



White Paper

Key Performance Indicators In Apparel Manufacturing

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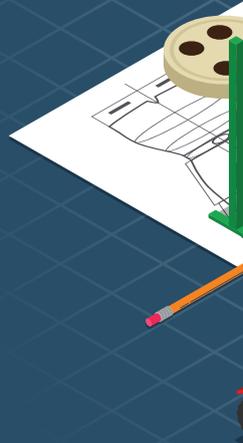
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I.

Abstract



Textile and Apparel Industry is one of the oldest industries of the human civilization. The industry has evolved continuously, from apparels that were hand sewn at home to apparels sewn in bulk in factories; from draped garments to snug garments and from four seasons a year to twenty-four seasons a year. Clothing and textiles reflect the social customs and culture in a society.

Over a period of time, there has been multiple shifts in preferred location for apparel manufacturing, from one country to other and sometimes to a different continent altogether. Factors on which these preferences depend have been:

1. Manufacturing cost
2. Market proximity (Retailer/End customer)

Apparel manufacturing has been a labor driven industry ever since, and relocates wherever the prices both on labor and the duty structures are more economical for the global brands and retailers. Due to this, in the past few decades, apparel manufacturing industry's geographical distribution has changed completely, and has resulted in loss of employment in Europe

and North America, and creating job opportunities in Asia and other developing parts of the world.

Fast fashion, use of technological advancement and changing business landscape are some of the variables resulting in changes in the textile and apparel industry. Cost effectiveness and streamlined process that caters textile manufacturing are the result of advancement in technology. These apparel manufacturing complexities make the industry prone to higher process variance and changeable manufacturing environment; this is the reason behind more focused approach towards performance evaluation and monitoring.

Various approaches and indicators are being used by apparel manufacturers to improve their business conduct. In some cases, these are also a combination of different performance indicators.

This outlook is an approach towards identifying the key performance indicators and explaining each of them briefly for application in apparel manufacturing for monitoring, analysis, benchmark, and goal setting to improve manufacturing performance.

II.

Performance Indicators

Key Performance indicators are a set of measures that a company uses to gauge its progress towards achieving its key business objectives and set targets. To assess their success at reaching targets organizations use KPIs at two levels:

1. First level KPIs emphasise organization's overall performance
2. Second level KPIs emphasise department processes such as Cutting, Sewing, Finishing, Quality, etc.

Measurement of performance involves:

- Defining what to measure
- Identifying methods of data collection
- Data collection
- Data analysis

Benefits of measuring performance are:

- To learn and improve
- To control and monitor people as well as processes
- To compare organization's performance against Industry benchmarks
- To report externally and demonstrate compliance

KPI's are associated with organization's goals and objectives. Monitoring, improvement and evaluation is needed by every organization, whether it is on a smaller scale or a larger one. Once the organization has figured out its mission, stake holders set the goals. This is because, they need an approach to evaluate progress towards the goal, and this is where the role of KPIs becomes essential. They are used to measure true performance against key success factors.

Selecting the correct KPIs depends on understanding of organization's priorities. It depends on which industry the organization belongs to, e.g. KPIs that are useful for an Apparel Manufacturer may differ from the KPIs useful for an Investment Banker.



III.

Key Performance Indicators for Apparel Manufacturing

The Textile and Apparel industry is observing a drift in business like other industries. In the present business conditions, earning only profit is not enough, but effective sustainable growth is the key to managing the business. With increasing pressures on pricing, combined with increasing costs, the only way to optimize profitability is through efficient utilisation of resources. Therefore, it is necessary to follow an integrated approach and choose KPI's which are most compatible and give an opportunity to monitor each and every aspect of manufacturing.



QUALITY

- Defects per Hundred Units
- First time Pass
- Cut to ship ratio



PRODUCTIVITY

- Efficiency
- Machine to Man Ratio
- Throughput Time



PROFITABILITY

- Activity
- Floor Cost %age to Activity



COST

- Cost of Manufacturing
- Cost of Quality



DELIVERY

- Planned Cut Date
- On time in Full



HR & TRAINING

- New Initiatives
- Trainings as per pre- set calendar
- Absenteeism & Attrition

IV.

KPIs

1. Quality

Quality is defined as complying with the requirements of buyer. Goods are accepted only if the quality parameters meet the required quality parameters set by them. If non-conformance is found, manufacturers have to rework on goods at their own cost.

