STUDY ON PERFORMANCE IMPROVEMENT AT KERALA LAKSHMI MILLS, THRISSUR

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ABSTRACT

Kerala Lakshmi Mills, Pullazhi, Thrissur, is one out of 127 mills owned by National Textile Cooperation of India (NTC). The company is producing 100 % cotton yarn and it is equipped with 42944 spindles. A study on financial performance of the company indicates that the company suffers financial loss over the years. Therefore, the present study aims to uncover the factors leading to the poor performance of the company. The work includes detailed analysis on expenditure of the company based on monthly data collected from the company over the period January-2017 to December-2018. Subsequent measurement of key performance index consisting of utilization of spindles, Material, labor, machinery and energy productivities, HOK and actual production per spindle per 8-hour shift facilitate comparison with the standard performances. Benchmarking of the mill's performance was accomplished with the standard established by South India Textile Research Association (SITRA) Coimbatore. Through further studies on production stoppage identified the major factors causing production loss using Pareto analysis. Root causes are identified by employing Cause and effect diagram and Pareto chart. The guidelines are also provided for improving the performance.

Keywords: Financial Performance, Key Performance Index, Benchmarking, Cause and Effect Diagram.

1. INTRODUCTION

Kerala Lakshmi Mills is a government company under public sector. The Kerala Lakshmi mill is equipped with 42944 spindles to manufacture cotton blend yarn with other balancing machinery required for this. The mill is manufacturing cotton yarns of count 50, 56, 60, and 65 along with polyester cotton blend yarn of count 60. The products are sold to Bombay & Ahmadabad market. The mill is working 24 hours a day with 7 days working in a week and producing 100% cotton yarn. The mill consists of the following departments- Mixing, Blow Room, Carding, Drawing, Comber, Simplex, Spinning, Cone winding and Packing. The financial performance of the company in terms of profit/ loss over the period of January-2017 to December-2018 is studied and it was observed that the mill is working under loss and there is significant decrease in the financial performance for the past two years. Loss was comparatively high for the year 2017 when compared to 2018. Therefore, a detailed study is undertaken to uncover the reasons for poor financial performance of the company.

2. LITERATURE REVIEW

Gupta (2013) [1] conducted a quality improvement study applied at a spinning mill based on six sigma methodologies. She, by employing a DMAIC (Define, Measure, Analyse, Improve, and Control) project management-methodology and various tools, tried to streamline processes and enhance productivity. Her studies mainly concentrated on reducing defect rate and fault opportunities in the final yarn.

Sachidanand and Pawar (2013) [2] presented a study on implementing a new Continuous improvement methodology Quality Six Sigma (QSS) practices at spinning sector. It is the incorporation of Six Sigma -DMAIC steps with a portion of company's current Quality management system (QMS). The study identified that QMS / ISO practices and Six Sigma have their own benefits but if they are executed at the same time as Quality Six Sigma (QSS=QMS+ Six Sigma), they balance each other and the total productivity is upgraded.

So, the integration of QMS / ISO and Six Sigma practices are the need for business development. Shaikh and Dulange (2013) [3] presented a study on performance improvement at power loom industry employing ANOVA technique to identify the major factors influencing productivity. The study revealed that human factors and technological factor are the two major factors affecting productivity. The study also revealed that instability in the cost of yarn affects productivity. Some of the factors such as infrastructure of the facility, plant factor and machinery factors do not have significant impact on the productivity.

Hari Krishnan and Kumar (2013) [4] studied the current situation of Trivandrum Spinning mills and identified that absenteeism as one of the major issues that face the firm. Further study revealed that the employees are not satisfied towards current monetary and nonmonetary incentive schemes followed by the mills. Fringe benefits and pay are the most displeasing factors that are obtained from the result of questionnaire survey conducted and result analysis using SPSS. He, there by devised a productivity gain sharing incentive scheme to the company that may help to improve the productivity and reduce absenteeism rate.

Raja and Rao (2007) [5] studied the performance evaluation of a spinning system through simulation modelling, he identified that breakage of yarns as one of the major defects. A sider which is a man – machine structure is modeled and analyzed, taking into consideration various constraints. After validating the prepared model further experimentations were conducted for different routing policies. The results obtained from the simulation model are likely to help the spinning mill managers in choosing a suitable routing policy for the sider.

