

# Lean Kaizen Business Consulting

## Lean Transformation Journey of Perfect Gear Company

*Become a least cost producer with  
world class Quality & Delivery*



*Key to the future Survival*

*There are four purposes of improvement: easier, better, faster and cheaper. These four goals appear in the order of priority. – Shigeo Shingo*

A Journey to World class organization.....



# What is a Lean and Kaizen Journey?

There are 4 elements as per Shigeo Shingo?



## Easier-

The first element is 'easier'. If the workplace improvements are not 'reducing efforts' in operations, the workforce will not accept the changes.



## Better-

The second element is 'better'. The customers must get the 'quality' products in full quantities.



## Faster-

The third element is 'faster'. The customer must get their products or services within the 'agreed time'.



## Cheaper-

The fourth element is 'cheaper'. The company must achieve the first three elements and then, to achieve more profits, it should continuously 'reduce cost of production' by implementing lean and kaizen.

These four goals appear in the order of priority.

This will be the 'win-win' situation for all stakeholders involved.

# Model Company -

Perfect Gear Company is a capital machine builder group with three divisions for capital machinery – hot rolling mills, cold rolling mills and gearbox division.

The company had many teething problems and was unable to serve its clientele. Customers were cancelling the orders at the last moment due to delay in supply and quality issues.



Q

## Quality Issues

The clients were unhappy with the repetitive quality issues. The first time right quality was poor, leading to rework and rejections.



D

## Delivery Issues

The products were not delivered on time and in full quantities.



M

## Mfg Issues

Internally, there were manufacturing issues in the bottleneck operations.



B

## Breakdown Issues

The breakdowns in the machines were hampering smooth operations.

C



## Changeover time high

The changeover times on the critical machines were high.



S

## Poor Skill set

Poor skills of the workmen and supervisors were a matter of concern.



L

## Poor Layout

The layout of the plant was poor and excessive internal transportation was adding delays and increased costs of production.



I

## Large Inventory

There was a high level of inventory in the raw material, WIP and finished goods.

For Perfect Gear company the market for their product was growing at a decent pace and more export opportunities were opening up on the other hand.

# Perfect Gear Company took the decision to implement the LPS, DMS and LAS simultaneously to come out of the sticky situation.

Perfect Gear Company availed the services of three members of an external sensei team who were experts in the field of lean production system, daily management system and lean accounting system.

The outsourced sensei team decided to take 5 actions -



**1. Assessment-** initiated first with the assessment,



**2. Gaps-** Second was to identify the gaps



**3. Targets-** Set the improvement targets,



**4. Financial Benefits-** Fourth was to estimate the summary of financial benefits.



**5. Road Map-** Fifth was to create the roadmap.



**6. Session with Top Mgt,-**



**7. Apprise** them of the assessment and the road map for improvement and share potential benefits and goals.



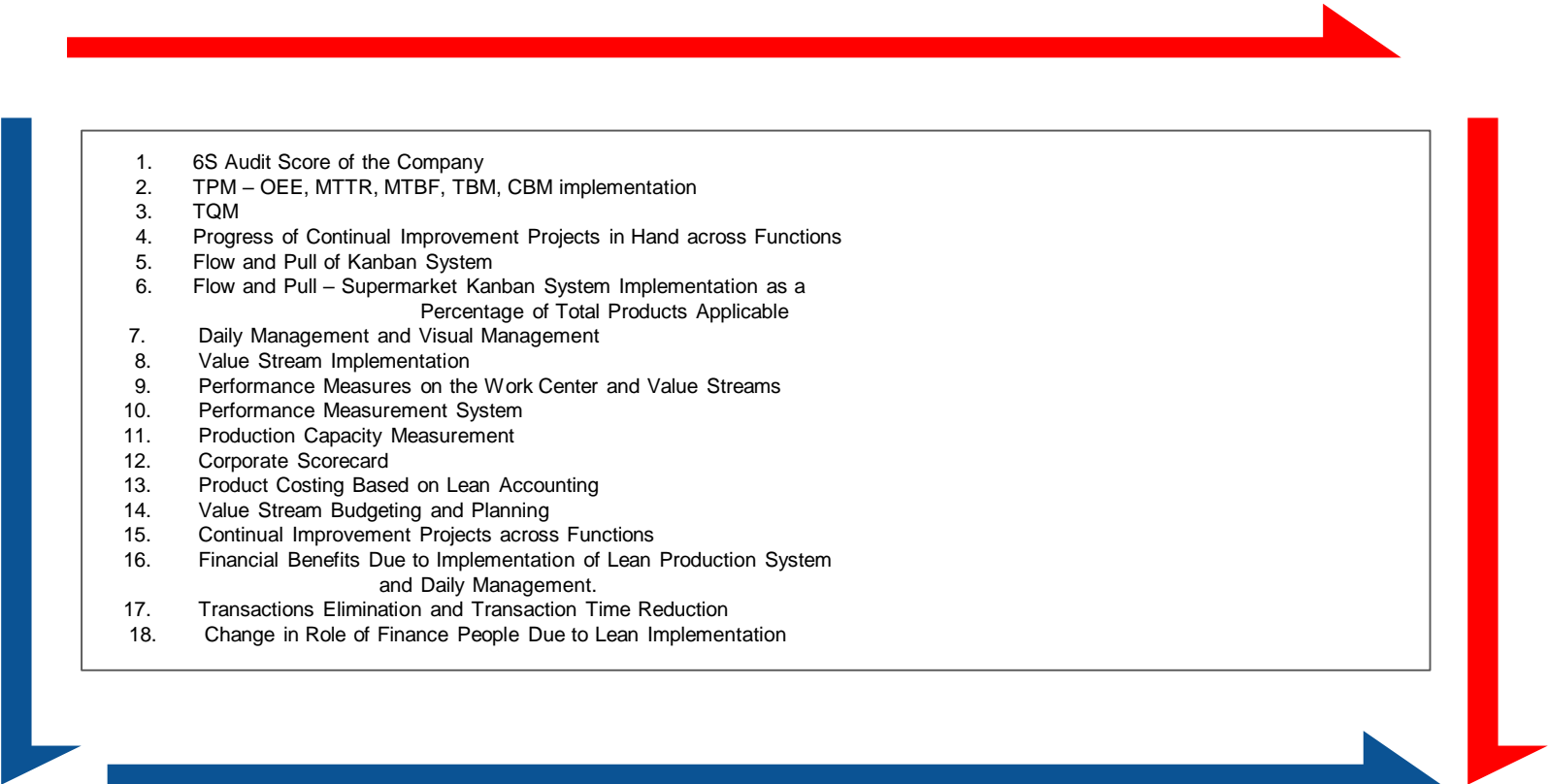
**8. Train the Teams-** obvious next step is to train internal change agents



**9. Implement-** Then start implementation/actions as per the road map.

# Lean Tools to be used ?

The following lean and kaizen tools methodology was formulated for Perfect Gear Company. The focus was broadly kept on the implementation of the following tools:

