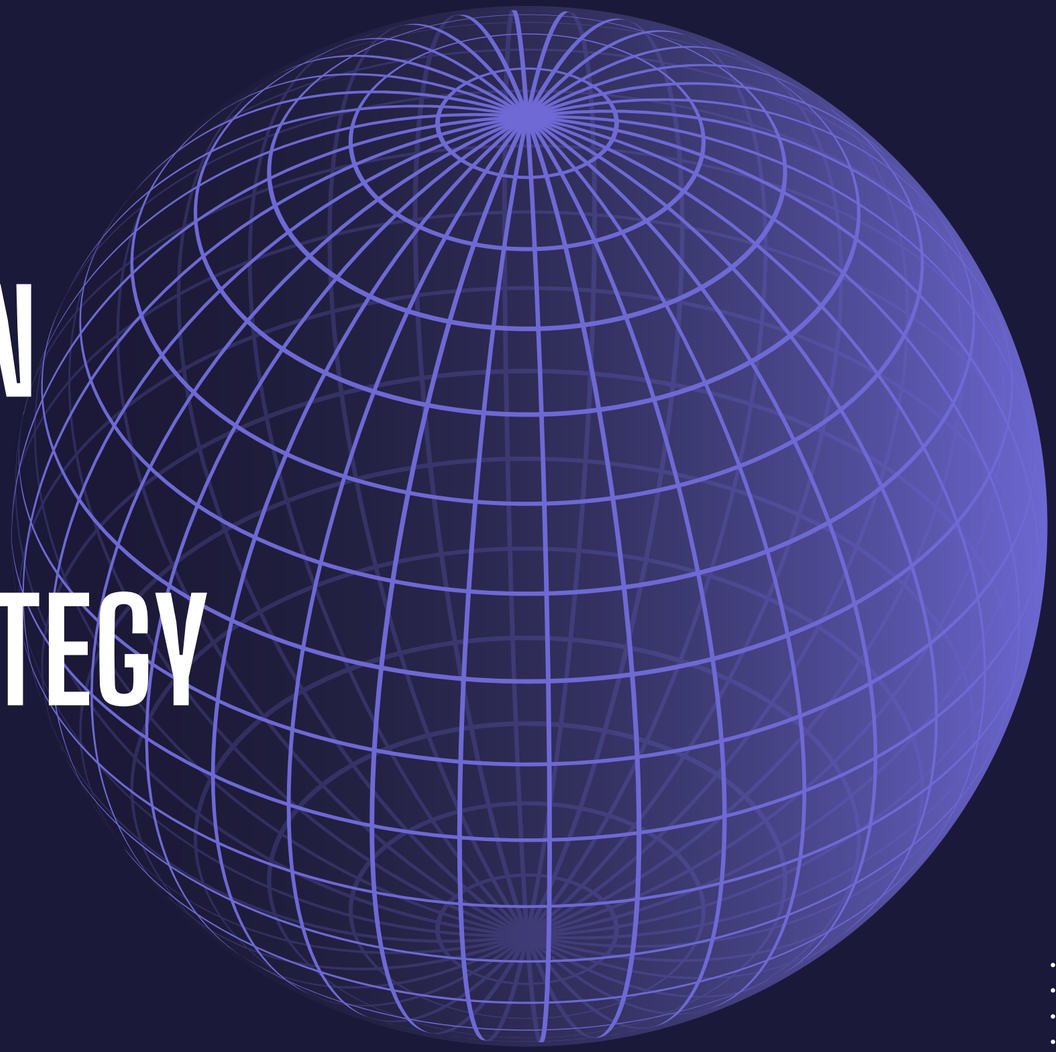
STOCK OPTIMIZATION & COMMERCIALE STARTEGY

MOHAMED GASSOUMI



PLAN

Today's Agenda

- Executive Summary
- Seasonal Trends & Revenue Growth
- Forecasting — Approach & Inputs
- Commercial Strategy — Risk & Discounts
- Demand Forecast & Reorder

EXECUTIVE SUMMARY

Expectations and outcomes

- The goal of the project was to analyze client behavior, identify segments, and forecast future demand.
- Finding a dataset with all required variables (weather, events, stock, client data...) was difficult, so I combined and cleaned different files.
- The project focused on RFM segmentation, trend/seasonal analysis, and time-series forecasting using Prophet.
- After cleaning, feature engineering, and handling missing values, the models were trained and evaluated.

