

WBS

1. Project Management & Planning

- **1.1 Requirements Gathering:** Define specific KPIs (Turnover Ratio, Stockout Rate).
- **1.2 Resource Allocation:** Assign roles (Data Scientist, Dev, Financial Analyst).
- **1.3 Technology Stack Selection:** Choose tools (Python)
- **1.4 Project Timeline & Milestones:** Set deadlines for the MVP (Minimum Viable Product).

2. Data Acquisition & Preparation

- **2.1 Sourcing:** Download datasets from Kaggle (Machine Learning and Data Science Community) or ISTAT.
- **2.2 Data Cleaning:** Handle missing values, outliers, and formatting dates.
- **2.3 Feature Engineering:** Create variables for seasonality, holidays, and promotional periods.
- **2.4 Category Mapping:** Group products to allow for "Category-level" forecasting.

3. Web Application Development

- **3.1 Backend Engine:** Develop the CSV upload functionality and data processing logic.
- **3.2 Frontend UI:** Design the dashboard for viewing indicators (charts, heatmaps).
- **3.3 Data Visualization:** Implement interactive graphs for historical sales vs. predicted demand.
- **3.4 User Authentication (Optional):** Secure login for management staff.

4. Forecasting Model & Analytics

- **4.1 Exploratory Data Analysis (EDA):** Identify trends and seasonal patterns.
- **4.2 Model Selection:** Implement algorithms
- **4.3 Training & Validation:** Split data to test the accuracy of the forecasts.
- **4.4 Integration:** Connect the model to the web app for "on-the-fly" predictions.

5. Financial & Break-even Analysis

- **5.1 Cost Estimation:** Sum up IT hours, server costs, and warehouse overhead.
- **5.2 Benefit Quantification:** Estimate savings from 10–20% reduction in unsold stock.
- **5.3 Break-even Calculation:** Determine the point where the software cost equals the savings.
- **5.4 Margin Analysis:** Calculate the increase in net margin due to optimized promotions.

6. Testing & Deployment

- **6.1 Unit & Integration Testing:** Ensure the CSV upload doesn't crash the system.
- **6.2 User Acceptance Testing (UAT):** Verify the "Management" users find the indicators useful.
- **6.3 Deployment:** Host the application