

# **A Comprehensive Study on Short and Delay Shipments; a Study on Sri Lankan Apparel Industry**

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## **ABSTRACT**

**The research was carried out in Sri Lankan apparel manufacturing organization which is facing short and delay shipments as a barrier when facing global competition. Fulfilling order quantity in the required date and in the required quality is very essential in apparel industry because it directly affects to buyer dissatisfaction and for a lower profit.**

**Literature survey is very important for a successful research. While referring literature related to short and delay shipments, the variables influencing on short and delay shipments could be identified as labor productivity, labor absenteeism, labor turnover, technology, efficiency, motivation, training, and work environment. Labor productivity, technology, efficiency, motivation, training, and work environment were selected for the study.**

**The research was an applied research. Both primary and secondary data collection methods were used in the study. Observation, interviews and questionnaires were used as primary data collection tools. Secondary data could be obtained from the company records. Descriptive statistical tools such as mean, standard deviations, confidence intervals, pie charts and line graphs were used in analyzing the data.**

**The study provides important findings on the root causes which exist within an organization as obstacles for on time deliveries. According to the data analysis low employee motivation and lack of technology availability within the organization were found as the root causes. Then different alternative solutions were identified. Finally, the best feasible solution was suggested for the organization by analyzing the feasibility of each alternative solution.**

**KEYWORDS: Apparel Industry, Efficiency, Labor Productivity, Motivation, Short and Delay Shipments, Technology in Apparel Industry**

## **INTRODUCTION**

Textile and apparel industry is one of the most significant contributors to Sri Lanka's economy. In the year 2006 this sector's exports amounted to US\$ 3,080 millions, accounting for 45% of the national exports and it was 57% of industrial exports. Textile and apparel sector contributed 39% to the overall growth of factory output in 2006 and contributed 5% to the national GDP. Currently the textile and apparel sector is a fully integrated industry with

necessary backward and superior logistical support linkages services. Sri Lanka is now considered as the Marketing and Service Hub in the South Asian region. (www.boi.lk, 2009).

The organization, in which the study was carried out, is one of the key players of the Sri Lankan Apparel Industry. The group of the organization was established in 1989 with a workforce of just 125 and 80 machines, and the group has now grown into an organization employing over 4000 employees with 2000 machines serving the best high street retailers in Europe and the USA. (www.penguinsl.com, 2009)

The study was carried out in the production department of the organization. Nearly seven hundred employees are employed in the production department of the organization. Also production department is considered as the heart of an

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apparel manufacturer, because the most important process, turning fabrics into garments. At present the organization is capable of producing more than 600 dozens of garments per day.

### RESEARCH OBJECTIVES

- Main Objective
  - Attempt to find root causes for short and delay shipments in Sri Lankan apparel industry
- Secondary Objectives
  - Exposure to strong literature survey to identify possible causes
  - Identify the causes influencing short and delay shipments in Sri Lankan apparel industry
  - Provide solutions for the short and delay shipments

Short shipment is a shipment which the organization fails to ship the requested order quantity in the particular shipment date. Delay shipment is a shipment which the organization fails to ship the order on the date stated on the purchase order.

### LITERATURE REVIEW

Sewing is one of the higher labor intensive operations in apparel industry. Hence labor productivity is critical in sewing. Labor productivity is typically measured as the ratio of output to the input of labor. Where possible, hours worked, rather than the numbers of employees, is used as the measure of labor input. With an increase in part-time employment, hours worked provides the more accurate measure of labor input. (www.wikipedia.org, 2009)

$$\text{Labor Productivity} = \frac{\text{output}}{\text{input}}$$

#### Equation 1. Labor Productivity

According to Professor Iacovone (2009) basically Productivity can be broken down into two conceptually distinct components. That is;

$$\text{Productivity} = \text{Technology} \times \text{Efficiency}$$

#### Equation 2. Decomposition of Productivity

Activity can be identified with production and consumption. Production is a process of combining various immaterial and material inputs so as to produce tools for consumption. The methods of combining the inputs of production in the process of making output are called technology. Technology can be depicted mathematically by the production function which describes the function between input and output. The production function depicts production performance and productivity is the metric for it. Measures may be applied with, for example, different technology to improve productivity and to raise production output (www.wikipedia.org).

