End-to-End Business Intelligence Pipeline for Revenue Optimization: A Case Study of PT Sejahtera Bersama

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***Abstract*—This paper presents an end-to-end business intelligence (BI) implementation for PT Sejahtera Bersama, developed as part of the Rakamin Academy x Bank Muamalat Virtual Internship Program. The study addresses fragmented transactional data stored in normalized tables, which constrained strategic decision-making on product and regional performance. The proposed solution integrates four source tables into a unified analytical dataset in Google BigQuery and uses Looker Studio for interactive reporting. The resulting BI system analyzes total sales of IDR 175,475,057 and 11,654 units sold, identifying Robots as the leading revenue driver (44.3%) and Washington as the top-performing region (~IDR 5.5M). The analysis reveals a volume–value paradox and supports three recommendations: product bundling, geographic strategy replication, and controlled price optimization.**

***Index Terms*—Business Intelligence, Data Engineering, Google BigQuery, Looker Studio, Revenue Optimization, Dashboard Analytics**

I. Introduction

A. Background

PT Sejahtera Bersama stores large transactional records in normalized relational tables. While this is effective for operational consistency, strategic users require denormalized analytical outputs to evaluate revenue concentration, market variation, and growth opportunities.

B. Problem Statement

The organization lacked an integrated analytical view to answer three core questions:

- Which categories drive revenue versus unit volume?
- Which geographies are strongest and weakest?
- Where do cross-sell and up-sell opportunities exist?

C. Objectives and Contributions

This project delivers a complete BI workflow, from data transformation to executive recommendation. Key contributions include:

1) Analytical schema design from four source tables.
2) BigQuery transformation pipeline to a persistent master table.
3) Looker Studio dashboard for KPI and comparative diagnostics.
4) Quantified recommendations for revenue optimization.

II. Data Architecture and Methodology

A. Source Data and Keys

The model uses four entities: **Customers**, **Orders**, **Products**, and **ProductCategory**. Primary keys are `CustomerID`, `OrderID`, `ProdNumber`, and `CategoryID`.

B. Relational Model

A star-schema-oriented analytical model is applied with `Orders` as the central fact-like table.

- Customers (1) to Orders (N): `CustomerID` linkage.
- Products (1) to Orders (N): `ProdNumber` linkage.
- ProductCategory (1) to Products (N): `CategoryID` linkage.

C. BigQuery Pipeline

The transformation flow consists of ingestion, relational joins, metric derivation, and materialization:

1) Upload source CSV tables into BigQuery.
2) Join all entities into one denormalized analytical table.
3) Compute `total_sales` = Quantity $\times$ Price.
4) Sort chronologically for time-series readiness.
5) Save output as `master_sales_data`.

III. Dashboard and Findings

A. Dashboard Strategy

The Looker Studio report is structured into three layers: executive KPIs, category comparison, and regional diagnostics.

B. KPI Results

The following KPIs summarize overall business performance:

- **Total Sales Revenue**: IDR 175,475,057
- **Total Units Sold**: 11,654
- **Top Revenue Category**: Robots (44.3%)
- **Top Region**: Washington (~IDR 5.5M)

Figure 1 belongs to this KPI section and presents the two dashboard scorecards that report Total Sales and Total Quantity.

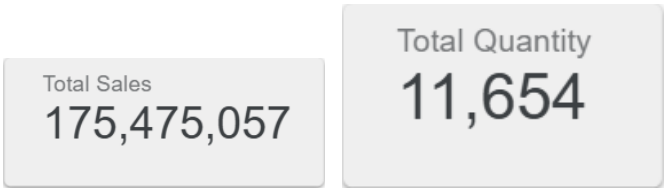

Fig. 1. KPI scorecards from the BI dashboard: Total Sales (left) and Total Quantity (right).

C. Category Performance Analysis

Figure 2, Figure 3, Figure 4, and Figure 5 present category-level views for revenue and quantity distribution.

