Tech Saksham

Case Study Report

Data Analytics with Power BI

"Supply Chain Analysis of Inventories"

"College Name"

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ABSTRACT

Supply chain management includes the planning and execution of the whole flow of a good or service. Essentially, supply chain management oversees the end-to-end processes involved in the production and distribution of goods or services, from raw material sourcing to delivery to the end customer. It encompasses various activities such as procurement, manufacturing, logistics and inventory management, with the goal of optimizing efficiency, reducing costs and meeting customer demand.

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CHAPTER 1

INTRODUCTION

1.1 Problem Statement

Risks in the supply chain primarily arise from volatility in the markets. Changing consumer demand, trade wars, raw material shortages, climate change, stricter environmental regulations, economic uncertainties and policy changes, industrial unrest, etc., contribute to supply chain management risks and challenges.

1.2 Proposed Solution

When demand is volatile, retailers should shape the demand based on available inventory through promotions and marketing. On the supply side, focus on autonomous recalibration of inventory, stock, and replenishment policies to minimize exception- driven approach to execution.

1.3 Feature

- *Supply Chain Analysis: The dashboard will provide supply chain analysis of data.*
- *Customer Segmentation: It will segment based on various parameters used in dashboard sum of quentity and sum of discount.*
- *Trend Analysis: The dashboard will identify and display trends in customer behavior.*
- *Predictive Analysis: It will use historical data to predict future customer behavior.*

1.4 Advantages

** Better collaboration. Information flow is a prominent challenge for companies.*

** Improved quality control.*

** Higher efficiency rate.*

** Keeping up with demand.*

** Shipping optimization.*

** Reduced overhead costs.*

** Improved risk mitigation.*

** Improved cash flow.*

1.5 Scope

**** Supplier Performance Analysis**: Supply chain analysts assess supplier performance metrics, such as on-time delivery, lead times, quality, and cost, to evaluate supplier performance. They identify areas for improvement, negotiate supplier contracts, and work to enhance supplier relationships to ensure a reliable and efficient supply chain.*

**** Inventory Control**: Inventory control professionals are responsible for monitoring and managing inventory levels to prevent excess inventory or stock outs. They implement inventory control policies, such as ABC analysis, Just-In-Time (JIT) inventory systems, and cycle counting, to optimize inventory management practices.*

** Demand Forecasting: Professionals in supply chain analysis and inventory management use demand forecasting techniques to predict future demand for products or services. They analyze historical data, market trends, and other factors to develop accurate demand forecasts, which help in optimizing inventory levels and reducing stockouts.*

** Inventory Optimization: Inventory management professionals focus on optimizing inventory levels to balance the trade-off between carrying costs and stockouts. They use inventory optimization tools, such as economic order quantity (EOQ) models, safety stock calculations, and reorder point analysis, to ensure that the right amount of inventory is available at the right time.*

CHAPTER 2

SERVICES AND TOOLS REQUIRED

2.1 Services Used

• *Data Collection and Storage Services: Banks need to collect and store customer data in real-time. This could be achieved through services like Azure Data Factory, Azure Event Hubs, or AWS Kinesis for real-time data collection, and Azure SQL Database or AWS RDS for data storage.*

• *Data Processing Services: Services like Azure Stream Analytics or AWS Kinesis Data Analytics can be used to process the real-time data.*

• *Machine Learning Services: Azure Machine Learning or AWS Sage Maker can beused to build predictive models based on historical data.*

2.2 Tools and Software used

Tools:

• *Power BI: The main tool for this project is Power BI, which will be used to create interactive dashboards for real-time data visualization.*

• *Power Query: This is a data connection technology that enables you to discover, connect, combine, and refine data across a wide variety of sources.*

Software Requirements:

Power BI Desktop: This is a Windows application that you can use to create reports and publish them to Power BI.

Power BI Service: This is an online SaaS (Software as a Service) service that you use to publish reports, create new dashboards, and share insights.

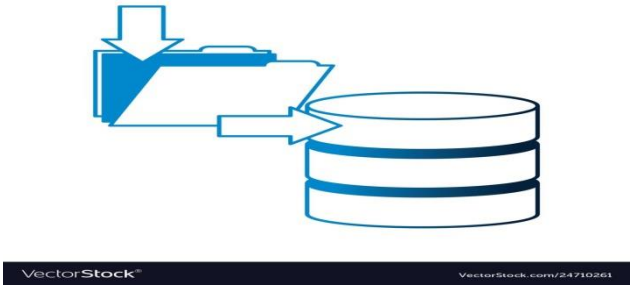
Power BI Mobile: This is a mobile application that you can use to access your reports and dashboards on the go.

