SCW.AI

Next Generation Digital Factory Platform for Self-driving Supply Chains

Manufacturing KPIs

Managers & Executives Handbook

DIGITAL FACTORY

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Introduction

In today's manufacturing landscape, achieving excellence requires understanding complex information, making informed decisions, and adapting to a constantly changing business environment. Key to this is the careful monitoring and analysis of Key Performance Indicators (KPIs), which guide manufacturers towards greater efficiency and success.

We present our Handbook on Manufacturing KPIs, designed for factory managers and executives. With over a decade of experience in providing digital factory solutions and advising the manufacturing sector, we have carefully selected each KPI in this guide.

Containing over 60 KPIs, each accompanied by its formula or illustrative example, this Handbook spans seven distinct domains:

- Production
- Maintenance
- Planning and Scheduling
- Quality
- Supply Chain
- Environmental Health & Safety
- And Finance.

Thus, we ensure that every facet of factory performance receives the scrutiny it deserves.

Following the KPIs, we introduce Scoreboards—visual tools that simplify KPI data into actionable insights, helping stakeholders quickly identify performance trends. We also provide a template Scoreboard to help you assess your factory's success easily.

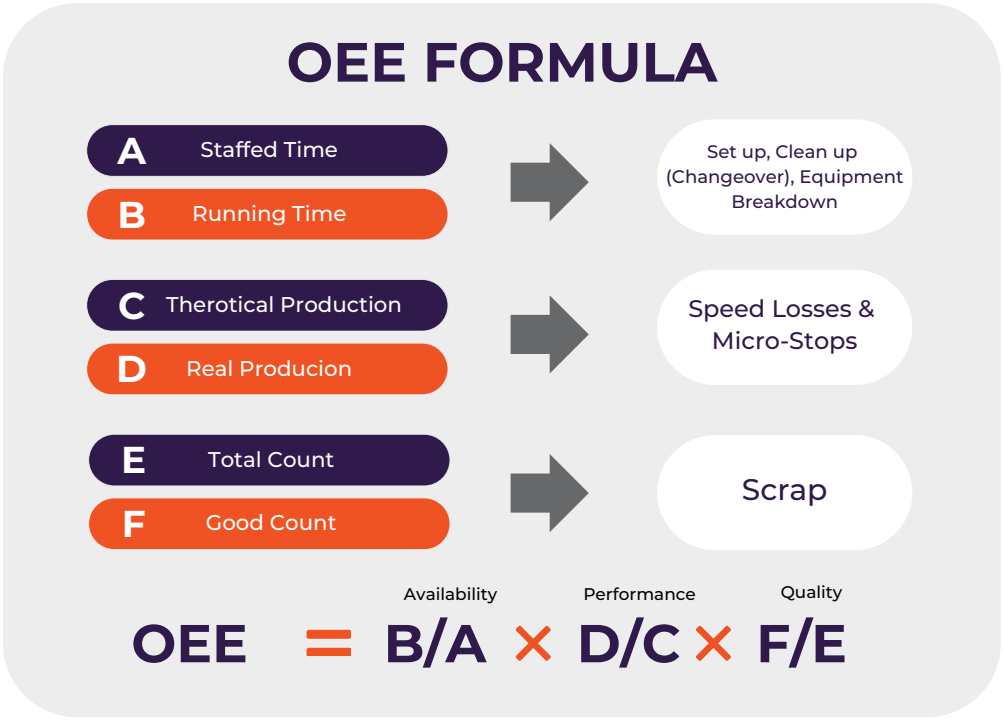
As the handbook concludes, we invite you to explore Industry 4.0 excellence. The final section introduces our advanced digital solutions, offering real-time assessment capabilities that turn raw data into actionable insights, driving efficiency and profitability.

1. Production KPIs

Production KPIs provide essential insights into the efficiency, speed, and overall performance of production processes. By monitoring and optimizing KPIs that are explained below, manufacturers can optimize resource allocation, streamline workflows, minimize waste, and ensure timely delivery of high-quality products to customers.

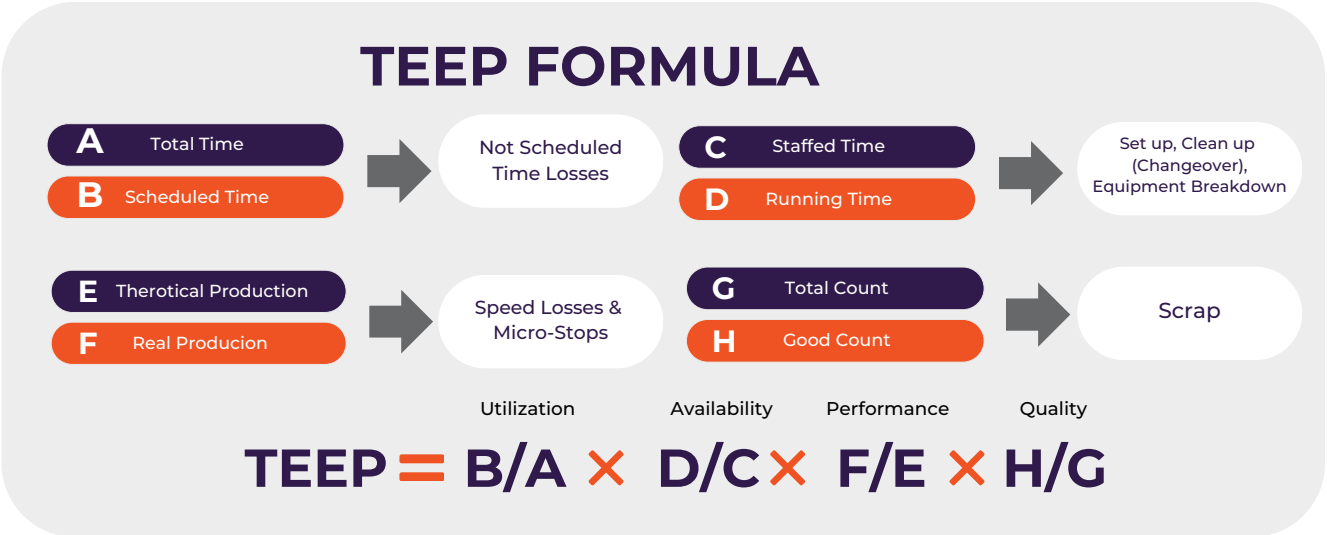
OEE (Overall Equipment Effectiveness)