- 
1. 6S Audit Score of the Company
  2. TPM – OEE, MTTR, MTBF, TBM, CBM implementation
  3. TQM
  4. Progress of Continual Improvement Projects in Hand across Functions
  5. Flow and Pull of Kanban System
  6. Flow and Pull – Supermarket Kanban System Implementation as a Percentage of Total Products Applicable
  7. Daily Management and Visual Management
  8. Value Stream Implementation
  9. Performance Measures on the Work Center and Value Streams
  10. Performance Measurement System
  11. Production Capacity Measurement
  12. Corporate Scorecard
  13. Product Costing Based on Lean Accounting
  14. Value Stream Budgeting and Planning
  15. Continual Improvement Projects across Functions
  16. Financial Benefits Due to Implementation of Lean Production System and Daily Management.
  17. Transactions Elimination and Transaction Time Reduction
  18. Change in Role of Finance People Due to Lean Implementation

# Road map for Phase 1

The following tentative road maps were finalized in three phases with 24 workshops.

Each phase had eight workshops and was executed in eight months. The road maps focused on the previous 18 yardsticks to guide the company's journey of lean production system, daily management system and lean accounting system.

The first phase road map as per Figure 18.1 focused on training of basic tools to change the paradigm of the staff and workers to accept the changes being brought in and implementation of the basic tools starting with 5S, TPM, SMED, flow and pull and initiating the TQM and lean accounting by selecting the quality projects and selection and implementation of performance measures.

After a month down the line the sustenance tools were also brought in and a kaizen and lean steering committee was formed.

Tentative lean and kaizen implementation road map											Date
Phase I											
Objectives	Means	Activities planned -Projects in the workshops	Workshop								
			0	1	2	3	4	5	6	7	8
Kaizen awareness for management team, and participants of phase 1 including finance and accounts team	Training	One week of pre implementation 'Kaizen Awareness' training: 3 sessions of two days each									
		TPM - education & training pillar									
Implement five S, visual management methods in model areas including finance and accounts department	5S	Five S & visual mgmt on the shop floor									
		Kaizen office level 1									
		Kaizen office level 2, 3, 4									
Implement TPM with 4 pillars for selected model equipment	TPM	Planned maint step 1 & 2									
		Planned maint step 3									
		Kobetsu kaizen projects originating from PM									
		AM step 1 on model machine 1									
		AM step 2 on model machine 1									
		AM step 3 on model machine 1									
		AM step 1 on model machine 2									
Implement SMED for selected model equipment	SMED	SMED on model machine 1									
		SMED on model machine 2									
		SMED on model machine 3									
Inventory management for FG & distribution management	Pull flow	Finished goods									
		Distribution management									
Inventory management - engg spares	Pull	Five S & materials mgmt for selected engg spares									
Quality	TQM	Select and work on quality improvement projects									
Performance Measures selection and implementation	Lean Accounting	Top management ,Value stream, Work floor level key measures									
Sustenance	TCM, SDCA, Daily Management	Creating visual standards, audit procedures for sustenance, daily work schedule, typical checklists, action plan board and attendance board									
	Steering Committee	Kaizen promotion/ communication; standardisation, audits; recognition & rewards, multiskilling, obeya room									

Figure 18.1 Tentative lean and kaizen roadmap for phase I

# Road map for Phase 2

The second phase road map as per Figure 18.2 was focused more on lean and pull, performance measurement system, capacity calculations, incorporation of corporate scorecard and product costing based on lean accounting.

A profit and loss statement based on production was initiated along with the dispatch-based profit and loss statement.

Tentative lean and kaizen implementation road map														Date
Phase II														
Objectives	Means	Activity planned - projects in the workshops	Workshop nos											
			T	9	10	11	12	13	14	15	16			
Training of finance to non finance leaders, training of operational aspects to finance people	Training	Three weeks - 10 sessions of two days each												
		TPM, TQM, LPS - education & training pillar, lean accounting, PMS												
Implement TPM with 4 pillars for selected model equipment	TPM	Planned maint step 3/ kobetsu kaizen projects originating from PM												
		Planned maint step 4												
		AM step 3												
Implement SMED for selected model equipment	SMED	AM step 4 planning & preparation												
		SMED on model machine 3												
		SMED on model machine 4												
Heijunka (levelled planning) for FG & distribution management	Pull and flow	SMED on model machine 5												
		Kanban implementation												
		Design & implementation of heijunka in-house												
		Logistics design (scheduled delivery routes & time-tables)												
		Distribution management - model channel partners												
Inventory management	Pull	Horizontal deployment - cross docks												
Quality	TQM	Kanban for packing material												
		Kanban for engg spares												
Implementation of Performance measurement system	PMS	Select and work on quality improvement projects												
Implementation of production capacity	Capacity	Workmen skill matrix												
		Executive performance scorecard												
Implementation of corporate scorecard	Corporate scorecard	Managers functional scorecard												
		Capacity for manpower												
Introduction of product costing based on lean accounting	Lean accounting	capacity for machines												
		Incorporation of operational data												
Profit and loss statement to be made as per lean accounting (on production basis additionally)	Lean accounting	Incorporation of financial data												
		Incorporation of capacity data												
Kaizen qualification for kaizen promotion office executives	Lean black belt	Concept of average value stream costing												
		Cost of individual product costs on dispatch												
Promotion & sustenance	TCM, SDCA, Daily management	Profit and loss statement on 1st of every month												
		Yellow belt, green belt, black belt, master black belt certification												
	Kaizen promotion office/steering committee	Creating visual standards, audit procedures for sustenance, daily work schedule, typical checklists, action plan board and attendance board												
		Creating visual standards, audit procedures for sustenance												
		Kaizen promotion/ communication; standardisation, audits; recognition & rewards, multiskilling, obeya room												

