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Integration lean and six sigma to improve the performance of corrugated fiber board “C.F.B.” manufacturing

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Corrugated Boxes are important due to the global demand is regularly increased by growth in industrial activities particularly the manufacturing sector, which often requires corrugated packaging to protect and transport goods.

In recent years increasing marketing competition has made it necessary for organizations to improve effectiveness and to do all possible targeted of quality.

The purpose of this thesis is to study the suitable methodology to improve the performance of fiberboard manufacturing which tested via case study for a leader corrugated Fiberboard Company was facing many problems due to Unsatisfied External Customer due to Delay in delivery time & Low Quality performance (Quality Problems). And Unsatisfied Internal Customer due to High waste & high cost.

Researcher uses three Hypotheses:

1. **Lean methodology** is insufficient to improve the performance in C.F.B Company.
2. **Six sigma methodology** is insufficient to improve the performance in C.F.B Company.
3. **Integration Lean Six Sigma methodology** is sufficient to improve the performance in C.F.B Company.

The researcher analysis the customer complaints for one year before and after improvement, and select pilot sample for one month to analysed full details before and after improvement to determine the root cause for Quality & delay in delivery time problems. The data collected via (customer complaints records, Quality control data, process control charts, historical data, and financial reports). The researcher finds that the results of implementation neither **lean nor six sigma alone is sufficient** to make high improvement in process performance alone due

- Lean cannot bring a process under statistical control
- Six Sigma alone cannot dramatically improve process speed.

The fusion of Lean and Six Sigma improvement methodology that maximizes shareholder value by achieving the fastest rate of improvement in customer satisfaction, cost, quality, process speed, and Invested capital.

Integration of Lean Six Sigma on corrugated fiberboard Box Company, fastest rate of improvement which:-

Satisfied external customer via reduce delivery time and reduce quality problems defects.

Satisfied internal customer via Reduce high waste, Reduce high cost

Below summary of the achieved following results:

Reduction in complaints from 229 to 7 Complaints per year (**96.6%**).

Reduction the time of delivery from 15.8 to 4.6 days (i.e. Reduction 70.8%).

Reduction in DPMO from average **168,865 To 424**

Increase sigma level from average **2.5 to 4.9**

Increase Process capability to become Capable $Cpk = 2$

The **total cost saving** per year **7,822,320 LE**

These results confirm the validity of third hypotheses which state that “Integration of Lean and six sigma methodologies is sufficient to improve performance within C.F.B Company.

To generalize the benefits of previous results, the researcher suggests applying these results in all types of corrugated fiberboard companies.

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