Wide World Importers
Business Data Analysis

OMIS 661 – Business Intelligence Applications and Tools
Group Project

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1. Executive Summary

This project used the Wide World Importers (WWI) Data Warehouse to perform different analysis that provide useful information for decision makers of the company. Wide World Importers (WWI) is a wholesale novelty goods importer and distributor based in United States. The company mostly buys the items from manufacturers and sells them to resellers.

The Microsoft Power Bi application is used to clean and prepare the data for analysis as well as to perform the business data analyses. The data that is used for the analyses is composed of four fact tables and six dimension tables. The main business areas addressed by these tables include purchases, sales, profit, inventory, customers, and suppliers.

There are a total of 90 items traded by WWI. Out of the 90 items traded, "The Gu" red shirt XML tag t-shirt is the most profitable item. Records show that it is also the highest purchased item in terms of quantity. But the quantity purchased is significantly greater than the sales quantity. The company need to change this pattern by developing a strategy that helps to release the accumulated inventory.

An analysis of factors that contributes to the high profit from "The Gu" red shirt XML tag t-shirt shows that profit is more likely to increase when the t-shirt size is Small, and Profit is more likely to decrease when the t-shirt size is 5XL. However, WWI is buying a lot of 5XL and small quantities of S size t-shirts. The company should buy and sell more S size shirts and discontinue the purchase of 5XL t-shirts.

Suppliers' analysis indicates that WWI dominantly imports stock items from Fabrikam Inc and Litware Inc. WWI should consider diversifying suppliers as a risk minimization strategy and negotiate with this two major suppliers to benefit from price reduction and cash flow advantage through increased payment terms.

A comparison of customer orders and sales volume shows that customer ordered quantity is higher than the sales order quantity for certain stock items. The company must check on those items and increase their stock to the required levels so that the sales order quantity will increase.

The inventory analysis shows on-hand inventory significantly exceeds the target level. The company needs to check the on-hand inventory levels for each stock item and develop a strategy to avoid the huge gap observed between target stock level and actual available inventory.

The highest record of both profit and sales amount is from the Southeast sales territory. WWI need to do a market analysis to identify new market opportunities and new approaches to increase sales to the other sales territories.

The comparison of the sales amount by employees shows that there is no major difference between salespersons. The company can use talents and improve sales by introducing a reward and recognition approach to highly performing salespersons.

2. Company Overview[1]

Wide World Importers (WWI) is a wholesale novelty goods importer and distributor operating from the San Francisco Bay area.

As a wholesaler, WWI's customers are mostly companies who resell to individuals. WWI sells to retail customers across the United States including specialty stores, supermarkets, computing stores, tourist attraction shops, and some individuals. WWI also sells to other wholesalers via a network of agents who promote the products on WWI's behalf. While all of WWI's customers are currently based in the United States, the company is intending to push for expansion into other countries/regions.

WWI buys goods from suppliers including novelty and toy manufacturers, and other novelty wholesalers. They stock the goods in their WWI warehouse and reorder from suppliers as needed to fulfill customer orders. They also purchase large volumes of packaging materials and sell these in smaller quantities as a convenience for the customers.

3. Data Modeling

Entities

The dimension tables in data model are:- Stock item, Supplier, Date, Customer, City, and Employee. Each of the above-mentioned entities have their respective attributes as shown in the below screenshot. Each entity is related to fact table and hence all the entities are connected using the primary and foreign key attributes.

Fact Tables

The fact tables in the data model are:- Fact Order, Fact Stock Holding, Fact Purchase and Fact Sale. These Fact tables have all the related information of the dimension tables. Fact tables contain all the primary keys of the related entities and the related columns.

Relationships

The data model shows that the relation between any two tables is either a one-to-one relation or one to many relations. Therefore, no bridging needed as all the tables are in third normal form. The following screenshot and table show the summary of the relationships between the dimension and fact tables included in the data model.

[1] https://learn.microsoft.com/en-us/sql/samples/wide-world-importers-what-is?view=sql-server-ver16