Kavitha and Gomatheeswaran (2018) [6] studied the financial performance analysis of five spinning mills in the Coimbatore district of Tamil Nadu. By employing comparative ratio analysis of the balance sheet, the study found that Quick ratios of all the spinning mills are below the standard norms. Debt to Equity Ratio of all the spinning mills showed a fluctuating trend during the period 2011-12 to 2015-16. The overall profits of the spinning mills companies are low.

Patil et.al. (2017) [7] conducted a study in a loom shed industry and found that level of moisture content in the yarn affects efficiency of the loom shed. The study also found that RH value significantly affects rate of warp breakage and the efficiency of loom. The successful control on the loom shed efficiency leads to reduced rate of warp breakage. This technology reduced the ideal time and thus increased the productivity and quality of the fabric.

3. OBJECTIVES OF THE STUDY

- Study on financial performance of the company for the years 2017 & 2018.
- Measure the Key Performance Index of the Firm.
- Benchmark the performance of the organization with South India Textile Research Association (SITRA) Coimbatore.
- Study the Root cause of production loss.
- Develop a set of guidelines to improve productivity and reduce production loss.

4. RESEARCH METHODOLOGY

The procedure employed to analyze the problem includes the following steps:

1. Conduct the detailed analysis of the firm’s expenditure
2. Measure the key performance index of the firm
3. Benchmark the mill’s performance against those established by SITRA
4. Study the cause wise production stoppages
5. Conduct root cause analysis.

5. DATA ANALYSIS AND FINDINGS

5.1. FINANCIAL PERFORMANCE OF THE SPINNING MILL

The profit/loss data of Kerala Lakshmi Mills depicted in Figure 1 indicates that the firm is on heavy financial loss over the years. Further, though the installed production capacity of mill is 3864960 Spindles per month, the available capacity per month is only around 3671712 Spindles. Thus, the plant generally losses the services of about 193248 Spindles per month, which in turn can lead to a huge loss of production. Therefore, the present study focuses on the production loss and productivity issues of the firm.

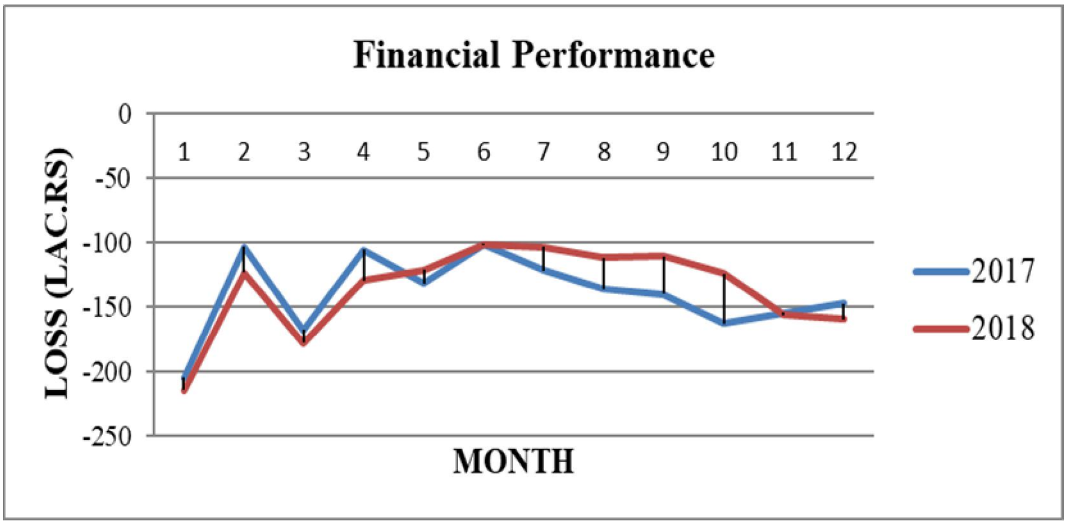

Figure 1 Financial performance of the firm

5.2. ANALYSIS OF FIRM'S EXPENDITURE

The major components of firm's expenditure over the period January-2017 to December-2018 is analyzed and based on the data Pareto Analysis is conducted and the result is displayed in Figure 2.

