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| Northwind Traders  IEC Portfolio 1 | | |
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**Data Dictionary**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Table Name | Field Name | Data type | Description | Example |
| Categories | Category ID | int | Unique identifier for each category. | 1 |
| Categories | Category Name | text | Name of the category | Beverages |
| Categories | Description | text | Description of the category | Soft drinks, coffees,  teas, beers, and ales |
| Categories | Picture | BLOB | Picture representing the category | ... |
| Customers | Customer ID | text | Unique identifier for each customer | ALFKI |
| Customers | Company Name | text | Name of the customer company | Alfreds Futterkiste |
| Customers | Contact Name | text | Name of the contact person | Maria Anders |
| Customers | Contact Title | text | Title of the contact person | Sales Representative |
| Customers | Address | text | Address of the customer | Obere Str. 57 |
| Customers | City | text | City of the customer | Berlin |
| Customers | Region | text | Region of the customer | BC |
| Customers | Postal Code | text | Postal code of the customer | 12209,  WA1 1DP |
| Customers | Country | text | Postal code of the customer | Germany |
| Customers | Phone | text | Phone number of the customer | 030-0074321 |
| Customers | Fax | text | Fax number of the customer | 030-0076545 |
| Employees | Employee id | int | Unique identifier for each employee | 1 |
| Employees | Last name | text | Last name of the employee | Davolio |
| Employees | First name | text | First name of the employee | Nancy |
| Employees | title | text | Job title of the employee | Sales Representative |
| Employees | Title of courtesy | text | Title of courtesy (e.g., Mr., Mrs.) | Ms. |
| Employees | birthdate | text | Birth date of the employee | 1948-08-12 |
| Employees | Hire date | text | Hire date of the employee | 1992-01-05 |
| Employees | address | text | Address of the employee | 507 - 20th Ave.  E.Apt. 2A |
| Employees | city | text | City of the employee | Seattle |
| Employees | region | text | Region of the employee | WA |
| Employees | Postal code | text | Postal code of the employee | 98122, SW1 8JR |
| Employees | country | text | Country of the employee | USA |
| Employees | Home phone | text | Home phone number of the employee | (206) 555-9857 |
| Employees | extension | int | Extension number | 5467 |
| Employees | photo | BLOB | Photo of the employee | … |
| Employees | notes | text | Notes about the employee | Education includes a BA.  in psychology from  Colorado  State University in 1970.  She also completed The Art  of the Cold Call."Nancy is a member  of Toastmasters  International." |
| Employees | Report to | text | ID of the manager the employee reports to | 2, he was transferred |
| Employees | photograph | text | Photograph of the employee | http://accweb/emmployees  /davolio.bmp |
| Employees | salary | double | Salary of the employee | 2954.55 |
| Employeeterritories | Employee ID | int | ID of the employee | 2 |
| Employeeterritories | Territory ID | int | ID of the territory | 1581 |
| Order details | Order ID | int | ID of the order | 10248 |
| Order details | Product ID | int | ID of the product | 11 |
| Order details | Unit Price | double | Unit price of the product | 14, 9.8 |
| Order details | Quantity | int | Quantity ordered | 12 |
| Order details | Discount | int | Discount applied | 0 |
| Orders | Order ID | int | Unique identifier for each order | 10248 |
| Orders | Customer ID | text | ID of the customer who placed the order | VINET |
| Orders | Employee ID | int | ID of the employee who processed the order | 5 |
| Orders | Order Date | text | Date when the order was placed | 1996-07-04 |
| Orders | Required Date | text | Date by which the order is required | 1996-08-01 |
| Orders | Shipped Date | text | Date when the order was shipped | 1996-07-16 |
| Orders | Ship Via | int | ID of the shipper used | 3 |
| Orders | Freight | double | Freight cost | 32.38 |
| Orders | Ship Name | text | Name of the shipper | Vins et alcools Chevalier |
| Orders | Ship Address | text | Address of the shipper | 59 rue de l-Abbaye |
| Orders | Ship City | text | City of the shipper | Reims |
| Orders | Ship Region | text | Region of the shipper | RJ |
| Orders | Ship Postal Code | text | Postal code of the shipper | 51100, B-6000 |
| Orders | Ship Country | text | Country of the shipper | France |
| Products | Product ID | int | Unique identifier for each product | 1 |
| Products | ProductName | text | Name of the product | Chai |
| Products | Supplier ID | int | ID of the supplier providing the product | 1 |
| Products | Category ID | int | ID of the category the product belongs to | 1 |
| Products | Quantity Per Unit | text | Quantity of product per unit | 10 boxes x 20 bags |
| Products | Unit Price | double | Price per unit of the product | 18, 21.35 |
| Products | Units In Stock | int | Number of units in stock | 39 |
| Products | Units On Order | int | Number of units on order | 0 |
| Products | Reorder Level | int | Level at which the product needs to be reordered | 10 |
| Products | Discontinued | int | Indicates if the product is discontinued | 0 |
| Region | Region ID | int | Unique identifier for each region | 1 |
| Region | Region Description | text | Description of the region | Eastern |
| Territories | Territory ID | int | Unique identifier for each territory | 1581 |
| Territories | Territory Description | text | Description of the territory | Westboro |
| Territories | Region ID | int | ID of the region | 1 |
| Shippers | Shipper ID | int | Unique identifier for each shipper | 1 |
| Shippers | Company Name | text | Name of the shipping company | Speedy Express |
| Shippers | Phone | text | Phone number of the shipper | (503) 555-9831 |
| Suppliers | Supplier ID | int | Unique identifier for each supplier | 1 |
| Suppliers | Company Name | text | Name of the supplier company | Exotic Liquids |
| Suppliers | Contact Name | text | Name of the contact person | Charlotte Cooper |
| Suppliers | Contact Title | text | Title of the contact person | Purchasing Manager |
| Suppliers | Address | text | Address of the supplier | 49 Gilbert St. |
| Suppliers | City | text | City of the supplier | London |
| Suppliers | Region | text | Region of the supplier | LA |
| Suppliers | Postal Code | text | Postal code of the supplier | EC1 4SD |
| Suppliers | Country | text | Country of the supplier | UK |
| Suppliers | Phone | text | Phone number of the supplier | (171) 555-2222 |
| Suppliers | Fax | text | Fax number of the supplier | (313) 555-3349 |
| Suppliers | Homepage | text | Homepage of the supplier | Mayumi's (on the World  Wide Web) #http://www.  microsoft.com/accessdev  /sampleapps/mayumi.htm# |

