

1. Strategic Dashboard

Audience: Senior Management (e.g., Plant Manager, Directors)

Purpose: Provide a high-level overview of production performance and long-term trends.

Business Questions:

- 1. What is the overall efficiency of the production line?
- 2. What are the major causes of downtime, and how do they impact productivity?
- 3. Are there any long-term trends in productivity or downtime?

KPIs and Metrics:

KPI	Metric	Formula
Overall Efficiency Ratio	Percentage	$(\text{Total Production Time} / \text{Total Planned Production Time}) * 100$
Total Downtime	Minutes	SUM(Downtime across all batches)
Downtime by Major Factor	Minutes	SUM(Downtime for each major factor)
Average Production Time	Minutes	AVERAGE(End Time - Start Time)
Trend in Productivity	Percentage change over time	$(\text{Current Efficiency} - \text{Previous Efficiency}) / \text{Previous Efficiency} * 100$

Visualizations:

- **Big Number Cards:** Overall Efficiency Ratio, Total Downtime, Average Production Time.
- **Tree map:** Downtime by Major Factor (e.g., Operator Error, Machine Failure).
- **Line Chart:** Trend in Productivity over time (e.g., weekly or monthly).
- **Bar Chart:** Efficiency Ratio by Product.

1. Strategic Dashboard Layout

Audience: Senior Management

Purpose: High-level overview and long-term trends.

Sections:

1. Header Section:

- Title: "Strategic Dashboard - Production Overview"
- Date Range Selector: Users can filter data by week, month, or quarter.

2. Key Metrics Section:

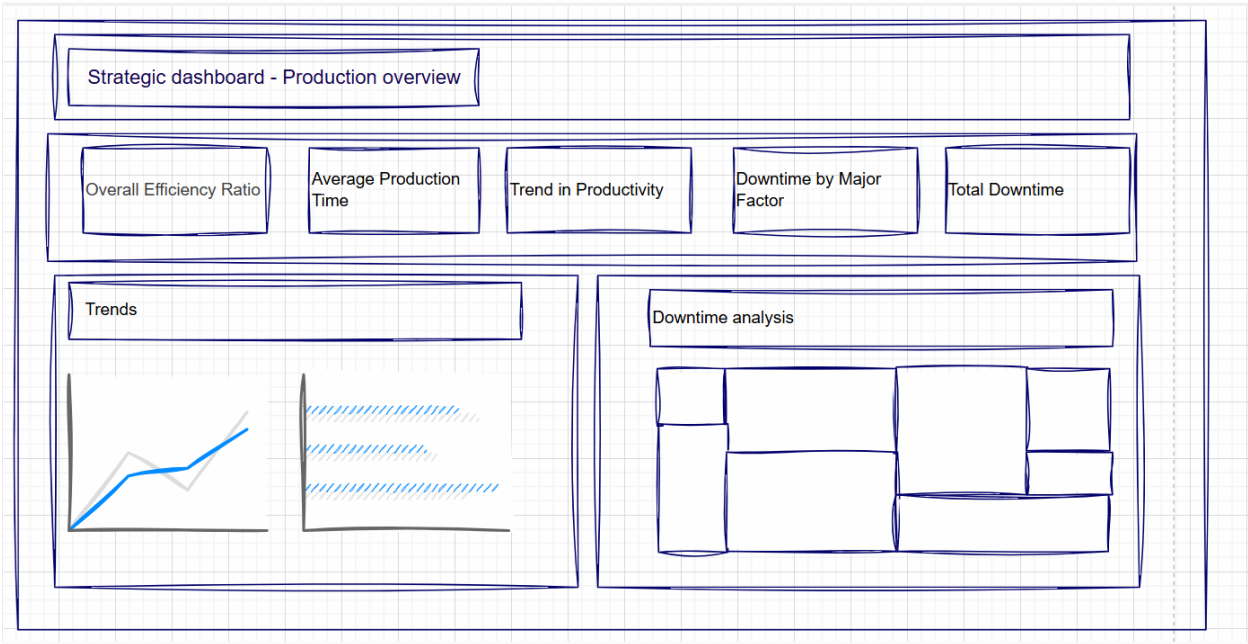
- **Big Number Cards:**
 - Overall Efficiency Ratio
 - Total Downtime
 - Average Production Time
- Layout: 3 cards in a single row.

3. Trends Section:

- **Line Chart:** Trend in Productivity over time (e.g., weekly or monthly).
- **Bar Chart:** Efficiency Ratio by Product.
- Layout: Two charts side by side.

4. Downtime Analysis Section:

- **Heat map:** Downtime by Major Factor (e.g., Operator Error, Machine Failure).
- Layout: One chart centered below the Trends Section.



2. Analytical Dashboard

Audience: Data Analysts, Business Analysts

Purpose: Enable deep dives into data to identify root causes and correlations.

Business Questions:

1. Why does a specific product have higher downtime?
2. Are there correlations between operator experience and downtime?
3. What are the root causes of inefficiencies in the production line?