Figure 18.2 Tentative lean and kaizen roadmap for phase 2

# Road map for Phase 3

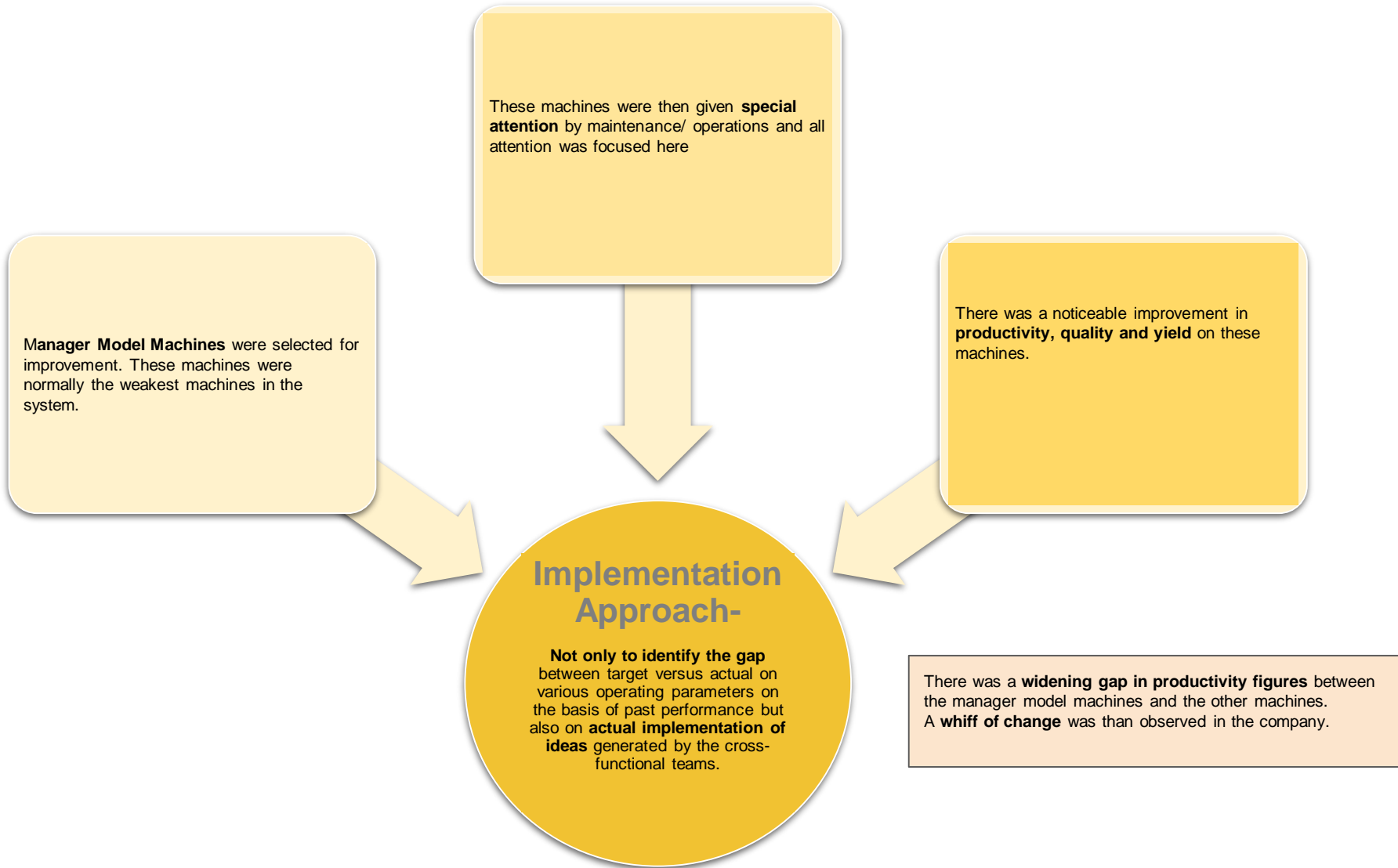
The third phase road map as per Figure 18.3 was focused on implementation of budgeting and planning, monthly budget review and making the managers comfortable with the corporate scorecard and full understanding of product costs, transactions reduction and linkages of daily activities with the costs incurred and profit and loss statement on the first of every month and product costing at the touch of computer keyboard as soon as it is dispatched.

Tentative lean and kaizen implementation road map													Date
Phase III													
Objectives	Means	Activity planned - projects in the workshops	Workshop no										
			T	17	18	19	20	21	22	23	24		
Training of finance to Non finance leaders, Training of operational aspects to finance people	Training	Three weeks - 10 sessions of two days each											
		TPM, TQM, LPS - education & training pillar, lean accounting, PMS											
Kaizen office- Transaction elimination and Transaction time reduction	Lean accounting	Kaizen Office Level 2 (Standards for effective teamwork)											
		Kaizen Office Level 3 (Process Mapping & Improvement)											
		Easier operational movements											
		Backflushing of accounts											
		Material procurement simplifications, Cycle counting of stores, E kanbans and open PO's, 3 way matching simplifications											
		Simplified accounts payables											
Value stream budgeting and planning	Budgeting and planning	Development of annual budgeting process value stream wise											
		Monthly budget review meetings											
Calculations of the financial benefits of lean changes	Lean accounting	Linkages of reduction of non value adding capacity usage with the financial benefits											
		Usage of free capacity available											
		Operational and financial team to calculate the monthly value stream profits											
		New role of finance managers											
Promotion & sustenance	TCM, SDCA, Daily management	Profit and loss statement to be made as per lean accounting.											
		Creating visual standards, audit procedures for sustenance, daily work schedule, typical checklists, action plan board and attendance board											
	Kaizen promotion office/steering committee	Creating visual standards, audit procedures for sustenance											
		Kaizen promotion/ communication; standardisation, audits; recognition & rewards, multiskilling, obeya room											