**Sales Analysis**

1. **What are the total sales for each month over the past year? (Monthly Sales Trends)**

**Objective:**

To identify the total sales for each month over the past year. This allows for a detailed understanding of seasonal trends, peak sales periods, and potential areas for improvement in sales strategies.

**Query:**

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**Result:**

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The result identifies total sales according to months. This helps in understanding when sales are highest and planning inventory and promotions accordingly.

**Recommendations:**

**Peak Periods:** If certain months show consistently high sales, ensure that inventory levels are sufficient to meet demand during these periods. Plan targeted promotions and marketing campaigns to maximize sales.

**Slow Periods:** For months with lower sales, consider implementing special promotions, discounts, or marketing efforts to boost sales. Analyze why sales might be lower during these months and address any underlying issues.

**Seasonal Trends:** If sales show clear seasonal patterns, align your product launches, marketing campaigns, and inventory management with these trends to optimize performance throughout the year.

1. **How has the total sales revenue grown year over year? (Yearly Sales Growth)**

**OBJECTIVE:**

To analyze how the total sales revenue has grown year over year. This helps in understanding the business's growth trajectory, identifying trends, and making informed decisions about future strategies.

**Query:**

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**Result:**

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The result shows total sales growth yearly. This helps us to understand how sales increase or decrease by year or whether there is consistent growth in sales year over year.