OEE is calculated by multiplying the percentage of available time of production lines, the performance of production, and the percentage of high-quality end products. The highest achievable OEE score is 100, indicating no loss in production. Manufacturers utilize OEE to pinpoint areas for improvement in equipment and labor efficiency.



TEEP (Total Effective Equipment Performance)

TEEP expands on OEE by incorporating all losses, including idle time, into the calculation. Similar to OEE, 100 indicates perfect TEEP.



Cycle Time

Cycle time represents the total time required to complete a production process from start to finish. A shorter cycle time indicates faster production and increased throughput. Manufacturers strive to minimize cycle time to meet customer demand promptly and optimize resource utilization.

Cycle Time Formula

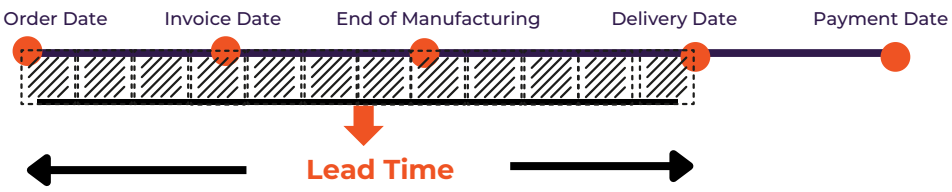
$$\frac{\text{Net Production Time}}{\text{Number of Units Produced}}$$

Lead Time

Lead time refers to the time it takes to fulfill a customer order, from order placement to delivery. Shorter lead times result in faster order fulfillment and improved customer satisfaction.

Lead Time Formula

$$\left(\text{Delivery Date} - \text{Order Date}\right)$$



Takt time

Takt time sets the pace of production to match customer demand, calculated as Available Production Time (work order run time) divided by Customer Demand or quantity of work order. Manufacturers aim for a takt time that aligns with customer requirements to optimize production scheduling and ensure line balancing.

Takt Time Formula

$$\frac{\text{Work Order Run Time (Hours or Minutes)}}{\text{Work Order Quantity}}$$

Throughput Rate

Throughput rate measures the rate at which a system or process can produce output. A higher throughput rate with the same inputs indicates greater production efficiency and capacity utilization. Manufacturers monitor throughput rate to maximize output and minimize idle time.

Throughput Rate Formula

$$\frac{\text{Number of Units Produced}}{\text{Time}}$$

Material Usage Variance

Material usage variance represents the difference between actual and standard quantities of materials used in production and its impact on finance. A lower variance indicates closer adherence to planned material usage and better cost control. Manufacturers analyze material usage variance to minimize wastage.

Material Usage Variance Formula

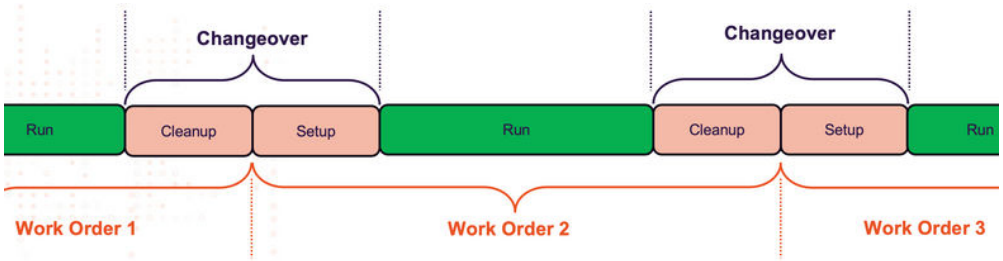
$$\left(\text{Actual Quantity Used} - \text{Planned Quality Used}\right) \times \text{Material Price}$$

Changeover Time

Changeover time refers to the duration needed to transition from producing one product to another. Setting up machines for new batches and cleaning up lines are examples of changeovers. A shorter changeover time facilitates more frequent production runs and enhances flexibility in meeting customer demands. Minimizing changeover time poses particular challenges and is crucial for heavily regulated industries like pharmaceuticals, where longer clean-up times can significantly impede production.

Changeover Time Formula

$$\sum_{i=1}^{n} \text{Changeover Time}_{(i)}$$



Micro Stop Time

Micro stops are brief, unplanned interruptions in production that last for a very short duration (mostly defined as downtimes that take less than 2 minutes but might change according to one factory to another). While a single micro stop may result in only a small loss, their cumulative impact can significantly disrupt production flow. Manufacturers are advised to monitor micro stops closely to mitigate their effects on productivity.

Micro Stop Time Formula

$$\sum_{i=1}^{n} \text{Micro Stop Time}_{(i)}$$

Speed Loss

Speed loss refers to the reduction in operating speed of equipment compared to its maximum capacity. Minimizing speed loss ensures efficient equipment performance and maximum throughput.

Speed Loss Formula

$$\left(\text{Run Time} - \text{Micro Stop Time} - \text{Net Run Time}\right)$$

Cleaning Variance Percentage

Cleaning variance percentage represents the deviation between planned and actual time spent on cleaning production lines. Minimizing deviation prevents production delays by reducing changeover time.