EXECUTIVE SUMMARY

Data inputs:

- Client & Orders Data
  1. client_id
  2. order_id
  3. order_date
  4. qty_sold
  5. consumption
  6. total_amount
- Stock Data
  1. initial_stock
  2. added_stock
  3. final_stock
  4. remaining_stock
  5. expiry_date
  6. days_to_expire
- External Factors
  1. temperature
  2. event / holiday
  3. season

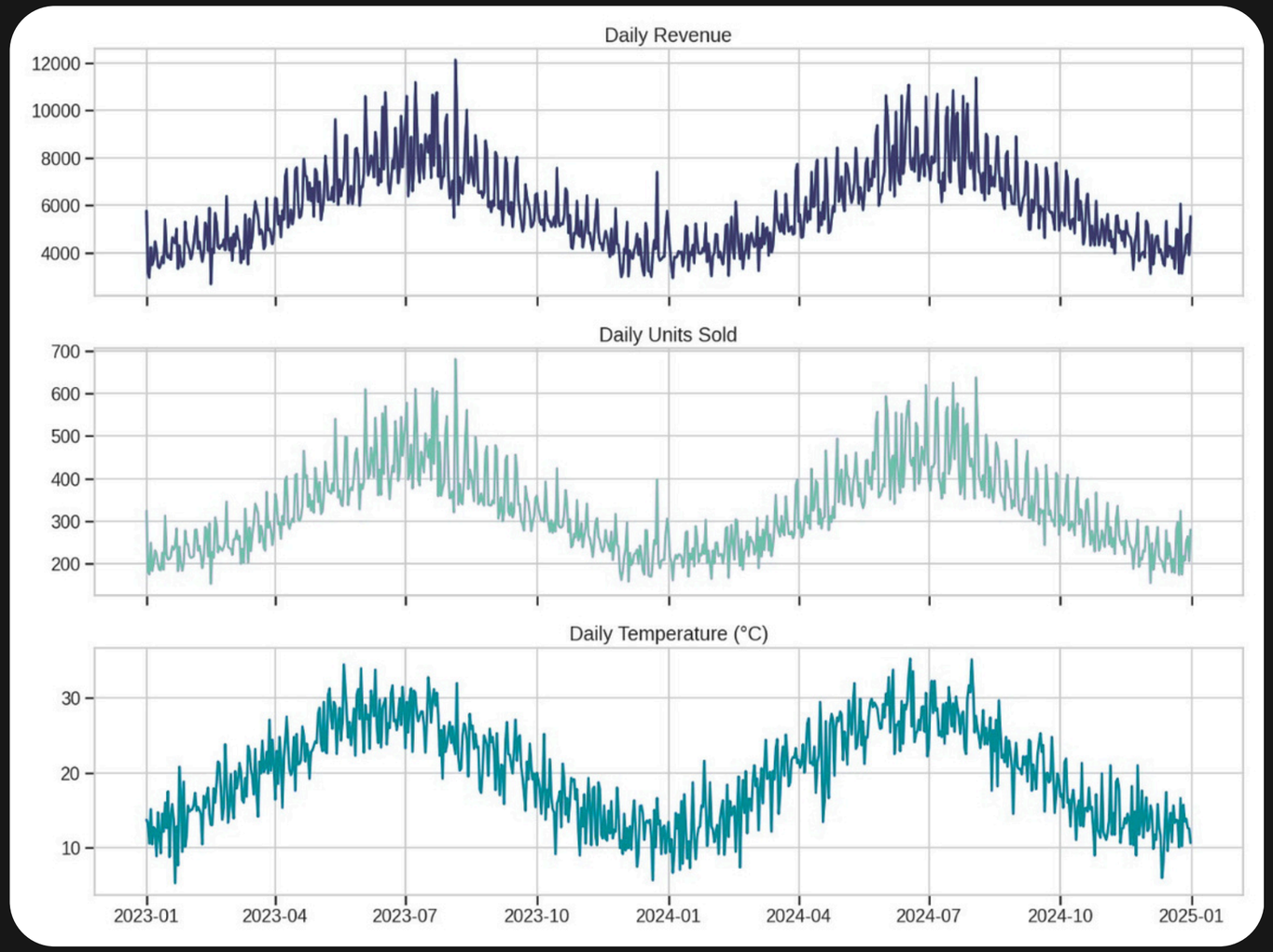
EXECUTIVE SUMMARY

Data Challanges:

- No single dataset had all required fields → had to combine multiple sources.
- Many missing values in stock & expiry → cleaned, aligned, and imputed.
- Merged external factors (weather/events) and fixed date inconsistencies.
- Created key features: days_to_expire, expiry_risk_score, rolling averages.
- Heavy preprocessing was necessary to enable reliable forecasting.