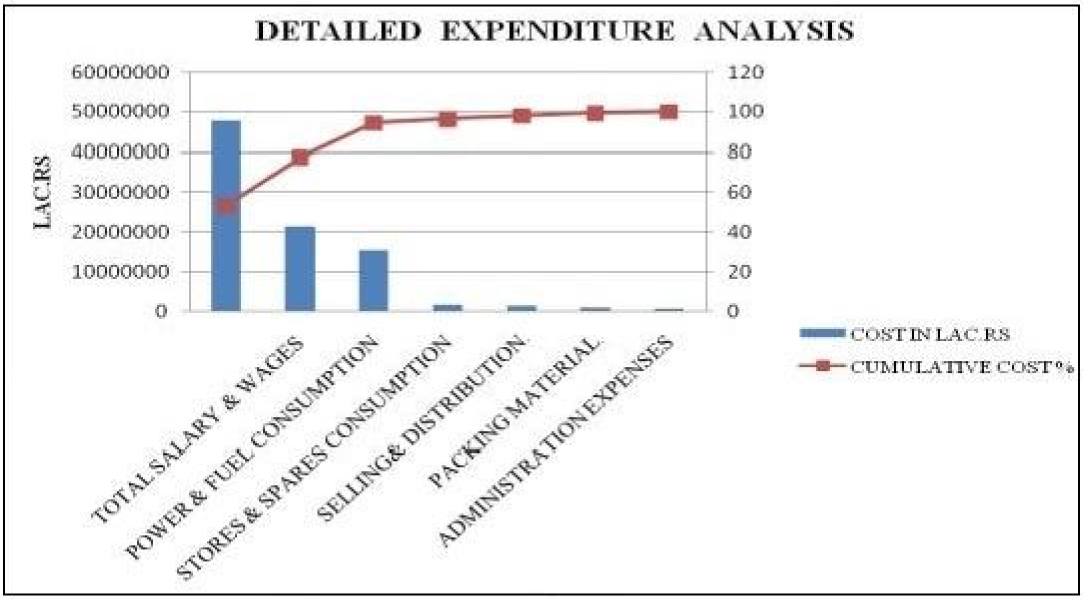

Figure 2 Analysis of Firms Expenditure

From the Pareto analysis depicted in Figure 2, it can be observed that the major components accounting for 94.6% of the total cost are the cost associated with raw material, salary and wages, and power and fuel consumptions.

5.3. MEASUREMENT OF KEY PERFORMANCE INDEX (KPI)

A Key Performance Indicator is a measurable parameter that determines how effectively a firm is attaining key business objectives. The high level KPI employed in the study is the index on profit/ loss. The low level KPIs measured in this study includes spindle utilization, material productivity, machine productivity, energy productivity, labor productivity and HOK.
The KPIs measured over the period January-2017 to December-2018 are presented below.

5.3.1. SPINDLE UTILIZATION

The monthly data on budgeted spindles and actual spindles worked during 2017 and 2018 were collected, analyzed and depicted in Figure 3. The utilization percentages for each month were found out by using the formula:

$$\text{Spindle Utilization} = \frac{\text{Actual spindles worked}}{\text{Available spindles}} * 100\%$$