Cleaning Variance % Formula

$$\frac{\left(\text{Actual Cleaning Duration} - \text{Scheduled Cleaning Duration}\right)}{\text{Scheduled Cleaning Duration}} \times 100$$

Setup Variance Percentage

Setup Variance Percentage represents the difference between planned and actual setup times. A lower percentage indicates closer adherence to planned setup times and smoother production transitions. Manufacturers strive to minimize setup efficiency percentage to reduce downtime.

- Has similar formula with cleaning variance percentage. You should change cleaning duration with set up duration.

2. Maintenance KPIs

By closely monitoring Maintenance KPIs, manufacturers can proactively identify equipment vulnerabilities, schedule maintenance activities efficiently, minimize unplanned downtime, and extend the lifespan of critical assets. Additionally, data collected for calculating Maintenance KPIs can help manufacturers to build machine learning models for predictive maintenance that optimize return from equipment.

Planned Maintenance Percentage (PMP)

PMP is the percentage of maintenance activities that are planned in advance. A higher PMP signifies proactive maintenance planning and reduced unplanned downtime. For manufacturers that utilize machine learning models for predictive maintenance PMP tends to be higher.

PMP Formula

$$\frac{\text{Planned Maintenance Hours}}{\text{Total Maintenance Hours}} \times 100$$

Mean Time Between Failure (MTBF)

MTBF measures the average time between equipment failures. A longer MTBF suggests greater machine reliability and longer intervals between equipment malfunctions. Manufacturers use MTBF to schedule preventive maintenance or train predictive maintenance models to minimize production disruptions.

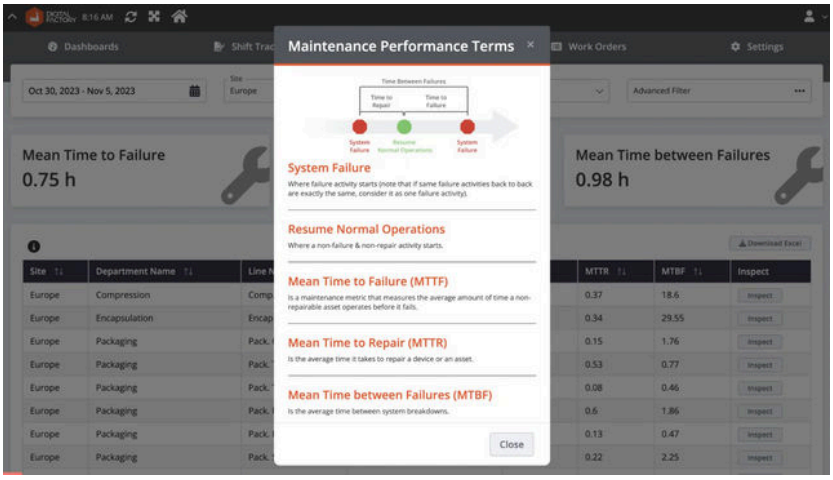
Mean Time to Repair (MTTR)

MTTR represents the average time it takes to repair equipment after a failure. A lower MTTR indicates faster repair times and shorter equipment downtimes. MTTR is another metric that can be utilized for training of predictive maintenance models.

Mean Time to Failure (MTTF)

MTTF measures the average duration an equipment fails to work during regular operation, calculated in hours. A higher MTTF indicates better reliability and fewer disruptions, guiding maintenance schedules and equipment decisions for optimal efficiency.

Below image from SCW.AI Maintenance Performance Report demonstrates definition of MTBF, MTTR and MTTF.



3. Scheduling and Planning KPIs

By monitoring scheduling and planning KPIs, manufacturers can optimize production schedules, improve resource utilization, enhance overall operational efficiency and maximize customer satisfaction.

Capacity Utilization Rate

Capacity utilization is calculated as the ratio of actual production output to maximum potential output, multiplied by 100. A higher utilization rate indicates efficient use of available resources and optimal production efficiency.

Capacity Utilization Rate Formula

$$\frac{\text{Actual Output}}{\text{Maximum Potential Output}} \times 100$$

Schedule Adherence

Schedule adherence measures the extent to which production activities follow the planned schedule, expressed as a percentage. Higher schedule adherence indicates better alignment of production activities with the planned schedule.

Schedule Adherence Formula

$$\frac{\text{Planned \& Started Work Orders}}{\text{Planned \& Started Work Orders} + \text{Planned \& Not Started Work Orders}} \times 100$$

Schedule Attainment

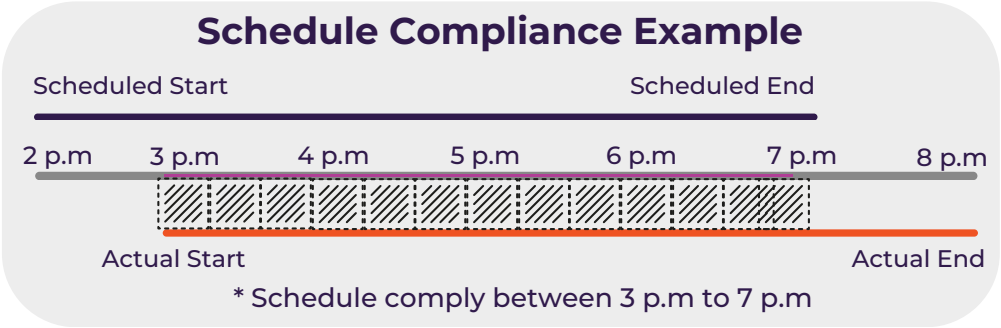
Schedule attainment is calculated as the ratio of actual production output to planned production output, multiplied by 100. Higher attainment scores indicates higher production capability of the manufacturers.

