

# Factors Affecting Raw Material Write Off: A Case Study of the Sri Lankan Apparel Industry

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## Abstract

The Sri Lankan apparel industry is considered as the most significant and dynamic contributor to the country's economy. Though the industry creates profits in significant still it has many losses in financial aspects such as the cost of raw material. Therefore this research was carried out as a case study in the Sri Lankan apparel industry to identify factors affecting raw material write off. The main raw material considered in the study was fabric being the single largest cost factor in the apparel industry. This research randomly selected 85 schedules as the sample. Both primary and secondary data were used and collected through author observations, interviews and secondary data sources. The data were quantitatively analyzed with regression analysis. The results showed that both excess ordered raw material quantity and yield per yardage saving were the significant factors that affected on raw material write off in the Sri Lankan apparel industry. Further descriptive analysis revealed that pattern changes and marker improvement mainly contributed to this yield per yardage saving. The regression analysis further identified a significant relationship among the raw material write off quantity, excess ordered raw material quantity and yield per yardage saving. Also this study suggested to create a Lean manufacturing culture to minimize raw material write off in the apparel industry.

**Keywords:** Excess Ordering, Excess Receiving, Raw Material, Sri Lankan Apparel Industry, Write Off, Yield per Yardage Saving (YY Saving).

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## Introduction

The Sri Lankan apparel export industry is considered as the most significant and dynamic contributor to the country's economy. It has grown to be the country's one of the leading contributors to the export revenue (Dheerasinghe, 2003 cited in Ranaweera, 2014). Sri Lanka is well known in the apparel industry for producing designer label clothing for reputed customers in the USA and Europe. The revenue from apparel exports has established a sustained increase over the last two decades.

As the Sri Lanka's largest export industry, the apparel industry has considerable potential to develop through minimizing unnecessary costs such as fabric write off which is focused throughout this research. Fabric write off defines the quantity of fabric left in the stores after the particular order has been delivered or shipped. Also it is a dead stock of raw material, which costs to the organization.

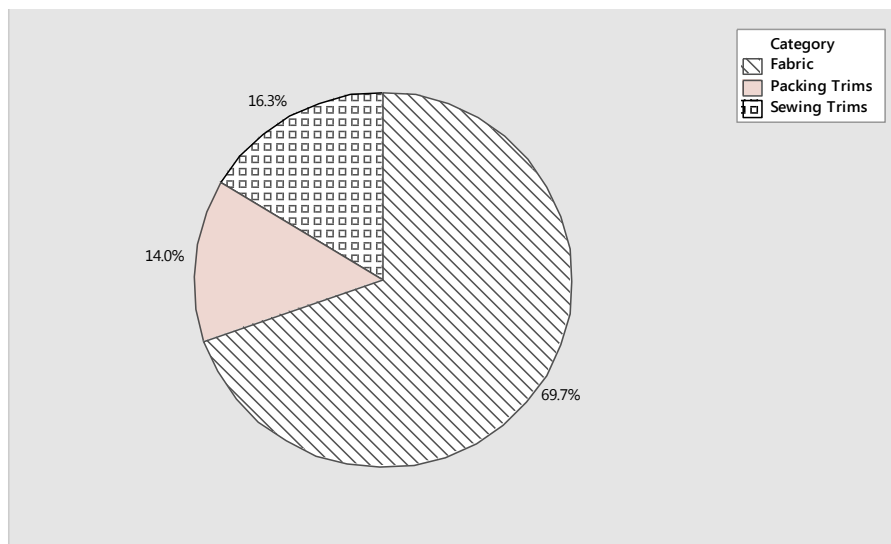


Figure 1 – Raw Material wise Contribution to the Value of Write Off

Profit is the primary concern of any manufacturing organization in the apparel industry. Thus the apparel manufacturers are paying more attention on reducing the costs in their financial statements. Cost of fabric for a garment is significant compared to other raw materials such as sewing trims, packing trims, etc. The raw material write off also contributes to this cost. Figure 1 provides evidence for that showing 69.7% contribution for the total raw material write off in the selected apparel manufacturing company.