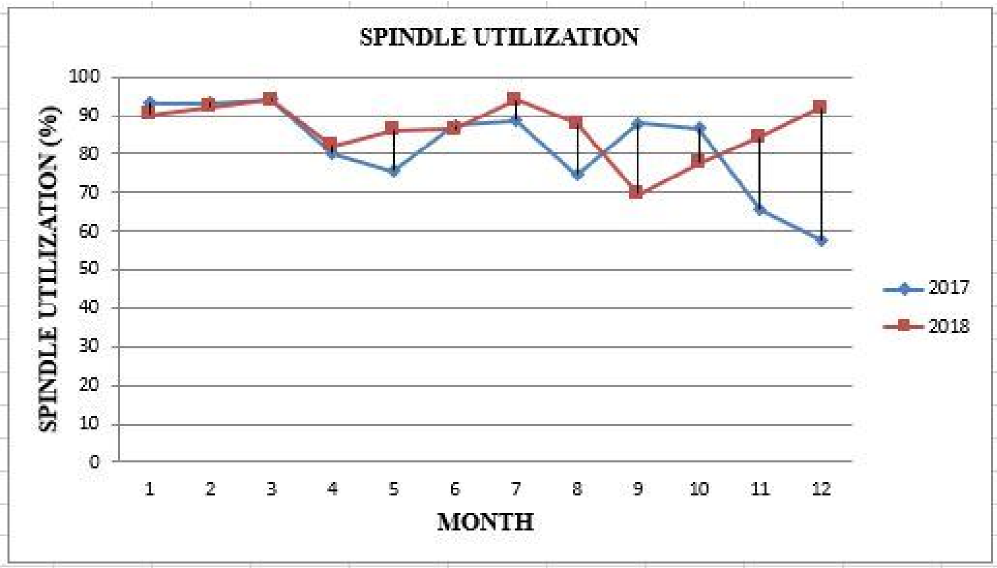

Figure 3 Spindle Utilization

From the graph depicted in Figure 3, it can be inferred that spindle utilization is above 85% for most of the month, but less than the standard value of 90%. From the data, the highest percentage of spindle utilization is achieved for the month March (2017) and lowest percentage is for December (2017).

5.3.2. PRODUCTIVITY

Analysis of the expenditure incurred by the firm indicates that the major cost components are raw material, salary and wages and power and fuel costs. Therefore, the productivities associated with the factor's material, machine, energy and labor productivities were measured and analyzed over the period January-2017 to December-2018. The graphs obtained for the Material productivity, Machine Productivity, Energy Productivity and Labour Productivity are depicted in Figures 4, 5, 6 and 7 respectively.

Figure 4 Material Productivity

From the graph depicted in Figure 4 Material Productivity, it can be inferred that there is significant decrease in the level of material productivity in the year 2018 when compared to the year 2017. The data shows a significant variability and ranges from 94.1% to 95.8%.

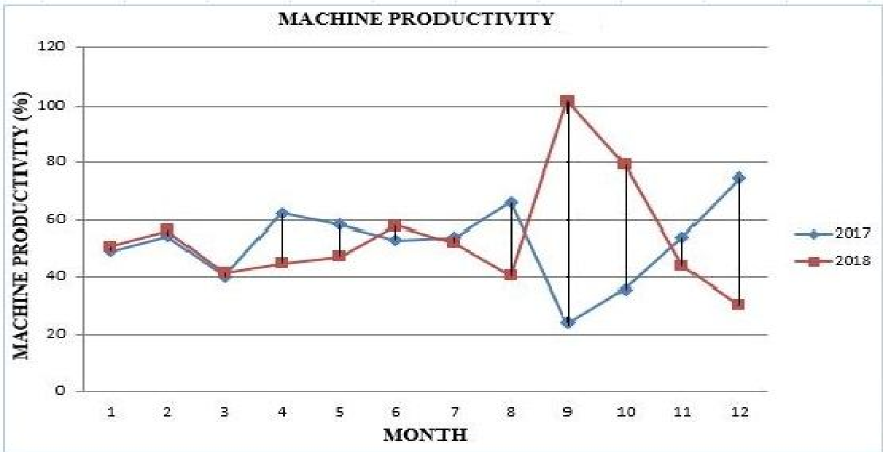

Figure 5 Machine Productivity

From the graph depicted in Figure 5 Machine productivity, it can be inferred that the data shows a high variability and ranges from 24.15 % to 101.68%.

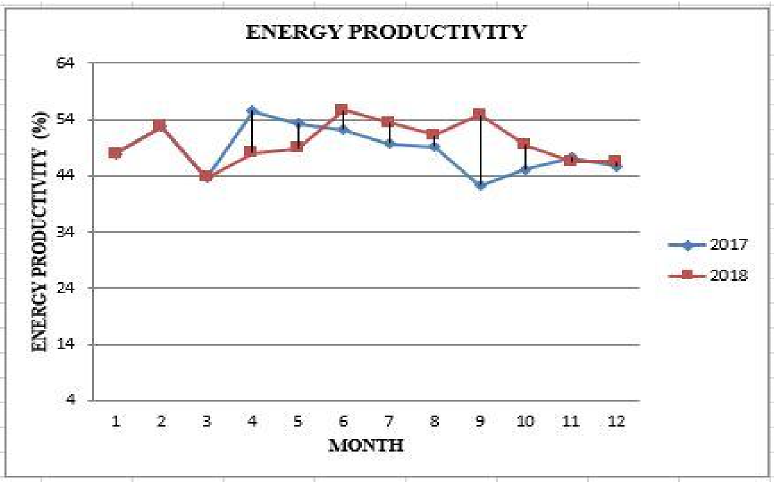

Figure 6 Energy Productivity

From the graph depicted in Figure 6 Energy productivity, it can be understood that the energy productivity varies from

42.26% to 55.62%. It can also be seen that there is only a considerable variation in the level of energy productivity over the years 2017 to 2018.

