# 🚚📦 Supply Chain Intelligence Dashboard

**(Power BI)**

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## ✴️ Project Overview

This project presents an end-to-end **Supply Chain & Operational Risk Intelligence Dashboard** built using Power BI to analyze revenue performance, inventory efficiency, and supplier risk exposure.

The objective was to design a structured relational data model, implement robust DAX measures, and deliver executive-ready insights connecting financial performance with operational and supplier risk metrics.

The dashboard integrates revenue analytics, working capital optimization, and supplier concentration analysis to simulate real-world enterprise supply chain monitoring.

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## 🎯 Business Objectives

- ★ Measure overall Revenue & Financial Performance
- ★ Analyze Inventory Turnover & Days Sales of Inventory (DSI)
- ★ Identify Revenue Concentration using ABC Classification
- ★ Evaluate Inventory Allocation by Category
- ★ Detect Overstock & Stockout Risks

★ Assess Supplier Risk Exposure
★ Identify Revenue & Capital Dependency on High-Risk Suppliers
★ Design a professional multi-page executive dashboard

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# 📂 Dataset Description

The dataset consists of structured supply chain tables:

| Table | Description |
|---|---|
| **Fact_SupplyChain** | Transaction-level operational and financial data |
| **Dim_Product** | Product attributes (ProductID, Category) |
| **Dim_Supplier** | Supplier information including Risk_Score |
| **Dim_Date** | Date dimension for time-based analysis |
| **Dim_Warehouse** | Warehouse-level inventory storage |
| **ABC_Table** | Disconnected classification table (A/B/C logic) |
| **MyMeasures** | Dedicated table to store all DAX measures |

The dataset simulates a multi-supplier retail supply chain environment.

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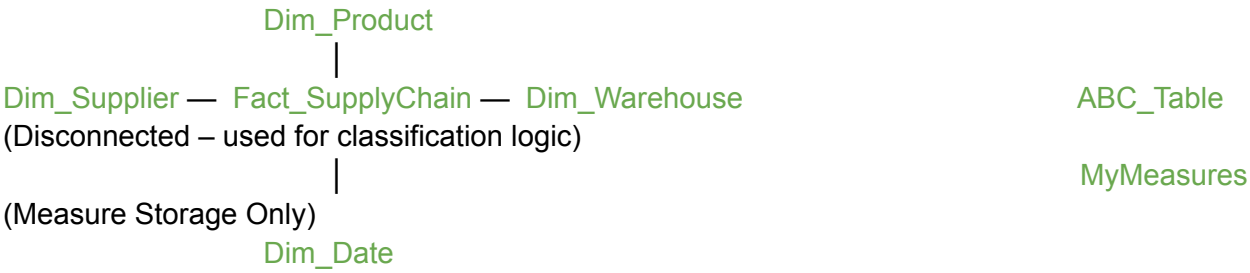
# 🧱 Data Model Design

The model follows a clean star-schema structure:



- One-to-Many relationships maintained
- Single-direction filtering
- No ambiguous or bidirectional filters
- Risk score stored at supplier dimension level
- Proper aggregation context ensured

The model follows a structured star schema design with a centralized fact table connected to product, supplier, warehouse, and date dimensions. A disconnected ABC classification table is used for revenue segmentation logic, and all DAX measures are organized in a dedicated measures table for maintainability.

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# 🧮 Key DAX Measures Implemented

## Core Financial KPIs

- Total Revenue
- COGS
- Average Inventory Value
- Inventory Turnover (Financial)
- Days Sales of Inventory (DSI)

## Inventory Intelligence Measures

- Total Inventory Value
- Inventory % by Category
- Avg Product Days on Hand (DOH)
- Inventory Risk Flag
- Stockout Rate
- Category Contribution Analysis

## Revenue Concentration (ABC Analysis)

- Revenue by Product
- Cumulative Revenue %
- ABC Classification Logic
- Revenue by ABC Class
- Inventory Allocation by ABC Class

## Supplier Risk Analytics

- Average Risk Score
- High Risk Supplier Count
- Revenue High Risk
- Revenue Exposure %
- Inventory High Risk
- Supplier Risk vs Revenue Exposure Matrix

All measures were implemented using proper filter context handling to ensure KPI integrity and prevent row-context distortion.

