

## Constructing Cause and Effect Diagram for Rework Issue in Apparel Industry in Sri Lanka

R.A.S.A Perera<sup>1</sup> National Institute of Business Management, Kurunagala

G.C.I Gunarathne<sup>2</sup> Department of Operations Management, Faculty of Management, University of Peradeniya.

<sup>1</sup>[shahein.aruna@gmail.com](mailto:shahein.aruna@gmail.com), <sup>2</sup> [isurugune.jp@gmail.com](mailto:isurugune.jp@gmail.com)

### ABSTRACT

Rework issue in mass production effect the organization productivity as well as the efficiency. To identify the appropriate causes for the rework issue may generate beneficial to the organization especially in terms of reducing material and labor cost. The major objective of the study is to construct the cause and effect diagram for rework issue in apparel industry in Sri Lanka in the view point of material issues. Primary and secondary data are used for the study. Primary data are collected from 100 sample size of apparel employees by conducting the interviews to get identified the causes for the effects for rework. Apparel company daily rework data were used as secondary data. 150 days Rework records are used. Descriptive analysis, content and pattern matching technique were used to analyze the data.

According to the analyzed data the major causes identified in cause and effect diagram for rework issues are Fabric fault, Mending, Insecure stitch, Uncut loose thread, Measurement out, Stitching issues. Slippery fabric is identified as a cause for fabric fault. Improper rolling, Miss matched sewing thread, exposed incorrect Raw stitch are identified as causes for Mending and Wrong pattern, Different composition of thread and needle and bobbin are the causes for Insecure stitch. Mismatching Thread to materials is a cause leads for Uncut loose thread and Template is not given is leads for the Measurement out issue and Incomplete thread used identified as cause for the Stitching issues. Organizations should draw their attention towards main issues which effects on reworks when they are improving the quality.

**Keywords:** Apparel industry, Cause and effect Diagram, Rework,

### Introduction and research problem/issue

Apparel industries in Sri Lanka generates considerable amount of foreign currency in last few decades. With the changes in global apparel market in apparel effect to the Sri Lankan apparel industry badly. Especially competition from other Asian countries make the Centuries challenge to apparel industry in Sri Lanka. As a results of that Sri Lanka has to depend on GSP + programs to win the global market. But apparel industry should consider about the other strategies to create competitive advantage in our apparel in global market. Therefore, drawing attention towards the quality of the product is the optimal solution to gain competitive advantage. Thus Quality control tools can be used to identify and analyses the reasons, ways, non- value generating process and causes which lead to the poor quality. Rework in a final product also considered as non value generating process in production system. It is about poor quality and leads to less productivity and less profitability of the business. Finding defects in the products and carrying out rework is critical process in apparel industry in Sri Lanka. Therefore, identifying

the causes and effects for rework in apparel is essential to control the quality in Sri Lanka apparel. This paper address the issues in rework process in apparel by constructing the cause and effect diagram which is commonly considered as quality control tool in production. This diagram will further helps to identify the effects and the causes for the effect in apparel in the view point of material sewing issues for rework process. The Research problem is what are the cause and effects for the rework in apparel industry in Sri Lanka from the view point of material sewing issues. The major objective of the study is to construct the cause and effect diagram for rework issue in apparel industry in Sri Lanka in the view point of material issues. The sub objectives of this study are (1) to identify the effects which leads to make rework process in the apparels in the view point of material issues. (2) to identify the causes for issues in rework in the apparels. Primary and secondary data are used for the study.

## Research Methodology

This study is a mixed method study. Both qualitative and quantitative methods are used. Primary data and Secondary data are used for this study. Secondary data are obtained from Apparel companies daily rework data recording sources. Rework records in 250 days are used to analyse the background and nature of the rework in the apparel production. 250 days considered from 2015 calendar year. The rework records are focus on calculation of the amount of reworks done within the sampled days and the identifying the causes for rework issues. Structured discussions are conducted with 100 employees in operations department in 03 apparel factories in Kandy district in Sri Lanka. The schedule which used to collect data from employees, focuses on the causes as well as effects which lead to the rework in apparel manufacturing process. Convenience sampling under non probability is used to select the rework data from factories. Operations department employees are also selected by using Convenience sampling method. Descriptive analysis, Content and pattern matching techniques were used to analyse the data.

