

Functional / Technical Design Document

DEMO Commerce Growth and Performance
Power BI Analytics Solution

Prepared by Patrick Y
December 2025

Exhibit 1

Partner contacts

Title	Name
Owner	Patrick Y

Exhibit 2

Version history

Version	Changes	Initiator	Date
1.0	Initial Draft	Patrick Y	26/12/2025

1 Introduction

1.1 Document composition

This functional design document (FDD) contains:

- Scope
- Report structure and visualizations
- Data model and architecture
- Additional functionality (bookmarks, interactive features)
- Security and access
- Integration
- Reporting and analytics

1.2 Abbreviations

Exhibit 3

Key abbreviations used in this document

Term	Definition
Power BI	Microsoft Power BI - Business Intelligence and data visualization tool
DAX	Data Analysis Expressions - formula language used in Power BI
DirectQuery	Storage mode that queries data source in real-time without importing
Import	Storage mode that imports and caches data in the model
SSAS	SQL Server Analysis Services database
KPI	Key Performance Indicator
AOV	Average Order Value
COGS	Cost of Goods Sold
MoM	Month-over-Month
CTR	Click-Through Rate

2 Project Overview

2.1 Scope

Report Name: DEMO Commerce Growth and Performance

Owner: Patrick Y

Semantic Model: DEMO Backup-marketing-campaign-analysis-report

Data Source: SQL Server Analysis Services (DirectQuery + Import)

This Power BI solution provides comprehensive e-commerce analytics covering sales performance, customer behaviour, product analysis, and marketing channel effectiveness.

Scope includes:

- Executive dashboard with high-level KPIs and trends (Overview page)
- Detailed breakdown of sales by geography and product categories (Customer and Product page)
- Marketing channel performance and ROI analysis (Ads Cost & Revenue page)
- Star schema data model with 9 tables (1 fact, 8 dimension/lookup)
- Hybrid storage mode (DirectQuery for fact table, Import for dimensions)
- Date range: 01/01/2022 to 31/12/2024
- 14 pre-configured bookmarks for navigation and state management

3 Report Structure and Visualizations

3.1 Report pages overview

The report contains three pages:

- Overview: Executive dashboard with KPIs and trends
- Customer and Product: Detailed sales breakdown by geography and categories
- Ads Cost & Revenue: Marketing channel performance and ROI analysis

3.2 Overview page

Purpose: Executive dashboard providing high-level KPIs and trends

Exhibit 4

Overview page visualizations

ID	Visualization	Details
OVW-01	KPI Cards	Total Orders (16K), Units Sold (167K), Revenue (285.55K), Customers (534), AOV (1.71)
OVW-02	Order Share by Country	Donut chart: UK dominates at 91.3%
OVW-03	Units Sold & Conversion Rate	Combo chart with bar and line by country
OVW-04	Revenue by Product Category	Donut chart (Top 5)
OVW-05	Weekly Orders Trend	Line chart with seasonal breakdown
OVW-06	New vs Returning Revenue	Donut chart (Returning: 95.04%, New: 4.96%)
OVW-07	Sales vs Returns	Donut chart (Sales: 93.16%, Returns: 6.84%)
OVW-08	Weekly Revenue Trends	Combo chart by weekday

Filters: Date range picker, Season dropdown, Order Type (New/Returning)

3.3 Customer and Product page

Purpose: Detailed breakdown of sales by geography and product categories

Exhibit 5

Customer and Product page visualizations

ID	Visualization	Details
CP-01	Sales & Category Breakdown	Drill: Country > Product Category > Category Share
CP-02	Units Sold by Country	Geographic drill-down view
CP-03	Revenue by Product Category	Category-level revenue analysis
CP-04	Units Sold Share	Donut chart by category
CP-05	Customer Engagement	Drill: Country > Category > AOV & Customer Counts
CP-06	Revenue by Country	New vs Returning comparison
CP-07	Revenue by Category	New vs Returning by category
CP-08	AOV & Customer Counts	New vs Returning comparison

3.4 Ads Cost & Revenue page

Purpose: Marketing channel performance and ROI analysis

Exhibit 6

Ads Cost & Revenue page visualizations

ID	Visualization	Details
ADS-01	Ads Cost and Revenue	Drill: Channel > Campaign > Ad
ADS-02	Revenue & Margin % by Channel	Bar chart: Google Shopping, Meta Ads, Amazon, SEO, Email & SMS
ADS-03	Revenue vs COGS	Stacked bar chart by channel
ADS-04	Clicks vs Conversion	Scatter plot
ADS-05	Cost per Conversion	Waterfall chart
ADS-06	Gross Margin Trends	Line chart by Quarter, Month, Channel

Exhibit 7

Channel performance summary

Channel	Revenue	Share
Google Shopping	111.73K	39.13%
Meta Ads	71.33K	24.98%
Amazon	56.21K	19.68%
SEO	28.11K	9.84%
Email & SMS	18.18K	6.37%

4 Data Model and Architecture

4.1 Conceptual object model

The data model follows a star schema design with fact_ecommercepurchases as the central fact table connecting to dimension tables.