#### Benefits of Using Technology in Sewing

- Increase the productivity of sewing room reducing the time taken for a particular operation.
- Increase and maintain the quality of the output and make the operation consistent.
- Help to reduce the time taken to train operators.
- Reduce the fatigue of the operators since the machineries help the operator to reduce body movements. (Wimalaweera. et al., 2000)

Efficiency means producing high-quality goods in the shortest possible time. Efficiency can be calculated as follow;

$$\text{Efficiency} = \frac{\text{No of Minutes Earned}}{\text{No of Minutes Per Day}} \times 100\%$$

#### Equation 3. Efficiency

$$\# \text{ of minutes earned} = \# \text{ of finished garments} \times \text{Standard Minute Value}$$

Number of minutes earned is the time that an operator spends on sewing or in other ways the time that needle operated. (Wanigathunga, 2000)

Hence to increase the employee efficiency, the company can increase the number of earned minutes per day that means the company can reduce the inefficiencies of the operators to increase the no of minutes earned. It cannot reduce the total waste time but able to reduce up to a

reasonable level. The individual performance is generally determined by;

- Motivation (the desire to do the job)
- Ability (the capability to do the job)
- The work environment (the tools, materials and information needed to do the job) (Griffin, 1999)

By increasing the quality of above factors within the organization, it can lead and encourage individual performances thereby increase productivity by reducing their inefficiencies.

### RESEARCH METHODOLOGY

The research was an applied research since it was undertaken to answer a specific industry problem and give solutions to it. The research utilized primary and secondary data. The primary sources of data were interviews, observations and questionnaires conducted by the researcher in the selected organization. The secondary sources of data include company records.

Structured interviews with the management were held to prioritize the most critical reason affected for sewing delays and to check the status of technology availability. Meanwhile an activity sampling was held to collect primary data to identify inefficiencies of the employees in the production department. Observations were taken at fixed intervals from randomly selected lines.

A questionnaire was used to test the motivational needs, working environment conditions and training needs of the employees in the production department. That tool was essential because the operators are the people who are familiar with the real situation of the organization. Moreover these kinds of facts may not be revealed from the secondary data. The researcher opted to use such technique considering the desire of the researcher to obtain first hand data from the respondents.

Secondary sources include company records such as daily loss minutes of each department. Secondary data was used in the

first step of the research that is analyzing the process with the aim of identifying causes for the delay and short shipments. Moreover secondary data was collected to check the status of technology availability.

And also some working conditional standards were referred to check the status of some working environment conditions such as noise, dust, temperature levels related to garment manufacturing organization. It is inappropriate to check these standard levels of the working conditions through a questionnaire because different people feel the same condition in different ways with their personal attitudes.

Based on the use of the research design and method, the analysis of the data was performed based on the descriptive statistical methods such as mean, standard deviations, confidence intervals, pie charts and column charts. These tools are suitable to cover up the main objective of the research that is finding route causes for short and delay shipments in Sri Lankan apparel industry.

### DATA COLLECTION AND ANALYSIS

Daily loss minutes of each department were analyzed with descriptive statistical method. Figure 2 indicates the pie chart which depicts average loss minutes of each department.