Cost of repair is not endured by the buyer; it is endured by the manufacturer and is the unwanted or extra cost to be borne by the manufacturer. By controlling quality in the process of manufacturing, this unwanted cost can be reduced, and this will in turn reduce rejections and delayed delivery rates.

Quality performance can be measured as % Defective Rate, Defects per Hundred Units (DHU), Rejection Rate, and Inspection Pass Rate etc.

1.1 Defects per Hundred Units - DHU

Defects are all the non-conformances that are not acceptable by the end customer.

The non-conformances may be improper shape of garment, broken button or other trims, holes in fabric, skip stitch, broken seam etc. The defects causing non-conformances are abrasion marks, double pick, oil stain, hole, bow, skew, crease, dye stain, slubs, calendar line, contamination etc.

Any garment containing one or more than one defects can be considered as a defective garment. Defect per Hundred Units (DHU) can be calculated as number of defects per hundred garments checked.

DHU calculation is a universal measure of quality which provides a platform to do an in-depth analysis to identify any deviant process for improvements.

1.2 Buyer Inspection Pass Rate

Buyer inspection pass rate is defined as the ratio of number of batches passing at the first inspection to the total number of batches inspected. This rate reflects the process capability aspect of any manufacturing facility.

The improvements can be achieved through eliminating non-value activities such as defects and rework in a manufacturing environment without changing the pace of work (efficiency) or resource deployment design (MMR).

1.3 Cut to ship ratio

The ratio of the total number of garments shipped vs the total number of garments cut is known as cut to ship ratio. It indicates wastage in manufacturing process and is calculated style wise for the styles shipped in a particular month and the average of all styles is cut to ship ratio for the month.



2. Productivity

Productivity describes various measures of the efficiency of production. A productivity measure is expressed as the ratio of an aggregate output to a single or an aggregate input used in a production process, i.e. output per unit of input. Productivity can be improved to a large extent by utilizing technology that allows more work to be done in less time. A simple way of measuring productivity could be number of garments produced divided by number of machines in a standard shift, although other variables such as type of fabric, construction method, machine type, extended working hours etc. provide alteration to the rather simple formula.

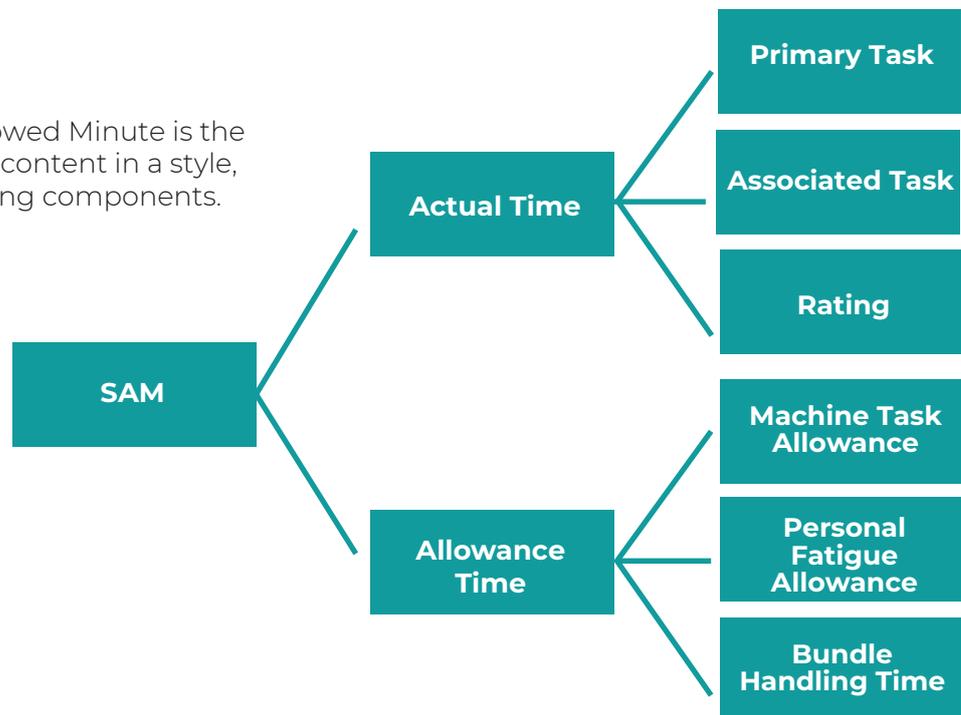
However, productivity does not give correct measurement in case of variance in number of working hours. And so, evaluating efficiency is one indicator which not only overcomes variability but also provides a comparative analysis between two

manufacturing facilities regardless of their product profile, working hours etc.