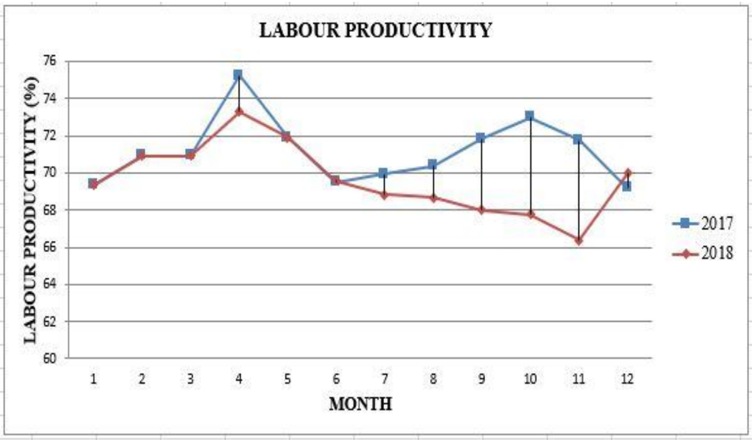

Figure 7 Labour Productivity

From the graph depicted in Figure 7 Labour productivity, it can be understood that the labour productivity varies from 66.37% to 75.21%. From the graph, it can be inferred that there is a significant decrease in the level of labour productivity in the year 2018 when compared to 2017.

5.3.3. HOK

HOK can be defined as the operative hours to produce 100 Kg of yarn. The HOK values obtained over the period is presented in Table 1. From the Table 1, the average HOK value is 8.15.

Table 1: HOK values

YEAR	MONTH	HOK POST SPINNING
2017	JAN	8.32
	FEB	7.59
	MAR	8.32
	APR	8.45
	MAY	8.62
	JUN	8.72
	JULY	8.81
	AUG	8.69
	SEP	8.48
	OCT	8.5
	NOV	8.5
	DEC	8.5
2018	JAN	8.5
	FEB	9
	MAR	9
	APR	8.79
	MAY	8.62
	JUN	8.12
	JULY	7.2
	AUG	7.81
	SEP	7.14
	OCT	6.88
	NOV	6.93
	DEC	6.07

5.4. ACTUAL PRODUCTION PER SPINDLE PER 8 HOURS SHIFT

The Actual production per spindle per 8-hour shift is another KPI relevant to the textile industry. The monthly data on the same over the period of study is collected and described in Table 2.

Table 2: Actual Production per spindle per 8 hours shift

	MONTH	ACTUAL PRODUCTION/SPINDLE/8-HOURS SHIFT (gms)
2017	JAN	69.39
	FEB	71.35
	MAR	68.25
	APR	75.21
	MAY	71.92
	JUN	69.49
	JULY	69.94
	AUG	70.36
	SEP	79.84
	OCT	72.96
	NOV	71.74
	DEC	69.19
2018	JAN	69.34
	FEB	70.93
	MAR	70.93
	APR	73.3
	MAY	71.92
	JUN	69.56
	JULY	68.84
	AUG	68.65
	SEP	68
	OCT	67.77
	NOV	66.37
	DEC	69.96

From the Table 2, the mean value of Actual production per spindle per 8 hours shift is 70.63 gms.

5.5. BENCHMARKING

Benchmarking is a process of measuring the performance of a company’s products, services, or processes against those of another business considered to be the best in the industry, aka “best in class.” The present study made use of South India Textile Research Association (SITRA) [7] standards for benchmarking. The average KPI value against SITRA standard is presented in Table 3 and the comparison is presented in graphical form in Fig 8.