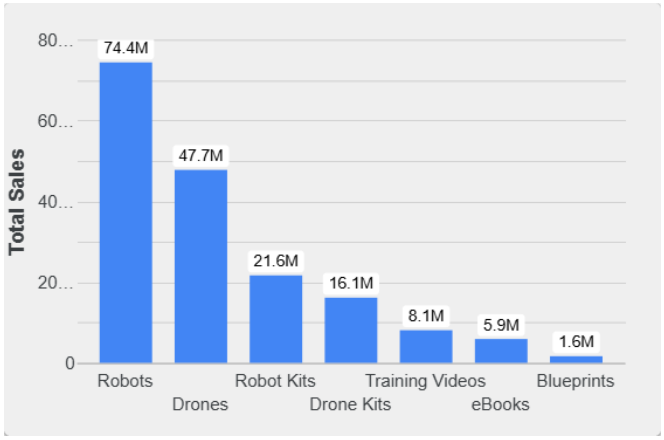

Fig. 2. Total Sales by Category bar chart from the BI dashboard.

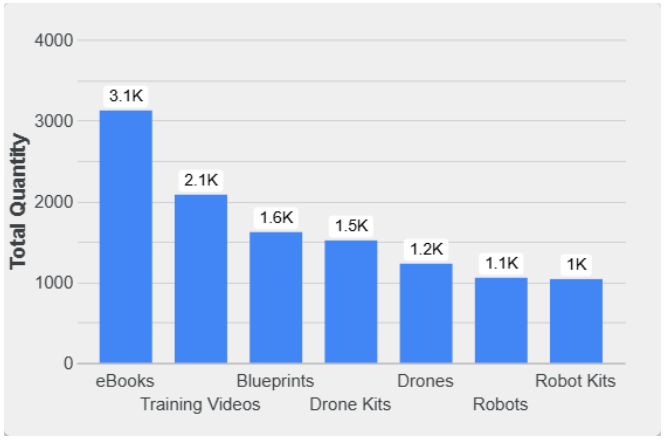

Fig. 3. Total Quantity by Category bar chart from the BI dashboard.

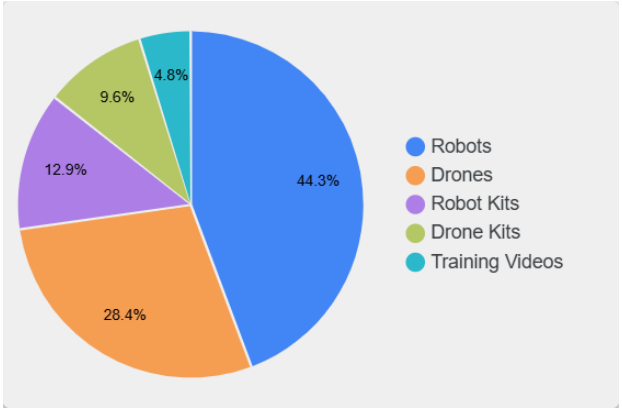

Fig. 4. Top 5 Categories by Sale pie chart from the BI dashboard.

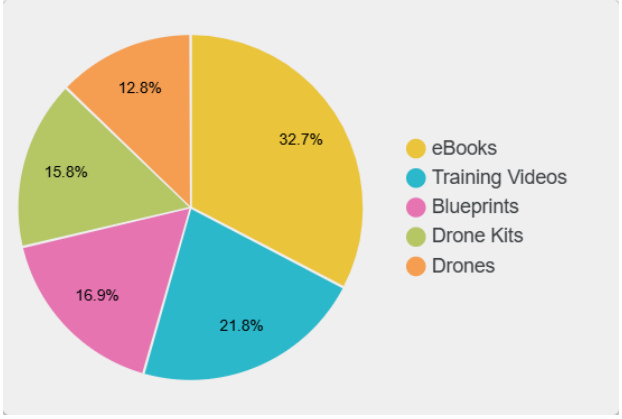

Fig. 5. Top 5 Categories by Quantity pie chart from the BI dashboard.

These charts highlight the volume–value paradox:

- **eBooks**: high volume share, low revenue contribution.
- **Robots**: high revenue concentration, lower unit volume.
- **Blueprints**: strong unit demand but weak monetization.

D. Geographic Performance Analysis

Figure 6 and Figure 7 provide the city-level bar charts for sales and quantity.