Man to machine ratio (MMR) is defined as the total workforce in a factory to the total number of operational sewing machines. It is used in order to monitor, control and optimise non-operatives. It is an indicator which correlates no. of operatives and no. of operational machines and aids management to optimise labour costs without disturbing the manufacturing capacity.

The expectation for high quality goods in quick time is growing on a daily basis due to the highly competitive Apparel Industry. Time has become a dominant decider in the market where the lifecycle of any product is condensed, and response time is also diminishing. Quick response or reduced throughput time is one of the basic strategies towards customer satisfaction and necessity to attain competitiveness.

SAM or Standard Allowed Minute is the measure of the work content in a style, which has the following components.



SAM = Basic Time X (1 + PF + MD) + BHT

BASIC TIME = Average Single Cycle Time x Rating

Allowances: PF – Personal & fatigue, MD – Machine delay, BHT – Bundle Handling Time



Therefore, to measure productivity, one needs to understand three important factors: at what rate a manufacturer is producing (Efficiency), how much manpower are being utilized (MMR) and how fast the manufacturer is turning around the orders (Throughput Time). The tools used to optimize the same in manufacturing processes may be:

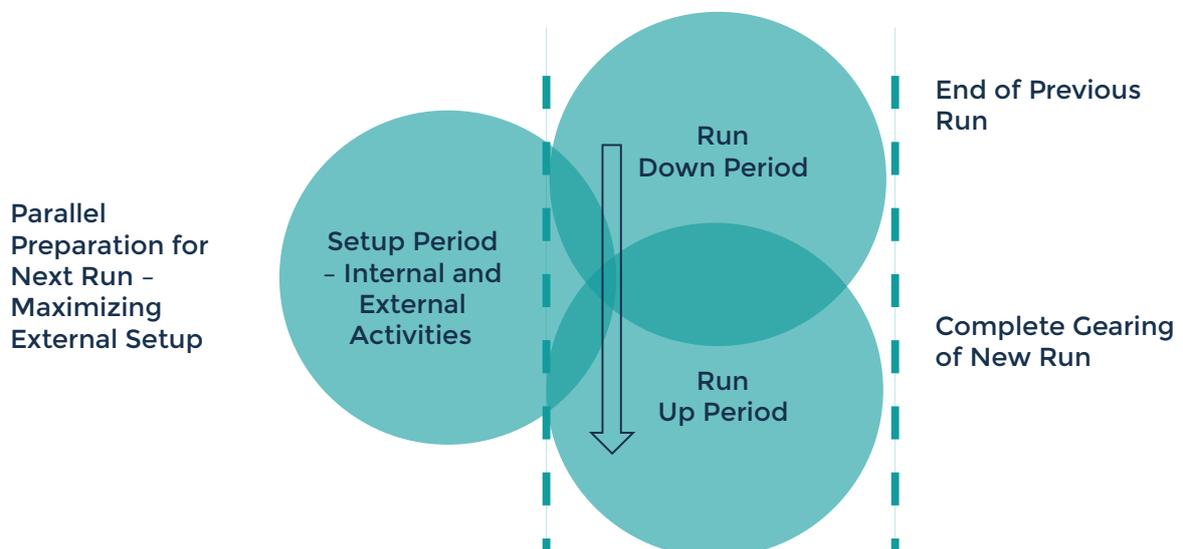
2.1 Value Stream Mapping (VSM)

Value-stream mapping is a method for analysing the current state and designing a future state for the series of events that takes a product or service from its beginning through to the customer with reduced wastes as compared to current map. A value stream focuses on the areas of a company that add value to a product or service, whereas a value chain refers to all of the activities within a company. It is the process of representing material and flow

of information system through all processes required to produce and ship the product to the customer creating a “single page picture”. Value Stream maps and documents all of the processes used to produce and ship a product, both value adding and non-value adding.

2.2 Single Minute Exchange of Dies (SMED)

Changeover is the practice of converting a line or machine from producing one product to another. This leads to a lot of time spent in an activity that actually has no end usage and consumes a lot of time that is actually intended for production. Single Minute Exchange of Dies (SMED) is a process of reducing changeover (setup) time by classifying elements as internal or external to a machine’s operating time and then converting the internal elements so they can be done externally as the machine continues to operate.