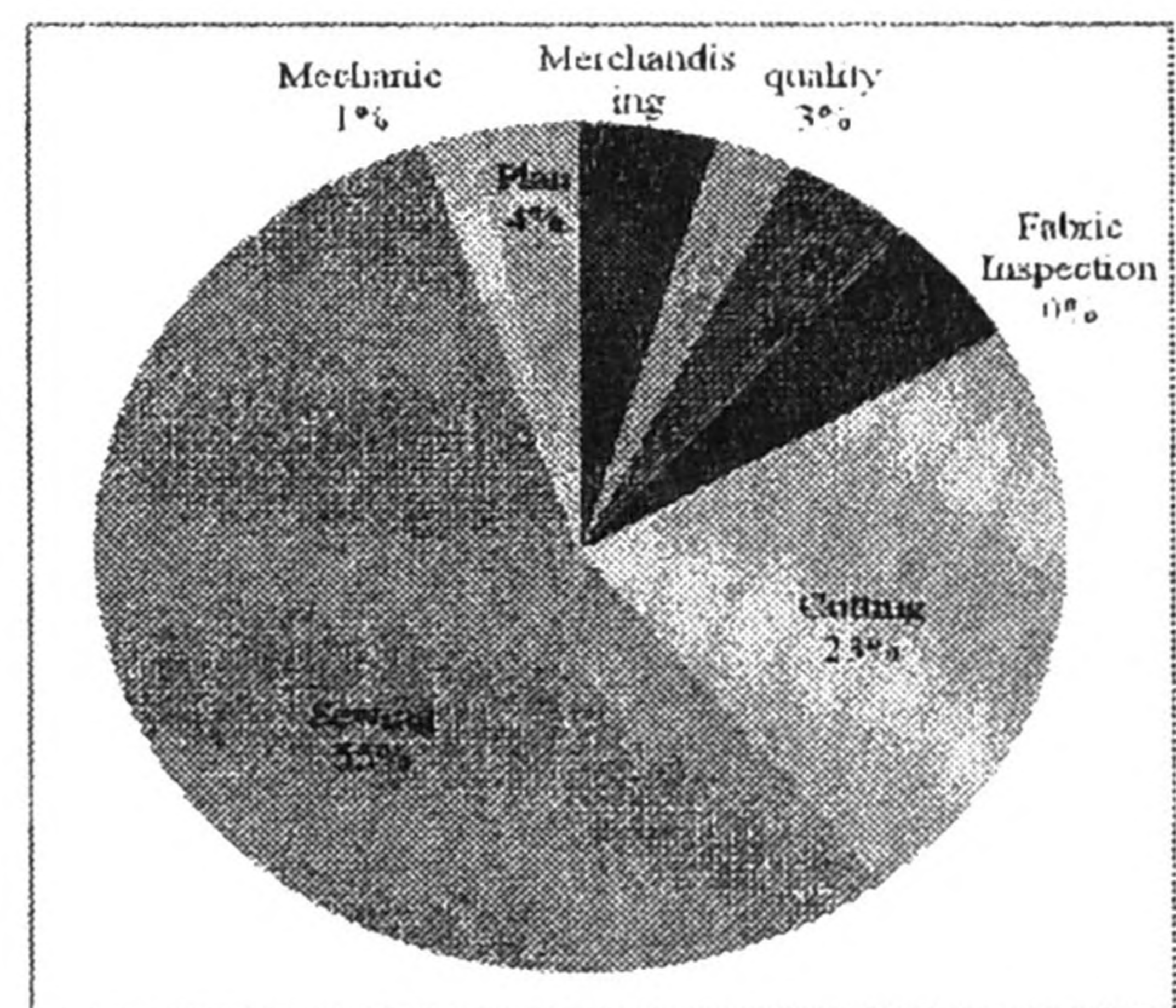


Figure 1. Loss Minute Analysis

The data received from the structured interview which was held to prioritize the most critical reason affected for sewing losses, was analyzed with mean and standard deviation of the priority numbers. Table 1 indicates the analysis.

**Table 1. Prioritizing the Critical Reason for Sewing Losses**

Reason	Mean	S.D.	Range
Labor Productivity	1.3	0.483	(0.817,1.783)
Labor Absenteeism	2.7	0.483	(2.217,3.183)
Labor Turnover	2	0.816	(1.184,2.816)

The summary of the technology availability data within the factory according to the records of the mechanical department, are as in Table 2.

**Table 2. Analysis of Technology Availability**

Worth But Not Available Technologies	Worth Available But Not Sufficient Technologies
Automatic tape cutter	Metering Devices
	Pneumatic Hemming Guide
	Thread Trimmers
	Automatic Tape Feeder
	Wiper

Activity sampling data was analyzed based on probability, standard deviation and confidence interval. The analysis is indicated by the Table 3. Then it was checked whether there were inefficiencies of the employees in the production floor exists.

