Power BI Case Study – ChocoShip (DAX-Focused)

---

1) Business Problem Statement

Company: ChocoShip manufactures and ships chocolate products globally.

Objective: Improve revenue and profitability by understanding how product mix, regions, and delivery performance affect sales and margins over time.

Key Business Questions:

- What are Total Sales, Total Boxes, Average Price/Box, Costs, Profit, Profit Margin?
- Which products/categories drive revenue and margin? Any loss-makers?
- How do sales trend by month/region? Any seasonality?
- What is the Delivered vs. Shipped mix? How does delivery status impact revenue recognition?
- Which regions underperform? Which products to prioritize in each region?
- Are we growing MoM/YoY? What's the MTD/YTD picture?

---

2) Data Overview

- **Fact_Shipment:** ShipmentID, SPID, PID, GID, Shipdate, Amount, Boxes, Order_Status
- **Dim_Product:** PID, Product, Category, Cost_per_box
- **Dim_Geo:** GID, Geo, Region
- **Dim_Calendar:** cal_date, Month_num, month_name, year, weekday_num, weekday_name

---

3) Data Cleaning (Power Query – Step-by-Step)

3.1 Import & Typing

Fact_Shipment

- Set types: ShipmentID (Text), SPID (Text), PID (Text), GID (Text), Shipdate (Date), Amount (Decimal), Boxes (Whole), Order_Status (Text)
- Remove duplicates by ShipmentID

Dim_Product

- Remove currency symbol from Cost_per_box → Decimal Number
- Trim/Clean text columns, ensure PID is Text

Dim_Geo

- Ensure GID is Text; Region & Geo as Text; Trim/Clean

Dim_Calendar

- cal_date → Date; Month_num → Whole; month_name → Text; year → Whole; weekday_num → Whole; weekday_name → Text

3.2 Normalization & Quality

- Standardize Order_Status values
- Validate referential integrity
- Optional: add Price_per_Box = Amount / Boxes (handle divide-by-zero safely in DAX)

---

4) Data Model & Relationships

- **Relationships:**
  - shipments[PID] → Products[PID]
  - shipments[GID] → locations[GID]
  - shipments[Shipdate] → Calendar[cal_date]
- **Data Types:**
  - Calendar[cal_date] → Date (mark as Date table)
  - Products[Cost_per_box] → Decimal
  - shipments[Amount] → Decimal
  - shipments[Boxes] → Whole Number
  - Text columns → Text

---

5) Calculated Columns & Measures

5.1 Calculated Columns (Row Context)

Shipments:

```
Year = YEAR(shipments[Shipdate])
Month_num = MONTH(shipments[Shipdate])
Month_name = FORMAT(shipments[Shipdate], "MMMM")
Quarter = "Q" & QUARTER(shipments[Shipdate])
Unit_Price = DIVIDE(shipments[Amount], shipments[Boxes], 0)
Cost_per_box_lookup = RELATED(Products[Cost_per_box])
Total_Cost = shipments[Boxes] * RELATED(Products[Cost_per_box])
Profit = shipments[Amount] - Total_Cost
Is_Delivered = IF(shipments[Order_Status] = "Delivered", 1, 0)
```

Products:

```
Cost_Band = SWITCH(TRUE(), Products[Cost_per_box] < 5, "Low",
Products[Cost_per_box] < 7.5, "Mid", "High")
```

Calendar:

```
YearMonth = FORMAT(Calendar[cal_date], "YYYY-MM")
End_of_Month = EOMONTH(Calendar[cal_date], 0)
Week_Number = WEEKNUM(Calendar[cal_date], 2)
```

5.2 Measures (Filter Context)

Core Measures:

```
Total Amount = SUM(shipments[Amount])
Total Boxes = SUM(shipments[Boxes])
Orders Count = COUNTROWS(shipments)
Distinct Products Shipped = DISTINCTCOUNT(shipments[PID])
Distinct Geos = DISTINCTCOUNT(shipments[GID])
Average Amount per Shipment = AVERAGE(shipments[Amount])
Min Amount = MIN(shipments[Amount])
Max Amount = MAX(shipments[Amount])
```

Delivery Status:

```
Delivered Orders = CALCULATE(COUNTROWS(shipments), shipments[Order_Status] =
"Delivered")
Shipped Orders = CALCULATE(COUNTROWS(shipments), shipments[Order_Status] =
"Shipped")
Delivered Amount = CALCULATE([Total Amount], shipments[Order_Status] =
"Delivered")
Delivery Rate % = DIVIDE([Delivered Orders], [Orders Count], 0)
```