3. Delivery

Every buyer looks for opportunity to reduce Inventory and WIP across their supply chain in current business scenario. To diminish business risks, order size and lead time are constantly being optimised. Delays in deliveries and incomplete shipments from manufacturer's end may result into loss of sales at the point of sales. Buyers like to control over the deliveries and quantities and often penalise manufacturers to compensate their losses due to any delay or short shipments. Late deliveries and short shipments also affect the credibility of manufacturer from Buyer's viewpoint.

So, it is important for a manufacturer to maintain the committed delivery dates and shipping of required quantities. Some of the important terms associated with the timely delivery are mentioned below:

3.1 Planned Cut Date

PCD is the threshold for the Merchandising team to complete their Pre-Production activities and the Production Team to start their Production activities.

3.2 On Time in Full - OTIF

On Time in Full (OTIF) is a composite measurement of deliveries with respect to the required delivery date and quantities. Any order which is shipped on time and meets the requisite quantity should be counted as qualified to OTIF. In case where either there is delay in shipment or variance in shipped quantity, more than the tolerance mentioned by the buyer, the order should not qualify for OTIF.

4. Cost

Following are the 2 approaches to measure cost performance –

- o Cost of manufacturing and
- o Cost of quality

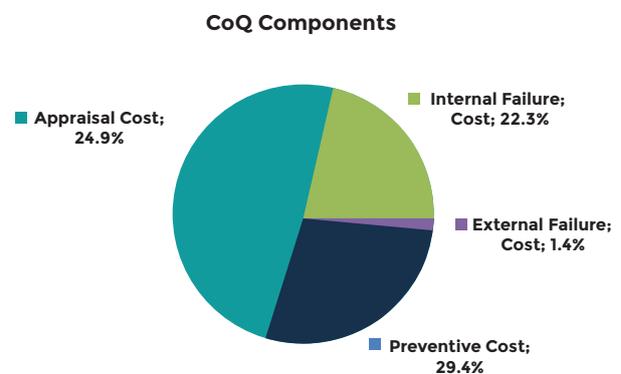
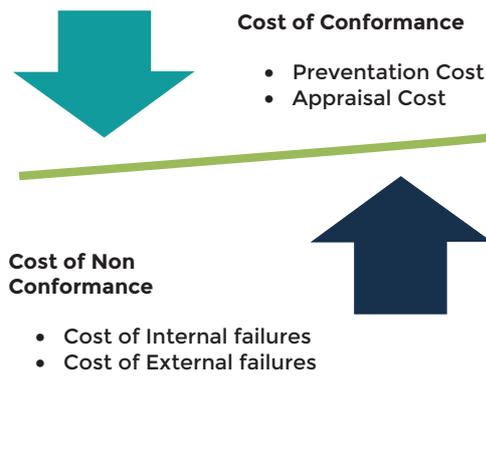
4.1 Cost of Manufacturing

Any actions taken to improve any above-mentioned KPIs will result in reduction of cost of manufacturing. Indicators that are used for measuring the improvement in the cost of manufacturing are:

- a. Cost per minute
- b. Cost per machine per day

4.2 Cost of Quality

Cost of quality is defined as the sum of cost of conformance and cost of non-conformance. Cost of conformance is defined as the cost incurred for maintaining good quality in the process, including appraisal cost and prevention cost. Whereas the cost of non-conformance can be depicted as the cost incurred due to poor quality during the process. It has two components: cost of internal failure and cost of external failure.





5. Profitability

Profitability is the degree to which an activity or business yields profit or financial gain. It is expressed as a relative amount instead of an absolute amount. No business will survive in the long run without taking care of the profitability factor. It is the ultimate goal of all business ventures.

On the other hand, Profit is the difference between the amount earned and the amount spent in buying, operating, or producing something. It is an absolute number determined by the amount of income or revenue above and beyond the costs or expenses that a company incurs. Profitability is closely related to profit. Net Profit Margin is the big picture view of an organization's profitability.

To assess the performance, industry standards are used as a benchmark and an internal year-over-year comparison should be performed.

5.1 Activity

Activity can be described as the value of work done by a manufacturer in a month or Top line in the P&L of the manufacturer.

Activity Benchmark for a Manufacturer depends upon the product mix, automation level of the manufacturing facility and many other factors. And an Organization can define its benchmarks by Industry Standards and internal month on month comparison of historical data.

Activity can be improved to large extent by Optimum utilization of available resources, automation of the manufacturing facility or by optimizing the product mix.

5.2 Floor Cost Percentage to Activity

Floor Cost can be described as Total cost of conversion of raw materials (i.e. Fabrics & Trims) into Final Product. This includes Salaries, Wages, Rents, Utility Bills and other factory expenses excluding the cost of fabric and trims.

