Report: Power BI Practical Exam using AdventureWorks Dataset

1. Introduction

This report provides a comprehensive account of the Power BI practical exam project using the AdventureWorks dataset. The objective was to develop an interactive business intelligence report highlighting sales performance, profitability, and customer insights. The report integrates data preparation, modeling, DAX measure creation, and visualization to generate actionable business intelligence.

2. Project Approach

2.1 Data Preparation

The AdventureWorks dataset was imported into Power BI. Data cleaning and transformation were performed using Power Query, ensuring accuracy and usability. The following key steps were implemented:

- Removal of null values and adjustment of incorrect data types.
- Creation of calculated columns such as Profit, Profit Margin, and Budget.
- Categorization of sales amounts into High, Medium, and Low.
- Filtering of dates to include records from 2018 onwards.
- Identification of outliers using conditional logic.

2.2 Data Modeling

Relationships were created between fact and dimension tables, including Sales, Customers, Products, Territories, and Dates. A star schema approach was adopted to optimize query performance and enhance data interpretability. Hierarchies (e.g., Date hierarchy) were created to allow drill-down analysis.

2.3 Measure Creation

DAX measures were developed to calculate key performance indicators (KPIs). These measures supported profitability analysis, budget comparisons, and customer-level insights. Examples include Total Sales, Profit Margin, and Sales Target comparisons. The following are the DAX codes for the measures.

```
• Avg Sales per Customer = SUM(Sales_data[Sales Amount]) / [Total
  Customers]
```

- Budget = SUMX(Sales_data, [Order Quantity] *
  LOOKUPVALUE(Product_data[Standard Cost], Product_data[ProductKey],
  Sales_data[ProductKey]) * 1.2)

- Profit Margin = SUM(Sales_data[Profit]) / SUM(Sales_data[Sales Amount])

- Profit Margin Target = 0.30

- Running Total Sales =

```
CALCULATE(
  SUM(Sales_data[Sales Amount]),
  FILTER(
    ALL(Date_data[Date]),
    Date_data[Date] <= MAX(Date_data[Date])
  )
)
```

- Sales Target = SUM(Sales_data[Sales Amount]) * 1.1

- Top 5 Products Sales =

```
IF(
  RANKX(
    ALL(Product_data[Product]),
    CALCULATE(SUM(Sales_data[Sales Amount]))
  ) <= 5,
  SUM(Sales_data[Sales Amount]),
  BLANK()
)
```

- Top Customer Sales = MAXX(VALUES(Sales_data[CustomerKey]),
  CALCULATE(SUM(Sales_data[Sales Amount])))

- Total Customers = DISTINCTCOUNT(Sales_data[CustomerKey])

- YoY Growth =

```
VAR CurrentYearSales = SUM(Sales_data[Sales Amount])
VAR PreviousYearSales = CALCULATE(
  SUM(Sales_data[Sales Amount]),
  SAMEPERIODLASTYEAR(Date_Data[Date])
)
RETURN
IF(
  NOT ISBLANK(PreviousYearSales),
  DIVIDE(CurrentYearSales - PreviousYearSales, PreviousYearSales),
  BLANK()
)
```

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2.4 Visual Development

The report employed a range of visualizations, including KPI cards, gauges, decomposition trees, pie charts, bar and line graphs, and custom bullet charts. These visuals were carefully selected to provide clarity and support decision-making.

3. Challenges and Solutions

Challenge	Solution
Missing or inconsistent data in AdventureWorks tables	Applied Power Query filters, transformations, and profiling techniques.
Target values in Gauge visuals required fields rather than static input	Created separate DAX measures to define targets dynamically.
Large dataset relationships caused performance issues	Adopted a star schema approach and optimized DAX calculations.

4. Dashboard Reports

The final Power BI report was divided into several dashboards, each targeting specific aspects of the business. Screenshots were included in the GitHub README and are summarized below:

- Budget and Profit Analysis Dashboard
- Sales Overview Dashboard
- Product Analysis Dashboard
- Customer Analysis Dashboard

5. Key Insights

The dashboards provided several business insights, including:

- Sales underperformed against budget by 9.09%, with profit margins significantly below targets.
- North America led in sales, followed by Europe and Asia, while Africa and South America showed room for expansion.
- Bikes accounted for over 85% of sales revenue, highlighting product concentration risk.
- Customer analysis revealed that a placeholder category ('Not Applicable') accounted for a substantial portion of sales, suggesting data entry or classification issues.