Profitability:

```
Profit (Measure) = SUMX(shipments, shipments[Amount] - (shipments[Boxes] *
RELATED(Products[Cost_per_box])))
Profit Margin % = DIVIDE([Profit (Measure)], [Total Amount], 0)
Weighted Unit Price = DIVIDE([Total Amount], [Total Boxes], 0)
Simple Avg Unit Price = AVERAGEX(shipments, DIVIDE(shipments[Amount],
shipments[Boxes], 0))
```

Time Intelligence:

```
Sales YTD = TOTALYTD([Total Amount], Calendar[cal_date])
Sales MTD = TOTALMTD([Total Amount], Calendar[cal_date])
Sales QTD = TOTALQTD([Total Amount], Calendar[cal_date])
Sales PY = CALCULATE([Total Amount], SAMEPERIODLASTYEAR(Calendar[cal_date]))
YoY % = DIVIDE([Total Amount] - [Sales PY], [Sales PY], 0)
Sales Prev Month = CALCULATE([Total Amount],
PREVIOUSMONTH(Calendar[cal_date]))
MoM % = DIVIDE([Total Amount] - [Sales Prev Month], [Sales Prev Month], 0)
Rolling 3M Sales = CALCULATE([Total Amount],
```

```
DATESINPERIOD(Calendar[cal_date], MAX(Calendar[cal_date]), -3, MONTH))
Rolling 12M Sales = CALCULATE([Total Amount],
DATESINPERIOD(Calendar[cal_date], MAX(Calendar[cal_date]), -12, MONTH))
```

Ranking & Top-N:

```
Product Rank by Sales = RANKX(ALL(Products[Product]), [Total Amount], , DESC,
Dense)
Region Rank by Sales = RANKX(ALL(locations[Region]), [Total Amount], , DESC,
Dense)
Top 5 Products Amount = CALCULATE([Total Amount], KEEPFILTERS(TOPN(5,
ALL(Products[Product]), [Total Amount], DESC)))
```

5.3 Key Takeaways

1. **Executive Dashboard**

- A **single-page, interactive dashboard** with:
- Headline KPIs (Sales, Profit, Profit %, Boxes, Delivery Rate, MTD/YTD growth).
- Sales trends with YoY comparison.
- Product mix view (by category, margin contribution).
- Delivery status split (Delivered vs Shipped vs Stopped).
- Regional performance (map + profit %).
- Drill-throughs for deeper product/region analysis.

2. **Actionable Insights**

- **Product Strategy**: Which products/categories drive profit vs. which erode margin.
- **Regional Strategy**: Which geographies underperform and why.
- **Delivery Impact**: How late shipments affect revenue recognition and profit.
- **Seasonality**: Peak months and category spikes for targeted campaigns.
- **Pricing Discipline**: Gaps between unit price and cost per box to flag discounting.

3. **Analytical Toolkit**

- Pre-built **DAX measures** for profitability, time intelligence (MTD, YTD, YoY, rolling averages), and ranking.

- Contextual measures like % of totals, category/region shares, and Top-N products.
- Error-handling and safe divide utilities for robust reporting.

4. **Scalable Data Model**

- Clean, standardized star schema (Shipments fact + Products, Geo, Calendar dimensions).
- Ready for future expansion (new products, regions, or additional KPIs).

5. **Business Value**

- **Faster decision-making**: Executives can see performance at a glance.
- **Revenue unlock**: Highlighting undelivered/shipped backlog that can be converted into recognized sales.
- **Profit optimization**: Identifying high-margin products and regions to prioritize.
- **Operational efficiency**: Pinpointing delivery bottlenecks and pricing issues

5.4 What the Dashboard Shows

- **Headline KPIs**:
    - Sales: ₹44.7M
    - Profit: ₹20.2M (≈45% margin)
    - Boxes: 3.8M
    - Delivery Rate: ~80%
    - MTD Sales: ₹17M
- **Trends**:
    - Monthly sales vs. last year → clear visibility into growth/seasonality.
- **Product Mix**:
    - Dark chocolates lead (~₹12M), followed by Milk (~₹10M), White (~₹8M), Others (~₹6M).
    - Profit % varies by category, highlighting margin leaders vs. laggards.
- **Delivery Status**:
    - Delivered dominates revenue (~₹35.7M), but ~₹9M is still tied up in *Shipped/Stopped* orders — a working capital opportunity.