There are several factors for higher floor cost but the biggest reason for high Floor Cost is the inefficiencies of operations, like low Sewing Efficiency, High Cost of Quality, High MMR, etc.

Once again, Benchmark can be defined as per Industry Standards and internal month on month comparison of historical data

6. HR & Training

Human resource is one of the most essential resources that every organization considers as an asset. The better the human resource an organization has, the better is its performance. And so, over the last decade HR training has played an important role in making better personnel for all the organizations that need competent human resource as part of their growth strategy. To maintain a highly motivated and productive workforce, HR must invest on Trainings & Development.



6.1 New Initiatives

HR must promote the Middle and Junior level Managers to an extent where the person with the most innovative or beneficial initiative is rewarded for his/her contribution every month.

HR Initiatives like “Know Your People”, where Supervisors are required to bond with workers to a level that they know all their workers names, their skill set etc. This not only helps in work force engagement but also leads to Right person at Right Job, which in turn will leads to better efficiencies and quality levels.

6.2 Training

Time to time training of existing employees is as important as for new persons joining the team for safety, productivity and satisfaction. HR must target fixed numbers of Trainings every month depending upon the organizations Training Requirements. Training

Schedule must be prepared accordingly by HR for every month, including internal and External Trainings. And then Trainings should be done as per the schedule.

6.3 Absenteeism & Attrition

Absenteeism can be defined as a voluntary or habitual absence from work by an employee. Though every employer expects his / her worker to miss certain no. of days from work. Absenteeism means either habitual evasion of work, or wilful absence as in a strike action. Involuntary or occasional absence due to accidents or sickness, or other valid reasons beyond one's control are not included. An excessive absence can lead to reduced motivation level and hence decrease productivity at work.

There are multiple factors that might affect absenteeism percentage for a factory, like engagement level of workers with the company, manufacturing facility's location, gender mix of workers, festivals, etc.

Apparel Industry is hub to migrant workers and HR needs to take initiative to make home away from home for them. Employee engagement activities like appreciating a person for good/ exceptional work, celebrating festivals, family day, increase the feeling of belonging in the work force. And lead to lower absenteeism in the factory. Continuous Awareness Sessions by HR, Attendance based incentive schemes and other planned employee engagements can also help to bring down the absenteeism level.

Attrition is reduction in workforce by retirement or resignations, and not planned reduction in work force by the manufacturer. In-depth analysis of attrition needs to be done by the way of exit interviews or informal conversation with the person leaving the job to understand the exact reason. Many a time's workers leave because of an unsolved grievance which might be small but ignored.

Like absenteeism, even high attrition rate can be brought down through awareness sessions and employee engagement.

Both Absenteeism and Attrition can be compared internally to reduce month by month.

KPI Benchmarking

While all of the KPI's are important for any apparel business, it has been observed that companies prefer some over the other. it is important to identify the most relevant KPI's for a particular business. Once identified, these must be measured in a way, which can be compared. In the absence of any process controls, it has been observed that businesses follow different measures.

Some of the quantitative values like Cost KPI's would depend on country of business, Efficiency and MMR may depend on technology adopted, while the others may be generically defined similar in most businesses. Following table indicates the generic KPI's as may be applicable to apparel manufacturing businesses.



Sl. No.	Parameters	Benchmark
1	Quality	
1.1	DHU	Sewing End Line DHU around 8 and Finishing DHU around 3-4
1.2	First Time Pass	100%
1.3	Cut to Ship	99%
2	Productivity	
2.1	Sewing Efficiency	Depends on various factors like Technology level, Order size, etc. Needs to be looked in to month on month and year on year comparison and improvements.
2.2	Machine to Man Ratio	Again depends on the level of automation and the processes. However, can be taken at 1:1.7 - 1:1.8 for the region.
2.3	Throughput Time	Depends on overall Supply Chain. Needs to be looked in to month on month and year on year comparison and improvements
3	Profitability	
3.1	Activity	Depends on various factors and needs to be looked in to month on month and year on year comparison and improvements
3.2	Floor Cost Percentage	Around 20% of Overall Earnings of the factory
4	Cost	
4.1	Cost per Minute	Depends on various factors and needs to be looked in to month on month and year on year comparison and improvements
5	Delivery	
5.1	Planned Cut Date	100%
5.2	On Time in Full	100%
6	HR & Training	
6.1	New Initiatives	Around 2 Per Quarter
6.2	Trainings As per Pre Set Calendar	Around 2 Per Month
6.3	Absenteeism	6%-8%
6.4	Attrition	1%-2%

Know Your Performance (KYP)

Defining Vitals/ Performance Indicator

A Key Performance Indicator is a Business metric or a type of Vitals Measurement that demonstrates how effectively a company is achieving its key business objectives or targets set by the Management.