Figure 2 illustrates the value of write off fabric in the selected apparel manufacturing company in year 2014.

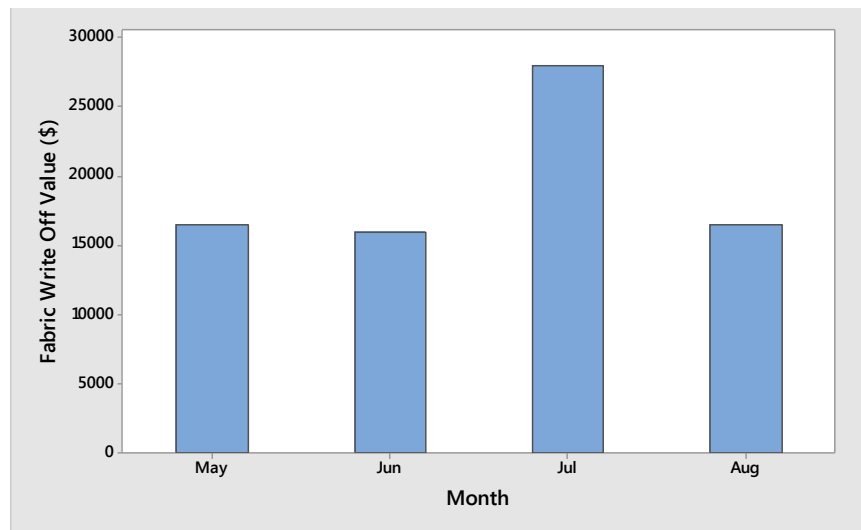


Figure 2 - Fabric Write Off Value

Due to the rapid changes in the customer requirements and fashion developments in the apparel industry, this dead stock of fabric is a waste as the same fabric is not used for another style and has become a problem for the apparel industry. Therefore this research was carried out to identify factors affecting raw material write off as a case study of the Sri Lankan apparel industry.

The main objective of this research is to identify the factors affecting raw material write off in the Sri Lankan apparel industry. Once the significant factors are identified, secondary objectives to be addressed are,

- To identify possible opportunities to minimize the raw material write off quantity
- To make recommendations in order to minimize the raw material write off

## Literature Review

The Sri Lankan apparel industry uses many raw materials. Among them, Fabric is the single largest factor in the cost of a garment and the prices of fabric are continuously increasing (Hands et al., 1997). The recent studies have explained the utilization of fabric in the apparel industry. According to Thomas (2012), the best fabric utilization is to use every inch of what is being bought, converting it into garments and then ultimately into earnings. Further he has shown that only 82% is being used effectively from the total fabric brought for an order. Therefore ultimately 18% is being lost in one way or the other. That study further showed the major contributors to this loss as dead stock, cut to ship, markers and width contributing 41%, 15%, 42% and 2% respectively. Comparing these contributions, dead stock is a significant loss contributor. But Thomas (2012) has not provided sufficient literature addressing the raw material write off.

Literature has defined the dead stock or the write off quantity in different terms. Thomas (2012) has defined the dead stock as the fabric that is left in the stores after the particular order has been delivered or shipped. These additional allowances also accounts

for utilization of fabric. Therefore the difference between the bought quantity and achieved consumption should be incorporated to define the write off quantity. This factor is considered in this research as excess ordered quantity of raw material.

This research also focuses on excess receipt of fabric due to supplier tolerances or safety margins. Although sufficient literature could not be found, this factor is considered for the study based on the observations, workflow, etc. to identify whether it influences on raw material write off quantity.

