

# Investigating the impact of normal and abnormal loss factors in garment industry: A case study based on a jeans manufacturer in India

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## ABSTRACT – REZUMAT

### Investigating the impact of normal and abnormal loss factors in garment industry: A case study based on a jeans manufacturer in India

*This study aimed to analyse the normal and abnormal loss of a jeans manufacturing company in India. Personal interview and observation method are used in this study. Abnormal loss in quantity and rupee value is computed for 40 days of production based on the observed data. Mean abnormal losses are computed and one sample t-test is applied to test the hypotheses that the mean abnormal loss is not equal to zero. The study revealed that a normal loss of 3 to 5% is expected in any garment manufacturing company due to loss during the cutting and shrinkage process. The p-values of one sample t-test were less than 0.05 for all the tested hypotheses, hence, all the null hypotheses ( $H_{01}$  to  $H_{05}$  mean abnormal losses equal to zero) were rejected. Further, it was found that fabric is the big contributor in terms of abnormal loss. Hence, proper training for workers and recruiting of trained workers are advised to reduce abnormal losses.*

**Keywords:** jeans manufacturing, textile industry, abnormal losses, normal losses, garment, apparel, volatility, financial performance

### Investigarea impactului factorilor de pierdere normală și anormală în industria de îmbrăcăminte: un studiu de caz bazat pe un producător de pantaloni tip jeans din India

*Scopul acestui studiu a fost de a analiza pierderea normală și anormală a unei companii producătoare de pantaloni tip jeans din India. Interviu personal și metoda de observare sunt utilizate în acest studiu. Pierderea anormală în cantitate și valoarea rupeii este calculată pentru 40 de zile de producție pe baza datelor observate. Pierderile medii anormale sunt calculate și un test t pentru un eșantion este aplicat pentru a testa ipotezele că pierderea medie anormală nu este egală cu zero. Studiul a arătat că pierderea normală de 3 până la 5% este de așteptat în orice companie producătoare de articole de îmbrăcăminte din cauza pierderii în timpul procesului de tăiere și contracție. Valorile p ale testului t pentru un eșantion au fost mai mici de 0,05 pentru toate ipotezele testate, prin urmare, toate ipotezele nule ( $H_{01}$  până la  $H_{05}$  înseamnă pierderi anormale egale cu zero) au fost respinse. În plus, s-a constatat că țesătura contribuie cel mai mult la pierderile anormale. Prin urmare, se recomandă pregătirea adecvată a lucrătorilor și recrutarea lucrătorilor instruiți pentru a reduce pierderile anormale.*

**Cuvinte-cheie:** producție de pantaloni tip jeans, industria textilă, pierderi anormale, pierderi normale, îmbrăcăminte, modă, volatilitate, performanță financiară

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## INTRODUCTION

India is the world's second-largest garment and apparel producer. With its 5% contribution to global trade, India is the world's second-largest garment and apparel exporter. India's textile and apparel exports including handicrafts increased marginally from US\$ 39.2 billion in 2017–2018 to US\$ 40.4 billion in 2018–2019 which is 3%. However, India's global market share is well behind China which controls about 38% of the global textile and apparel trade. Textile and clothing exports accounted for 12% of India's overall exports in 2018–2019. In the fiscal year, 2018–2019 India's textiles industry contributed 7% of total industry production (by value). In the fiscal

year, 2018–2019 the Indian textiles and apparel industry contributed 2% to Gross Domestic Product, 12% to export earnings and 5% to the global textiles and apparel trade. In the last 5 years, the textiles industry has seen a surge in investment. From April 2000 to September 2020 the industry received \$3.46 billion in foreign direct investment [1].

Even though the Indian garment industry outlook is lucrative, the instability in the cost of production has made the companies disclose inconsistent numbers. Several business dailies and academic journal papers have discussed the impact of volatile raw material prices on the performance of textile and garment manufacturing companies in India. For example, Aggarwal [2], Hawaldar et al. [3], Jha [4], and

Meher et al. [5] stated that the textile and garment manufacturing companies are using petrochemical raw materials as their core material and as the crude oil price is highly volatile in the market, the garment and textile companies financial performance are not stable. Hence, an efficient cost management and cost control technique is the need of the hour for garment companies to manage to stabilize their financial performance. This work aims to analyse the normal and abnormal losses in the production process of garment manufacturing companies, jeans in particular.