**Recommendation:**

If the results show sustained growth, consider investing more in successful product lines, expanding to new markets, and increasing marketing efforts.

**Inventory management:**

1. **What is the inventory turnover rate for each product over the past year? (Inventory Turnover Rate)**

**Objective:**

Calculate the inventory turnover rate for each product over the past year. This metric helps understand how efficiently inventory is being managed and how often stock is being sold and replaced within a year.

**Query:**

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**Result**

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The result indicates how many times the inventory has been sold and replaced over the past year. A higher turnover rate suggests efficient inventory management, while a lower rate may indicate overstocking or slow-moving inventory.

**Recommendation:**

**Improve Inventory Management**: For products with low turnover rates, analyze demand patterns and adjust inventory levels accordingly to reduce holding costs and free up capital.

**Enhance Sales Strategies**: For slow-moving products, consider implementing promotional strategies, discounts, or bundling options to boost sales and improve turnover rates.

**Optimize Ordering Practices**: For high turnover products, ensure that ordering practices are optimized to maintain adequate stock levels and avoid stockouts. Consider increasing order quantities or frequency for these products.

**Product & Customer Analysis**

1. **What is the reorder frequency of each product?**

**Objective:**

Determine the reorder frequency of each product to ensure adequate inventory management and timely restocking.

**Query:**

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**Result:**  
The results help in understanding the demand pattern for each product by calculating how frequently they need to be reordered. It is crucial for inventory management to ensure products are available when needed and to identify fast-moving items.

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**Recommendation:**

Use the reorder frequency data to prioritize inventory management, ensuring that products in high demand are adequately stocked to meet customer needs.

1. **Question**
2. **Total sale of product and which customer bought them?**
3. **Category-wise breakdown of products and their total sales?**
4. **Quantity wise breakdown?**

**Objectives:**a) To determine the total sales of each product and identify the corresponding customers who purchased them, providing insights into consumer purchasing behavior and facilitating personalized marketing strategies.

b) To analyze the total sales of products within each category, enabling the assessment of category performance and the identification of high-performing product categories for strategic resource allocation and marketing efforts.

c) To examine the breakdown of product quantities available, categorized by product and product category, aiding in inventory management decisions, and ensuring optimal stock levels to meet customer demand efficiently.

Q5a.  
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Q5b.

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Description automatically generated

Q5c.Quantity wise breakdown

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**Result:**Aggregating sales data by product category offers insights into revenue-generating categories, aiding in market trend analysis and resource allocation. Simultaneously, monitoring current stock quantities with category information facilitates effective inventory management, enabling businesses to maintain optimal stock levels and identify products requiring replenishment promptly.  
  
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**Recommendation:**

Utilize the insights gained from analyzing the total sales of each product and the corresponding customers to tailor personalized marketing strategies. Implement customer segmentation based on purchasing behavior to target specific customer groups effectively. Additionally, consider offering incentives or promotions to encourage repeat purchases from high-value customers. Similarly, leverage the category-wise breakdown of product sales to identify top-performing product categories and capitalize on emerging market trends. Allocate resources towards promoting products within these high-performing categories to maximize profitability. Furthermore, consider diversifying product offerings within successful categories to meet evolving consumer preferences and capture a larger market share.

**Freight Analysis:**

1. **What are the shipping details for each shipped order?**

**Objective:**

Calculate the average freight cost for each shipper over time, allowing for the identification of trends, comparisons between shippers, and potential cost optimization strategies.

**Query & Result:**

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**Results Interpretation:**

The data presents a comprehensive view of shipping activities, encompassing details about the customer's location, the shipment's destination, the associated freight cost, the duration it took to ship the order, and any delays in delivery.

**Key observations from the provided data include:**

**Diverse Customer Base**:The orders originate from various cities and countries, indicating a wide geographical spread of customers.

**Timely Deliveries**: Most orders are delivered within a reasonable timeframe, with DaysToShip ranging from 2 to 12 days. Notably, there are no instances of late deliveries in this dataset, as indicated by DaysLate being 0 for all entries.