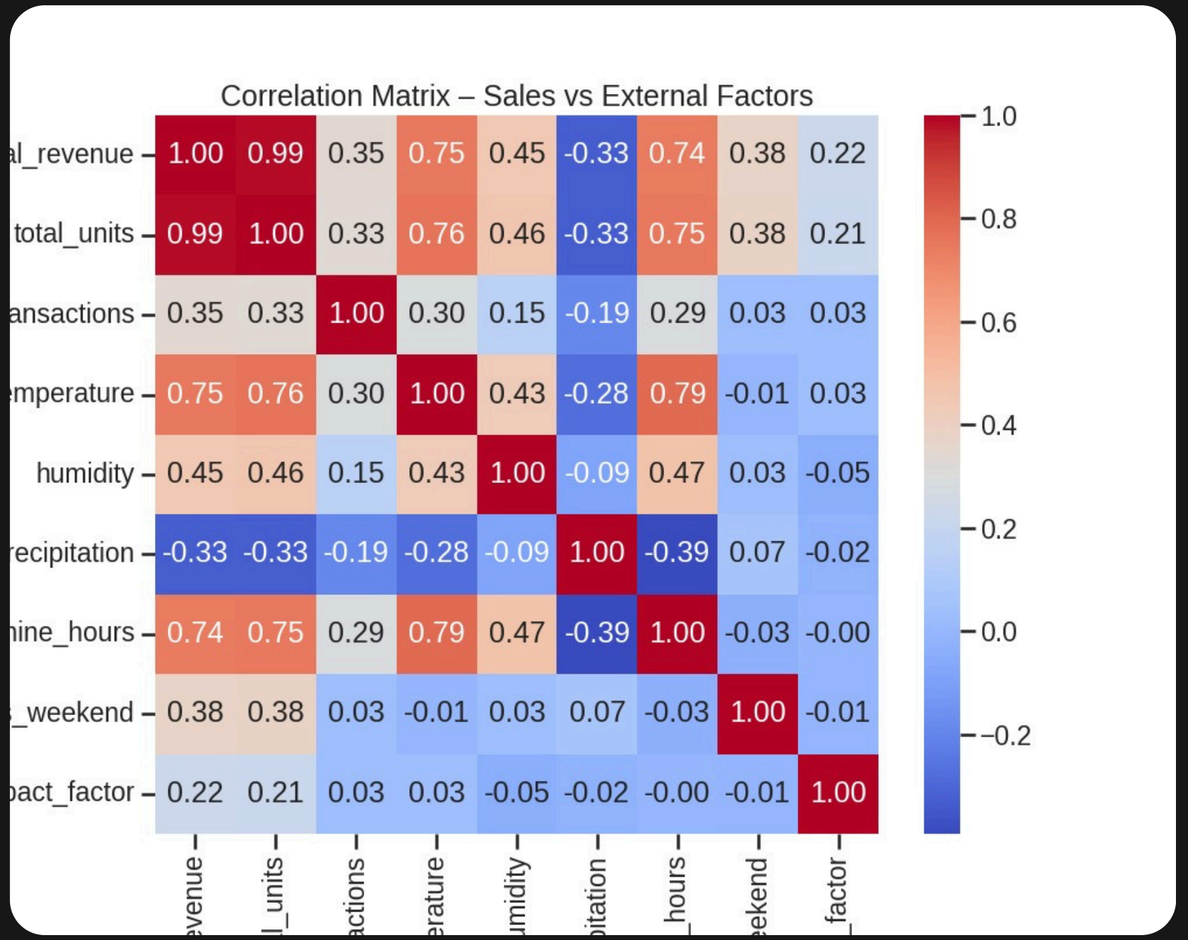
SEASONAL TRENDS & REVENUE GROWTH

Seasonal Patterns and Year-Over-Year Stability



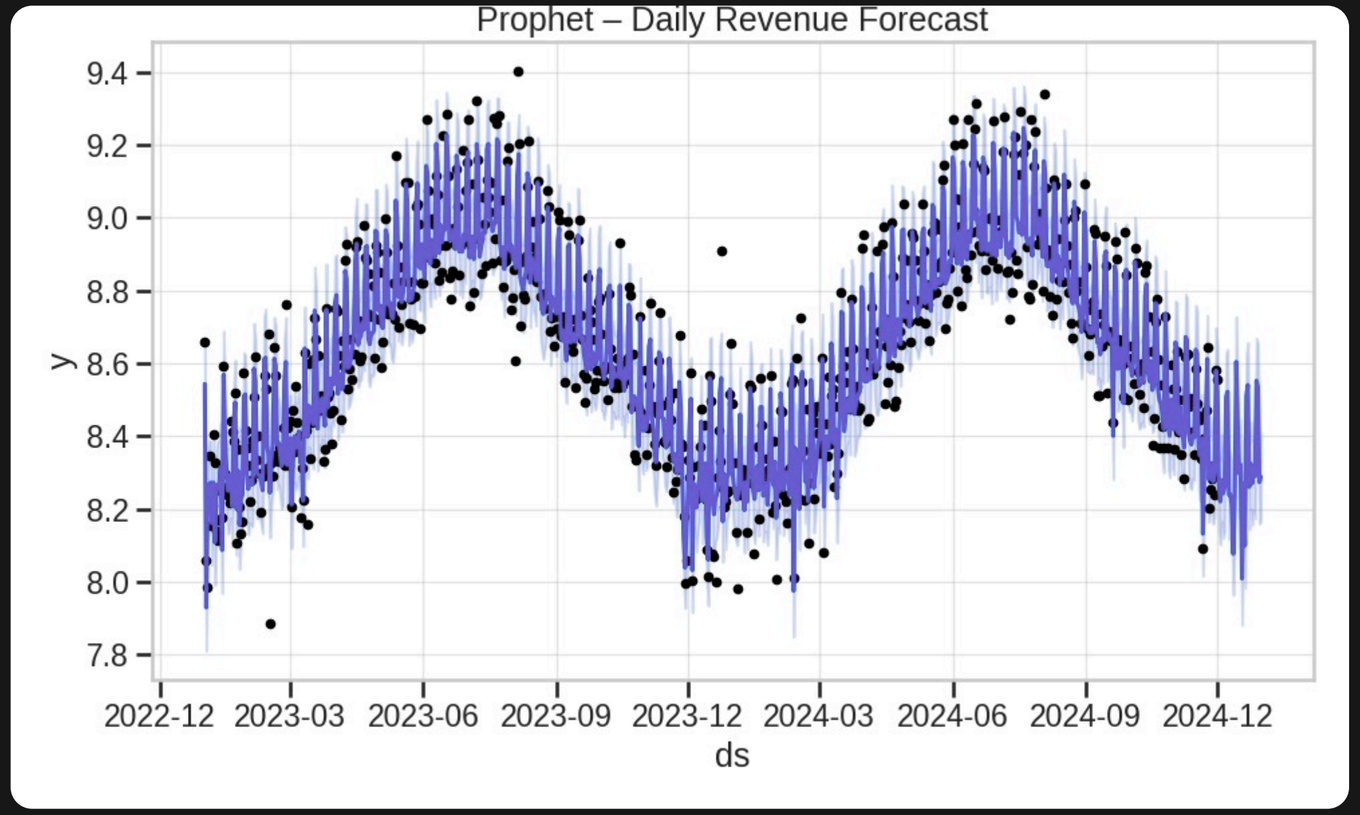
EXTERNAL FACTORS

Understanding Drivers of Sales (Correlation Matrix)



FORECASTING — APPROACH & INPUTS

- MODEL: PROPHET WITH YEARLY, WEEKLY AND ADDED MONTHLY SEASONALITY; MONTHLY = PERIOD 30.5.
- INPUTS:
  - DATE (DS), TOTAL_UNITS (Y), OPTIONAL REGRESSORS:(TEMPERATURE, PRECIPITATION, PLUS IS_WEEKEND.)
- PREPROCESSING:
  - LOG1P TRANSFORM ON Y, LAST 30 DAYS USED FOR TEST, REGRESSORS IMPUTED BY DAY-OF-YEAR MEAN.