- **Geography**:
- Regional sales/margin distribution visible on the map → shows where revenue is strong vs. where profitability lags.

✸ Final Key Takeaways

1. **Strong topline with healthy margin** → 45% profit margin is solid, but delivery delays are holding back recognition of ~20% of sales.
2. **Product mix matters** → Dark chocolates are the revenue driver, but Fruit & Nut or premium categories may be margin leaders.
3. **Regional imbalance** → Some geographies contribute high revenue but weaker profit % (pricing/logistics issue).
4. **Seasonality visible** → Sales spike in certain months (likely festive/holiday periods).
5. **Execution lever** → Clearing shipped/stopped orders could immediately boost recognized revenue.

💡 Ideas the Dashboard Supports

- **Product Strategy**: Double down on high-margin categories (e.g., Dark, Fruit & Nut). Reassess low-margin SKUs.
- **Regional Focus**: Investigate underperforming regions — is it pricing, cost, or delivery inefficiency?
- **Delivery Discipline**: Improve logistics to raise delivery rate → faster revenue recognition and better customer satisfaction.
- **Promotional Timing**: Align campaigns with seasonal peaks to maximize uplift.
- **Price vs. Cost Monitoring**: Track unit price vs. cost per box to prevent margin erosion from discounting.

5.5 My Key Takeaways

1. **DAX Mastery for Business Insights**

- Learned how to **separate calculated columns vs. measures**:
    - Columns for fixed row-level values (e.g., Profit per shipment, Unit Price).
    - Measures for dynamic, slicer-sensitive KPIs (e.g., Profit Margin %, YoY Growth).
- Built a **comprehensive KPI suite**:

    - Core metrics: Sales, Boxes, Profit, Profit Margin, Delivery Rate.
    - Time intelligence: MTD, QTD, YTD, YoY, MoM, rolling averages.
    - Context manipulation: % of totals, category/region shares, Top-N ranking.
- Understood the **power of virtual tables** (SUMMARIZECOLUMNS, ADDCOLUMNS) to create ad-hoc analysis without physical tables.
- Appreciated **robust DAX patterns**:
- Safe divide with DIVIDE().
- Dynamic titles and labels with SELECTEDVALUE() and CONCATENATEX().
- Error handling with COALESCE() and ISBLANK().