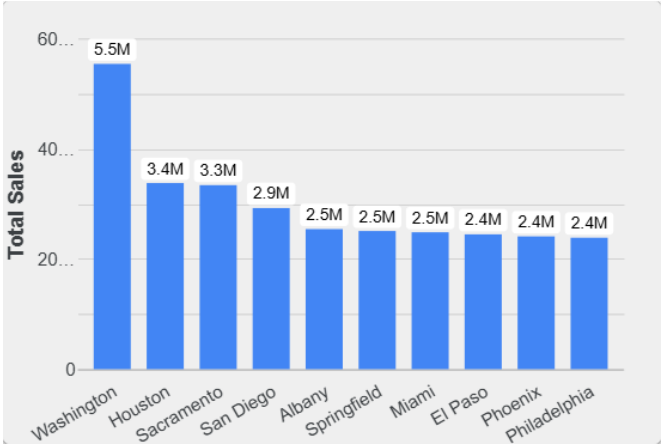

Fig. 6. Total Sales by City bar chart from the BI dashboard.

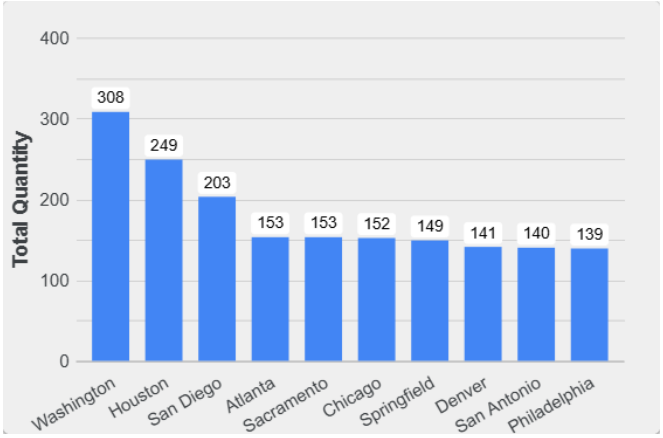

Fig. 7. Total Quantity by City bar chart from the BI dashboard.

The geographic charts confirm Washington as the leading city in both revenue and unit contribution, supporting the regional replication recommendation in Section IV.

IV. Business Recommendations

A. Path-to-Pro Bundling

Bundle Robot + Training Video + Blueprint at 10–15% discount to improve AOV and move entry-level customers toward higher-value purchases.

B. Washington Model Replication

Audit Washington's performance drivers and replicate proven tactics in Houston and Sacramento, with targeted marketing budget allocation.

C. Blueprint Price Optimization

Run a 30-day controlled elasticity test with a 10–15% Blueprint price increase in a pilot city and scale if retention remains healthy.

V. Technical Appendix

A. Master Table SQL Query

```
SELECT
  c.CustomerEmail AS cust_email,
  c.CustomerCity AS cust_city,
  o.Date AS order_date,
  o.Quantity AS order_qty,
  p.ProdName AS product_name,
  p.Price AS product_price,
  pc.CategoryName AS category_name,
  (o.Quantity * p.Price) AS total_sales
FROM
  `rakamin-bank-muamalat-1.bank_muamalat.Orders` AS
      o
JOIN
  `rakamin-bank-muamalat-1.bank_muamalat.Customers`
      AS c
  ON o.CustomerID = c.CustomerID
JOIN
  `rakamin-bank-muamalat-1.bank_muamalat.Products`
      AS p
  ON o.ProdNumber = p.ProdNumber
JOIN
  `rakamin-bank-muamalat-1.bank_muamalat.
      ProductCategory` AS pc
  ON p.Category = pc.CategoryID
ORDER BY
  order_date ASC;
```

B. Tools and Resources

- Google Cloud Platform (BigQuery)
- Google Looker Studio
- Microsoft Excel / Access
- Repository: BI-Project-BankMuamalat
- Dashboard: Looker Studio Report

VI. Conclusion

This project demonstrates a practical BI lifecycle: transforming normalized operational data, delivering interactive analytics, and converting findings into strategic action. The final framework supports measurable revenue improvement through bundling, geographic replication, and pricing optimization.

Acknowledgment

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