Schedule Attainment Formula

$$\frac{\text{Planned \& Started Work Orders} + \text{Unplanned \& Started Work Orders}}{\text{Planned \& Started Work Orders} + \text{Planned \& Not Started Work Orders}} \times 100$$

Schedule Compliance

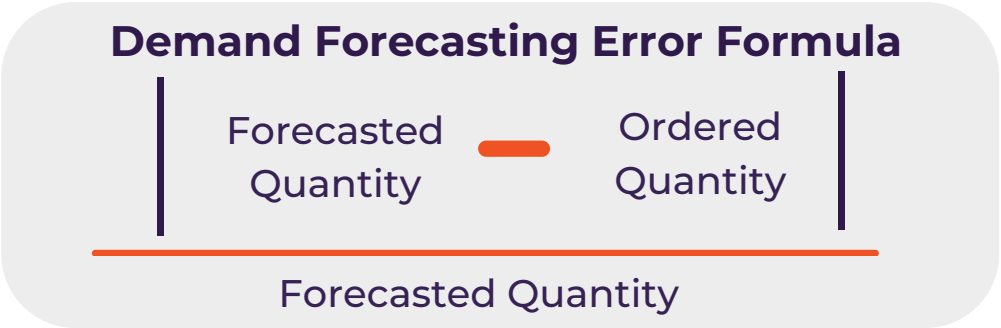
Schedule compliance measures the percentage of completed production tasks compared to the total planned production tasks. Higher compliance indicates adherence to the planned production schedule without deviations.



$$\frac{\text{(7-3) Overlap}}{\text{(7-2) Scheduled Time}} \times 100 = 80$$

Demand Forecasting Error

Demand Forecasting Error measures the variance between forecasted demand and actual demand for products within a specified period. Thus, it quantifies the accuracy of the forecasting. Nowadays manufacturers utilize AI driven advanced planning and scheduling tools for improving their demand forecasting accuracy.



4. Quality KPIs

By monitoring quality KPIs, managers can identify areas for improvement, implement corrective actions, and ensure consistent delivery of high-quality products to meet customer expectations.

Scrap Rate

Scrap rate is calculated as the percentage of defective or unusable products generated during the manufacturing process. A lower scrap rate indicates less waste and higher product quality. Manufacturers focus on reducing scrap rate by improving production processes and implementing quality control measures.

Scrap Rate Formula

$$\frac{\text{Scrap (Defective) Product Count}}{\text{Total Product Count}} \times 100$$

Right First Time

Right First Time measures the percentage of products that meet quality standards upon the first inspection. Higher first-time quality indicates fewer defects and higher customer satisfaction.

Right First Time Formula

$$\frac{\text{Number of Products Produced Correctly on First Attempt}}{\text{Total Number of Products Manufactured}} \times 100$$

Rejection Rate

Rejection rate is calculated as the percentage of products rejected during quality inspections. A lower rejection rate signifies better quality control and higher product reliability.

Rejection Rate Formula

$$\frac{\text{Number of Rejected Products}}{\text{Total Number of Products Manufactured}} \times 100$$

Rework Rate

Rework rate measures the percentage of products that require rework to meet quality standards. Lower rework rate indicates higher production efficiency.

Rework Rate Formula

$$\frac{\text{Quantity of Products Reworked}}{\text{Total Quantity Produced}} \times 100$$

Customer Complaint Rate

Customer Complaint rate is calculated as the number of complaints received from customers regarding product quality or performance, expressed as a percentage of total products sold. Lower compliant rate indicates higher customer satisfaction and product quality.

Customer Complaint Rate Formula

$$\frac{\text{Number of complaints Received}}{\text{Total Products Sold}} \times 100$$