RMSE: 30.51, MAPE: 10.20%, R^2: 0.473

FORECASTING — APPROACH & INPUTS

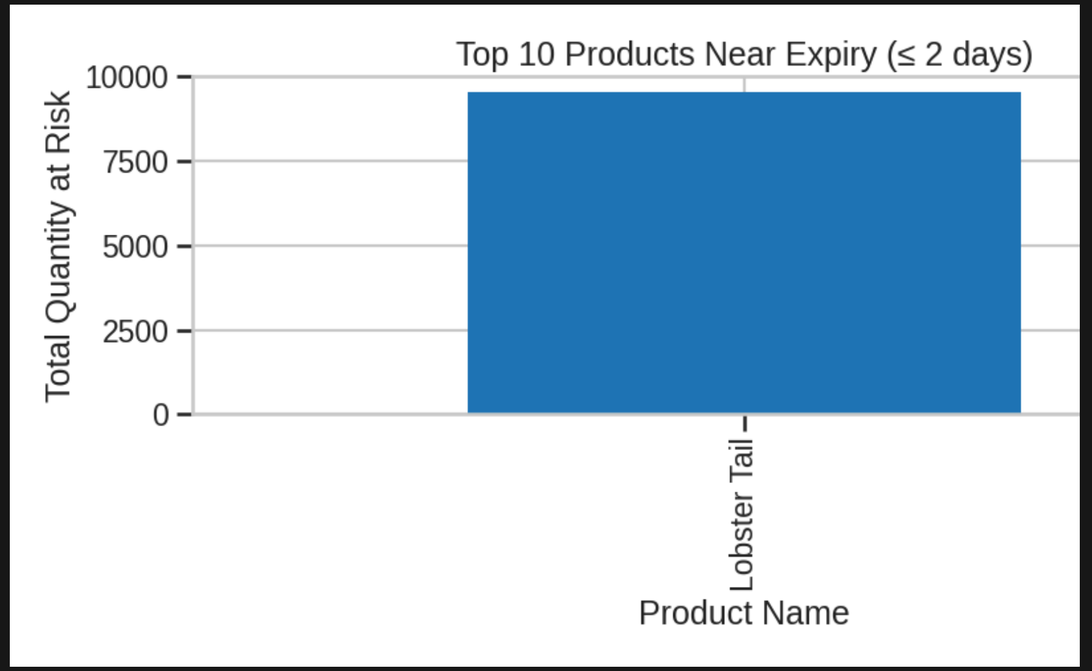
Outputs

OUTPUTS WERE SAVED IN “OUTOUTS/PLOTS”

- OUTPUTS/PLOTS/PROPHET_FORECAST.PNG
- OUTPUTS/PLOTS/PROPHET_COMPONENTS.PNG
- OUTPUTS/PLOTS/PROPHET_RESIDUALS.PNG

COMMERCIAL STRATEGY — RISK & DISCOUNTS

- IDENTIFIES SKUS CLOSE TO EXPIRY (WINDOW = 2 DAYS) AND SCORES THEM BY RATIO & QTY.
- PRODUCES RECOMMENDED DISCOUNT % PER SKU (CAPPED AT 80%).
- SAVED: OUTPUTS/PLOTS/DISCOUNT_RECOMMENDATIONS_{_TS}.CSV AND OUTPUTS/PLOTS/NEAR_EXPIRY_RISK_{_TS}.PNG.



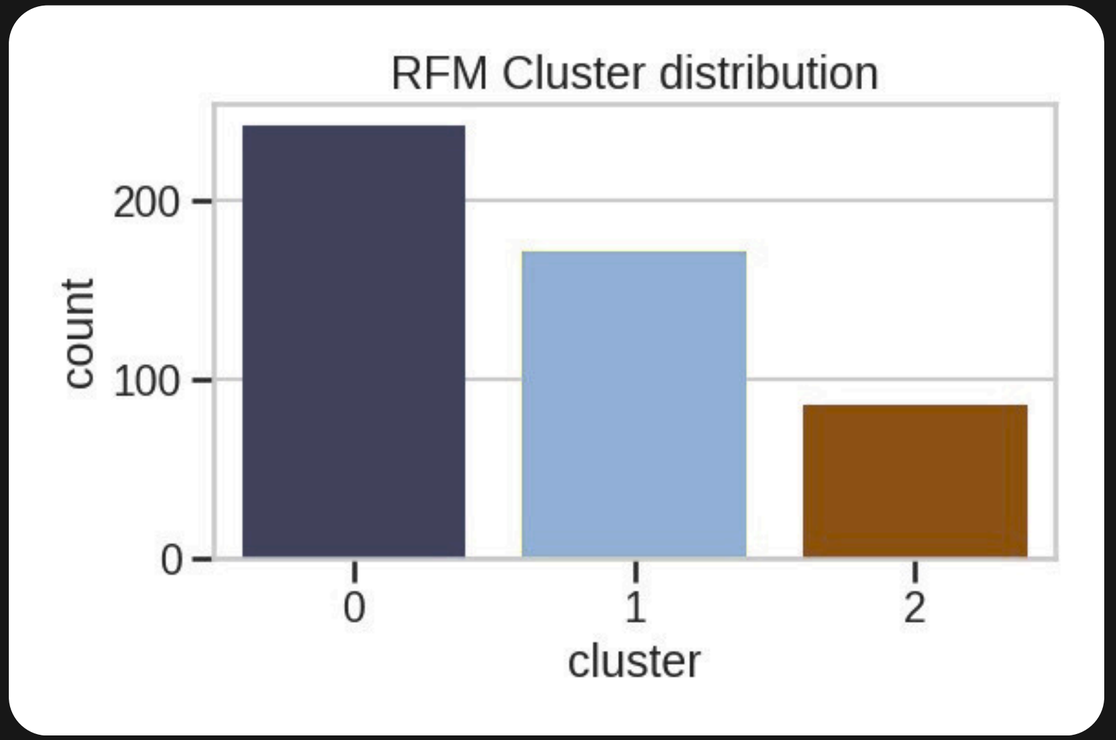
BUNDLES (MARKET-BASKET + FALLBACK)