## LITERATURE REVIEW

Keane and te Velde [6] stated that the textile and garment industries play a vital role in the development of emerging economies because they provide employment and income for both the male and female working population of the country. Abraham & Sasikumar [7] mentioned that the agreement on textile and clothing (ATC) of the world trade organization (WTO) has made both positive and negative impact on the Indian textile industry. To successfully compete in the international markets, textile makers in India have to focus on cost-cutting strategies and efficiency-building techniques. Cost management and product innovation are must for textile producers around the globe [8–10] opined that the unit cost is the major competitive factor for textile and garment manufacturing companies. He further stated that efficient utilization of raw material will yield profit, however, most textile entities are experiencing diseconomies of scale because of stringent labour laws. Choudhary [11] stated that production cost in textile companies has to be predicted and managed effectively to compete in the wholesale and retail markets. Using a case study and action research methodology, Becker [12] has tried reducing the cost variance. More accurate sketches and costing from the designers are advised to minimize the cost variance.

Akeem [13] and Stan et al. [14] stated that the proper budgetary control techniques may help manufacturing companies manage their cost-effectively. Aaron [15] has made a comparative cost analysis between the bundle and modular method of apparel production and the study revealed that modular production is better for apparel manufacturing, however, the commitment of supervisors and management is very much crucial. The cost analysis of textile industries using lean manufacturing systems was studied by some authors [16, 17]. The above-stated studies

have discussed the need for cost analysis in the textile and garment business, and comparative cost analysis in different manufacturing systems. However, the study on normal and abnormal loss analysis in garment manufacturing companies is not covered so far in the academic literature. On the other hand, Ullal et al. [18] suggested that “future in the services industry belongs to Artificial Intelligence (AI) driven machines”.

## DATA AND RESEARCH METHODOLOGY

Personal interview and observation methods were used to collect the primary data for this study. The production manager and supervisors are the key respondents for our production process and cost-related discussions. The daily production process was observed for 40 working days and the abnormal loss estimations were made at the end of each working day. The company manufactures five different sizes of jeans pants; they are 30, 32, 34, 36 and 38 inch in the ratio of 0.15:0.25:0.25:0.25:0.15 respectively. The installed capacity of the plant is to produce a maximum of 1000 pants per day, whereas the actual productions use to vary between 800 to 1000 pants on a daily base on the availability of workers. The normal loss was measured based on the standard expected loss % given by the production manager. In the cutting and washing process of the material, a normal loss of 3 to 5% is expected. Abnormal losses are estimated for 40 days of production and the mean abnormal loss values are computed for each size of pants. Further, one sample t-test is used to test the hypothesis that the mean abnormal loss is not equal to zero. In this study following hypotheses are developed and tested.

$H_{01}$ : The mean abnormal loss value in 30-size jeans production is significantly equal to zero.

$H_{02}$ : The mean abnormal loss value in 32-size jeans production is significantly equal to zero.

$H_{03}$ : The mean abnormal loss value in 34-size jeans production is significantly equal to zero.

$H_{04}$ : The mean abnormal loss value in 36-size jeans production is significantly equal to zero.

$H_{05}$ : The mean abnormal loss value in 38-size jeans production is significantly equal to zero.