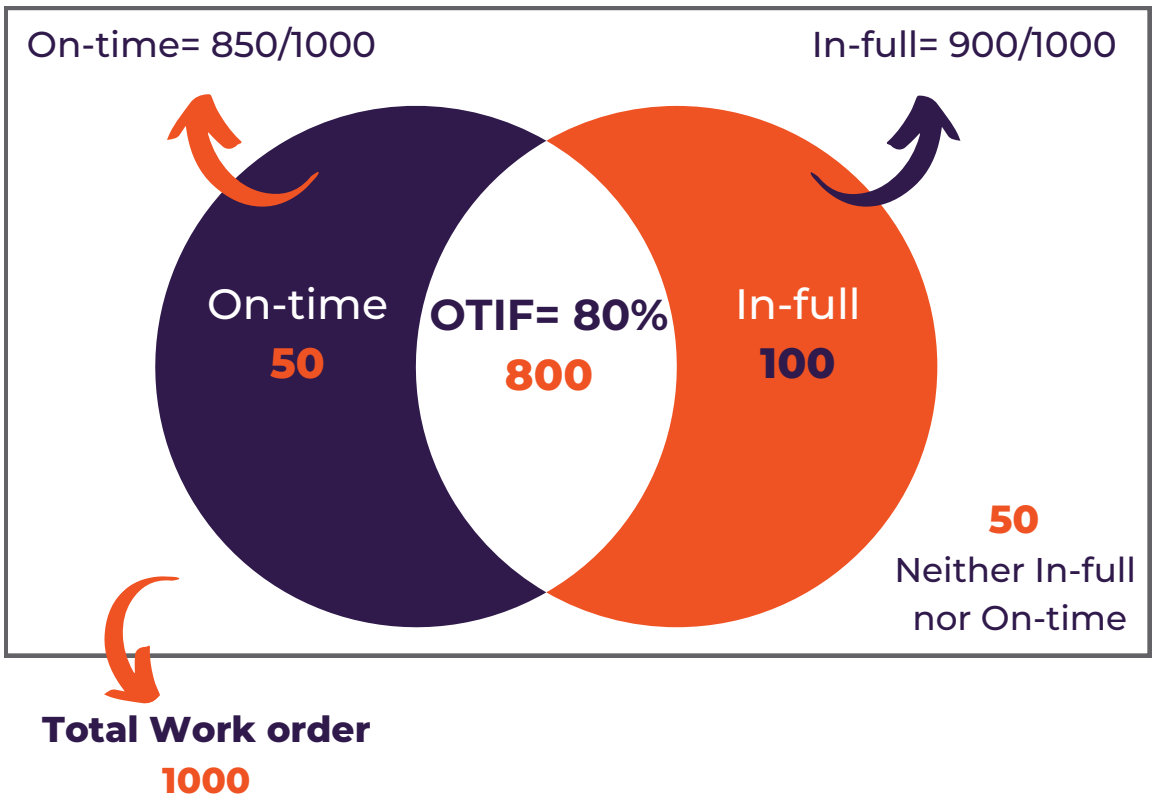
5. Supply Chain KPIs

Supply Chain KPIs offer valuable insights into various aspects of supply chain management, including logistics, inventory management, and order fulfillment. By monitoring these KPIs, manufacturers can optimize supply chain processes, improve customer satisfaction, and enhance overall business performance.

OTIF (On Time In Full)

OTIF is determined by the percentage of orders delivered to customers on time and in full. Achieving a higher OTIF reflects superior order fulfillment performance and customer satisfaction.

Representation of OTIF



Days Sales Outstanding (DSO)

DSO represents the average number of days it takes to collect payment from customers. A lower DSO signifies more efficient cash flow management and quicker receipt of revenues. By monitoring DSO, manufacturers can evaluate their credit and collection processes, optimize cash flow, and enhance financial stability.

DSO Formula

$$\frac{\text{Average Account Receivable}}{\text{Total Value of Credit Sales}} \times 365$$

Return Reason

Return reason provides insights into the reasons cited by customers for returning products, offering valuable feedback on product quality, functionality, or customer preferences. Manufacturers analyze return reasons to identify trends, address recurring issues, and continuously improve product offerings to meet customer needs effectively.

Pick and Pack Cycle Time

Metric Measures the time taken to pick and pack products for shipment. A shorter pick and pack cycle time indicates faster order processing and reduced lead time.

Pick & Pack Cycle Time Formula

$$\frac{\text{Average Time of Packaging}}{\text{Average Time of Picking Good from Warehouse}}$$

Average Use of Packaging Material

Average use of packaging material evaluates how effectively packaging material are used per unit of product, aiming to minimize waste and environmental impact while ensuring adequate product protection.

Average Use of Packaging Material Formula

$$\frac{\text{Total Mass of Packaging Materials Used}}{\text{Number of Good Solds}}$$

Damage Free Delivery

Damage-free delivery measures the percentage of products delivered to customers without any damage, reflecting effective handling, packaging and transportation practices. Manufacturers prioritize damage-free delivery to minimize product returns, warranty claims, and customer dissatisfaction.

Damage Free Delivery Formula

$$\frac{\text{Number of Damage Free Deliveries}}{\text{Number of Total Deliveries}} \times 100$$

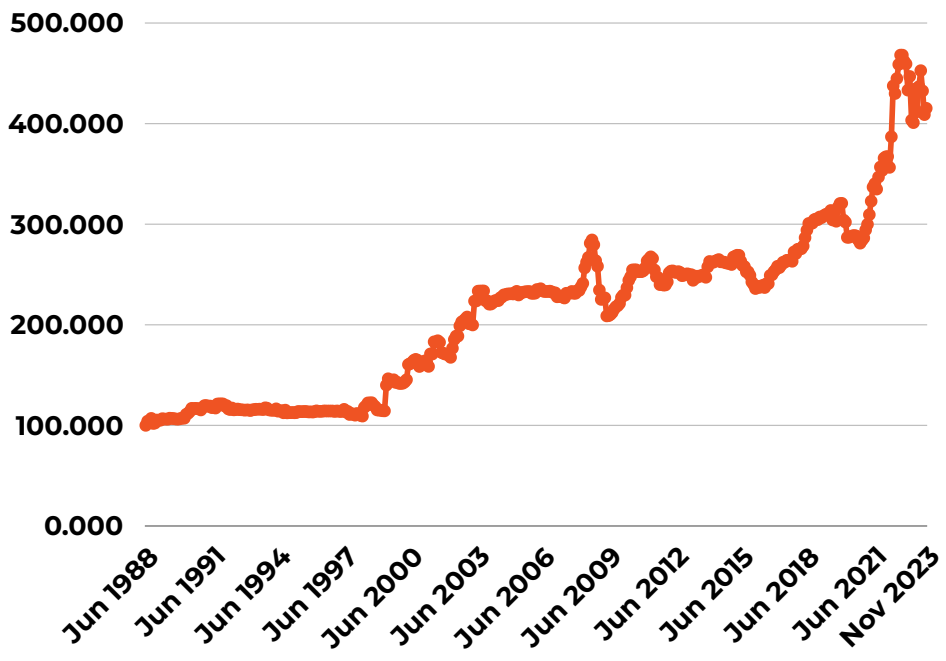
Customer Satisfaction Index

A survey that allows customers to quantify your supply chain operations from 1 to ten where higher score implies greater satisfaction. By tracking customer satisfaction index scores, manufacturers can assess their performance, identify areas for improvement, and prioritize initiatives to enhance the customer experience and drive repeat business.