## Results and findings

All the 16 types of reworks issues are identified relevant to the sawing materials. Based on their nature and the percentages of the issues we categorised them into 06 such as

Effect	Percentage	Mean value per day
Uncut loose thread	20%	4.32
Fabric Faults	43%	6.42
Mending	8%	2.8
Insecure Stich	12%	4.1
Stich	4%	1.3
Measurement out	13%	4.6

Uncut loose thread, Fabric Faults, Mending, Insecure Stich, Stich, Measurement out.

Their percentages ad descriptive statistics as follows in table no 01.

**Table no 01. Descriptive Statistics of rework issues.**

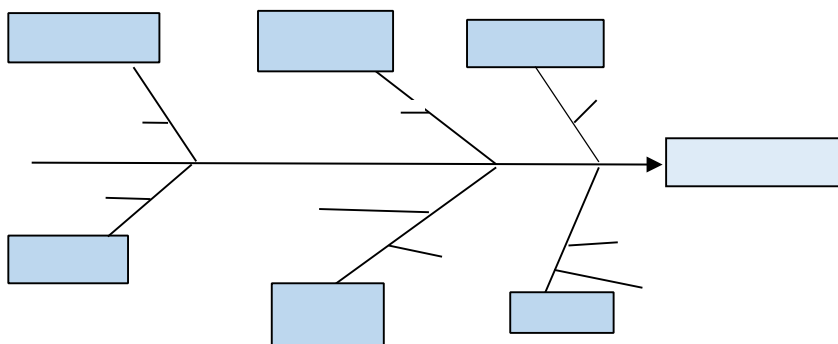
The causes of the issues are obtained from the discussions held with the employees and their view for the above issues are converted into percentages using the content and pattern matching analysis. Thus the identified accuses are separately graphs in a cause and effect diagram before constructing a general causes and effect diagram. The data revealed from Content and Pattern matching analysis Technique is as given in table no 02.

Table no 02. Identified causes for rework issue

Effect	Causes	Percentage
Fabric fault	Slippery fabric	100%
Mending	Improper rolling	38%
	Miss matched sewing thread	46%
	Exposed incorrect Raw stitch	12%
Insecure stich	Wrong pattern	63%
	Different composition of thread and needle and bobbin	37%
Uncut loose thread	Mismatching Thread to materials	100%
Measurement out	Template is not given	100%
Stiching issues	Incomplete thread used	100%

Based on above analytical data following Cause and Effect diagram for the rework issues in apparel industry is constructed.

Diagram no 01. Cause and effect diagram for rework in apparel industry in Sri Lanka.



**Conclusions, implications and significance**

Among 16 types of rework in material sawing records categorised in to 06 based on the nature and the percentage recording of them. Basically 06 effects for the rework are identified such as Measurement out, uncut loose thread, Fabric faults, Stiching issues, Insecure stich Mending. The causes for these effects are identified separately. They are recorded in the table no 03.

Table no 03. causes for the identified effects.

Effect	Causes
Fabric fault	Slippery fabric
Mending	Improper rolling
	Miss matched sewing thread
	Exposed incorrect Raw stitch
Insecure stich	Wrong pattern
	Different composition of thread and needle and bobbin
Uncut loose thread	Mismatching Thread to materials
Measurement out	Template is not given
Stiching issues	Incomplete thread used

Thus the plan makers should draw their attention toward these root causes when they are preparing budgets and they can adapt this diagram when they are concerning about the quality control method for material issues reworks. Based on this diagram they can construct to find another root causes related to apparel production process.

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