CHAPTER 3

PROJECT ARCHITECTURE

3.1 Architecture

User ***Computer*** ***Data Collection***



Database

Here's a high-level architecture for the project:

1. *Data Collection: Supply chain data is collected from various sources like Customer Name, Customer Full Name, Gender etc. This could be achieved using services like Azure Event Hubs or AWS Kinesis.*

2. *Data Storage: The collected data is stored in a database for processing. Azure SQL Database or AWS RDS can be used for this purpose.*

3. *Data Processing: The stored data is processed in supply chain using services like Azure Stream Analytics or AWS Kinesis Data Analytics.*

4. *Machine Learning: Predictive models are built based on processed data using Azure Machine Learning or AWS Sage Maker. These models can help in predicting customer behavior, detecting fraud, etc.*

5. *Data Visualization: The processed data and the results from the predictive models are visualized in real-time using Power BI. Power BI allows you to create interactive dashboards that can provide valuable insights into the data.*

6. *Data Access: The dashboards created in Power BI can be accessed through Power BI Desktop, Power BI Service (online), and Power BI Mobile.*

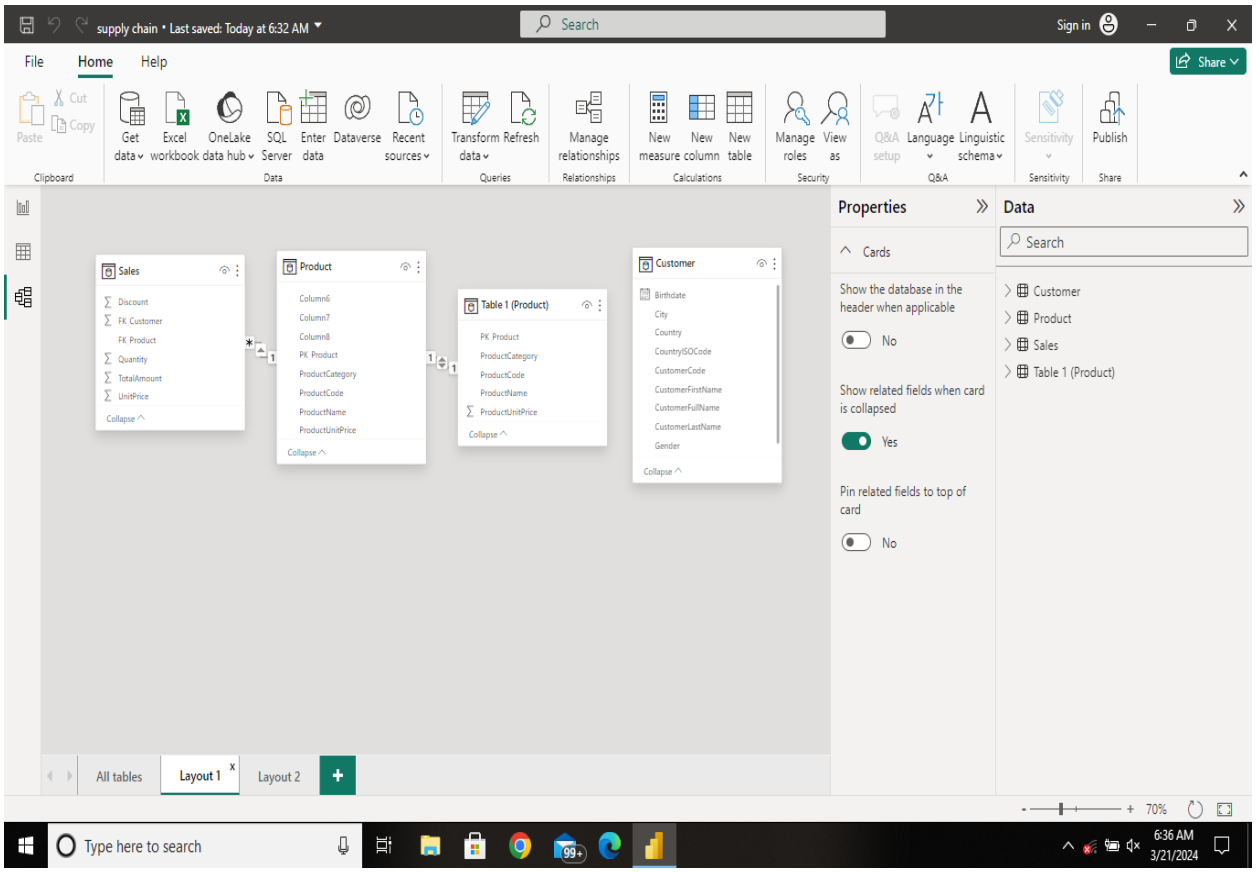
This architecture provides a comprehensive solution for real-time analysis of bank customers. However, it's important to note that the specific architecture may vary depending on the bank's existing infrastructure, specific requirements, and budget. It's also important to ensure that all tools and services comply with relevant data privacy and security regulations.