Table 3: Comparison of KPI with Standard values of SITRA (Average Values)

KPI	ACTUAL PRODUCTION PER SPINDLE PER 8 HOURS	LABOUR PRODUCTIVITY	HOK POST SPINNING	UTILIZATION (%)
KERALA LAKSHMI MILLS	**70.63**	**70.58**	**8.15**	**84.21**
STANDARD	**90**	**90**	**9**	**90**

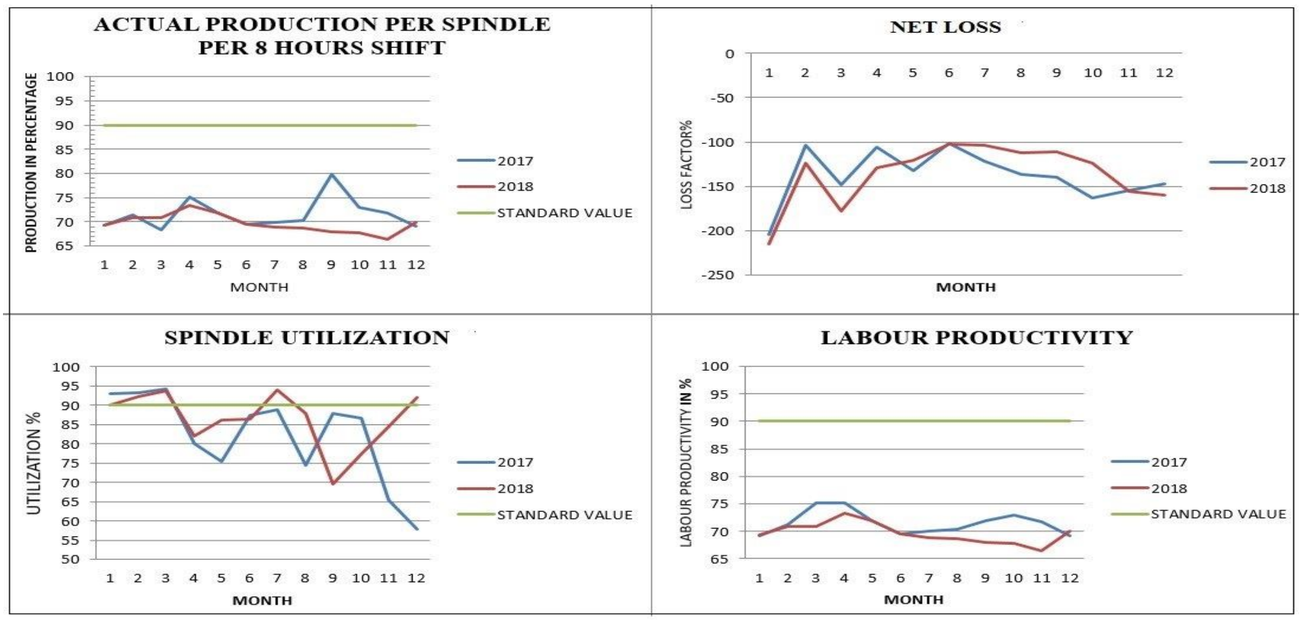

Figure 8 Comparison of KPI with Benchmark values

Table 3 indicates that the average values obtained for actual production per spindle per 8 hours for the mill is 70.63 gm, while the standard value for a mill working in healthy condition is 90 gm. The average labor productivity for the mill is 70.58 % while the standard value is 90 %. The average HOK for post spinning is 8.15 when compared to the standard value of 9. The utilization for the mill is 84.21 % when compared to the standard value of 90 %. Comparison of KPI with Benchmark values of SITRA are depicted in Figure 8. Based on the above data it can be concluded that the parameters employed for benchmarking is not crossing the standards established by the South India Textile Research Association (SITRA). and hence it can conclude that the mill is in sick condition.

5.6. STUDY ON CAUSE-WISE PRODUCTION STOPPAGES

The production capacity of spinning mills is specified in terms of number of spindles. Due to many reasons the available capacity in any period must be lower than the designed capacity. The data on monthly cause-wise production stoppages in terms of spindle loss over the period spanning January-2017 to December-2018 is collected, analyzed and presented in a Pareto chart as shown in the figure 9.

