

Fulfillment Orders Performance Power BI Documentation

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Document Purpose:

This document provides comprehensive technical and business documentation of the Power Query transformations and data model used to analyze and report on order fulfillment performance. It details all steps applied to the raw datasets to ensure clean, reliable, and actionable insights in Power BI, supporting key performance indicators and operational decision-making.

Contents:

- Data Source Overviews
 - Power Query Transformation Steps for Orders, Deliveries, OrdersFiltered, and Products Tables
 - Final Data Schemas
 - Business Value and Use Cases Enabled
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Orders Table

Power Query Transformation Steps

1. Load Excel Workbook

- What it does: Connects Power BI to the Excel file.
 - Why: Loads the complete dataset for reporting.
 - Business Value: Provides the foundational transactional data.
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2. Extract “Orders” Sheet

- What it does: Selects the Orders sheet within the workbook.
 - Why: Focuses transformations only on the relevant data tab.
 - Business Value: Keeps the data pipeline efficient and targeted.
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3. Promote First Row to Headers

- What it does: Converts the first row into column headers.
 - Why: Structures the data for consistent referencing.
 - Business Value: Enables clear field names for modeling and visuals.
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4. Set Column Data Types

- What it does: Assigns the following data types:
 - OrderID, CustomerID, Confirmed: Whole Number
 - ProductID, PaymentMethod, OrderChannel: Text
 - OrderDate: DateTime
 - Why: Ensures compatibility for joins, calculations, and filters.
 - Business Value: Prevents errors and improves model performance.
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5. Extract Order Time and Date Components

- What it does: Splits OrderDate into separate fields:
 - Time: Time portion of the order timestamp
 - Date: Date portion of the order timestamp
 - Why: Allows analysis by time of day and calendar date.
 - Business Value: Supports granular reporting such as hourly trends and daily summaries.
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Deliveries Table

Power Query Transformation Steps

1. Load Excel Workbook

- What it does: Loads the Excel file from the specified path.
 - Why: Imports delivery-related data for modeling and analysis.
 - Business Value: Provides visibility into fulfillment operations.
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5. Extract Time and Date from DeliveryDate

- What it does: Splits DeliveryDate into two separate columns:
 - Deliverytime: Time portion
 - DeliveryDatee: Date portion
 - Why: Enables granular analysis of delivery patterns by time of day and date.
 - Business Value: Supports time-series and operational reporting.
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6. Extract Time and Date from ExpectedDeliveryDate

- What it does: Splits ExpectedDeliveryDate into:
 - ExpectedDeliverytime: Time portion
 - ExpectedDeliveryDatee: Date portion
 - Why: Allows comparison of actual vs. expected delivery times.
 - Business Value: Enables SLA and delivery timeliness analysis.
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7. Add Row Flag for Data Inconsistency

- What it does: Adds a column RemoveRowFlag to flag records where:
 - Delivered = 1 and Shipped = 0
 - Why: These records represent logically inconsistent deliveries.
 - Business Value: Prevents invalid data from distorting delivery metrics.
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8. Remove Invalid Rows Based on Flag

- What it does: Filters out rows where RemoveRowFlag = 1.
 - Why: Ensures only valid, consistent delivery records remain in the dataset.
 - Business Value: Improves trust in metrics and reports.
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Final Deliveries Table Schema

Column	Data Type	Description
OrderID	Number	Foreign key linking to Orders table
Shipped	Number	1 if shipped, 0 otherwise
Delivered	Number	1 if delivered, 0 otherwise
DeliveryDate	DateTime	Actual delivery timestamp
ExpectedDeliveryDate	DateTime	Scheduled delivery timestamp
LogisticsPartner	Text	Name of the delivery partner
DeliveryCity	Text	City where the order was delivered
Deliverytime	Time	Time portion extracted from DeliveryDate
DeliveryDatee	Date	Date portion extracted from DeliveryDate
ExpectedDeliverytime	Time	Time portion extracted from ExpectedDeliveryDate
ExpectedDeliveryDatee	Date	Date portion extracted from ExpectedDeliveryDate
RemoveRowFlag	Number	1 = Invalid record removed, 0 = Valid

Business Use Cases Enabled

- Delivery performance tracking (early/on-time/late deliveries)
 - Logistics partner reliability analysis
 - Process quality checks for invalid data scenarios
 - Delivery city heatmaps and operational reporting
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Summary of Steps and Value

Step	Purpose	Value to Business
Split Date and Time	Enable granular reporting	Hourly and daily trend analysis
Flag Invalid Rows	Identify inconsistent records	Improve data integrity
Remove Invalid Rows	Retain only clean records	Support accurate delivery metrics and dashboards

Products Table

Power Query Transformation Steps

1. Load Data from Excel Workbook

- **What it does:** Loads the Excel workbook from the specified file path.
 - **Why:** Brings the source product metadata into Power BI.
 - **Business Value:** Provides all product attributes necessary to enrich and categorize order data.
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2. Extract Specific Worksheet

- **What it does:** Selects only the "Products" worksheet.
 - **Why:** Limits the data import to the relevant tab.
 - **Business Value:** Keeps the data model clean and ensures only the intended data is processed.
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3. Promote First Row to Headers

