Technical paper for Power BI based Valmart supermarket chain's Data analysis & visualization project

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Abstract. This study presents a data analysis and visualization project conducted for Valmart, a multi-outlet supermarket chain, using Microsoft Power BI. The project aimed to extract actionable insights from large-scale retail data for 1559 items encompassing over 8,523 rows. Utilizing Power Query for ETL operations and DAX expressions for analytical computation, the research produced interactive Power BI dashboards to aid strategic and operational decisions. Important business KPIs like Sales turnover, Profit margins, and Product performance represented on insightful and easy-to-understand Power BI dashboards.

I INTRODUCTION

Valuable takeaways from efficiently cleaned, organized & analyzed data; visualized on effective dashboard; empowers organizations to formulate strategy, improves decision making, and increases efficiencies / output / turnover.

This project included cleaning, analyzing & transforming huge Excel data spread across 8523 rows using Power Query and thereafter designing & presenting aforesaid business KPIs through a simple & useful dashboard using Power BI [1] with DAX measures & interactive elements.

Data is from 10 supermarket outlets selling 1559 items. Outlets are further classified into 3 Location sub-categories, 3 Size sub-categories, and 4 Type sub-categories.

Dashboard represents important KPIs like Sales, Profit, Rating, and Item visibility; represented Item wise, Outlet wise, Outlet location wise, Supermarket size wise, Year wise, etc.

II RELATED WORKS

"Superstore Sales & Profit Report Using Power BI" - Analytics Vidhya
Chaitanya Shah
https://www.analyticsvidhya.com/blog/2023/01/a-case-study-superstore-sales-profit-report-using-power-bi/
We referred many articles and found article [3] as a Related work.
Both, aforesaid article [3] and our project, focused on dual dashboard architecture for sales and profit analysis, and has used identical tools such as Microsoft Power BI Desktop [1], Power Query for ETL operations and DAX.
While the Article [3] analyses a general superstore data set; Valmart project provides insightful visualization of huge data set of 1559 items spread across 8523 rows from 10 outlets; categorized by location, size and types; thereby demonstrating good data handling capacity and analytical rigour. Further my project includes business context elements such as outlet establishment year and item identifier analysis providing strategic insights which are not emphasized in article [3].

III TOOLS, PROGRAMMING LANGUAGES & DATA SOURCE

- Microsoft Power BI [1] Desktop for Data visualization & transformation, and dashboard report building.
- Power Query for extract, transform and load (ETL) operations.
- DAX (Data Analysis Expressions): Library of functions & operators to build formulas, expressions and custom measures.
- M.S. Excel [2] containing raw data.

IV DASHBOARD VISUAL & STRUCTURE

Dashboard on two interactive panes (Snapshots enclosed as Fig. 1 and Fig. 2) provides a consolidated

view of key business metrics using various visualizations like the following :

Common for both Sales and Profit dashboards:

- Slicer for Outlet location, Outlet size & Item type.
- KPI cards for Total Sales, Total cost, Total Profit & Average sales

Sales dashboard

- Bar charts with Total sales, Average rating, Average sales, and Number of items slicer for various Item types
- Donut chart with Total sales, Average rating, Average sales, and Number of items slicer for Fat contents
- Clustered bar chart for Total sales, Average rating, Average sales, and Number of items slicer for Fat content as per outlet location.
- Area chart of Total sales as per Outlet establishment years,
- Funnel chart: Total sales for various Outlet locations
- Matrix showcasing Total sales, Number of items, Average sales, Average rating, and Item visibility for various outlet types.

Profit dashboard

- Clustered bar chart for Total sales, Average rating, Average sales, Number of items slicer compared with Total profit of various Item identifiers.
- Line chart of Total sales, Total cost & Total profit for various Outlet identifiers.
- Donut chart of Total profit for various Outlet sizes.
- Funnel chart of Total profit for various Outlet locations.
- Matrix showcasing Total profit for Various item identifiers in different types of Outlets

V DATA CLEANING, ANALYSING & TRANSFORMATION

Raw data from an Excel file [1] was imported in Power BI [2] . Thereafter Data labels were standardized, Column quality checks were done, Data type was changed & Duplications were removed by using Power Query editor. Data inflation removed. Data analyzed & measures created by using DAX queries. Multiple measures are combined in a matrix table to create a slicer using DAX. Similarly, 3 individual slicers were made for Outlet location, Outlet size & Item type.

VI DATA VISUALISATION TOOL

Using Power BI [1] , an interactive, eye catching & useful dashboard developed with the following representations:

- Cards with images & data
- Slicers with metrics.
- Slicers with drop-down menu
- Clustered bar chart with data labels & metrics.
- Line charts, Donut charts, Funnel charts & Area charts with Data labels
- Matrix

VII LEARNINGS

- Created dynamic visuals and learned about Power BI [1] visual formatting.
- Applied DAX to create custom measures and KPIs.
- Implemented interactive filtering.

VIII TESTING

- Validated all relationships between tables in the model.
- Verified that DAX measures produce accurate results.
- Tested all slicers and visuals for interactivity.
- Ensured no blank visuals appeared with default filters.

IX RESULTS & CONCLUSION

Using the latest technologies like Power BI [1], satisfactorily developed interactive & useful dashboard depicting a concise view of key business metrics from extensive dataset. Valuable insights from dashboards empowers users to make effective strategic and operational decisions.

X FUTURE ENHANCEMENTS

- Integration with live SQL database or API for real-time updates.
- Mobile optimized view for handheld devices.