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# 📈 Dashboard Pages

## 1️⃣ Executive Summary

- Total Revenue
- Inventory Turnover
- DSI
- On-Time Delivery %
- Stockout Rate
- Revenue Overview by Category

*Purpose: Provide high-level financial and operational performance snapshot.*

## 2️⃣ Revenue & Demand Analysis

- Revenue by Category
- Revenue Concentration (ABC Classification)
- Cumulative Revenue %
- Category Contribution

*Purpose: Identify revenue drivers and concentration risks.*

## 3️⃣ Inventory & Working Capital Optimization

- Inventory Value by Category
- Inventory Contribution %
- Inventory Allocation by ABC Class

- ❖ Product-Level Inventory Health Table
- ❖ Supplier Lead Time vs Inventory Exposure

*Purpose: Evaluate working capital efficiency and inventory risk patterns.*

## 4️⃣ Supplier Risk & Lead Time Analysis

- ❖ Average Supplier Risk Score
- ❖ Revenue Exposure to High-Risk Suppliers
- ❖ Inventory Exposure to High-Risk Suppliers
- ❖ Supplier Risk vs Revenue Exposure Matrix
- ❖ Supplier Revenue Contribution

*Purpose: Identify structural supplier dependency and financial exposure risk.*

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# 🎨 Advanced UX Features

- ★ Multi-page executive layout
- ★ Clean KPI structuring
- ★ Consistent visual formatting
- ★ Filter-sensitive dynamic measures
- ★ ABC logic using disconnected table
- ★ Risk segmentation using DAX filters
- ★ Executive-style insight sections

The dashboard balances analytical depth with professional presentation design.

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# 🔍 Key Business Insights

- ★ **42.76%** of total revenue is exposed to high-risk suppliers.
- ★ **$454.63M** inventory is tied to structurally unstable suppliers.
- ★ Supplier **S04** identified in high-risk, high-revenue quadrant.
- ★ The **Electronics** category shows highest risk concentration.
- ★ Lead time stable (**8 days**), indicating structural supplier risk rather than logistical delay risk.
- ★ Revenue concentrated among a limited supplier base (**50% high-risk**).

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# 💼 Business Recommendations

- ★ Diversify supplier base to reduce dependency concentration.
- ★ Develop alternate sourcing strategy for the Electronics category.
- ★ Reduce inventory capital tied to high-risk suppliers.
- ★ Implement supplier risk monitoring framework.
- ★ Align procurement strategy with ABC revenue classification.
- ★ Introduce supplier performance scorecard system.

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# 🧪 KPI Integrity Validation

To ensure accuracy:

- ★ Verified revenue aggregation consistency
- ★ Validated Inventory Turnover formula logic
- ★ Confirmed DSI calculation integrity
- ★ Checked relationship direction & filter propagation
- ★ Tested supplier-level vs fact-level risk modeling
- ★ Ensured no circular dependencies
- ★ Confirmed category-based filtering impact

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# ⚒️ Tools Used

- ★ Power BI Desktop
- ★ DAX (Advanced Filter Context Handling)
- ★ Data Modeling (Star Schema Principles)
- ★ Power Query (Data Cleaning & Structuring)
- ★ Supply Chain Risk Modeling Concepts

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# 🚀 Portfolio Value

This project demonstrates:

- ★ End-to-end BI solution development
- ★ Financial & operational KPI integration
- ★ Advanced DAX modeling
- ★ Risk analytics implementation
- ★ Revenue concentration modeling (ABC)
- ★ Executive-level dashboard storytelling
- ★ Strategic supply chain intelligence design

It reflects the ability to move beyond descriptive reporting and deliver actionable operational and financial risk insights.

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