SQL-Power BI Portfolio Project

Database construction and Power BI visualization - Sales Analysis Report for the first 15 days of a Department Store

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Project duration:
Two days

Feb - 2024

Abstract

This project aims to demonstrate my proficiency in the use of relational databases and handling of analysis and visualization tools as Power BI through the analysis and visualization of the data from a database created for a hypothetical department store located in Costa Rica. The database consists of six tables: Categories, Suppliers, Products, Inventory, Invoice_Details and Billing. The goal is to create an intuitive dashboard to track historical sales behavior on the first 15 days of the business, using different charts and a attractive design to visualize the following key aspects:

Total Sales.
Sales per day.
Sold stock percentage.
Top 10 most sold products.
Top 5 profitable categories.
Investment v Sales

The dashboard will provide a clear and understandable visual representation of this data, which will facilitate the identification of trends and patterns in a department store sales.

Introduction

In the current context of data analysis, the ability to manipulate relational databases as SQL Server and extract valuable information from a serious analysis of this data and finally show an understandable dashboard that will help the decision-making process is a must. In this project, a detailed database construction and analysis of a department store sales behavior is presented, using advanced SQL queries and Power BI tools to effectively transform and visualize the data.

The main objective of this project is to demonstrate a good foundation on SQL query-writing as well as in transformation and visualization data analysis tools. This analysis is based on a database created for a hypothetical department store located in Costa Rica.

The importance of this project lies in the ability to identify trends, patterns and opportunities for improvement from the available data as well as the knowledge of a building process of a database. By better understanding the behavior of sales over the first 15 days, informed strategic decisions can be made to optimize operational efficiency and maximize revenues.

Methodology

The methodology used in this project is divided into several stages, ranging from the database creation to the building of an attractive and intuitive dashboard in Power BI. The steps followed are detailed below:

Database creation:

The objective is to create a database that allows us to keep track of inventory, sales and expenses. But, in addition, I wanted to design an invoicing table capable of relating the sale of more than 1 product per invoice.

- **Tables**: A simple relational model is designed between 6 tables that will be essential to keep track of purchases made. The tables are: Categories, Suppliers, Products, Inventory, Invoice_Details and Billing.

- **Trigger**: A trigger is created to update the quantity of a product in inventory after a sale.

- **Stored Procedures**: Stored procedures are created to insert records into the tables in an orderly fashion.

Data ETL:

The point is to create a connection between the database and Power BI through Power Query. Once in Power Query, the idea is to transform the data as the project require, inserting new columns, formatting data and finally load the query to Power BI. Once the data is loaded we can make the measures we need.

Data visualization:

The goal is to build a nice-looking and intuitive dashboard so it can show the present state of the business, helping to make conscious decisions for the company's future. The dashboard is meant to use this color palette: #7C6C77, #AAA694, #D1D0A3, EBF8B8 and #FFE787. The main insights for the dashboards to show are: Total Sales through a card, Sales per day through a bar chart, Sold stock percentage through a card, Top 10 most sold products through a funnel chart, Top 5 profitable categories through a pie chart and Investment v Sales by a bar chart.

Project development

This section presents the steps taken from the preparation of the data to the presentation of the final results of the analysis and the preparation of the dashboard.

Database creation

Tables:
1. Categories: id_category, name_category.
2. Suppliers: id_supplier, name_supplier, address_supplier, tel_supplier, email, national_supplier.
3. Products: id_product, name_product, cost_price, sale_price, id_category, id_supplier.
4. Inventory: id_product, quantity_available, restock_date.
5. Invoice_Details: id_detail, cod_detail, id_product, quantity, total.
6. Billing: id_billing, cod_detail, billing_date, subtotal, vat, total.

Trigger:
1. The trigger is created on the Invoice_Details table.
2. The variables @id_product and @quantity are declared.
3. Getting the id_product and quantity from the row just inserted.
4. Updating the quantity_available on the Inventory table

Stored Procedures:
1. Insert_Category:

       1.1 - Only the @name_category variable is requested.

2. Insert_Supplier:

       2.1 - Variables @name_supplier, @address_supplier, @tel_supplier, @email and @national_supplier are requested.
       2.2 - Validate that the supplier is not already in the database and insert the record.

3. Insert_Product:

       3.1 - Variables @name_product, @cost_price, @sale_price, @id_category and @id_supplier are requested.
       3.2 - Validate that the product is not already in the database and insert the record.

4. Insert_Inventory:

4.1 - Variables @id_product, @quantity_available and @restock_date are requested.

4.2 - Validate that the product is not already in inventory and insert the record.

5. Insert_Invoice_Details:

5.1 - Variables @cod_detail, @id_product and @quantity are requested.

5.2 - It validates that the product exists.

5.3 - The variable @total is declared.

5.4 - The value of @total is obtained through a query that multiplies @quantity by the selling price of the product.

5.5 - The record is inserted.

6. Insert_Billing:

6.1 - Variables @cod_detail and @billing_date are requested.

6.2 - It is validated that @cod_detail exists.

6.3 - The variable @subtotal is declared.

6.4 - The value of @subtotal is assigned through a query that sums the total amount of each Invoice_Detail where the cod_details match.

6.5 - The variable @vat is declared.

6.6 - The value of @vat is assigned through a query that multiplies @subtotal by 0.13.

6.7 - The variable @total is declared.

6.8 - The value of @total is assigned through a query that adds @subtotal plus @vat.

6.9 - The record is inserted.

Data transformation

After the database is fully created and functional, we connect the database to Power BI through the Power Query tool. Once the connection is created, we proceed to the data transformation.

First it is placed in the Inventory table and the following steps are performed:
- The cost_price, sale_price and name_product columns are expanded.
- The Categories and Invoice_Details tables are expanded.
- The Categories table expands the name_category column.
- From the Invoice_Details table the sum of the quantity and the sum of the total are added.
- Change nulls to zeros.
- Add a custom column called opening_stock to know the opening stock.

- Add a custom column called Investment to know how much was the initial investment per product.
- Add a custom column called sold_units to know how many products were sold by id_product.
- Add a custom column called Sales per product to know how much money was earned per product sold.
- Columns are formatted.
- The measure % sold stock is created.
- Close and Load.

Data visualization

Sales per day (Line Chart):
- X-axis: billing_date(Dia) from Billing table.
- Y-axis: Count of id_bill from Billing table.

Top 10 sold products (Funnel Chart):
- Category: name_product from Inventory table.
- Values: Sum of sold_units from Inventory table.
- Filter: Top 10 on name_product by Sum of sold_units.

Top 5 most profitable categories (Pie Chart):
- Legend: name_category from Inventory table.
- Values: Sum of sales per product.
- Filter: Top 5 on name_category by Sum of sales per product.

Investment v Sales (Bar Chart):
- X-axis: Investment and sales per product.

Final Dashboard

Sales

464,45K

% Sold Stock

2,39 %

Sales per Day

Top 10 most sold products

Product	Value
Arroz	13
Refresco de cola	10
Escoba	9
Tomates	9
Acondicionador	8
Atun	8
Shampoo	8
Desinfectante	7
Escoba de cerdas	7
Leche	7

Top 5 most profitable categories

- Electronicos
- Carnes
- Pastas y Arroces
- Pescados y Mariscos
- Verduras

255K, 80K, 23,8K, 20,5K, 14,4K

Investment v Sales

- Investment
- Total Sales

Investment: 0,5M
Total Sales: 16,8M

0M   5M   10M   15M