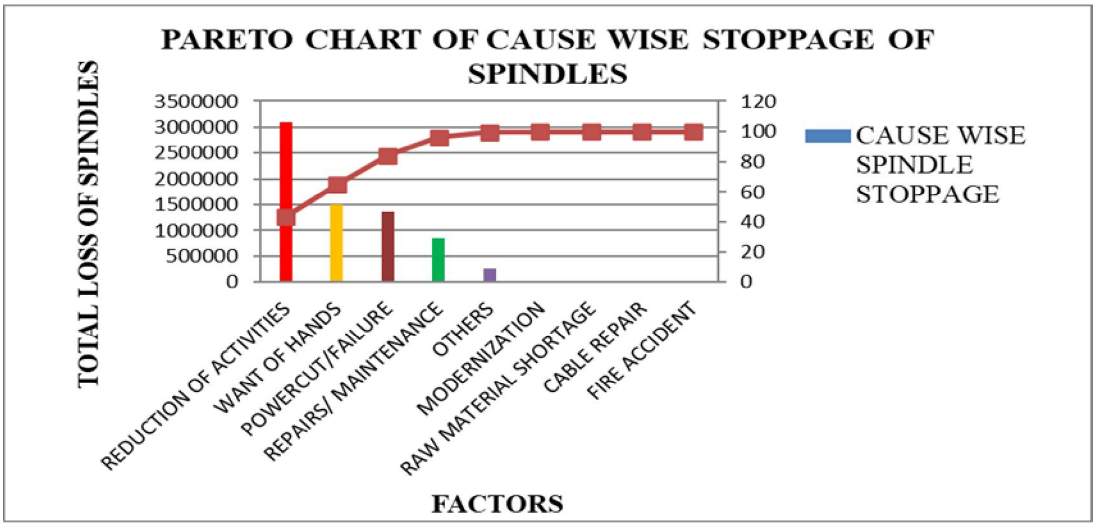

Figure 9 Pareto chart of Cause wise stoppage of spindles

From the Pareto Chart depicted in Figure 9, it can be understood that major factors leading to production loss are reduction of activities, want of hands, Power cut/ failure, repairs or maintenance.

5.7. IDENTIFICATION OF ROOT CAUSES

The results obtained from the pareto chart in figure 9 indicates that major factors leading to production loss are-reduction of activities, want of hands, power cut/ failure, repairs or maintenance. In order to identify the root causes leading to these major factors, cause wise stoppage of spindles over the period January 2017 to December 2018 are collected, analyzed and depicted in Table 4.

Table 4: Causes and number of spindles lost

MONTH	COUNT CHANGE	TRANSFORMER TRIP	STRIKE/ HARTHAL	ABSENTEEISM OF LABOURS	ELECTRIC REPAIRS	LOAD SHEDDING	MAINTENANCE REPAIRS
JAN-17	6749	0	16954	20487	9876	7111	42178
FEB-17	4687	0	12547	0	8964	4400	63874
MAR-17	14804	0	35944	135390	9641	13922	102241
APR-17	4632	0	99456	0	10547	4440	65874
MAY-17	1647	0	0	0	11287	10360	74638
JUNE-17	1364	0	21987	65874	14363	18984	65487
JULY-17	924	0	29364	0	25471	54160	71684
AUG-7	6483	0	49324	0	9856	12018	79324
SEPT-17	1932	0	76985	54368	7493	4140	27055
OCT-17	6103	0	0	59874	9364	11223	61874
NOV-17	2547	0	32647	46874	8458	8287	48746
DEC-17	16324	0	18246	0	6812	1042	39784
JAN-18	6541	0	18524	21458	7631	9827	49871
FEB-18	4820	0	10203	0	8115	7809	54156
MAR-18	11724	0	0	98741	9834	7249	71682
APR-18	3543	0	174567	0	4687	6908	61517
MAY-18	0	0	0	0	14963	11705	83870
JUNE-18	1425	0	23647	55748	14832	18042	63478
JULY-18	872	0	28356	0	24712	49973	76281
AUG-18	6957	598296	45651	0	6384	12192	74091
SEPT-18	1701	0	70883	59327	8541	11180	80043

OCT-18	5978	0	0	52545	11247	14906	69492
NOV-18	2319	0	30533	44983	6482	6659	54109
DEC-18	17070	0	15782	0	4175	5809	47663
TOTAL	131146	0	811600	715669	254235	312346	1529017

Based on the data obtained from the Table 4, a cause and effect diagram were prepared. The diagram determines why something happened by organizing probable causes into smaller groups. Determining the minor causes which can develop into major causes is the main objective of this diagram.