Freight Cost

Freight cost evaluates the total cost incurred for shipping products to customers, impacting overall product profitability and supply chain efficiency. By monitoring freight costs, manufacturers can identify opportunities to optimize transportation routes, consolidate shipments, negotiate favorable freight rates, and minimize transportation expenses.

Monthly Sea Freight Cost Index



Source: FRED

Inventory Turnover

Inventory turnover measures how quickly inventory is sold and replenished, indicating inventory management efficiency. A higher inventory turnover ratio suggests more effective inventory management practices and better utilization of working capital. Manufacturers monitor inventory turnover to optimize stock levels, minimize carrying costs, and improve cash flow.

Inventory Turnover Formula

$$\frac{\text{Cost of Goods Sold}}{\text{Average Inventory}}$$

Inventory Days of Supply

Inventory days of supply calculates the number of days inventory can sustain operations, informing production and procurement strategies. A lower inventory days of supply indicates leaner inventory levels and better inventory management efficiency. Manufacturers aim to minimize inventory days of supply to reduce carrying costs, improve cash flow, and enhance responsiveness to market demand fluctuations.

Inventory Days of Supply

$$\frac{\text{Average Inventory}}{\text{Cost of Goods Sold}} \times 365$$

Inventory Holding Cost

Inventory holding cost calculates the expenses associated with storing inventory, guiding cost-effective inventory management practices. It encompasses expenses like storage fees, insurance premiums, obsolescence charges, and depreciation costs. By minimizing inventory holding costs, manufacturers improve profitability.

Inventory Holding Cost Formula

$$\text{Storage Cost} + \text{Depreciation Cost} + \text{Insurance Cost} + \text{Capital Cost}$$

Stockouts

Stockouts measure the frequency and duration of inventory shortages, highlighting potential disruptions in supply chain operations. A lower stockout rate indicates better inventory management and higher customer satisfaction levels.

Stockout Ratio Formula

$$\text{Frequency of Stockouts} \times \text{Annual Sales Volume}$$

JIT (Just-in-Time) Delivery Performance

JIT delivery ensures timely delivery of materials and components to support production schedules, minimizing inventory holding costs and improving operational efficiency. By aligning material deliveries with production demand, manufacturers reduce inventory levels, lead times, and storage costs while enhancing production flexibility and responsiveness to customer orders.

JIT Delivery Performance %

$$\left(1 - \left(\frac{\text{Number of Late or Early Deliveries}}{\text{Number of Total Deliveries}}\right)\right) \times 100$$

6. EHS KPIs

By monitoring Environmental Health and Safety (EHS) KPIs, manufacturers can identify potential hazards, implement preventive measures, and promote a culture of safety among employees. Furthermore, analyzing these metrics enables manufacturers to track progress towards sustainability goals. Improving EHS KPIs improve employee morale and productivity, and safeguards the reputation and credibility of the organization in the eyes of stakeholders and the broader community.

GHG Emissions

GHG emissions measure the amount of greenhouse gasses emitted during manufacturing processes. Lower GHG emissions signify reduced environmental impact and commitment to sustainability. Manufacturers monitor GHG emissions to comply with regulations, mitigate climate change risks, and enhance corporate social responsibility.

GHG Emissions Formula

$$\sum_{i=1}^{n} E_{(i)} \times A_{(i)}$$

- n is the total number of carbon-emitting activities
- E(i) is the specific carbon emission of activity i. For instance, for a gallon of gasoline consumption GHG is 0.008887 metric tons
- A(i) is the amount of activity i. For example, a transportation activity consuming 27,000 gallons of gasoline

Product Carbon Footprint

Product carbon footprint quantifies the greenhouse gas emissions associated with a product's lifecycle. By assessing the carbon footprint of products, manufacturers can redesign their products in a more ecological way and can reduce per product emissions.

Product Carbon Footprint Formula

Transportation Emission Per Unit + Raw Material Emission Per Unit + Manufacturing Emission Per Unit + Waste Disposal Emission Per Unit

Energy Consumption

Energy consumption measures the amount of energy used in manufacturing operations. Reduced energy consumption indicates greater energy efficiency and lower operating costs. Manufacturers implement initiatives, such as upgrading equipment, optimizing processes, and adopting renewable energy sources, to minimize energy consumption and environmental impact.

Energy Consumption Formula

Power (kW) × Time (hours)

Percentage of Renewable Energy

Percentage of Renewable Energy evaluates the sources of carbon neutral energy used in manufacturing processes, such as solar, wind, wave energy. By increasing reliance on renewable sources, manufacturers reduce carbon emissions.

% of Renewable Energy Formula

$$\frac{\text{Renewable Energy Consumption}}{\text{Total Energy Consumption}} \times 100$$

Percentage of Non-Virgin Material Used

Percentage of non-virgin material used assesses the incorporation of recycled or reclaimed materials in manufacturing processes. Higher usage of non-virgin materials indicates commitment to resource conservation, waste reduction, and circular economy principles.

% of Non-Virgin Material Used Formula

$$\frac{\text{Mass of Recycled Raw Materials}}{\text{Mass of Total Raw Materials}} \times 100$$

Percentage of Recyclability of Product

Percentage of product recyclability evaluates the ease of recycling and reuse of manufactured products. Products with higher recyclability are environmentally friendly and contribute to a circular economy by reducing waste and conserving resources.

% of Recyclability of Product Formula

$$\frac{\text{Recyclable Mass of Product}}{\text{Total Mass of Product}} \times 100$$

Percentage of Circular Water Consumption

Metric measures the proportion of water recycled or reused in manufacturing processes. By increasing circular water consumption, manufacturers conserve freshwater resources.