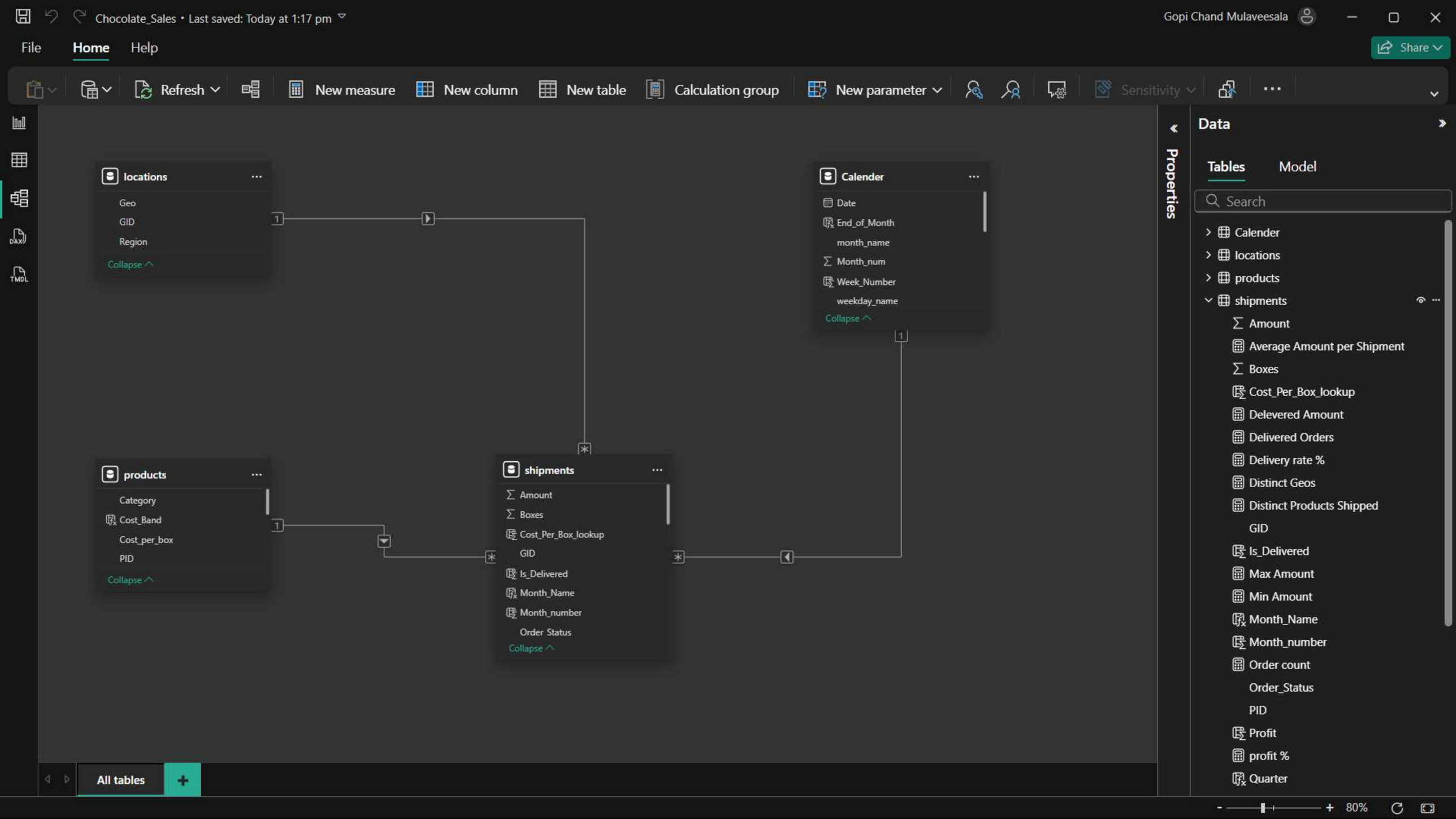
2. **Row-Level Security (RLS)**

- Designed **region-based RLS** so managers only see their own geography (e.g., APAC manager sees APAC only).
- Learned how to apply **DAX filters in RLS roles**:
    - Example: [Region] = "APAC" or dynamic mapping via user attributes.
- Understood that RLS ensures **data confidentiality** while still allowing a single shared model.
- Realized RLS is not just about security — it also **personalizes insights** for each stakeholder.

3. **Strategic Value**

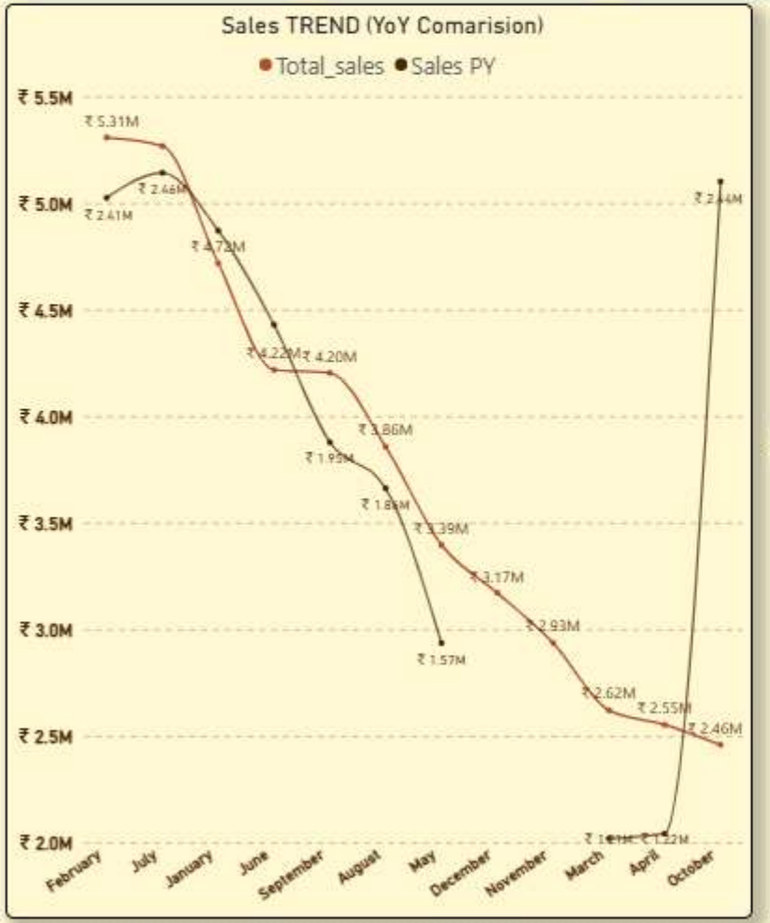
- DAX enables **deep analytical storytelling**: profitability drivers, delivery impact, seasonality, and pricing discipline.
- RLS ensures the **right insights reach the right people**, building trust and governance in reporting.
- Together, they transform Power BI from a reporting tool into a **decision-support system**.