Figure 18.3 Tentative lean and kaizen roadmap for phase 3

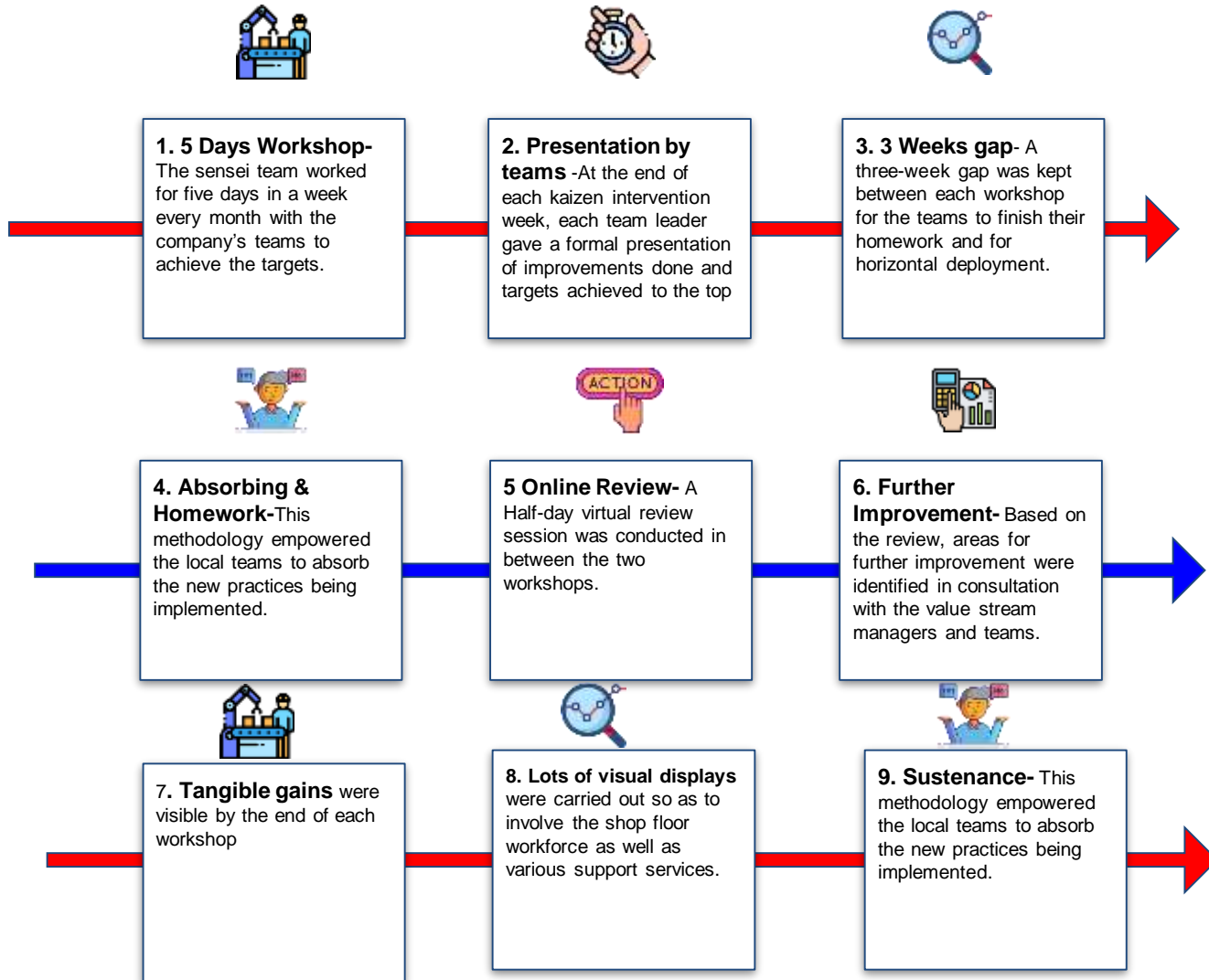


# Implementation Approach-



# Implementation Methodology-

How Sensai team handled the implementation?



# Major Improvements Achieved in 12 months period-

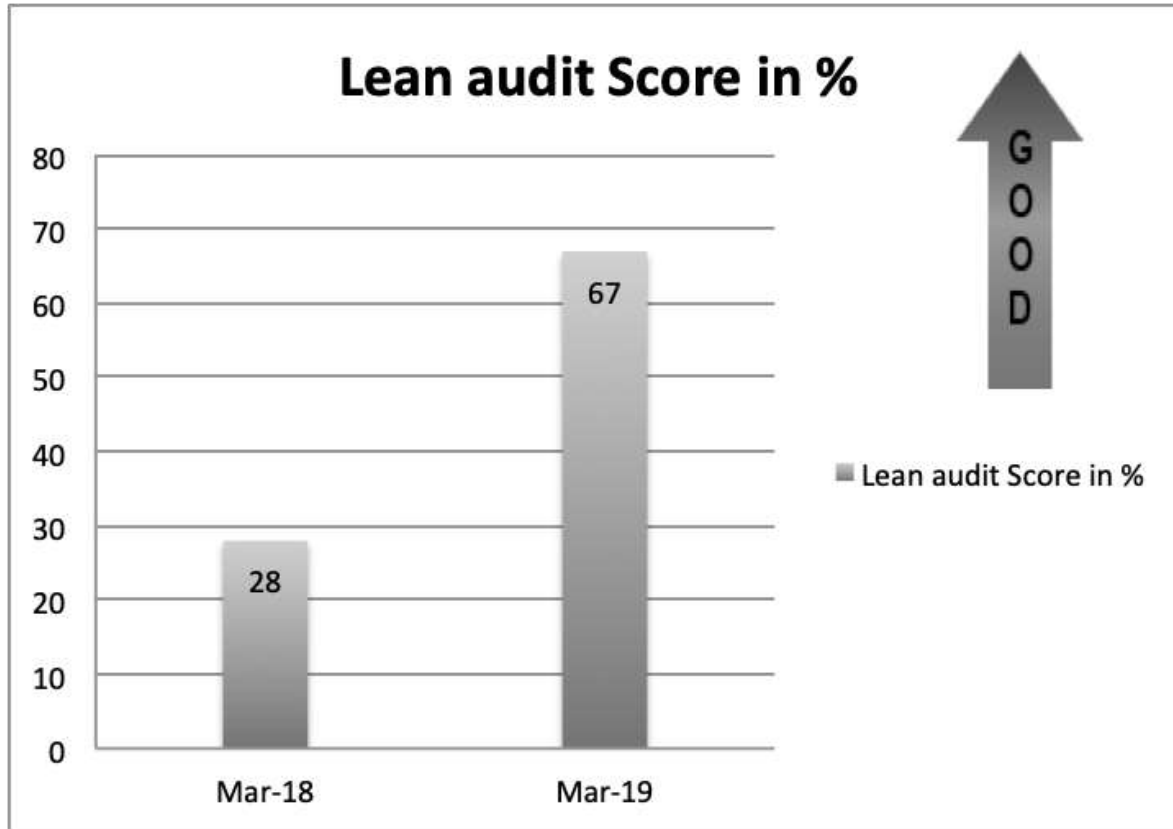


Figure: Lean Audit Score

## Lean Audit Score

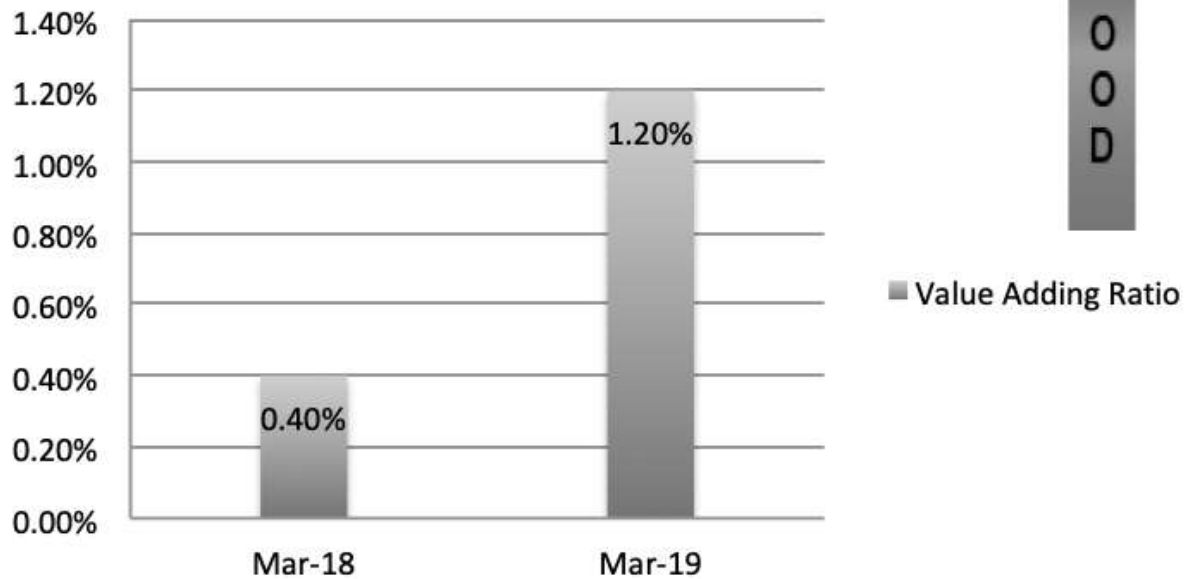
The assessment was conducted initially in the last week of March 2018 when the first phase of eight months was over and the achieved score was 28%.