% of Circular Water Consumption Formula

$$\frac{\text{Amount of Treated Waste Water Consumption}}{\text{Total Water Consumption}} \times 100$$

Percentage of Circular Water Discharge

Percentage of circular water discharge evaluates the proportion of wastewater treated and reused in manufacturing processes. Manufacturers invest in wastewater treatment technologies and sustainable practices to minimize water discharge.

% of Circular Water Discharge Formula

$$\frac{\text{Quantity of Circular Water Discharge}}{\text{Total Water Consumption}} \times 100$$

Waste Reduction Rate

Waste reduction rate measures the percentage of waste generated relative to production output. Higher waste reduction rate indicates effective waste management practices, such as recycling, reuse, and waste minimization.

Waste Reduction Rate Formula

$$\left(\frac{\text{Amount of Initial Waste} - \text{Amount of Final Waste}}{\text{Amount of Initial Waste}}\right) \times 100$$

TRIR (Total Recordable Incident Rate)

TRIR calculates the total number of recordable workplace incidents per 100 full-time employees within a given period, typically one year. Decreasing TRIR is desirable, indicating fewer workplace incidents and a safer working environment for employees.

TRIR Formula

$$\frac{\text{Number of Recordable Injuries \& Illnesses} \times 200{,}000}{\text{Employee Total Hours Worked}}$$

LTIFR (Lost Time Injury Frequency Rate)

LTIFR measures the rate of lost time injuries per million hours worked, providing insight into the frequency of injuries that result in lost workdays. Lower the LTIFR indicates fewer injuries on the shop floor.

LTIFR Formula

$$\frac{\text{Number of Lost Time Injuries} \times 1{,}000{,}000}{\text{Employee Total Hours Worked}}$$

Days without Safety Incident

Days without Safety Incident measures the consecutive number of days during which no workplace accidents or incidents resulting in injury or harm occur. Increasing the number of days without safety incidents indicates a safer work environment. Implementing regular safety training to employees, conducting routine safety inspections, and fostering a culture of safety awareness can help extend the duration of days without safety incidents.

Days without Safety Incident Formula

$$\left(\text{Current Date} - \text{Date of Last Safety Incident}\right)$$

Number of Safety Violations

Metric quantifies the total instances of non-compliance with safety regulations or protocols within a specified timeframe. Conducting regular safety audits, providing ongoing safety training, implementing disciplinary measures for safety violations, and promoting a culture of accountability for safety can help minimize the number of violations.

Number of Safety Violations Formula

$$\sum_{i=1}^{n} V_{(i)}$$

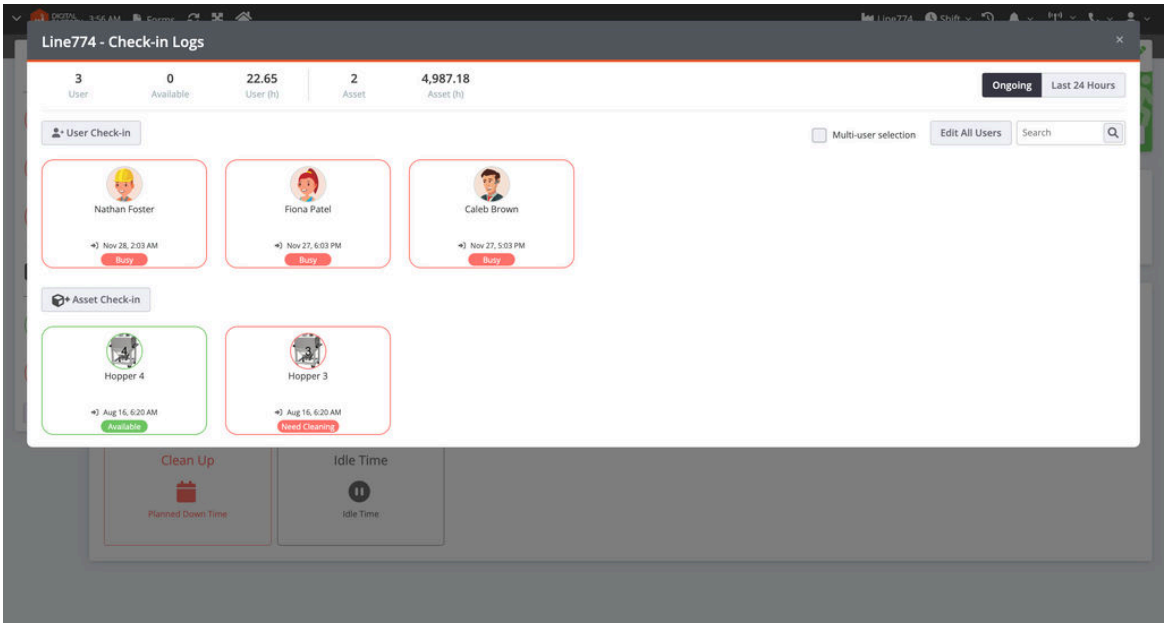
- V(i) represents each individual safety violation recorded.

Satisfaction with Working Environment Score

Satisfaction with Working Environment Score assesses employees' perceptions of safety and satisfaction with their workplace environment through surveys or feedback mechanisms. Improving the satisfaction with working environment score is desirable, indicating higher levels of employee morale, engagement, and perceived safety.

Employee Attendance Rate

Employee Attendance Rate measures the percentage of scheduled work hours fulfilled by employees without absences. To measure this metric in real-time with ease and evacuate employees when an undesired event like a fire occurs, RTLS systems and IoT devices can be handy. As demonstrated in the image below, such tools allow managers to know in which lines specific employees are checked in.



Percentage of Workers Trained for Health & Safety

KPI measures the proportion of employees who have received training on health and safety procedures and protocols. Increasing the percentage of workers trained for health & safety is beneficial, ensuring that all employees are equipped with the knowledge and skills to mitigate workplace hazards and respond effectively to emergencies.