XI ACKOWLEDGEMENTS

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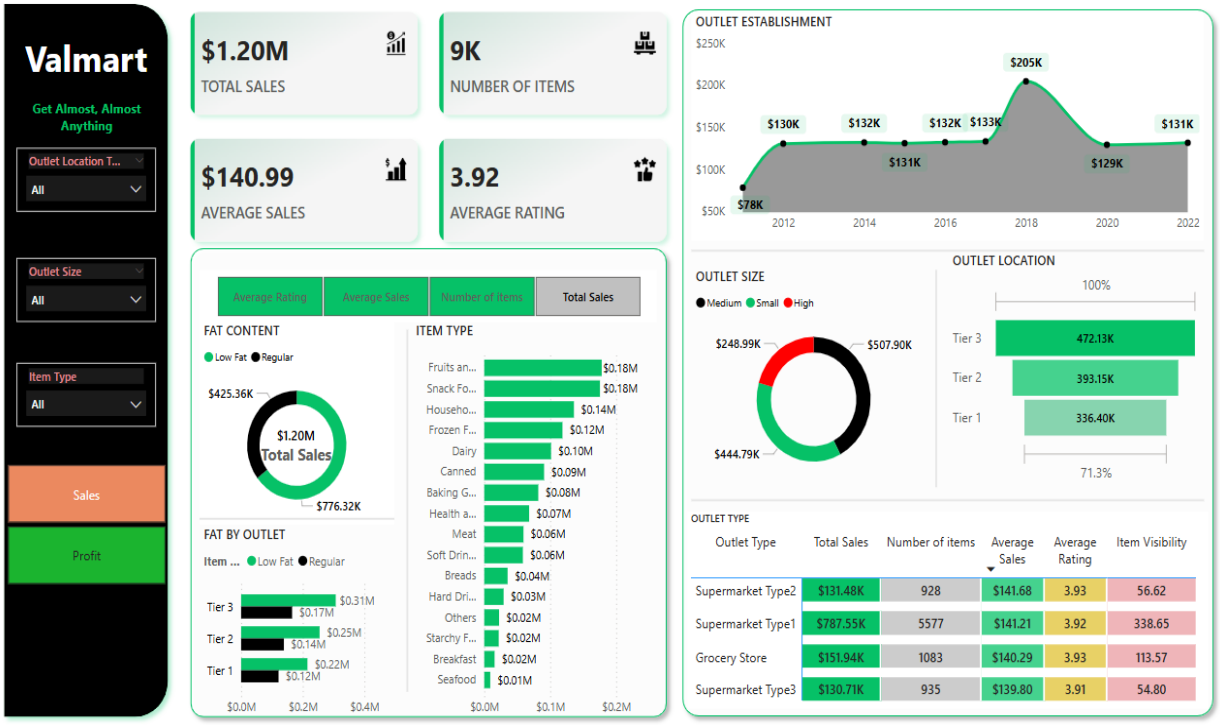
REFERENCE

[1] Microsoft Power BI. https://powerbi.microsoft.com
[2] M.S. Excel
[3]"Superstore Sales & Profit Report Using Power BI" - Analytics Vidhya

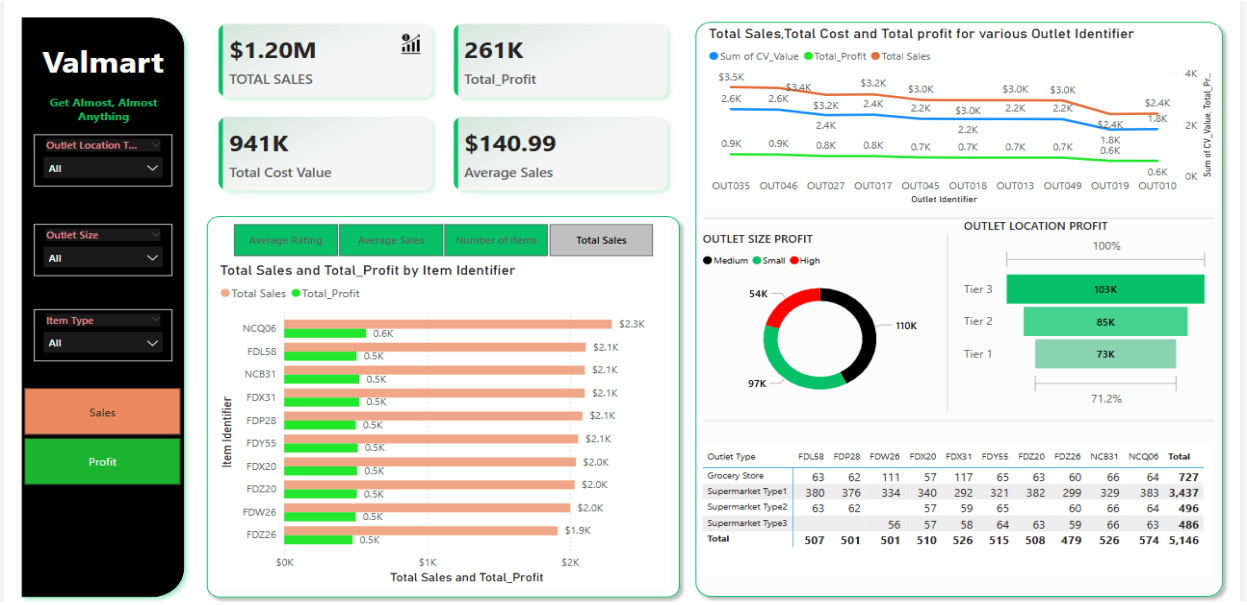
XIII ANNEXURE

Following Snapshots of Sales & Profit Dashboards:
Fig. 1 Sales Dashboard
Fig. 2 Profit Dashboard

Annexure: Snapshots of Sales & Profit Dashboards



"Fig. 1" Sales Dashboard



"Fig. 2" Profit Dashboard