

Supply Chain Finance Management – SQL Mega Project

1. Introduction

AtliQ Hardware Technologies, founded in 2018, operates in the hardware manufacturing domain, producing electronic devices such as mice, keyboards, laptops, and printers. The company sells products through multiple channels including Brick & Mortar retailers, E-commerce platforms, distributors, and AtliQ-owned direct stores. This project focuses on analyzing AtliQ's financial and supply chain data using SQL to derive insights related to sales, costs, profitability, forecasting accuracy, and customer behavior.

The analysis is aligned with AtliQ's fiscal year, which runs from **September to August**, ensuring business-relevant reporting.

2. Business Understanding

Revenue Flow

- **Gross Price:** Base price set by AtliQ
- **Pre-Invoice Deductions:** Annual negotiated discounts
- **Post-Invoice Deductions:** Promotional discounts, platform fees, performance rebates
- **Net Sales:** Final revenue after all deductions

Profitability

- **COGS:** Manufacturing cost + Freight cost + Other costs
 - **Gross Margin** = Net Sales – COGS
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3. Database Design (Task 1)

Database

```
CREATE DATABASE SupplyChainFinanceManagement;
```

Tables

- dim_customer
- dim_product
- fact_sales_monthly
- fact_forecast_monthly
- fact_gross_price

- fact_pre_invoice_deductions
- fact_post_invoice_deductions
- fact_manufacturing_cost
- fact_freight_cost

(Star-schema based analytical model)

4. Data Population (Task 2)

Sample records were inserted into each table as provided in the dataset images, ensuring referential integrity between dimension and fact tables.

5. Fiscal Year Logic (Task 3 – Q1)

If calendar_date = '2023-07-15':

- Month = July
 - Since fiscal year starts in September, July 2023 belongs to **FY 2023**.
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6. Gross Sales Monthly Report (Task 3 – Q2)

Objective: Monthly product transaction report

```
SELECT
    s.date,
    p.product_code,
    p.product_name,
    p.variant,
    s.sold_quantity,
    g.gross_price,
    (s.sold_quantity * g.gross_price) AS gross_price_total
FROM fact_sales_monthly s
JOIN dim_product p ON s.product_code = p.product_code
JOIN fact_gross_price g ON p.product_code = g.product_code
```

```
JOIN dim_customer c ON s.customer_code = c.customer_code  
WHERE c.customer_code = 'CUST001'  
AND s.fiscal_year = 2023;
```

7. Analytical Insights (Task 4)

Sales Trend Analysis

- Identified monthly sales fluctuations using time-series aggregation.
- Festive months (Sep–Dec) show higher volumes.

Customer Segmentation

- High-volume retail customers contribute the majority of revenue.

Product Performance

- Premium products show higher margins but lower volumes.
- Low-margin products rely on volume-driven profitability.

Market Expansion

- Forecast data highlights strong growth in emerging APAC markets.

Cost & Profitability

- Products with lower freight costs and optimized manufacturing show highest margins.
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8. Advanced SQL Implementations (Task 5)

Example: Window Function – Product Ranking

```
SELECT  
product_code,  
fiscal_year,  
month,  
sold_quantity,  
RANK() OVER (PARTITION BY fiscal_year ORDER BY sold_quantity DESC) AS sales_rank  
FROM fact_sales_monthly;
```

Example: User Defined Function – Total Forecast Quantity

```
CREATE FUNCTION fn_total_forecast_qty(@product_code VARCHAR(20), @fy INT)
RETURNS INT
AS
BEGIN
    DECLARE @total INT;
    SELECT @total = SUM(forecast_quantity)
    FROM fact_forecast_monthly
    WHERE product_code = @product_code AND fiscal_year = @fy;
    RETURN @total;
END;
```

9. Forecast Accuracy Analysis (Task 6)

Approach

- Compare forecast vs actual sales
- Accuracy = $(\text{Actual} / \text{Forecast}) * 100$

```
SELECT
    fiscal_year,
    month,
    forecast_quantity,
    sold_quantity,
    (sold_quantity * 100.0 / NULLIF(forecast_quantity,0)) AS forecast_accuracy
FROM fact_forecast_monthly f
JOIN fact_sales_monthly s
    ON f.product_code = s.product_code
    AND f.month = s.month
    AND f.fiscal_year = s.fiscal_year
WHERE f.product_code = 'P001';
```

Interpretation

- High accuracy during stable demand periods
 - Low accuracy during promotions and seasonal spikes
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10. Key Findings

- Net sales are heavily influenced by post-invoice deductions.
 - Freight cost optimization directly improves margins.
 - Forecast accuracy drops during festive seasons due to demand volatility.
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11. Actionable Insights

- Improve demand forecasting models for peak seasons.
 - Re-negotiate freight contracts in high-cost markets.
 - Focus marketing efforts on high-CLV customer segments.
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12. Conclusion

This project demonstrates how SQL-driven analytics can support financial and supply chain decision-making. By integrating sales, cost, and forecast data, AtliQ Hardware can enhance profitability, optimize inventory, and strengthen customer relationships.

13. Tools & Technologies

- MS SQL Server
 - SQL (DDL, DML, Window Functions, UDFs, Triggers)
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End of Project