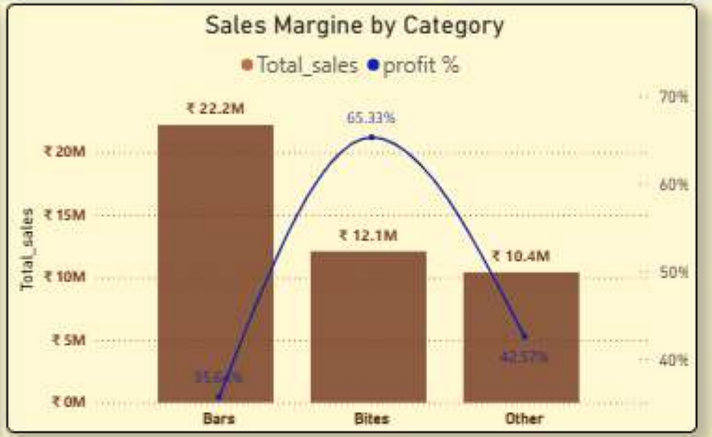
NOTE: - I used ChatGPT and Copilot for my report writing and Data for this Analysis is for Practice purpose only.

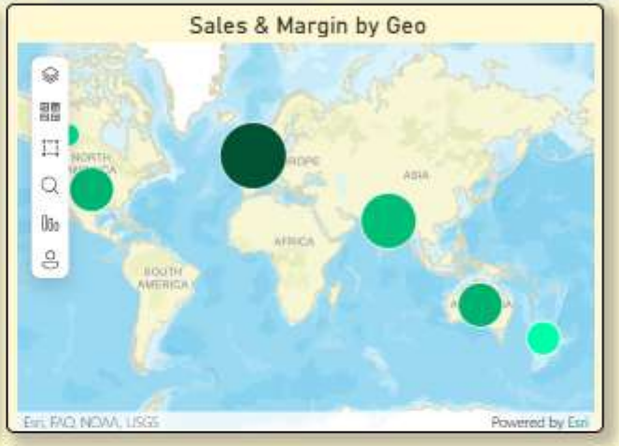

Chocolate_Sales • Last saved: Today at 1:17 pm
Gopi Chand Mulaveesala
File
Home
Help
Share
Refresh
New measure
New column
New table
Calculation group
New parameter
Sensitivity
locations
Geo
GID
Region
Collapse
Calender
Date
End_of_Month
month_name
Month_num
Week_Number
weekday_name
Collapse
products
Category
Cost_Band
Cost_per_box
PID
Collapse
shipments
Amount
Boxes
Cost_Per_Box_lookup
GID
Is_Delivered
Month_Name
Month_number
Order_Status
Collapse
All tables
Properties
Data
Tables
Model
Search
Calender
locations
products
shipments
Amount
Average Amount per Shipment
Boxes
Cost_Per_Box_lookup
Delevered Amount
Delivered Orders
Delivery rate %
Distinct Geos
Distinct Products Shipped
GID
Is_Delivered
Max Amount
Min Amount
Month_Name
Month_number
Order count
Order_Status
PID
Profit
profit %
Quarter
80%

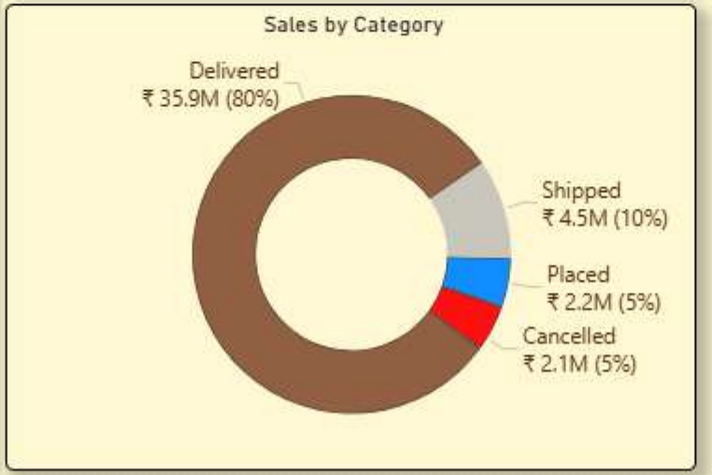
CHOCOLATE'S SALES DASHBOARD

Total Sales	Profit	Profit %	Total Boxes	Dellivery rate %	MTD Sales	MTD Sales
₹ 44.7M	₹ 20.2M	45.3%	3.8M	80.4%	₹ 17.0K	₹ 19M









