Supply Chain Management
(Methodology Document)

Executive Summary

This document outlines the comprehensive methodology employed in developing a data-driven Supply Chain Management Dashboard for a Fashion and Beauty startup's makeup product line. The dashboard leverages advanced analytics to provide actionable insights across inventory management, supplier performance, logistics optimization, and operational efficiency.

1. Project Scope and Objectives

1.1 Primary Objectives

- **Inventory Optimization**: Achieve optimal stock levels to minimize carrying costs while preventing stockouts
- **Supplier Performance Monitoring**: Establish comprehensive supplier scorecards for strategic decision-making
- **Logistics Efficiency**: Optimize transportation modes and carrier selection for cost and time efficiency
- **Revenue Optimization**: Align inventory strategy with revenue generation potential

1.2 Key Performance Indicators (KPIs)

- Stock Coverage Ratio
- Supplier Performance Score
- Inventory Adequacy Percentage (Critical Stock Items)
- Transportation Cost Efficiency
- Stock Adequacy Percentage

2. Data Architecture and Preparation

2.1 Dataset Overview

Source: Fashion and Beauty startup supply chain data
Volume: Comprehensive product catalog covering haircare, skincare, and cosmetics
Key Dimensions: 24 variables including operational, financial, and performance metrics

2.2 Data Quality Framework

Data Validation Process:

- Duplicate removal and null value handling
- Data type standardization (numerical, categorical, text)
- Outlier identification and treatment
- Consistency checks across related fields

2.3 Critical Data Interpretations

Availability vs Stock Levels Analysis:

- **Availability**: Market demand/forecasted requirements/order capacity
- **Stock Levels**: Current physical inventory quantities
- **Business Logic**: Stock Coverage Ratio = Stock Levels ÷ Availability

Lead Time Differentiation:

- **Lead times (plural)**: Actual/historical performance data
- **Lead time (singular)**: Standard/contractual commitments
- **Manufacturing lead time**: Production cycle duration
- **Shipping times**: Transportation and delivery duration

3. Analytical Methodology

3.1 Inventory Management Analytics

Stock Coverage Analysis:

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Stock Coverage Ratio = Stock Levels ÷ Availability
Classification:
- Adequate: Stock Levels ≥ Availability
- Moderate: Stock Levels ≥ 50% of Availability
- Insufficient: Stock Levels < 50% of Availability
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Reorder Priority Algorithm:

Priority Classification:
- Urgent: Stock Coverage < 20% of Availability
- High: Stock Coverage 20-50% of Availability
- Medium: Stock Coverage 50-80% of Availability
- Low: Stock Coverage > 80% of Availability

Key Metrics:

- Average Stock Coverage: 3.477 (indicating 248% excess inventory)
- Inventory Value: Stock Levels × Price
- Inventory Gap: Availability - Stock Levels

3.2 Supplier Performance Framework

Multi-dimensional Performance Scoring:

Supplier Performance Score = (Lead Time Performance × 0.4) + (Quality Performance × 0.3) + (Cost Efficiency × 0.3)

Lead Time Performance Analysis:

Lead Time Variance = Actual Lead Times - Standard Lead Time
Performance Rating:
- Excellent: ≤-2 days (early delivery)
- Good: 0 to -2 days (on-time/slightly early)
- Average: 1-3 days late
- Poor: >3 days late

Quality Assessment:

- Defect Rate Analysis by Supplier and Product Type
- Inspection Results Distribution (Pass/Fail/Pending)
- Quality Trend Analysis

3.3 Logistics and Transportation Analytics

Carrier Performance Evaluation:

- Average Shipping Times by Carrier
- Cost Efficiency Analysis
- Transportation Mode Optimization

Multi-modal Transportation Analysis:

- Mode Distribution: Road, Air, Rail, Sea
- Cost-Time Efficiency Matrix
- Product Type Transportation Preferences

3.4 Financial Impact Analysis

Revenue Optimization:

- Revenue per Unit Analysis
- Inventory Turnover Ratios
- Cost-Benefit Analysis of Stock Levels

Cost Structure Analysis:

- Manufacturing Costs vs Production Volumes
- Transportation Cost Breakdown
- Total Supply Chain Cost Analysis

4. Dashboard Architecture

4.1 Multi-Page Dashboard Structure

Page 1: Executive Summary

- High-level KPIs and performance indicators like - Total Revenue, Total Orders, Total Inventory Value, Critical stock Items
- Overall supply chain health metrics
- Revenue trend across Product type, Location & Supplier

Page 2: Inventory Management

- Stock coverage analysis and gap identification

- Stock status distribution
- Reorder priority matrix
- Inventory value and adequacy metrics

Page 3: Supplier & Manufacturing Performance

- Comprehensive supplier scorecards
- Lead time variance analysis
- Quality and defect rate monitoring

Page 4 : Logistics & Transportation

- Carrier performance comparison
- Transportation mode efficiency
- Route optimization insights
- Shipping Cost analysis

4.2 Advanced Analytics Implementation

DAX Calculations:

- Complex conditional logic for performance ratings
- Time intelligence functions (where applicable)
- Statistical measures (averages, standard deviations)
- Comparative analysis metrics

Interactive Features:

- Dynamic filtering across all dimensions
- Drill-through capabilities for detailed analysis
- Cross-visual highlighting and filtering
- Mobile-responsive design considerations

5. Visualization Strategy

5.1 Visual Selection Rationale

Scatter Plots: Identify relationships and outliers (Availability vs Stock Levels)
Heat Maps: Show performance across two dimensions (Defect Rates by Supplier and Product Type)
Waterfall Charts: Display cumulative effects (Total Shipping Cost Breakdown)
Funnel Charts: Show progression and conversion (Shipping Performance Flow)
Combo Charts: Compare different metrics on single visual (Time vs Cost by Transportation Mode)

5.2 Design Principles

- Consistent color coding across all visuals

- Intuitive navigation and user experience
- Conditional formatting for immediate attention to critical issues
- Tooltips and context for enhanced user understanding

6. Technical Implementation

6.1 Data Modeling

- Star schema design with fact and dimension tables
- Optimized relationships for performance
- Calculated columns vs measures optimization
- Data refresh strategy and scheduling

6.2 Performance Optimization

- Efficient DAX expressions
- Appropriate aggregation levels
- Visual load time optimization
- Memory usage considerations

7. Limitations and Assumptions

7.1 Data Limitations

- Absence of time-series data for trend analysis
- Single-point-in-time snapshot of operations
- Limited historical context for seasonal analysis

7.2 Methodological Assumptions

- Static demand patterns (Availability field interpretation)
- Standard industry benchmarks for performance thresholds
- Linear relationship assumptions in certain calculations

8. Future Enhancements

8.1 Data Enrichment Opportunities

- Integration of time-series data for trend analysis
- Customer satisfaction and feedback metrics
- Market demand forecasting capabilities
- Seasonal variation analysis

8.2 Advanced Analytics Potential

- Predictive analytics for demand forecasting
- Machine learning for optimal reorder points
- Scenario analysis for supply chain disruptions

- Real-time alerts and automated recommendations

9. Conclusion

This methodology provides a comprehensive framework for supply chain analytics that transforms raw operational data into actionable business intelligence. The multi-dimensional approach ensures that all critical aspects of supply chain management are monitored, analyzed, and optimized for maximum business value.

The dashboard serves as a strategic tool for data-driven decision-making, enabling stakeholders to identify opportunities, mitigate risks, and optimize overall supply chain performance through evidence-based insights.