- FINDS TOP CO-PURCHASED PRODUCT PAIRS USING TRANSACTION IDS; FALLBACK PAIRS FROM TOP-SELLERS.
- SAVED: OUTPUTS/PLOTS/BUNDLES_COPURCHASE_{_TS}.CSV, OUTPUTS/PLOTS/BUNDLE_SUGGESTIONS_{_TS}.CSV, OUTPUTS/PLOTS/TOP_COPURCHASE_PAIRS_{_TS}.PNG (OR BUNDLES_FALLBACK_{_TS}.CSV).

CUSTOMER SEGMENTATION STRATEGY

Customer Segmentation Breakdown (RFM Analysis)

- BUILDS RFM PER CLIENT_ID, CLUSTERS (KMEANS IF SKLEARN AVAILABLE, ELSE MONETARY QUANTILES), MAPS CLUSTERS TO OFFERS (VIP, BUNDLE, DISCOUNT, STANDARD).
- SAVED: OUTPUTS/PLOTS/UPSELL_CROSSSELL_RFM_{_TS}.CSV AND OUTPUTS/PLOTS/RFM_CLUSTER_DISTRIBUTION_{_TS}.PNG.



MONTHLY COMMERCIAL SUMMARY

- TOP-5 PRODUCTS PER MONTH WITH UNITS, REVENUE, EXPIRY RISK & SUGGESTED DISCOUNT MERGED.
- SAVED: OUTPUTS/REPORTS/MONTHLY_COMMERCIAL_SUMMARY_{_TS}.CSV.

THE SUMMARY SUPPORTS DECISION-MAKING REGARDING PROMOTIONS, PURCHASING, AND STOCK ALLOCATION. THE RESULTING CSV FILE PROVIDES A CONSOLIDATED OPERATIONAL AND COMMERCIAL
VIEW

DEMAND FORECAST & REORDER

- FORECASTED NEXT 30 DAYS OF DEMAND FOR EACH PRODUCT.
- USED PROPHET WHEN ENOUGH HISTORY; FALLBACK TO SIMPLE MEAN OTHERWISE.
- CALCULATED WEEKLY & MONTHLY DEMAND, LEAD-TIME DEMAND, SAFETY STOCK, AND REORDER QUANTITY.
- OUTPUT CSV: OUTPUTS/REPORTS/DEMAND_FORECASTS_REORDER_{TIMESTAMP}.CSV
- PLOT SAVED: OUTPUTS/PLOTS/TOP_REORDERS_{TIMESTAMP}.PNG

TODAY'S TOPIC

Brief Introduction

Kick off the class with an introduction of today’s lesson or topic. You can be straightforward about it or you can formulate questions that will lead to the formal class discussion. Duplicate this page as many times as needed.

UNDERSTANDING THE TOPIC DEEPER

CONCEPT AND DEFINITION

Take the discussion further by talking about the lesson's key concepts and its corresponding definitions. Duplicate this page as many times as needed to give you more space for discussion. Pair the concepts and definitions with relevant images too for a more visualized presentation of the lesson.

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