% of Workers Trained for Health & Safety Formula

$$\frac{\text{Number of Trained Workers}}{\text{Total Number of Workers}} \times 100$$

Mean Time to Resolution of Safety Issues

Mean Time to Resolution of Safety Issues calculates the average duration taken to address and resolve safety-related concerns or incidents from the time they are reported. Establishing clear reporting channels for safety issues, implementing efficient incident response protocols, conducting root cause analyses to identify underlying safety issues, and prioritizing corrective actions based on risk severity can help manufacturers to minimize resolution duration. To do so executives should improve factory visibility and issue tracking via digital factory solutions.

Mean Time to Resolution of Safety Issues Formula

$$\frac{\sum_{i=1}^{n} T_{(i)}}{n}$$

- T(i) represents the time taken to resolve each safety issue.
- n is the total number of safety issues resolved during the specified period.

7. Financial KPIs

The Financial KPIs offer valuable insights into cost management, revenue generation, and return on investment, empowering manufacturers to make informed decisions and achieve financial success.

Production Cost Per Unit

Production cost per unit calculates the total cost of manufacturing per unit of product. Lower production cost per unit signifies greater cost efficiency and profitability. Manufacturers optimize production processes, streamline operations, and negotiate favorable supplier contracts to reduce production cost per unit and maintain competitiveness in the market.

Production Cost Per Unit

$$\frac{\text{Direct Materials} + \text{Direct Labor} + \text{Overheads}}{\text{Total Number of Units Produced}}$$

Unit Maintenance Cost

Unit maintenance cost evaluates the expenses incurred for maintaining equipment or machinery per unit of production output. Lower unit maintenance cost indicates efficient maintenance practices and optimal asset utilization.

Unit Maintenance Cost Formula

$$\frac{\text{Total Maintenance Costs}}{\text{Total Number of Assets}} \times 100$$

Avoided Cost

Avoided cost assesses the cost savings achieved through efficiency improvements or waste reduction initiatives. By identifying and quantifying avoided costs, manufacturers measure the financial benefits of industry 4.0 transformation, digital lean initiatives and sustainability practices.

Avoided Cost Formula

(Cost Before Implementing the Action − Cost After Implementing the Action)

Unused Capacity Cost

Unused capacity cost evaluates the expenses incurred for maintaining unused production capacity. By minimizing unused capacity cost, manufacturers reduce overhead expenses.

Unused Capacity Formula

Fixed Costs × Unused Capacity Percentage

Overtime Hours

Overtime hours measure the additional labor hours worked beyond regular schedules. High overtime hours indicate inefficiencies in job shop scheduling, resource allocation, or work order management.

Overtime Hours Formula

(Actual Weekly Working Hours − Weekly Threshold of Ideal Working Hours)

ROI (Return on Investment)

ROI calculates the financial return generated from an investment. Higher ROI indicates greater profitability and effectiveness of investment decisions. By utilizing SCW.AI's ROI Calculator, you can estimate the financial return of your digital factory investments.

ROI Formula

$$\frac{\text{Net Return of Investment}}{\text{Cost of Investment}} \times 100$$

Total Revenue

Represents total sales of the company. If the business is profitable, higher revenue is associated with the more valuable business.

Total Revenue Formula

$$\sum_{i=1}^{n} \text{Quantity Sold}_{(i)} \times \text{Price per Unit}_{(i)}$$

Factory Scorecard For Self-Assessment

A scorecard serves as a structured tool to evaluate various facets of manufacturers' operations, processes, and outcomes. It encompasses KPIs against which the manufacturer's performance is measured. These criteria typically cover essential areas such as production, quality, maintenance, sustainability, safety etc.

Each section within the scorecard is assigned a weight reflective of its significance in the overall evaluation. This weight signifies the relative importance of each section in the manufacturer's performance assessment. For instance:

By multiplying the weight assigned to each section with the corresponding score of its KPIs, an overall score can be calculated for Year-to-Date (YTD), Quarter-to-Date (QTD), and Month-to-Date (MTD) performance. This comprehensive evaluation enables manufacturers to gain insights into areas of strength and areas needing improvement, facilitating informed decision-making to optimize operations and enhance overall performance.

You can proceed to the following page to discover an example of a Factory Scorecard meticulously crafted by our team. Within this comprehensive scorecard, you will encounter a blend of key performance indicators spanning production, maintenance, scheduling, and more. Feel free to print it out and populate it with the weights you have designated to effectively evaluate your progress.

Factory Scorecard Example

Month:

	KPI	WEIGHT	TARGET	CURRENT	YTD
Financial	PRODUCTION COST PER UNIT ($)	___%	___	___	___
	TOTAL REVENUE ($)	___%	___	___	___
Production	OEE	___%	___	___	___
	TAKT TIME	___%	___	___	___
	LINE CLEANING VARIANCE	___%	___	___	___
Main.	MTBF	___%	___	___	___
Scheduling	CAPACITY UTILIZATION	___%	___	___	___
	SCHEDULE ADHERENCE	___%	___	___	___
Quality	SCRAP RATE	___%	___	___	___
	CUSTOMER COMPLIANT RATE	___%	___	___	___
Supply Chain	OTIF	___%	___	___	___
	INVENTORY TURNOVER	___%	___	___	___
EHS	GHG EMISSIONS (METRIC TONS)	___%	___	___	___
	% OF CIRCULAR WATER CON.	___%	___	___	___
	MT TO RESOLUTION OF SAFETY ISSUES	___%	___	___	___
	OVERALL	100%			

To monitor Manufacturing KPIs in real-time, start your Digital Factory Transformation today!

Book a Demo now!

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