KPIs and Metrics:

KPI	Metric	Formula
Downtime by Specific Factor	Minutes	SUM(Downtime for each factor)
Operator Error Downtime	Minutes	SUM(Downtime where Operator Error = "Yes")
Correlation: Operator Experience vs. Downtime	Correlation coefficient	Statistical analysis (e.g., Pearson correlation).

Root Cause Analysis	Percentage of downtime by cause	(Downtime for a specific cause / Total Downtime) * 100
Batches with Excessive Downtime	Number of batches	COUNT(Batches where Downtime > Threshold)

Visualizations:

- **Drill-Down Bar Chart:** Downtime by Specific Factor (e.g., machine failure, operator error).
- **Scatter Plot:** Operator Experience vs. Downtime.
- **Heatmap:** Downtime by Operator and Product.
- **Pivot Table:** Detailed breakdown of downtime by batch, operator, and factor.
- **Tree Map:** Root causes of downtime (e.g., machine failure, operator error, etc.).

2. Analytical Dashboard Layout

Audience: Data Analysts

Purpose: Deep dives and root cause analysis.

Sections:

1. **Header Section:**
 - Title: "Analytical Dashboard - Root Cause Analysis"
 - Filters: Allow users to filter by Product, Operator, Date Range, and Downtime Factor.
2. **Downtime Breakdown Section:**
 - **Drill-Down Bar Chart:** Downtime by Specific Factor (e.g., machine failure, operator error).
 - **Heatmap:** Downtime by Operator and Product.
 - Layout: Two charts side by side.

3. **Correlation Analysis Section:**

- **Scatter Plot:** Operator Experience vs. Downtime.
- Layout: One chart centered below the Downtime Breakdown Section.

4. **Root Cause Analysis Section:**

- **Tree Map:** Root causes of downtime (e.g., machine failure, operator error, etc.).
- **Pivot Table:** Detailed breakdown of downtime by batch, operator, and factor.
- Layout: Two visualizations side by side.

3. Operational Dashboard

Audience: Supervisors, Team Leads, Operators

Purpose: Provide real-time metrics and alerts for day-to-day operations.

Business Questions:

1. How is the production line performing today?
2. Which batches are experiencing the most downtime, and why?
3. Are there any immediate issues that need to be addressed?

KPIs and Metrics:

KPI	Metric	Formula
Daily Production Time	Minutes	SUM(End Time - Start Time for the day)
Daily Downtime	Minutes	SUM(Downtime for the day)
Downtime by Batch	Minutes	SUM(Downtime for each batch)
Operator Performance Today	Percentage	(Production Time / Time Worked) * 100
Batches Completed Today	Number of batches	COUNT(Batches completed today)

Visualizations:

- **Big Number Cards:** Daily Production Time, Daily Downtime, Batches Completed Today.
 - **Bar Chart:** Downtime by Batch (top 10 batches with the most downtime).
 - **Table:** Operator Performance Today (real-time or daily summary).
 - **Line Chart:** Hourly Downtime (trend throughout the day).
 - **Alert System:** Highlight batches with excessive downtime or operator errors.
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3. Operational Dashboard Layout

Audience: Supervisors, Operators

Purpose: Real-time monitoring and alerts.

Sections:

1. Header Section:

- Title: "Operational Dashboard - Real-Time Monitoring"
- Date/Time Selector: Allow users to view data for the current day or shift.

2. Key Metrics Section:

- **Big Number Cards:**
 - Daily Production Time
 - Daily Downtime
 - Batches Completed Today
- Layout: 3 cards in a single row.

3. Downtime Alerts Section:

- **Bar Chart:** Downtime by Batch (top 10 batches with the most downtime).
- **Alert System:** Highlight batches with excessive downtime or operator errors (e.g., red/yellow/green indicators).

- Layout: One chart and alert system side by side.

4. Operator Performance Section:

- **Table:** Operator Performance Today (real-time or daily summary).
- **Line Chart:** Hourly Downtime (trend throughout the day).
- Layout: Two visualizations side by side.

Summary of Dashboards

Dashboard	Audience	Purpose	Key KPIs
Strategic	Senior Management	High-level overview and long-term trends	Overall Efficiency, Total Downtime, Trend in Productivity.
Analytical	Data Analysts	Deep dives and root cause analysis	Downtime by Specific Factor, Operator Error Downtime, Root Cause Analysis.
Operational	Supervisors, Operators	Real-time monitoring and alerts	Daily Production Time, Downtime by Batch, Operator Performance Today.

Dashboard Layout Summary

Dashboard	Sections	Visualizations
Strategic	1. Header 2. Key Metrics 3. Trends 4. Downtime Analysis	Big Number Cards, Line Chart, Bar Chart, Pie Chart.

Analytical	1. Header 2. Downtime Breakdown 3. Correlation Analysis 4. Root Cause Analysis	Drill-Down Bar Chart, Heatmap, Scatter Plot, Tree Map, Pivot Table.
Operational	1. Header 2. Key Metrics 3. Downtime Alerts 4. Operator Performance	Big Number Cards, Bar Chart, Alert System, Table, Line Chart.