Common Symptoms



Increased Overtime Bills



Late Deliveries



Short Shipments



Quality Claims



Increasing Rejections



Decreasing Top and Bottom Line

Proposal/ Objective of Engagement

To define the Baseline KPI of the Manufacturing facility against various Parameters and set the quarterly, half yearly and Annual Targets or Benchmarks for the factory for Improvements.

Work Steps

Step 1 Audit & diagnostic of the factory to understand the current production & Quality levels

Step 2 Define the Baseline KPIs against various Parameters as explained earlier in the sheet

Step 3 Define the Benchmarks for improvements against all the KPIs with Quarterly, Half yearly and Annual Improvement Targets

What we offer

Our Expert Consultant will visit the Factory and do the Diagnostic audit of the Manufacturing Facility to define the following KPIs

Level 1: Organizational KPIs

- 1. Productivity** - Efficiency- MMR -Throughput Time
- 2. Quality-** DHU- Buyer Inspection Pass Rate - Cut to Ship (CTS) - Order to Ship (OTS)
- 3. Delivery-** Planned Cut Date - OTIF
- 4. Cost-** Cost of Manufacturing - Cost of Quality.
- 5. HR & Training-** New Initiatives - Trainings as per Set Calendar - Absenteeism & Attrition
- 6. Profitability-** Activity- Floor Cost percentage to Activity

Level 2: Departmental KPIs

- 1. Cutting Department** - Cutting Efficiency - Cutting Cost per Piece
- 2. Sewing Department-** Productivity - Sewing Cost per Piece
- 3. Finishing Department** - Finishing Efficiency - Finishing Cost per Piece
- 4. Quality Department** - FTR - Rejections & Rework Percentage

Please write to amit.gugnani@technopak.com / abhishek.yugal@technopak.com to know your factory's KPIs

About Technopak

India's leading management consulting firm with more than 28 years of experience in working with organizations across consumer goods and services.

Founded on the principle of "concept to commissioning", we partner our clients to identify their maximum-value opportunities, provide solutions to their key challenges and help them create a robust and high growth business models.

We have the ability to be strategic advisors providing customized solutions during the ideation phase, implementation guides through start-up assistance, and be a trusted advisor overall.

Drawing from the extensive experience of 85+ professionals, Technopak focuses on four major divisions, which are Retail, Consumer Products & E-tailing; Fashion (Textile & Apparel); Food and Food Services, and Education.

Technopak also represents WGSN, world's largest fashion forecasting service and Coloro, the new color system, both from Ascential, a specialist global information company, for the Indian sub-continent.
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Technopak's Service Mix for Apparel Operations

Strategy & Planning

- Business Entry and Growth Strategy
- Business Plan, Resource Requirement, and Key Business Numbers
- Manufacturing and Supplying Capabilities

Start Up Assistance

- Planning and Design of Factory
- Implementation of Layouts and Processes
- Selection and Training of Middle Management
- Efficiency and Production Build-up

Capacity Building

- Training Need Assessment
- Middle Management Training on Master Plato
- Merchandisers, Quality Personnel, and Industrial Engineer's training
- Establish Training Methodology

Incentive Schemes

- Monitoring of Individual Operator Performance and Efficiency
- Designing Performance-based Incentive Schemes for Operators
- Development of KPI-based appraisal for Middle Management

Performance Enhancement

- Productivity/Efficiency Enhancement
- Material Utilization and Quality Enhancement
- Streamlining Merchandising and Pre-production Activities
- Lean Manufacturing Tools
- Visual Control and SOPs
- Total Quality Management

Setting Up Operator Training Centre

- Program Design and Team Profile Development
- Setting-up Selection and Recruitment Criteria, and Procedures for Operators
- Training Operators on AAMT Methodology

Pre-Production Process Streamlining

- Capacity Analysis
- Operator Remunerations
- Setting Time and Method Standards
- Layout and Method Improvements
- Production Planning

Sourcing Services

- Industry Landscape and Product Strategy
- Selection of Key Positions
- Identification, Due Diligence, Training, and Analysis of Vendors

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