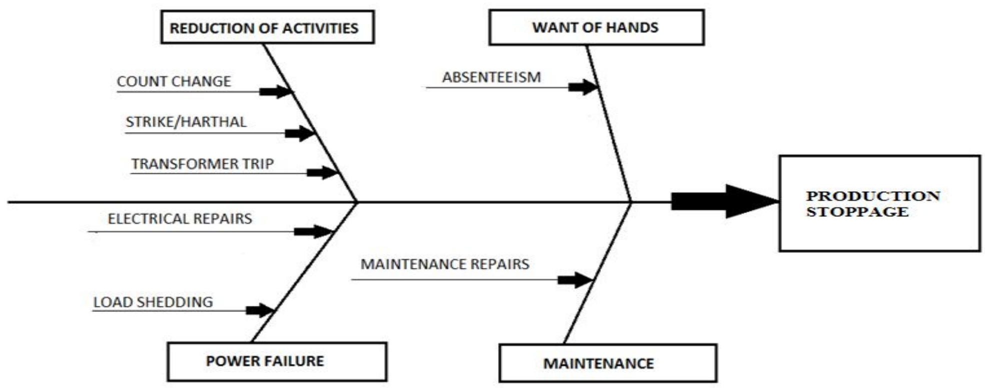

Figure 10 Cause and effect diagram for loss of production

From the Fig 10, it can be inferred that Loss of production is the effect and the major factors contributing to it were identified as Reduction of Activities, Want of hands, Power failure and maintenance. The root causes contributing to each of the major factors are also given in the diagram. The Pareto analysis of root causes contributing to spindle loss over the period January 2017 to December 2018 is depicted in Figure 11.

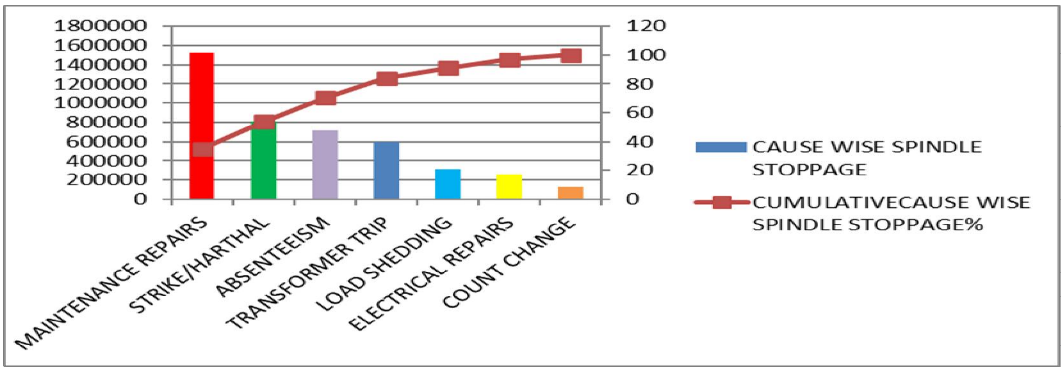

Figure 11 Pareto Analysis of root causes

From the Figure 11, it can be inferred that the root causes contributing to loss of productivity are maintenance repairs, strike/harthal, and absenteeism and transformer trip. The factors which are controllable include maintenance repairs, absenteeism and electrical repairs. The factors which are non-controllable include strike/ Harthal and Load shedding.

6. CONCLUSION

The present study identified the root causes leading to loss of production over the years January 2017 to December 2018. The measures expected to reduce the production stoppages can be summarized as Reduce the employ turn-over, Prepare and follow proper maintenance schedule, Correction of electrical pitfalls, Reduction of set-up time for implementing the count change.

7. LIMITATION AND SCOPE FOR FUTURE WORK

- Root-cause analysis does not include maintenance related factors.
- Employees were unwilling to respond due to busy schedule and time constrains. Therefore, exact reason for absenteeism is not evident.
- Further study on root-cause analysis can be carried out for all factors.
- Questionnaire survey can be employed in order to identify causes related to absenteeism of labors.

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