Slicers

Year
All

Month
All

GEO
All

Category
All

Order Status
All

Product
All

Chocolate_Sales • Last saved: Today at 1:17 pm

Gopi Chand Mulaveesala

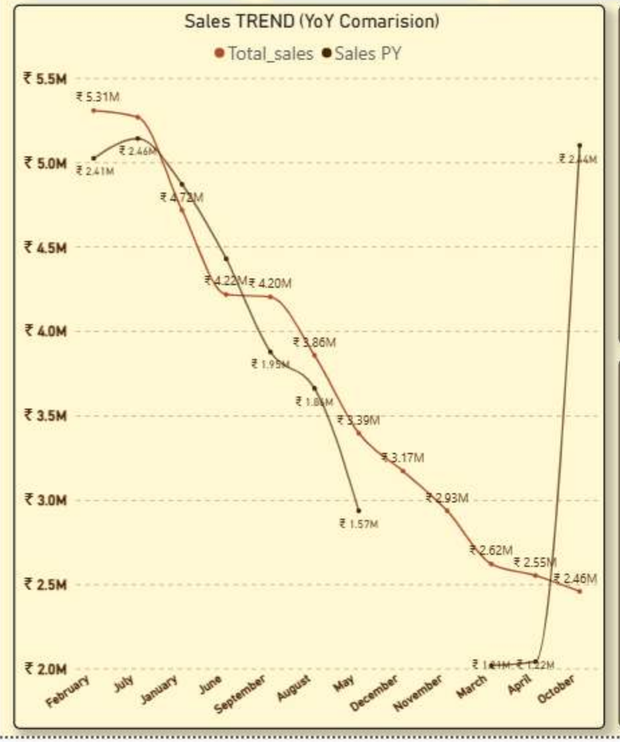
File Home Insert Modeling View Optimize Help

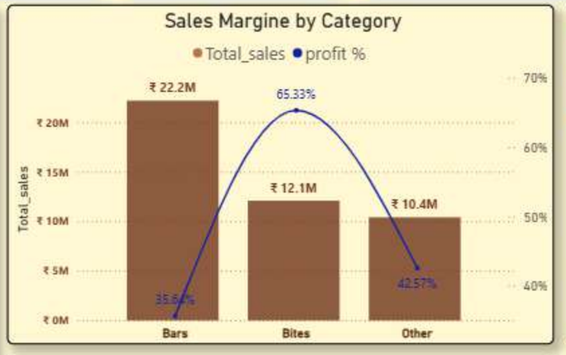
Share

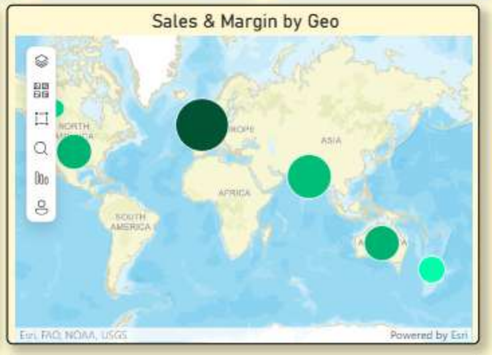
Refresh Sensitivity Publish Prep data for AI Copilot

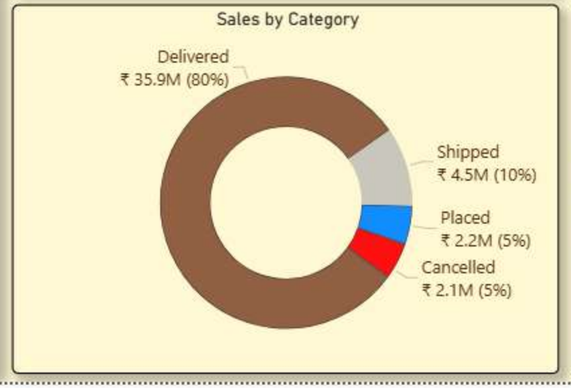
CHOCOLATE'S SALES DASHBOARD

Total Sales	Profit	Profit %	Total Boxes	Dellivery rate %	MTD Sales	MTD Sales
₹ 44.7M	₹ 20.2M	45.3%	3.8M	80.4%	₹ 17.0K	₹ 19M