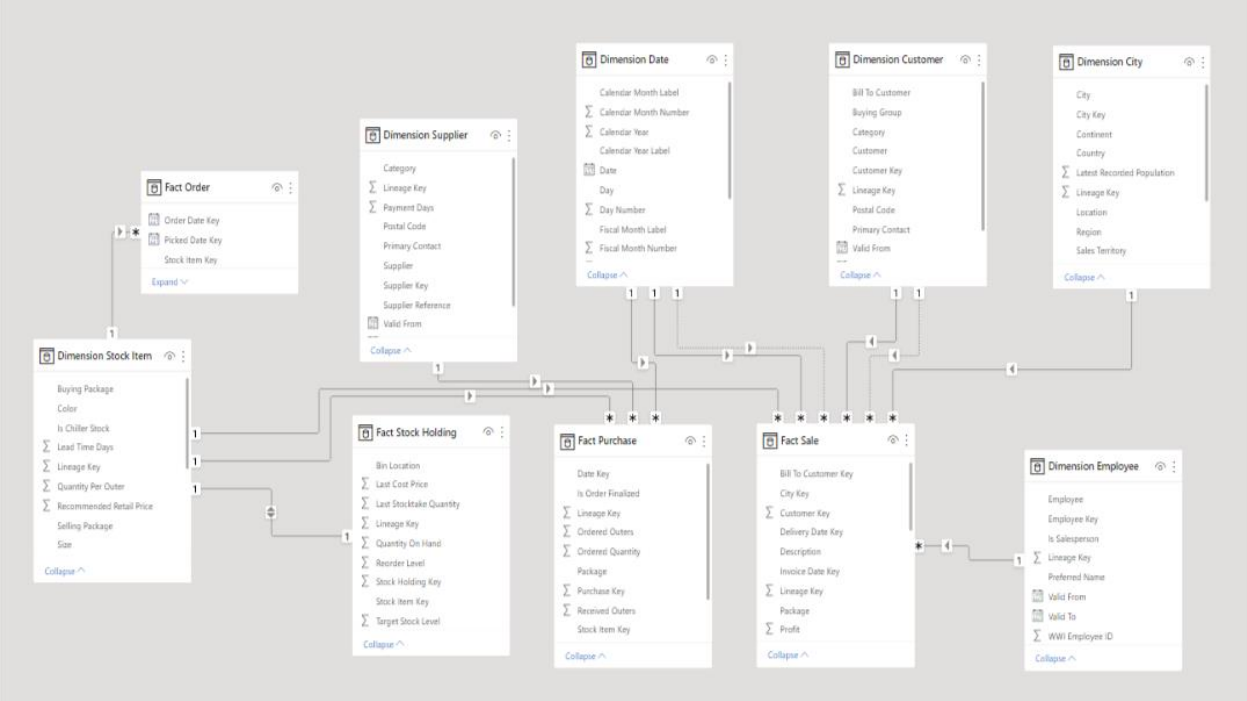

Figure 1: Data Model for WWI Business Data Analysis

Table 1	Table 2	Cardinality
Dimension Stock Item	Fact Order	1 to Many. One record in the Dimension Stock Item table is associated with one or more records in the Fact Order table. Each stock item can have many orders.
Dimension Stock Item	Fact Stock Holding	1 to 1. One record in the Dimension Stock Item table is associated with one or more records in the Fact Stock Holding table. Each stock item has one stock holding record.
Dimension Stock Item	Fact Sale	1 to Many. One record in the Dimension Stock Item table is associated with one or more records in the Fact Sale table. Each Stock Item can have many sales records.
Dimension Stock Item	Fact Purchase	1 to Many. One record in the Dimension Stock Item table is associated with one or more records in the Fact Purchase table. Each stock item can have many purchase records.
Dimension Supplier	Fact Purchase	1 to Many. One record in the Dimension Supplier table is associated with one or more records in the Fact Purchase table. Each Supplier can have many purchase records.
Dimension Date	Fact Purchase	1 to Many. One record in the Dimension Date table is associated with one or more records in the Fact Purchase table. Each Date can have many purchase records.
Dimension Date	Fact Sale	1 to Many. One record in the Dimension Date table is associated with one or more records in the Fact Sale table. Each Date can have many sales records.
Dimension Customer	Fact Sale	1 to Many. One record in the Dimension Customer table is associated with one or more records in the Fact Sale table. Each Customer can have many sales records.
Dimension City	Fact Sale	1 to Many. One record in the Dimension City table is associated with one or more records in the Fact Sale table. Each City can have many sales records.
Dimension Employee	Fact Sale	1 to Many. One record in the Dimension Employee table is associated with one or more records in the Fact Sale table. Each Employee can have many sales records.

Table 1: Entity Relationship for WWI Business Data Analysis

4. Data Cleaning and Shaping

The data source of this project is Wide World Importers (WWI) Data Warehouse (**WideWorldImportersDW** (SQL Server)). Microsoft Power BI tool is used to clean and prepare the data for analysis as well as to perform the business data analyses.

A major data cleaning is done for the Dimension Stock Item table. The brand and barcode columns are removed because there is no data in them. Also, the Stock Item column is split in to three columns because the size and color of stock items were included in the name of the item. The total number of stock items was 228 before the data cleaning. The data cleaning resulted in a distinct count of 90 stock items traded by WWI.

The date field in the dimension date table is set to sort column by calendar month number to ensure the months are displayed in chronological order.

A new measure titled "Purchase Amount" is created to get the dollar amount of purchased items. Also, a new column titled "Sales Amount" is created to have a view of the sales in terms of dollar amount. The following Data Analysis Expressions (DAX) are used to create the fields.

```
Purchase Amount = SUMX('Fact Purchase', 'Fact Purchase'[Ordered
Quantity] * RELATED('Dimension Stock Item'[Unit Price]))

Sales Amount = ('Fact Sale'[Total Including Tax] + 'Fact
Sale'[Profit])
```

The data is formatted to the USD value and 2 decimal places.

The quick measures functionality is used to perform a time intelligence analysis for sales amount. Year over year percentage (YoY%) and year to date (YTD) measures are created to evaluate the performance of sale across the years. The quick measure created DAX are as follows.

```
YoY% Sales Amount =
DIVIDE(SUM('Fact Sale'[Sales Amount]) - CALCULATE(SUM('Fact
Sale'[Sales Amount]),DATEADD('Dimension Date'[Date], -1,
YEAR)),CALCULATE(SUM('Fact Sale'[Sales
Amount]),DATEADD('Dimension Date'[Date], -1, YEAR)))

YTD Sales Amount =
TOTALYTD(SUM('Fact Sale'[Sales Amount]), 'Dimension Date'[Date])
```

The data for YoY % and YTD Sales Amount are formatted to percent and USD values respectively with 2 decimal places.

5. Data Analysis & Visualization