## ANALYSIS AND DISCUSSIONS

Figure 1 shows the production process of the selected jeans manufacturing company. The production manager stated that the normal loss of 3 to 5 % occurs in the shrinkage, cutting and sewing process which are the 2<sup>nd</sup> and 5<sup>th</sup> stages of the production

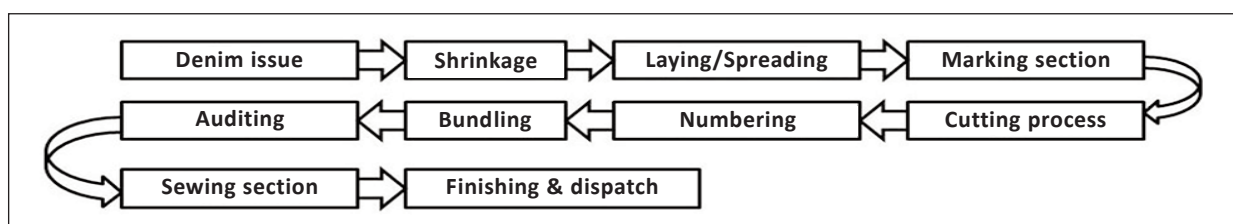


Fig. 1. The production process of the selected jeans manufacture

ONE SAMPLE T-TEST STATISTICS						
Pant size	Quantity/Value in Rs	t	df	p-value	Mean	Mean difference
30	Abnormal loss in quantity	3.365	39	0.002	0.30	0.30
	Abnormal loss in value	3.365	39	0.002	180.00	180.00
32	Abnormal loss in quantity	3.557	39	0.001	0.35	0.35
	Abnormal loss in value	3.557	39	0.001	210.00	210.00
34	Abnormal loss in quantity	2.726	39	0.010	0.20	0.20
	Abnormal loss in value	2.726	39	0.010	120.00	120.00
36	Abnormal loss in quantity	2.449	39	0.019	0.20	0.20
	Abnormal loss in value	2.449	39	0.019	120.00	120.00
38	Abnormal loss in quantity	3.557	39	0.001	0.35	0.35
	Abnormal loss in value	3.557	39	0.001	210.00	210.00

process. This normal loss is an unavoidable loss, which goes as a corner or border piece while cutting the denim material. The cutting process in the selected company is semi-automated; the hand scissors and computer-operated straight knife machine are used for the cutting purpose. The supervisors stated that the hand scissors are very much essential for a particular shape and pattern cuttings, however, the major errors which lead to abnormal loss come from this method of cutting. The sewing section also contributes to the abnormal loss; however, the errors in the higher size products will not go to waste because they can be adjusted with lower size pants. Hence, the abnormal loss contribution from this section is less compared to the cutting section:

The collected abnormal loss data and normal loss computations are presented in the annexure section. The one sample t-test statistics and mean values of all 40 days of abnormal loss in quantity and rupee value are presented in table 1. *t* is the t-statistic value, *df* is the degrees of freedom, and the *p*-value is the probability value.

The *p*-values of all one sample t-tests are less than 0.05 indicating that the abnormal loss values and quantity are significantly different from zero. As the test value was equal to zero, the mean and mean difference values for the entire test are equal. The proportions of different costs that add up to give the abnormal cost value in the analysis are 50 percent for raw materials, 20 percent for direct labour, 20 percent for indirect labour and 30 percent for factory overheads. Fabrics, sewing thread, trims and accessories (button, zipper, fusible interlining, embroidery, bidding,

stickers, narrow fabrics, motifs and so on) are among the raw materials used in the garment. However, the fabrics account for 80% of the cost of raw materials. All other materials are also essential for the production of jeans, the fabric, as the most significant cost factor, must be properly handled. As cutting is the most common source of fabric waste in various garment manufacturing processes, this material has to be handled carefully. Much attention should be paid to the cutting room to reduce fabric waste.

## CONCLUSION

The objective of this study was to examine the normal and abnormal losses at selected jeans manufacturers in India. The direct interaction with the production manager revealed that the normal loss of 3 to 5% is common in any garment or textile manufacturing company, which is because of the cutting and shrinkage process. Further after 40 days of production observation, we have computed the abnormal loss in units and rupee value for each day's production. The defects caused abnormal losses were found on the majority of days. One sample t-test significantly proves that the abnormal loss is not equal to zero. Further, it was found that fabric is the big contributor in terms of abnormal loss. Specifically, the errors in cutting and sewing fabrics lead to abnormal losses. An in-depth examination of fabric losses during the cutting and sewing process may help in reducing material waste. Proper training for workers and recruiting trained workers may also help in reducing abnormal losses.

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