. (www.pro.defects)

Fabric defect:- is any abnormality in the fabric that hinders its acceptability by consumers and most of the products in the garment industry has a short lifespan. Even after knowing the products in & out, it is very hard to keep defects from finding their way to the finished product. (www.pro.defects)

According to Kalayu (2014) the four critical fabric defects (Needle line, Hole, Yarn variation and Lycra jump) are achieved and these fabric defects need to be corrected by

using quality control tools such as pareto-chart and control chart to minimize the rejection rate. That means, from existing 7.87% rejection rate can be reduced to 1.574% which resulted in the net difference of 6.296. This researcher uses some of quality control tools to reduce the defect rate of products, but he does not identify the root cause of the problems by using additional quality control tools such as fishbone diagram.

Sewing defects

Sewing is the process of attaching two fabric parts by using stitches which is made with a needle and thread and the basic steps of garments manufacturing process. Also different types of faults or defects arise in sewing section which should be reduced to maintain the required quality of products. (www.pro.defects)

According to Mazedul (2015) the operations which have highest sewing defect rates are examined by using the pareto analysis and determine statistically by p-control chart whether it's under control or not. And also this researcher use pareto-chart and p-chart to analysis and reduce the rate of defects, however, to know the source or root cause of problem, he possible to use additional techniques of quality control approach.

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