**Freight Cost Variations:** The shipping costs (Freight) exhibit significant variability, ranging from 11.61 to 148.33. This variation is observed even for shipments to the same destination (e.g., Rio de Janeiro), suggesting that factors beyond distance, such as shipper choice or service level, influence the final cost.

**Power BI Narrative & Business Insights:**

This data is prime for a compelling narrative within a Power BI dashboard. Here is how it could be used:

**Shipping Performance Analysis**: Visualize the Days to Ship and Days Late data to understand how long it typically takes to fulfill orders and how often they are late. This can reveal bottlenecks in your shipping process and identify areas for improvement.

**Freight Cost Analysis**: Analyze Freight data across different Customer City and Shipped City pairs to understand how shipping costs vary based on origin and destination. You could create visualizations like:

**Operational Efficiency**: Identify trends in shipping times and costs over time to see if your operations are becoming more efficient or if there are areas that need attention.

**Cost Optimization**: Use the insights gained to make data-driven decisions about optimizing shipping routes, negotiating better rates with carriers, or adjusting pricing to account for shipping costs.

By exploring the data visually in Power BI, you can gain valuable insights to optimize your shipping operations, improve customer satisfaction, and ultimately enhance your bottom line.

1. **What is the shipping cost summary for each shipping company?**

**Objective:**

The objective of the query is to analyze the freight costs associated with different shipping companies to assess their overall cost-effectiveness and identify potential cost-saving opportunities.

**Query & Result:**

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Results Interpretation:

The results provide a statistical summary of freight costs for each shipping company:

Federal Shipping: Handled 255 shipments, with freight costs ranging from 0.4 to 1007.64, averaging 80.44 per shipment.

Speedy Express: Handled 249 shipments, with a smaller freight cost range (0.12 to 458.78) and a lower average of 65.00 per shipment.

United Package: Handled the most shipments (326), with the widest range of freight costs (0.02 to 890.78) and the highest average of 86.64 per shipment.

**Power BI Narrative & Business Insights:**

This data is valuable for crafting a narrative around shipping costs and performance within a Power BI dashboard. Here's how it could be utilized:

* **Shipper Comparison:**
  + A **bar chart** could visualize the average freight cost for each shipper, allowing for easy comparison of their overall cost-effectiveness.
  + A **scatter plot** with NumShipments on one axis and Av Freight on the other could reveal if there's a relationship between shipment volume and average cost.
* **Cost Variability:**
  + Box plots or histograms could display the distribution of freight costs for each shipper, highlighting outliers and showing which shipper has the most consistent pricing.
  + The StdDevFreight value could be included in tooltips or as a separate table to quantify the variability.

1. **What was the average freight cost incurred by each shipping company in each month of the specified time period?**

**Objective:**

The objective of the query is to analyse the average freight cost per month for each shipping company to identify trends in shipping expenses over time and facilitate comparisons between different carriers.

**Query & Result:**

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**Results Interpretation:**

The data shows how the average freight costs fluctuate for each shipping company over time. For example, we see that United Package had the highest average freight cost in April 1998 and the lowest in May 1998, indicating significant volatility.

**Power BI Narrative & Business Insights:**

This data is prime for a compelling narrative within a Power BI dashboard. Here's how it could be used:

* **Trend Analysis:** A **line chart** with OrderMonthYear on the x-axis and Av Freight on the y-axis, with separate lines for each shipper, would visually showcase the trend of average freight costs over time. This could reveal seasonal patterns, long-term trends, or anomalies in shipping costs.
* **Shipper Comparison:** A **bar chart** comparing the average freight costs of different shippers for each month could easily identify the most and least cost-effective options. This could inform decisions about which shippers to use for future orders.
* **Cost Optimization:** By identifying months with high average freight costs, businesses can investigate the underlying causes and explore strategies to mitigate these costs, such as negotiating better rates with shippers or consolidating shipments.

By visualizing the data in Power BI, the business can gain valuable insights into the shipping costs and make informed decisions to optimize the logistics operations.