The empirical studies have found that the dead stock or raw material write off is created due to several reasons (Thomas, 2012). One reason is addition of allowances in calculating the fabric consumption. Cutting wastage, shrinkage and defects and over shipping practiced by the suppliers are some of those allowances considered. Another reason identified by Thomas (2012) is that supplied fabric has a considerable variation in its width that ultimately leads to this difference in fabric consumption. In many cases buyers are responsible for changing the pattern or style specifications which contributes to these variances. These additional allowances account for the cost of fabric while raw material write off has become a problem in the Sri Lankan apparel industry at present.

The cost of fabric is a very important factor to address the fabric write off problem. Powell (1977) estimated that the fabric costs alone to be 35% to 40% of the selling price of a garment (cited in Hands et al., 1997). Therefore according to Hands et al. (1997), a reduction of 2.5% in fabric could save a company 1% in cost. Further, Broadhead (2003) also stated that no other single refinement in production can provide substantial savings as easily as fabric control.

According to Crofton (2000, cited in Gam et al., 2009) the apparel industry is a major contributor to the environmental problems arisen in textile manufacturing to the apparel production and landfills. Therefore the fabric write off indirectly becomes responsible for environmental pollution starting from its production to the disposal. This again emphasizes the importance of this research in an environmental perspective.

Though reviewed literature provided sufficient evidence for minimizing wastages in the apparel industry, a very few has addressed the issue of fabric wastes due to write off. Among them, any research done in the Sri Lankan context could not be found within the accessible literature. Therefore this research is an effort to fulfill that empirical gap.

## **Methodology**

The variables and relevant indicators were identified through literature and author observations. The research was developed by observing production of several garments in the selected apparel manufacturing company. Based on the reviewed literature and field observations, the research model as shown in Figure 3 was developed.

Material write off quantity was the dependent variable and excess ordered quantity, excess received quantity and YY saving were the independent variables.

The three independent variables were defined as follows;

- Excess ordered quantity = ordered fabric quantity - fabric order requirement
- Excess received quantity = received fabric quantity - ordered fabric quantity
- YY saving = Ordered YY – Actual YY

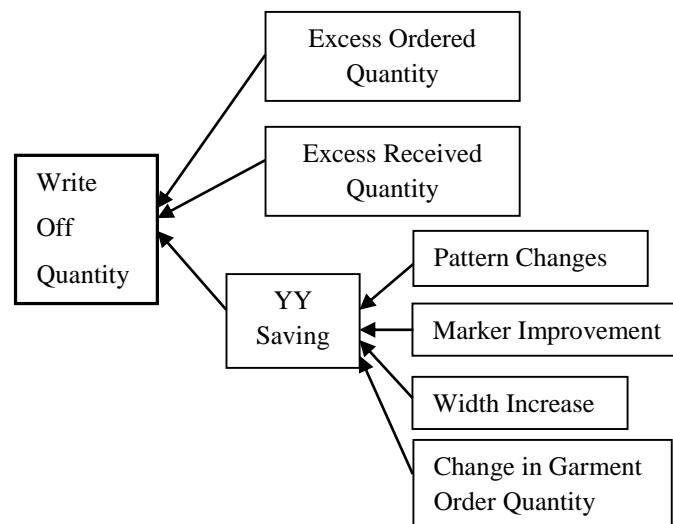


Figure 3 - Research Model

These variables are then quantitatively measured and analyzed to test the following hypotheses.

- Excess ordered quantity impacts on raw material write off quantity
- Excess received quantity impacts on raw material write off quantity
- YY saving impacts on raw material write off quantity

This study used random sampling technique, and 85 schedules were selected for the sample. Both primary and secondary data were then collected according to the identified variables, using author observations, secondary data sources and interviews.

The statistical analysis techniques such as correlation analysis, multiple linear regression, etc. were used to identify the significant factors affecting raw material write off. Hypotheses were developed and tested for the normality of data, correlation between the variables, significance of the model and the coefficients. A quantitative relationship was developed to model the relationship between the raw material write off quantity and the significant factors. Conclusions and recommendations were then made to minimize the raw material write off problem based on the results.