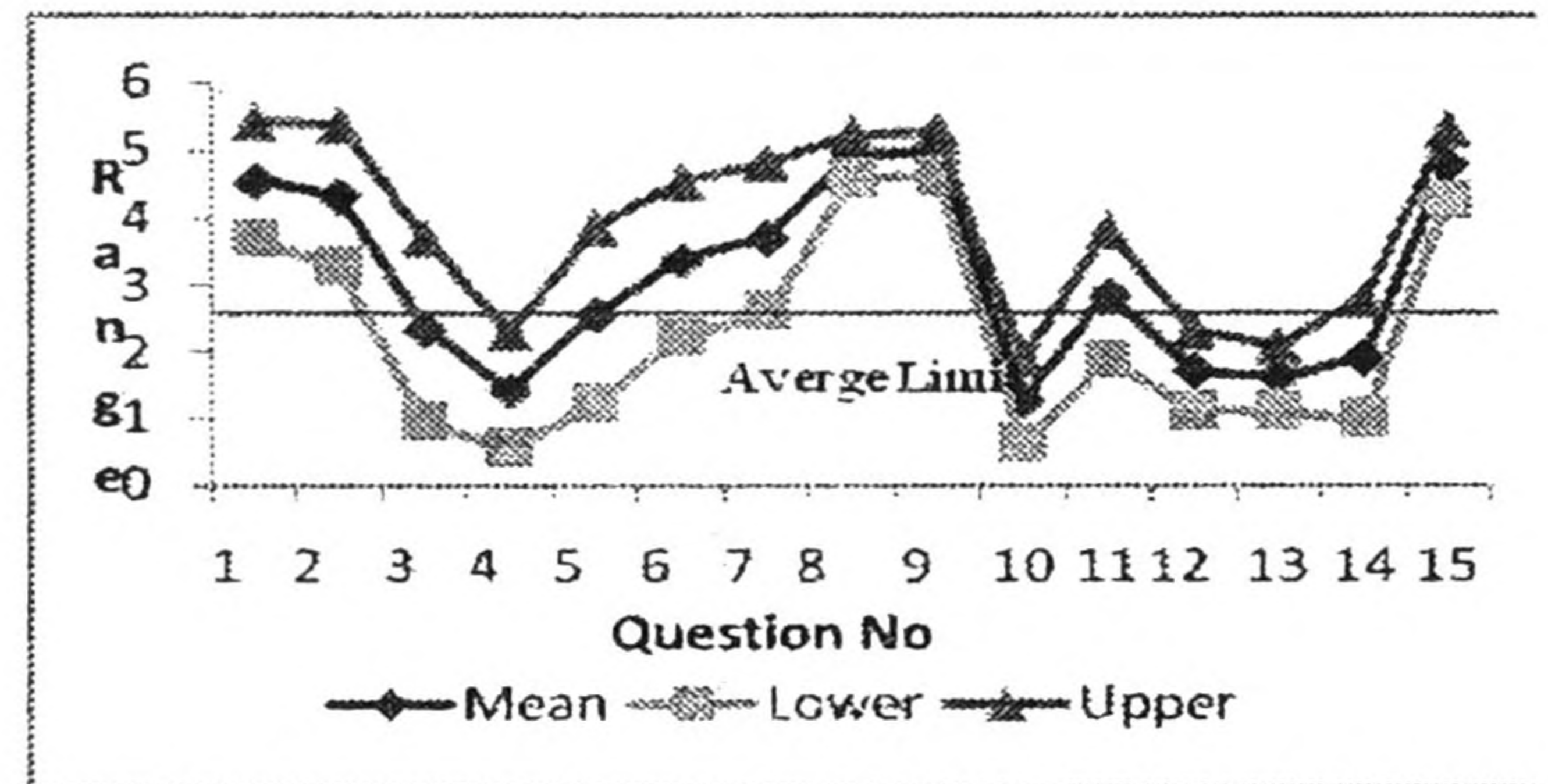
**Table 3. Analysis of Activity Sampling Observations**

Activity	Obs <sup>ns</sup>	Prob.%	S.D.	95% C.I.
Sewing	263	22.04	0.306	(21.43,22.65)
Other activities	930	77.96	0.163	(77.63,78.28)

The results of the questionnaire were analyzed in two steps. Firstly it was analyzed in order to prioritize the area which influences for individual's performances. Those areas are motivation, training and working environment. The results are indicated in the Table 4. Secondly, the individual questions of the significant area were analyzed. Those results are indicated in the Figure 3.

**Table 4. Analysis of the Questionnaire**

Question Area	Mean	S.D.	Range
Motivation	3.079	1.6	(1.479,4.679)
Training	2.707	1.283	(1.424,3.990)
orking Environment	2.813	1.199	(1.614,4.012)



**Figure 2. Line Chart of Individual Question Analysis**

**RESULTS AND DISCUSSION**

According to the analysis several results could be described as follow.

All the departments of the organization are accountable for the short and delay shipments occur within the factory. According to the Figure 1 it can be concluded that the sewing operation, which is carried out under production department, is highly responsible for the issue.