Slicers

Year: All

Month: All

GEO: All

Category: All

Order Status: All

Product: All

Name 'shipments'[Boxes]

Visualizations

Data

Search

- Simple AVG Unit Price
- Top 5 Products Amount
- Weighted Unit Price
- shipments
  - Amount
  - Average Amount per Ship...
  - Boxes
  - Cost_Per_Box_lookup
  - Delevered Amount
  - Delivered Orders
  - Delivery rate %
  - Distinct Geos
  - Distinct Products Shipped
  - GID
  - Is_Delivered
  - Max Amount
  - Min Amount
  - Month_Name
  - Month_number
  - Order count
  - Order_Status
  - PID
  - Profit
  - profit %
  - Quarter
  - Shipdate
  - ShipmentID

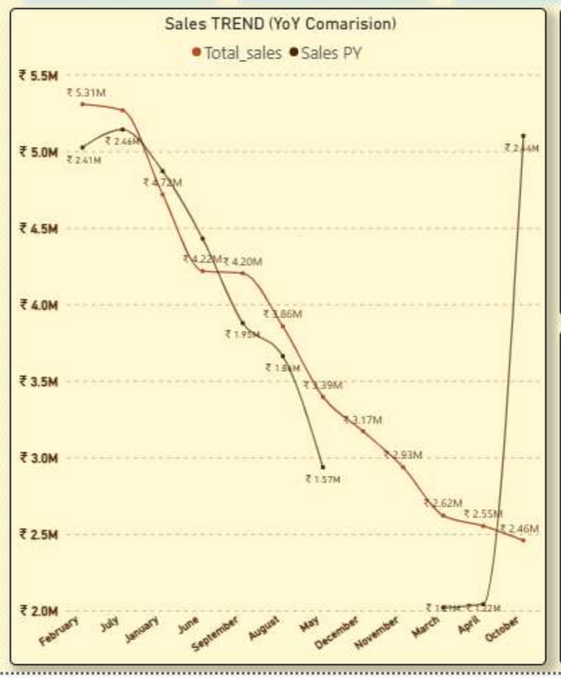
Page 1

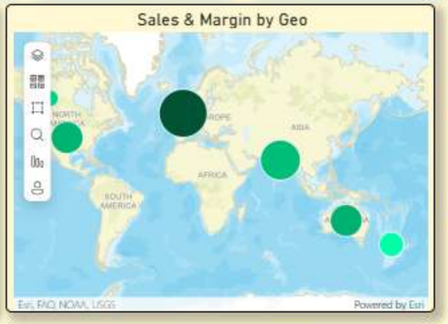
Page 1 of 1

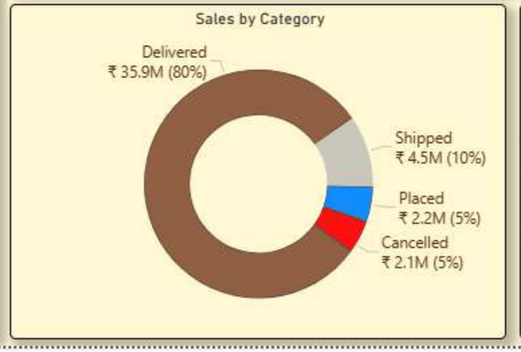
55%

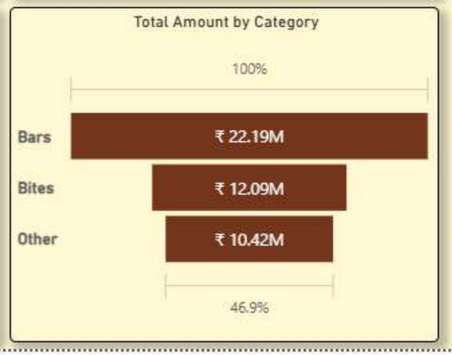
CHOCOLATE'S SALES DASHBOARD

Total Sales	Profit	Profit %	Total Boxes	Dellivery rate %	MTD Sales	MTD Sales
₹ 44.7M	₹ 20.2M	45.3%	3.8M	80.4%	₹ 17.0K	₹ 19M









Slicers

Year: All

Month: All

GEO: All

Category: All

Order Status: All

Product: All

Name [Rolling 12M Sales]