## Data Analysis

### *Distribution of Write Off Category*

Figure 4 illustrates the distribution of the two categories of write off in the selected sample that are namely, Normal write off and Reserve write off. In normal write off, this

write off fabric quantity is removed from the stores permanently and documented as write off in the financial statements. In reserve write off, although the write off quantity is documented as write off in the financial statements, the quantity will be remaining in the stores temporarily for few months. This happens when the particular fabric is predicted to be used for production of an upcoming style.

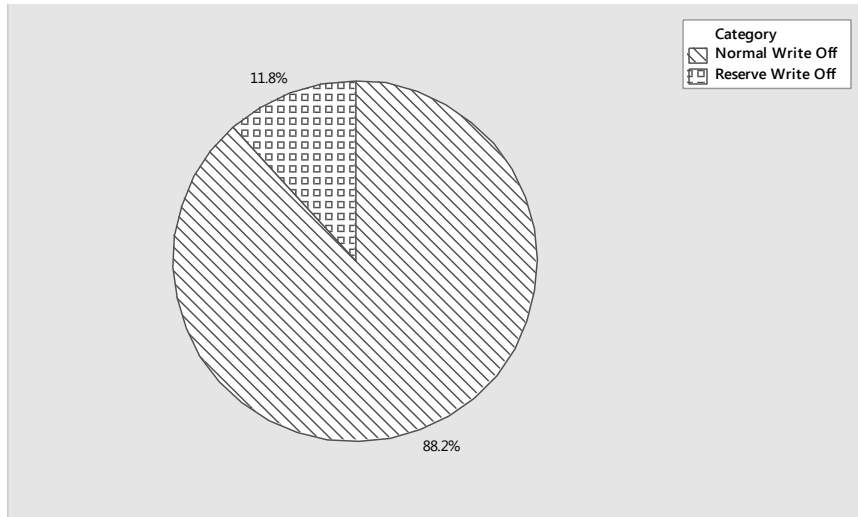


Figure 4 - Distribution of Write Off Category

The results showed that the majority was normal write off and removed from the stores as a waste, since the fabric will not be useful for another garment production due to the high volatility of fashion changes and customer requirement. This emphasizes the need for attracting management's attention to reduce write off, as it is a waste with a value. Further, reserve write off should also be minimized, since keeping a dead stock in a store would generate unnecessary costs such as, inventory cost, disposal cost, etc.

#### *Reasons for Raw Material Write Off*

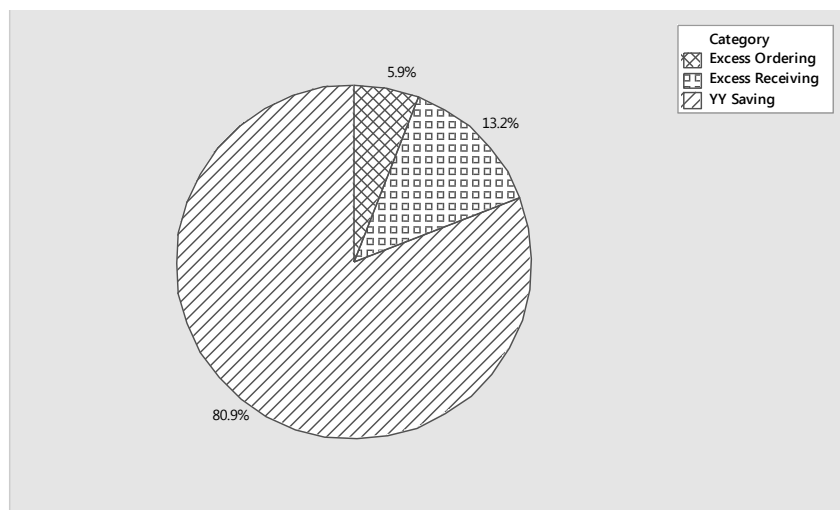


Figure 5 - Reasons for Raw Material Write Off

Figure 5 illustrates the contribution of each identified reason for raw material write off. It showed the major contributor to write off as YY saving and contributed 80.9% to write off. Excess ordering and excess receipt of raw material contributed 5.9% and 13.2% respectively. Therefore more attention should be focused on controlling YY saving to minimize write off.