The assessment was done again for evaluating the progress of implementation after one year in the last week of March 2019 when the second phase was over and the company was four months into the third phase.

The achieved score was 67%.

This happened due to continuous improvement projects in place. This was commendable.

## Value Adding Ratio



### Value Adding Ratio

The value adding ratio went up by more than three times but a lot of scope was still there for improvements.

Figure: Value Adding Ratio

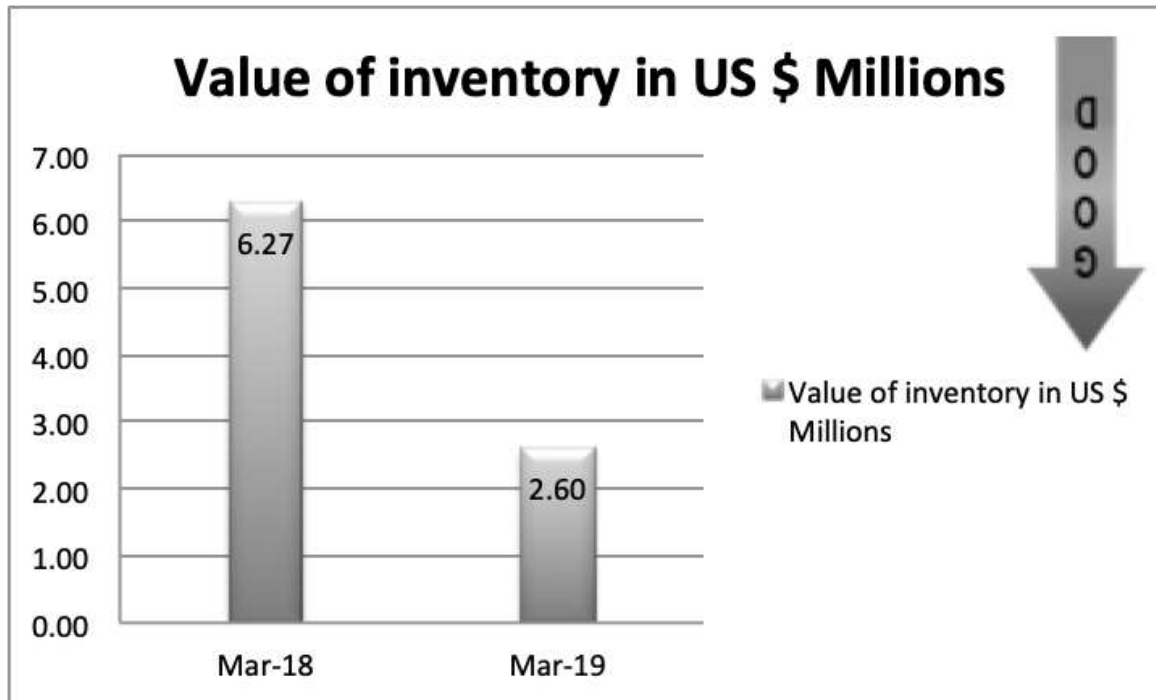


Figure: Value of Inventory

#### Value of Inventory in US\$ Millions

The inventory in raw material, work in progress and finished goods and consumables was very large at the start of the first phase.

The implementation of flow and pull through kanban system and inventory management resulted in a large drop of inventory from 4413 tons to 1725 tons. The value of the total inventory came down from US\$6.27 million to US\$2.6 million.

This is despite the fact that the cost of the raw material went up by 20%.

This resulted in improved cash flows and profits as well as freed the workplace and stores.

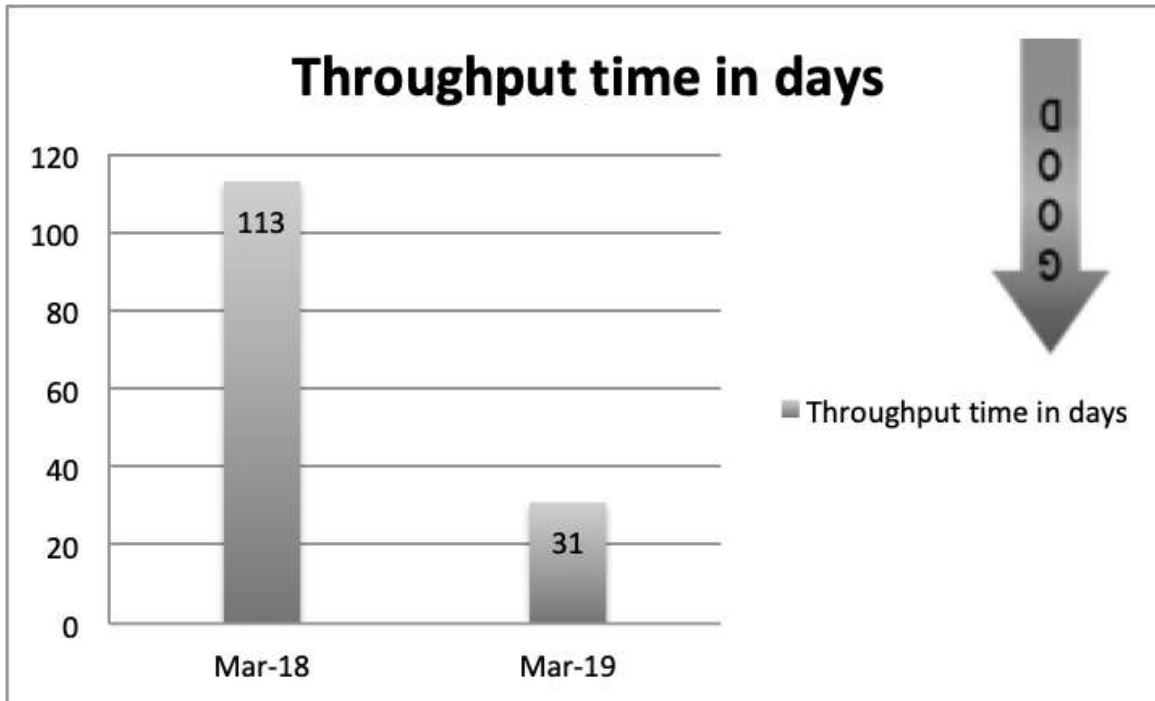


Figure: Throughput time in days

#### Throughput Time in Days

The company's ability to deliver the products had become four times faster.

