Final Project Proposal: Manufacturing Downtime Analysis and Forecasting

1. Project Description

The project aims to analyze and forecast manufacturing downtime to enhance production efficiency and reduce productivity losses. By leveraging historical production data the team will identify the root causes of downtime evaluate performance trends and build predictive models to forecast future downtime occurrences. The project will also deliver a Tableau dashboard to visualize insights and support data driven decision making for continuous process improvement.

2. Group Members & Responsibilities

Name	Responsibilities
Fawzia El-Desoky	(Data collection and preprocessing)
Hanan Ibrahim	(Requirement gathering and KPI definition)
Mohamed Nady	(Data cleaning, analysis, and visualization)
Abdelrahman Gamal	(Dashboard creation and report design)

3. Team Leader

Team Leader: Abdelrahman Gamal
Email: abdog0706@gmail.com

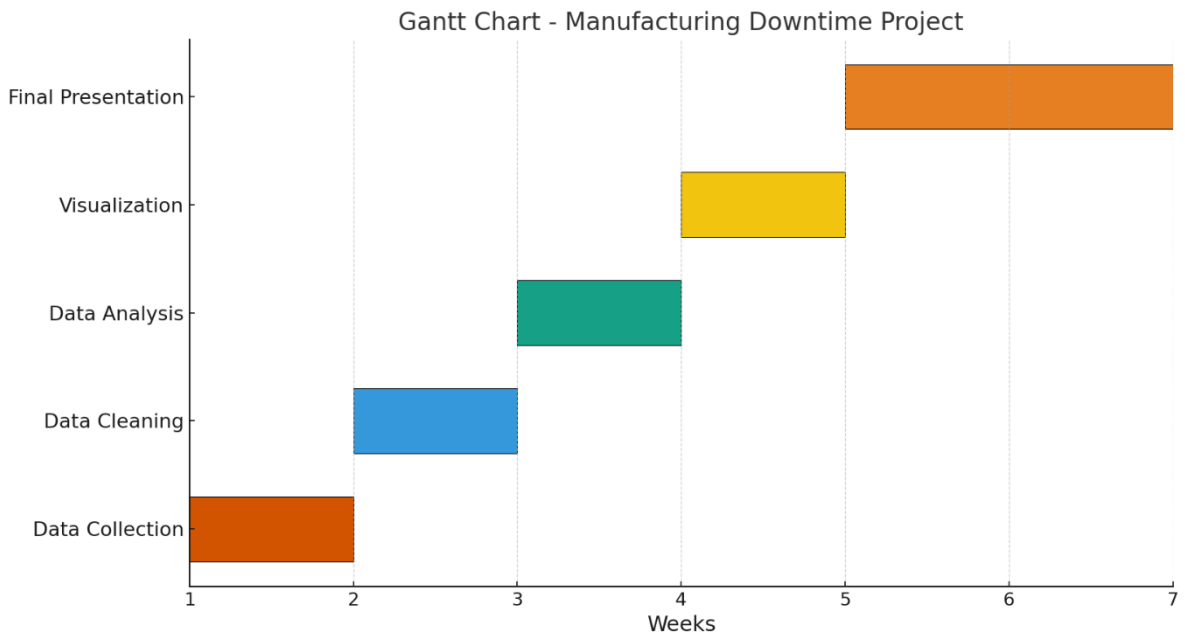
4. Objectives

1. Build a comprehensive data model representing manufacturing and downtime metrics.
2. Clean and preprocess raw production data to ensure accuracy and consistency.
3. Identify and analyze key factors contributing to downtime.
4. Develop predictive models to forecast future downtime events and production output.
5. Create an interactive Tableau dashboard to visualize analytical findings.
6. Provide actionable recommendations to minimize downtime and improve productivity.

5. Tools & Technologies

- **Python (pandas, matplotlib, seaborn)**: Data cleaning, analysis and forecasting.
- **Tableau/Power Bi**: Visualization and dashboard development.
- **Excel**: Initial data validation and KPI tracking.
- **Microsoft PowerPoint / Word**: Final report and presentation

6. Milestones & Deadlines



7. Expected Outcomes

- A cleaned, well-structured manufacturing dataset ready for analysis.
- Insightful analysis identifying key downtime causes and performance trends.
- Predictive model to forecast downtime and optimize production planning.
- Interactive Tableau dashboard summarizing all findings.
- Practical recommendations for improving operational efficiency.

8. KPIs (Key Performance Indicators)

Category	KPI Description	Target
Data Cleaning & Processing	Percentage of missing, inconsistent, or duplicate records detected and corrected in the manufacturing downtime dataset.	100%
	Accuracy of data model validation (data relationships and schema integrity).	≥ 95%
Analysis & Insights	Percentage of business and operational questions about downtime patterns, causes, and trends that are successfully answered through data analysis.	≥ 90%
	Identification of top downtime causes with quantifiable impact on production (e.g., duration, frequency).	At least 5 key causes identified
Forecasting & Predictive Modeling	Forecasting accuracy of downtime prediction model	≥ 85% accuracy
	Ability to estimate number of batches impacted or produced under predicted downtime conditions.	≥ 90% estimation accuracy
Visualization & Reporting	Average dashboard load time (Tableau).	< 3 seconds
	User satisfaction rate (based on internal testing or peer feedback on dashboard usability).	≥ 80% of users navigate without assistance
Final Documentation & Presentation	Completeness of final report, including methodology, findings, visualizations, and recommendations.	100%
	Number of actionable recommendations provided to minimize future downtime and improve productivity.	≥ 3 recommendations