### *Reasons for YY Savings*

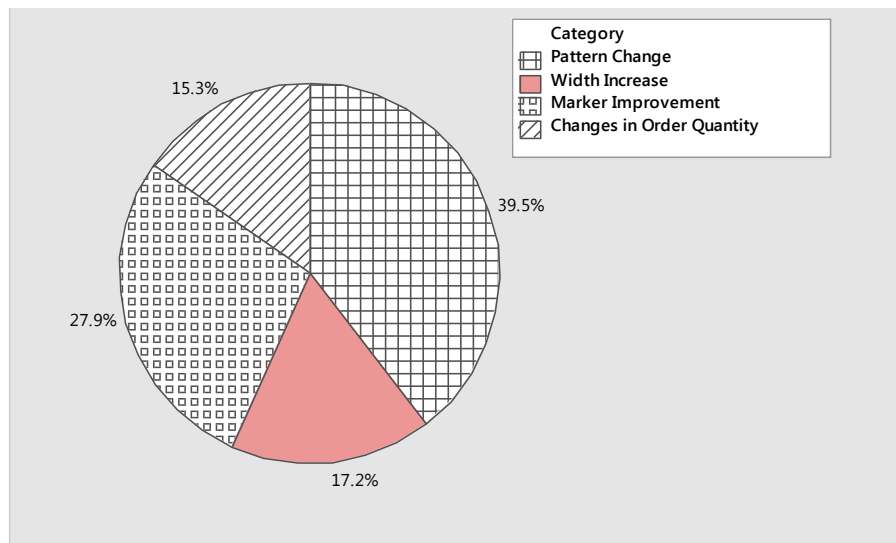


Figure 6 - Reasons for YY Savings

According to Figure 6 pattern changes contributed 39.5% to YY saving. This was mainly because customer specifications and requirements changed time to time during the style approval process. Due to long lead time and responsibility to deliver on time, company could not wait until the final pattern approval was done in order to purchase raw material.

Another reason was that styles were developed at front end producing two to four samples to check the feasibility. Most of the difficulties were identified once the style was selected to be executed for a bulk production. Therefore during its trial, the production department should request pattern changes to smooth the bulk production.

Mostly, fabric was provided in a greater width than ordered. This obviously reduced the fabric consumption and led to YY saving. Marker was also improved and redrawn for the received width.

Marker improvement and width increases also contributed to YY saving 27.9% and 17.2% respectively. The estimation of fabric requirement to complete a garment order was done based on the fabric width. The marker was also drawn for a particular fabric



width and fabric was ordered on that width. But sometimes, suppliers failed to supply fabric in exact width ordered.

Figure 6 showed the contribution of the changes in garment order quantity to be 15.3% to YY savings. Changes in garment order quantity could be occurred with the requests of customer. Customer may change the ordered garment quantity or may change the ordered size ratios. This would also lead to YY saving since a change in order quantity means the change in fabric consumption per garment.

### *Multiple Regression Analysis*

Multiple Linear Regression Analysis was used to develop a relationship between the dependent variable and independent variables. The following assumptions were made in analysis.

- The errors associated with any two observed values are independent of each other.
- The error component is normally distributed.
- The error component has a constant variance.
- The functional relationship between the predictor variables and the response variable can be established linearly.

Further a correlation analysis was carried out and revealed that there is no correlation between the independent variables. Summary of the regression analysis is shown in Table 1.