- **What it does:** Converts the first row into column headers.
 - **Why:** Most Excel sheets have human-readable field names in the first row.
 - **Business Value:** Provides consistent field names for downstream transformations and analysis.
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4. Change Column Data Types

- **What it does:** Explicitly sets data types for all columns:
 - ProductID, ProductName, Category, Supplier: Text
 - Weight_kg: Number
 - **Why:** Guarantees data integrity and prevents type-related errors in joins, measures, and visuals.
 - **Business Value:** Supports reliable calculations (e.g., average weight), categorical grouping (e.g., by category), and filtering (e.g., by supplier).
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Resulting Data Schema

Column Name	Data Type	Description
ProductID	Text	Unique identifier for each product
ProductName	Text	Name of the product
Category	Text	Product category or grouping
Weight_kg	Number	Weight in kilograms
Supplier	Text	Supplier or vendor of the product

Why This Table Matters in the Data Model

- Acts as a dimension table to filter, categorize, and group order and delivery data.
- Enables product-level insights (e.g., sales by category, delivery delays by supplier).
- Supports joins to fact tables such as Orders and Deliveries.
- Provides a clean, well-typed reference dataset essential for accurate reporting.

OrdersFiltered Table

Source: Merged result of Orders and Deliveries tables

Purpose: Clean and enrich order and delivery data to enable fulfillment performance analysis, delay detection, and operational insight.

Power Query Transformation Steps

1. Join Orders with Deliveries

- **What it does:** Joins the Orders table with the Deliveries table using OrderID.
 - **Why:** To append delivery details (such as delivery date, expected date, logistics partner) to the corresponding order.
 - **Business Value:** Enables performance metric calculation, such as delivery timeliness and service quality.
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2. Expand the Delivery Table

- **What it does:** Expands the nested delivery fields into individual columns.
 - **Why:** Makes all delivery attributes available for transformations and calculations.
 - **Business Value:** Provides full access to fulfillment data for downstream metrics.
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3. Calculate Delivery Delay in Days

- **What it does:** Adds a new column calculating the number of days between OrderDate and DeliveryDate.
 - **Why:** Quantifies delivery performance in terms of timeliness.
 - **Business Value:** Identifies late deliveries, tracks SLA adherence, and supports operational monitoring.
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4. Filter Invalid Delays

- **What it does:** Removes rows where DeliveryDelayDays < 0.
 - **Why:** Negative delays are usually caused by incorrect data entries.
 - **Business Value:** Maintains clean, logical data for accurate KPIs and analysis.
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5. Column Cleanup and Renaming

- **What it does:** Removes unnecessary columns, renames fields for clarity, and simplifies column naming.
- **Why:** Makes the data model lean and easy to understand.
- **Business Value:** Reduces confusion and improves usability in report development.

6. Flag Long Delivery Delays

- **What it does:** Adds two columns:
 - A text flag (DeliveryDelayFlag) that categorizes orders as “Delay >90d” or “Normal”.
 - A binary flag (DeliveryDelayFlag-binary) for numeric filtering in visuals.
- **Why:** Helps segment delayed deliveries for targeted monitoring.
- **Business Value:** Enables alerting, exception handling, and bottleneck identification.

7. Classify Delivery Status

- **What it does:** Creates a column that labels each order as Early, On Time, Late, or Unknown based on actual and expected delivery dates.
- **Why:** Provides categorical delivery performance insight.
- **Business Value:** Supports SLA reporting and high-level performance dashboards.

8. Detect Delivered but Unconfirmed Orders

- **What it does:** Adds a column (Unconfirmed_Delivered) with a value of 1 where:
 - Confirmed = 0
 - Delivered = 1
- **Why:** Flags orders that were marked delivered but were never confirmed.
- **Business Value:** Highlights system integration issues or operational inconsistencies for process improvement.

9. Reorder Columns

- **What it does:** Reorganizes columns for logical grouping (e.g., Order Info → Delivery Info → Flags).
 - **Why:** Enhances data model readability.
 - **Business Value:** Facilitates efficient report building and exploration in Power BI.
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Final Output Schema (Key Fields Only)

Column Name	Description
OrderID	Unique order identifier
CustomerID	Buyer ID
ProductID	Associated product
OrderDate	Date the order was placed
Confirmed	0/1 flag indicating confirmation status
Delivered	0/1 flag from delivery table
DeliveryDate	Actual delivery timestamp
ExpectedDeliveryDate	Scheduled delivery timestamp
DeliveryDelayDays	Days between order and delivery
DeliveryDelayFlag	"Normal" or "Delay >90d"
DeliveryDelayFlag-binary	0 or 1
DeliveryStatus	Categorization: Early / On Time / Late / Unknown
Unconfirmed_Delivered	1 if delivered but not confirmed, else 0

Business Value Summary

Transformation	Decision Support Use Case
Delay Calculation	SLA tracking, vendor performance assessment
Delivery Status Classification	High-level fulfillment reporting
Long Delay Flagging	Delay trend analysis, operational bottlenecks
Delivered without Confirmation	System/process anomaly detection
Column Standardization	Reliable KPIs, simplified data model