6. Assumptions and Limitations

- Budgets were assumed as 1.2 × Cost for all products.
- Forecasting assumed linear trends, not accounting for external market influences.
- Some product categories lacked complete historical data, impacting year-over-year analysis.

7. Row-Level Security (RLS)

Row-Level Security was implemented to restrict data access by user roles. Specific roles were created to ensure users only view data relevant to their region or department, enhancing confidentiality and data governance.

8. Conclusion

The project successfully demonstrated proficiency in data preparation, modeling, DAX measures, and Power BI visualization. The dashboards offered actionable insights for strategic decision-making, while challenges encountered during the process were effectively resolved through systematic approaches. Overall, the project highlights the value of data-driven analysis in business intelligence.

Appendix A: Data Preparation Screenshots

Screenshot: https://github.com/user-attachments/assets/1ae6ae0d-ca86-4ffe-829c-aff91a695229

Screenshot: https://github.com/user-attachments/assets/2fa2005c-6888-49a5-9783-0435b7f5d856

Screenshot: https://github.com/user-attachments/assets/a5ede4af-cee5-4868-9326-f349d504108f

Screenshot: https://github.com/user-attachments/assets/62e3e53d-166d-4423-8903-c83dc30eaca5

Screenshot: https://github.com/user-attachments/assets/790f30b7-3df3-4492-8d16-11b11e419afd

Screenshot: https://github.com/user-attachments/assets/fea78b73-50bf-44b8-b554-210236ad5732

Screenshot: https://github.com/user-attachments/assets/73cb2aeb-f02d-4915-93b4-5559d8f71d1d

Appendix B: Data Modeling Screenshots

Screenshot: https://github.com/user-attachments/assets/1e4066ca-9f70-4a0c-84f6-c3ed73c8bbb2

Screenshot: https://github.com/user-attachments/assets/707c56a0-5da0-49bd-9425-a330491c21e8

Screenshot: https://github.com/user-attachments/assets/6676397b-8c65-4049-87c6-1be9dbe4a776

Screenshot: https://github.com/user-attachments/assets/e62d7cf7-4009-421f-99f9-74944b190df3

Appendix C: DAX Measures Screenshot

Screenshot: https://github.com/user-attachments/assets/aa3b7733-79d4-4a43-ad6a-723742bd2c6d

Appendix D: Visual Development Screenshots

Screenshot: https://github.com/user-attachments/assets/4b92e1bd-d438-4e23-99ac-f2ef44459b04

Screenshot: https://github.com/user-attachments/assets/0e3a7169-b9e4-4c39-9420-50904685f5e2

Screenshot: https://github.com/user-attachments/assets/a217284c-f01d-4999-9342-20ab1e5ce98d

Screenshot: https://github.com/user-attachments/assets/423a2525-34d6-40f9-b259-e117ffdd96e5

Screenshot: https://github.com/user-attachments/assets/d14098fd-43e9-4a03-9995-eeb7c484afa5

Screenshot: https://github.com/user-attachments/assets/78e878ca-5cb3-4536-a4ac-34cd71ae5359

Screenshot: https://github.com/user-attachments/assets/44f2e6b4-f0aa-4585-ac3f-9b3cb7b43b5e

Screenshot: https://github.com/user-attachments/assets/57f0831c-987f-4493-bc1a-0e37e204ef51

Screenshot: https://github.com/user-attachments/assets/af7cab61-13a1-48fc-b410-3b7ef404192b

Appendix E: Dashboard Screenshots

Screenshot: https://github.com/user-attachments/assets/2df3c1d4-131d-4426-9151-8476bbf62960

Screenshot: https://github.com/user-attachments/assets/a75333cd-11fb-42c0-bc7a-7c1374766fc4

Screenshot: https://github.com/user-attachments/assets/8f9c4a92-d47c-4b8b-b866-e39ce064899f

Screenshot: https://github.com/user-attachments/assets/3267e29d-082e-4dbc-9717-21a0fb420ae8

Appendix F: Row-Level Security Screenshots

Screenshot: https://github.com/user-attachments/assets/38a45957-bf1d-4984-a184-37b1262abed6

Screenshot: https://github.com/user-attachments/assets/2bdf3177-17ab-465f-b786-12a0d7936d23