Table 1 - Summary of Regression Analysis

Model Summary		
R <sup>2</sup> Value	0.741	
P Value	0.000	
Model		
	Coefficient	P value
Constant	108.291	0.000
Excess Ordered Quantity (Yds)	0.868	0.000
Excess Received Quantity (Yds)	0.007	0.469
YY Saving (Yds)	70.839	0.016

Table 1 concluded that the fitted model is significant at 95% level of significance. According to the P values, constant, excess ordered quantity and YY saving have a significant impact on write off quantity whereas excess received quantity does not have. The model was good enough to explain the data having R<sup>2</sup> value of 74.1%.

Thus the regression equation at 95% confidence level could be concluded as,

$$\text{Write Off Quantity} = 108.291 + 0.868 \text{ Excess Ordered Quantity} + 70.839 \text{ YY Saving}$$



When other factors held constant, a one unit increase in Excess ordered quantity will increase write off quantity by 0.868 yards. Similarly, a one unit increase in YY saving will increase write off quantity by 70.839 yards.

### Findings & Conclusions

According to the findings of this research, main reasons for raw material write off are excess ordering, excess receiving and YY saving. The major reason was YY saving when compared with contributed values.

Further the identified main reasons for YY saving are pattern changes, width increase, marker improvements and changes in order quantity.

According to the analysis, the most significant factors affecting raw material write off were excess ordering and YY saving. A model was developed to explain the relationship between raw material write off and these two independent variables.

#### *Root Causes of Write Off*

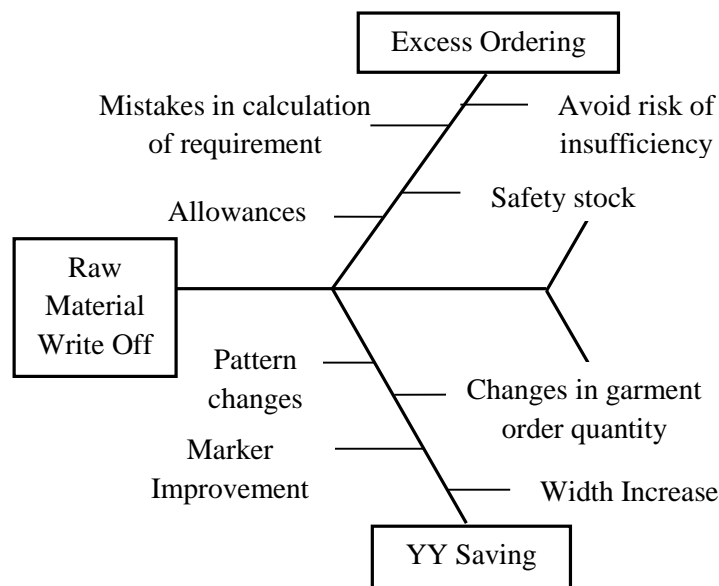


Figure 7 - Root Causes of Write Off

Through addressing the identified root causes, raw material write off problem can be minimized.

The main solution suggested through this research is adopting lean manufacturing including techniques such as supplier integration, maintaining effective communication and understanding between product development and production teams, occupying better trained personnel for operations, implementing standard operating procedures, avoid adding allowances at every point, recycling and reuse of fabric, etc. which are focused on addressing the identified root causes.

Lean techniques are associated with the elimination of seven wastes. One of its objectives is to minimize the consumption of resources that added no value to a product, such as write off raw material. Lean tools and techniques are applied selectively to eliminate the three sources of losses that are namely, waste, variability and inflexibility. So by implementing lean concept, raw material write off can be minimized (Paneru, 2011). Also lean operating system follows certain principles to deliver value to the customer while minimizing all forms of losses. For that each value stream within the operating system would be optimized individually.

Further lean addresses inflexibility and variability since those two are sources of losses. Therefore by implementing lean techniques, the variability in pattern changes can be addressed. Further it would improve the flexibility of the total process from product development to shipment, which is a key success factor in today's fashion world.

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