By referring to literature three reasons could be identified for the sewing losses. Those are labor absenteeism, labor turn over and labor productivity. According to the Table 1 it was able to identify the most critical reason which related to the considered organization is labor productivity as it has scored the lowest mean rank.

Labor productivity depends on two factors. Those are technology availability and labor efficiency. According to the technology availability data within the factory, it can be identified that the organization is suffering from the lack of modern technology availability. Some technologies are not available while some technologies are available but the extent to which the technology available is not sufficient. This has been clearly described in the Table 2.

According to the Table 3 it can be identified that the employees in the production floor spend more time on other activities than sewing. They spend time for sewing only in between 21.4% to 22.6% of the total working hours. They spend nearly 77.6% to 78.2% of the time for other activities such as bundle handling, material handling, threading, trimming, and damage repairing unproductively. Therefore higher labor inefficiencies exist among machine operators.

According to the mean grade values of the questionnaire which indicated in the Table 4, it can be concluded that all three factors affect for the performance of the employees as all three mean values are above the average value 2.5. But motivation has scored the highest mean value 3.079 making the employee motivation is critical within the organization. According to the Figure 2 it can be identified that question 1, 2,7,8,9 and 15 are highly affected for low employee motivation as they have scored mean values more than the average value and also the range exceeds the average value. Hence the problematic areas related to the organization are low relationship among employees and management (Q1), not having a positive drive from the management to improve their productivity (Q2), not keen on employees' necessities (Q7), not receiving incentives and bonus (Q8, Q9), not responding for employee achievements (Q15).

**Alternative Solutions and Feasibility Study**

1. Improving Technology
2. A Training Program to Develop Supervisors and Senior Managers' Skills
3. Individual rewards and payment system
4. Motivating through competition

**Table 5. Feasibility Analysis**

Solution	Economica I Feasibility	Financial Feasibility	Operationa I Feasibility
1	×		×
2	×	×	×
3	×		×
4	×	×	×

**Best Feasible Solution**

A successful training program can be designed to improve both labor-management relations and productivity. The supervisory skills program should be designed to give participants a deep understanding of important leadership and supervision concepts and equip them to play a firm, fair and effective role as leaders and supervisors. Participants are also trained to avoid a passive or authoritarian style of leadership and to keep a fair balance between the interests of the company and the interests of the staff. The training will significantly improves staff motivation and morale, and leads to better company performance.

The next best solution is motivating through competition. Workers in any organization need something to keep them working. Placing employees in competition with each other is a traditional technique use to motivate employees. Friendly competition is a great way to generate motivation among employees. It gives a chance for employees to flex their working skills in a competition against their peers. It will not only motivate employees with a result of greater production but also the competition with recorded results will give the employer an idea of who is being most productive.

**Limitations of the Research**

All the processes of the organization affect for short and delay shipments. But the research carried out only for the most critical process, sewing as time was a

limitation to analyze the whole processes. To completely get rid of from this problem, it is also needed to find root causes from the other processes such as cutting, embroidery, merchandising, print and etc. Again the researcher had to limit the area by choosing only one factor from labor productivity, labor turnover and labor absenteeism. Labor productivity is the severe problem causes for the losses in the sewing process of the organization.

## CONCLUSION

According to the research it was revealed that the sewing process is the most critical process which causes for short and delay shipments in the apparel industry. It is the heart of the manufacturing process. Therefore management need to concern more on this area to minimize the failures they faced for their survival. Sewing is a higher labor intensive operation. Hence the most common issues that the management would face in the apparel industry are low labor productivity, higher labor absenteeism, and higher labor turn over. Among those problems low labor productivity was the salient problem in the considered organization.

Labor productivity can be reduced due to low technology availability and higher inefficiencies of the employees. Technology is a tool that can be used to improve labor productivity as this helps the labors to easily perform their operations. Not only for this apparel industry but for any manufacturing industry technology is essential. The organizations with modern technologies are the leaders in an industry.

Labor inefficiencies exist due to many reasons. Mainly there are three factors which cause for individual performances. Those are motivation, ability and working environment. Thus management must clever to increase the level of these factors to minimize the labor inefficiencies. Among those factors low employee motivation is critical in the considered organization.

To overcome the prevailing situation, the organization can conduct a training program to develop supervisors' and senior managers' skills and can implement the strategy 'motivating through competition' which are economically, financially and operationally feasible.

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