The throughput time, the time required for raw material to travel through the company's plant and become finished products, went down from 113 to 31 days.

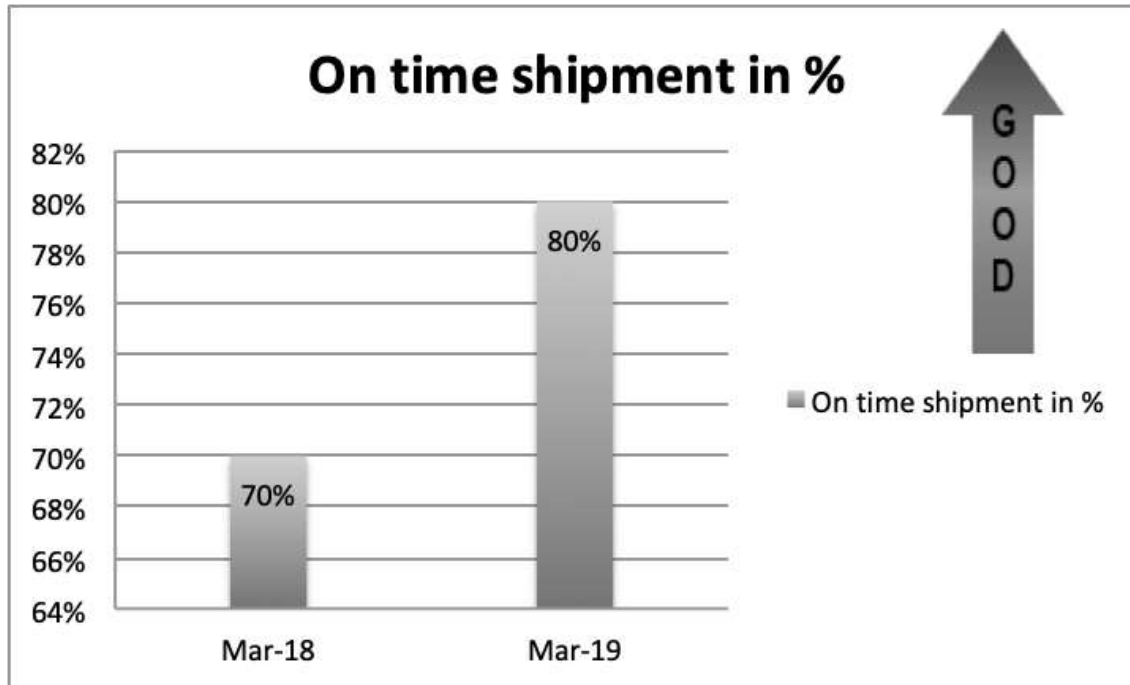


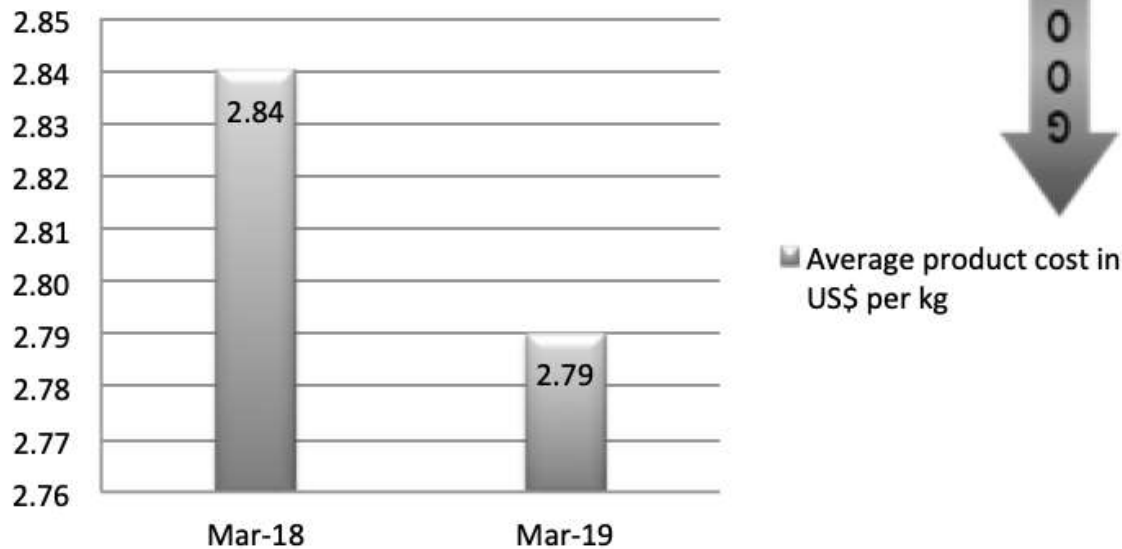
Figure: On Time Shipment in percentage

#### On Time Shipment in %

On time shipment with full ordered quantities went up from 70% to 80%.

The clients appreciated it.

## Average product cost in US\$ per kg



### Average Products Costs in US\$ per Kg

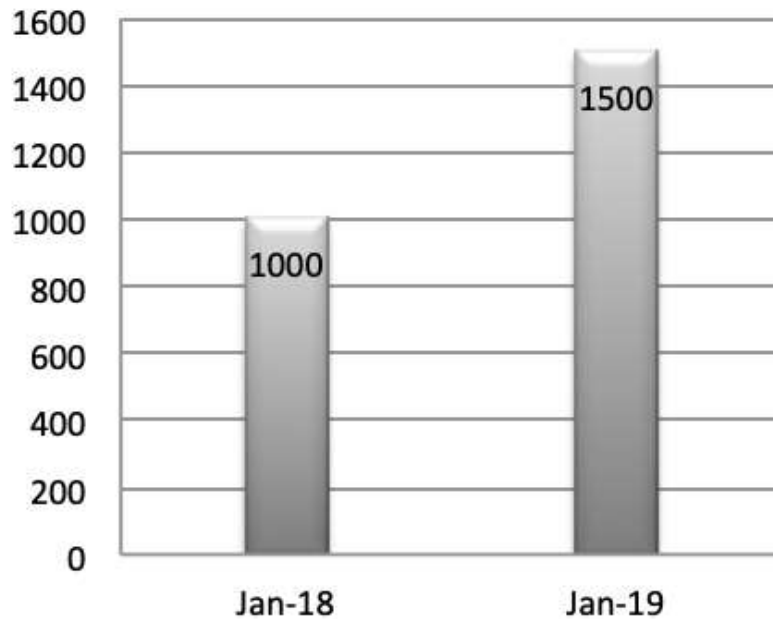
Due to the 40% reduction in the manpower costs and 16% drop in the conversion costs and despite the increase of raw material prices by 20% over one year the average product costs dropped by 2%.

This was a creditable achievement.