Scalability and performance

Storage mode configuration:

- fact_ecommercepurchases: DirectQuery (real-time data, slower queries)
- All dimension tables: Import (fast performance, scheduled refresh)

4.2 Table structure

Exhibit 8

Data model tables

Table	Type	Storage	Description
fact_ecommercepurchases	Fact	DirectQuery	Main transactional data
DimCustomer	Dimension	Import	Customer master data
DimDate	Dimension	Import	Date dimension
DimDateX	Dimension	Import	Extended date attributes
DimProduct	Dimension	Import	Product master data
Customer Segment	Lookup	Import	Customer segmentation
Customer Type Table	Lookup	Import	Customer type definitions
LineType	Lookup	Import	Sale/Return type
OrderType	Lookup	Import	New/Returning order types

4.3 Fact table columns

Exhibit 9

fact_ecommercepurchases columns

Column	Type	Description
Channel	Text	Marketing acquisition channel
Country	Text	Customer country
CustomerFirstPurchaseDate	Date	Customer's first purchase date
CustomerID	Integer	Customer identifier (FK)
Description	Text	Product/transaction description
EstCOGS	Decimal	Estimated cost of goods sold
GrossMargin	Decimal	Calculated gross margin amount
InvoiceDate	Date	Transaction date (FK to DimDate)

DAX measures

Order metrics: Total Orders, Total Orders Weekly, Total Orders Last Month, Total Orders MA30, Total Orders MoM %

Revenue metrics: Total Revenue, Total Revenue Last Month, Total Revenue MoM %, Gross Margin

Customer metrics: Distinct Customers, Distinct Customers Last, Distinct Customers MoM, Customers - Returning

Product metrics: Units Sold, Units Sold Last Month, Units Sold MoM %, Units per Order

Date intelligence: End of Selection (Date), First Purchase Date

4.4 Data model relationships

Star schema with M:1 relationships from fact to dimension tables:

- fact_ecommercepurchases > DimCustomer (via CustomerID)
- fact_ecommercepurchases > DimDate (via InvoiceDate)
- fact_ecommercepurchases > DimProduct (via product key)
- fact_ecommercepurchases > LineType (via line type)
- fact_ecommercepurchases > OrderType (via order type)

5 Additional Functionality

5.1 Report bookmarks

The report contains 14 pre-configured bookmarks for navigation and state management.

Exhibit 10

Bookmark configuration

Bookmark	Purpose
clear slicer	Clears all slicer selections
instruction	Displays instructions/guidance
normal	Default view state
P2 - Insights Open/Closed	Toggle insights panel on Customer & Product page
P3 - Insights Open/Closed	Toggle insights panel on Ads Cost & Revenue page
Overview, P1, P2, P3	Page navigation bookmarks
Impressions & CTR	Specific marketing metrics view

5.2 Interactive features

Exhibit 11

Slicer configuration

Slicer	Type	Scope
Date Range	Date between picker	All pages
Season	Dropdown	All pages
Order Type	Dropdown	All pages
CustomerType	Dropdown	Ads Cost page

Drill-through capabilities:

- Page 2: Country > Product Category > Category Share
- Page 3: Channel > Campaign > Ad

5.3 Visual design

Color theme:

- Primary background: Dark navy (#1e1e2e)
- Card background: Dark charcoal
- Accent colors: Teal/Cyan (charts), Blue (KPIs)
- Text: White/Light gray

6 Reporting and Analytics

6.1 Key business metrics

Exhibit 12

Key performance indicators

Metric	Value
Total Orders	16K
Units Sold	167K
Total Revenue	GBP 285.55K
Distinct Customers	534
Average Order Value	GBP 1.71
Return Rate	~2% (varies by day)
Returning Customer Revenue	95.04%
UK Revenue Share	91.3%

6.2 Data warehousing strategy

Storage Mode: Hybrid (DirectQuery for fact table, Import for dimensions)

Date Range: 01/01/2022 to 31/12/2024

Primary Geography: United Kingdom (91.3% of revenue)

Refresh Schedule: Data last refreshed 15/08/2025

Data Source: Fact_ECommercePurchases database via SQL Server Analysis Services

7 Integration (SSAS DirectQuery)

7.1 Scope

The Power BI report connects to Fact_ECommercePurchases database via SQL Server Analysis Services (SSAS) using DirectQuery mode for the fact table.

7.2 Interface design

Components:

- Power BI Service / Desktop
- SQL Server Analysis Services database
- Fact_ECommercePurchases database

Data structure: Star schema with 1 fact table (DirectQuery) and 8 dimension/lookup tables (Import mode).

Request format: DAX queries generated by Power BI visuals

Response format: Tabular data returned from SSAS