Data

Search

- Calender
  - Date
  - End_of_Month
  - MoM %
  - month_name
  - Month_num
  - Rolling 12M Sales
  - Rolling 3M Sales
  - Sales MTD
  - Sales Prev Month
  - Sales PY
  - Sales QTD
  - Sales YTD
  - Week_Number
  - weekday_name
  - weekday_num
  - year
  - YearMonth
  - YoY %
- locations
  - Geo
  - GID
  - Region
- products
  - Category
  - Cost_Band
  - Cost_per_box

Chocolate_Sales • Last saved: Today at 1:17 pm

Gopi Chand Mulaveesala

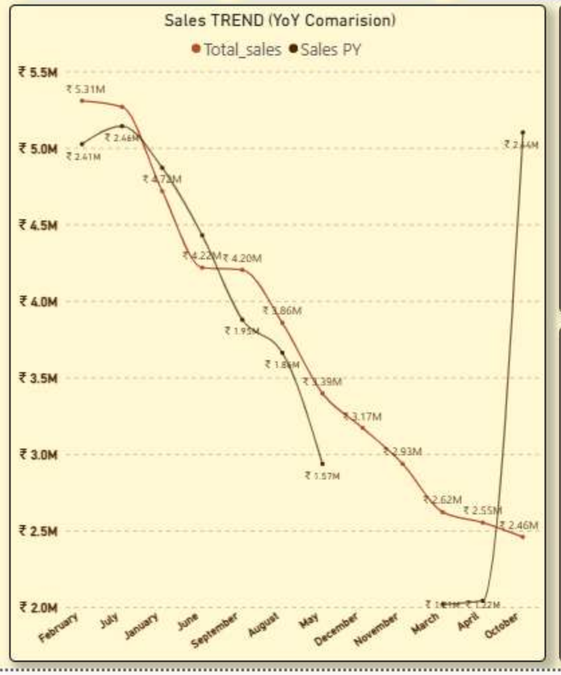
File Home Insert Modeling View Optimize Help

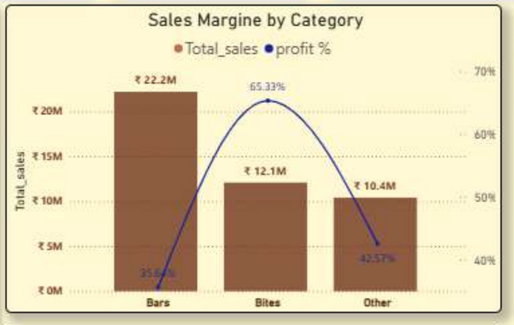
Share

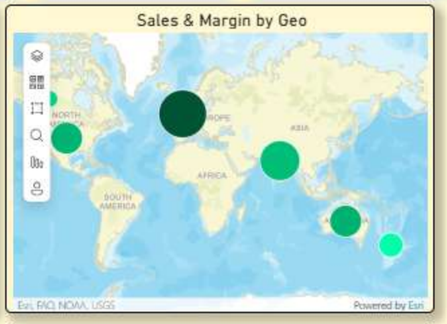
Refresh Sensitivity Publish Prep data for AI Copilot

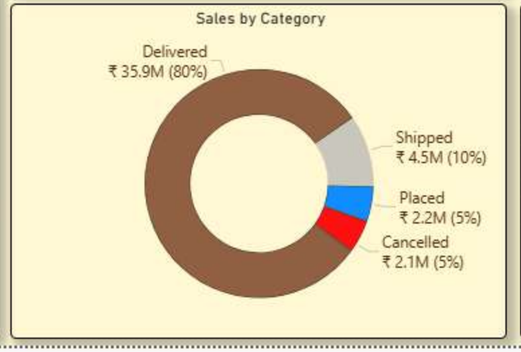
CHOCOLATE'S SALES DASHBOARD

Total Sales	Profit	Profit %	Total Boxes	Dellivery rate %	MTD Sales	MTD Sales
₹ 44.7M	₹ 20.2M	45.3%	3.8M	80.4%	₹ 17.0K	₹ 19M









Slicers

Year: All

Month: All

GEO: All

Category: All

Order Statu: All

Product: All

Visualizations

Data

Search

- Sales YTD
- Week_Number
- weekday_name
- weekday_num
- year
- YearMonth
- YoY %
- locations
  - Geo
  - GID
  - Region
- products
  - Category
  - Cost_Band
  - Cost_per_box
  - PID
  - Product
  - Product Rank by Sales
  - Profite Margine %
  - Profits
  - Region Rank by Sales
  - Simple AVG Unit Price
  - Top 5 Products Amount
  - Weighted Unit Price
- shipments
  - Amount
  - Average Amount per Shipment

Page 1

Page 1 of 1

50%