Figure: Average Product Cost in US\$ per Kg



## Average monthly dispatch in tons



■ Average monthly dispatch in tons

GOOD

### Average Monthly Dispatch in Tons

The company dispatches in tons increased by one and a half times from 1000 tons per month to 1500 tons per month without any increase in the infrastructure costs.

This was made possible by saving the non-value adding time of breakdowns, long changeovers times, reducing time for waiting and inspection, improvements on the layout.

This also was made possible as the quality issues like defects, rework and scrap generations were decreasing. This resulted in more time available for production.

Figure: Average Monthly Dispatch in Tons

## Capacity status for Manpower

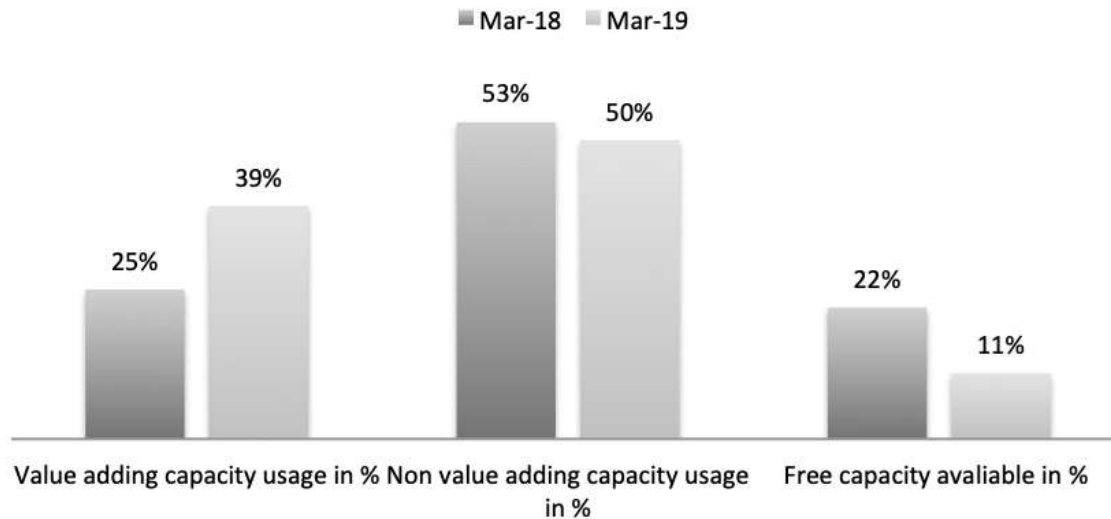


Figure: Capacity Status for Manpower

### Capacity Status in Manpower

This was a new eye opener for the company when the company's managers understood the concept of 'capacity available' to them in both manpower and machines and how well they were using it.

The manpower value adding capacity usage went up from 25% to 39%.

The non-value adding capacity usage in manpower dropped by 3% and 11% capacity was freed for future usage and bringing in the contract jobs within the plant.

## Capacity status for Machines

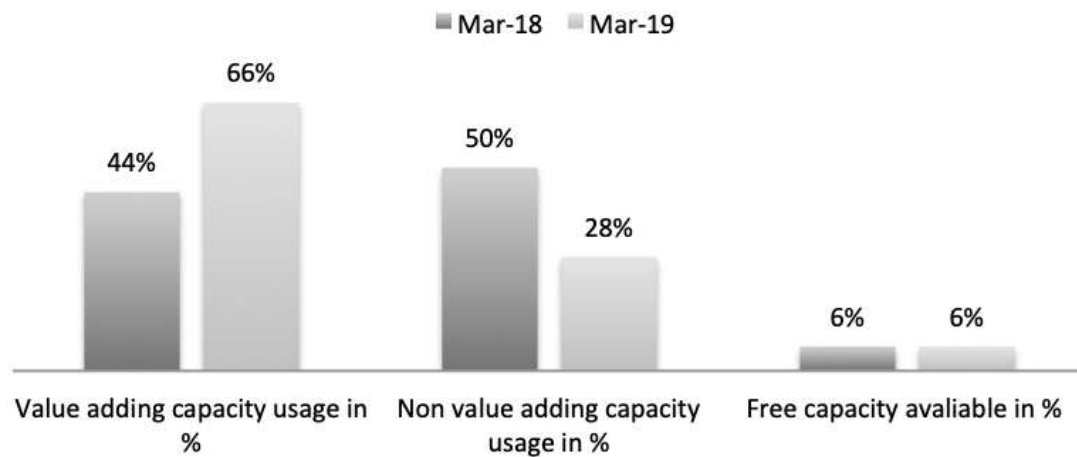


Figure: Capacity Status for Machines

### Capacity Status in Machines

This was a new eye opener for the company when the company's managers understood the concept of 'capacity available' to them in both manpower and machines and how well they were using it.

The machine capacity usage went up from 44% to 66%. This was made possible by a drop of 22% of the non-value adding capacity usage by reducing the breakdowns, long changeovers, waiting for material and inspection.

A 50% increase in the capacity usage from 44% to 66% is like adding half the plant in the company without investment in machines and manpower. This was praiseworthy.

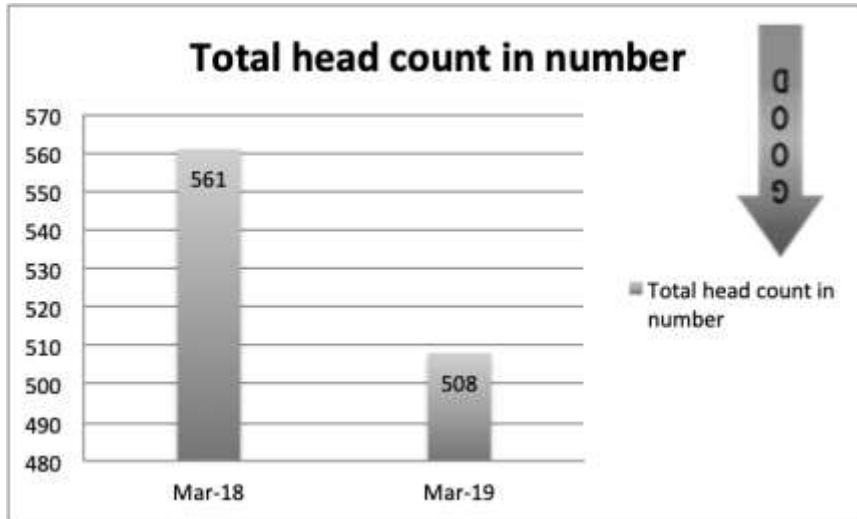


Figure: Total Headcount in Number

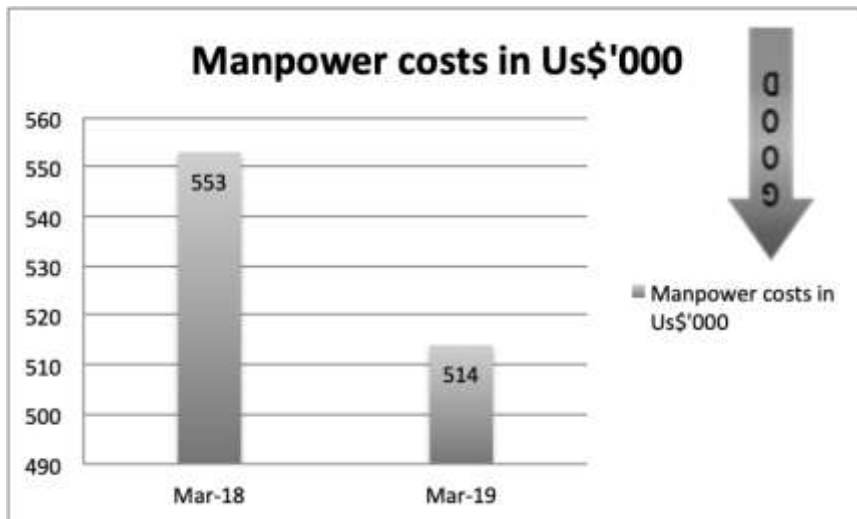


Figure: Manpower Costs in US \$'000

#### Total Headcount in Numbers and Total Manpower Costs in USD'000

The total head count dropped by 53 numbers. This happened due to reorganization of the people as per the value streams. There was no loss of jobs.

The surplus people were immediately absorbed in the other value streams of the Perfect Gear Company where the expansion was underway. This resulted in savings to the tune of US\$53,000 annually despite a 10% increase of individual salary in average over the one-year period.

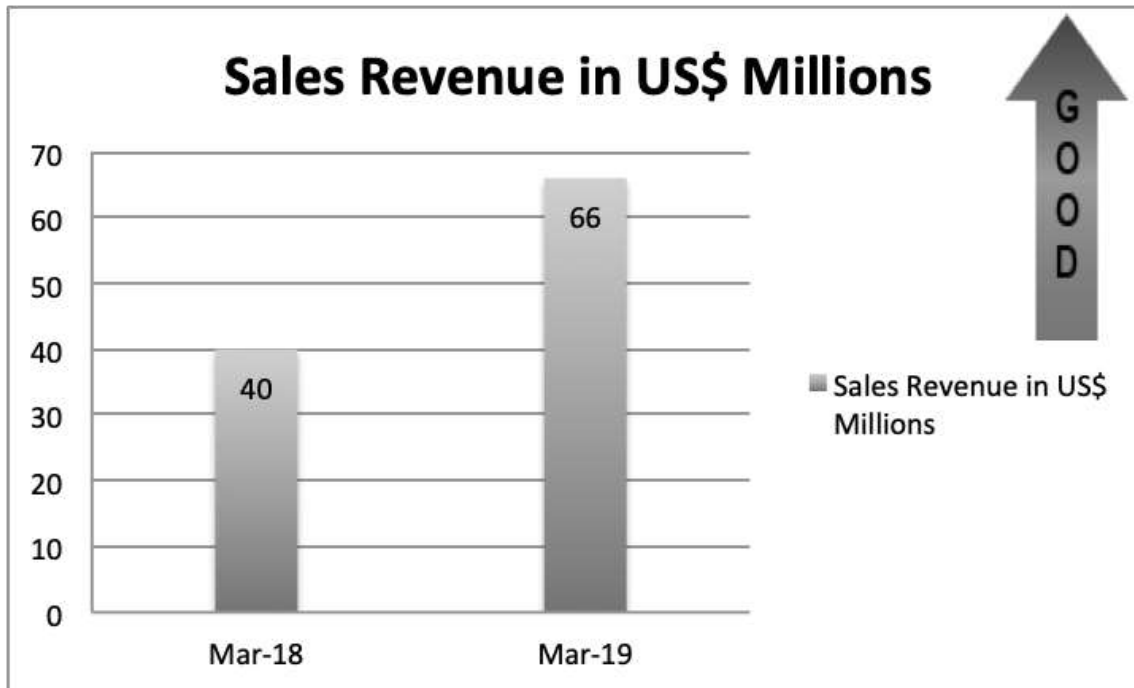


Figure: Sales Revenue in US \$ Millions

#### Annual Sales Revenues

There was a 10% increase in average product sales price from March 2018 to March 2019.

Due to increased turnover and reduced conversions costs the annual sales revenue went up from 40 million to 66 million USD, a rise of 65%.

This was well recognized by the company and teams were suitably rewarded.



Figure: Profits in US \$ Millions

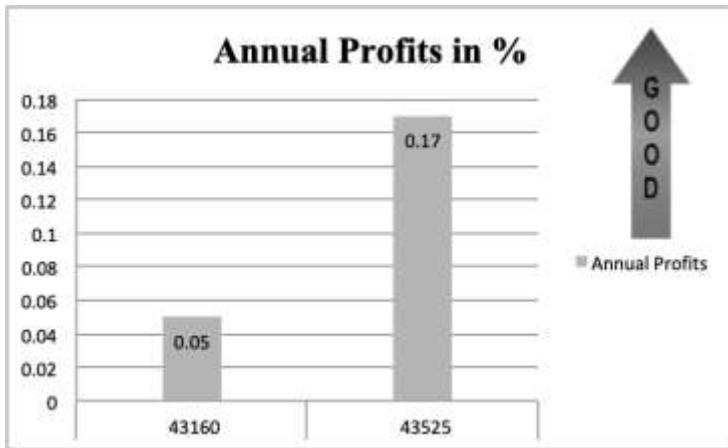


Figure: Annual Profits in Percentage

### Annual Profits in US\$ Millions and Percentage Terms

Annual profits in percentage went up from 5% to 17% of the sales value.

In absolute terms the profits jumped from two million to 11.3 million USD, a rise of 5.6 times.

# Key Takeaways- Lean Transformation Journey of Perfect Gear Company-

## 1. Easier, Better, Faster and Cheaper

The key purposes of continual improvement for successful implementation of the lean production system, daily management system and lean accounting system in two lines:

There are four purposes of improvement: easier, better, faster and cheaper. These four goals appear in the order of priority.— Shigeo Shingo

## 2. LPS+DMS+LAS together Must

A company must implement the lean production system, daily management and lean accounting simultaneously to come out of the sticky situation.

## 3. DMS for Sustenance

Daily Management is an important link for sustenance. This is to be implemented also along with LPS.

## 4. Lean Accounting makes people speak money-

Lean accounting is the missing link that has been ignored too long.

## 5. Lean Cost Producer after OTIFEF

The company will become the 'lean cost producer' with best on time delivery of the quality products and services to the customers than its competition and together with its happy employees.

## 6. 1st of every month and product costing immensely important

Healthy financial statements on first of every month and product costing at the touch of computer button as it is shipped' are the next best achievements.

# Perfect Gear Company's lean and kaizen journey was a success story and laudable.