CHAPTER 4

MODELING AND RESULT

Manage relationship

The "disp" file will be used as the main connector as it contains most key identifier (account id, client id and disp id) which can be use to relates the 8 data files together. The "district" file is use to link the client profile geographically with "district id"

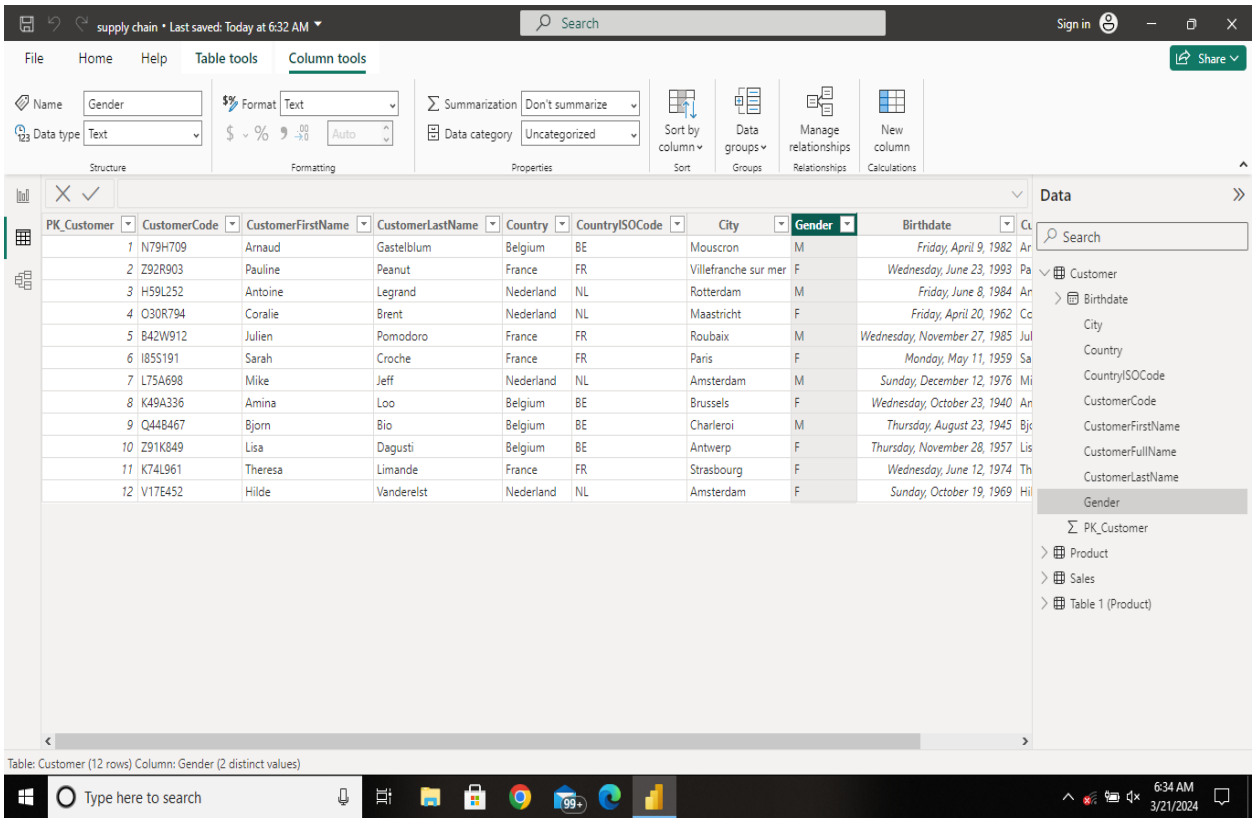


Modeling for Gender and Age data

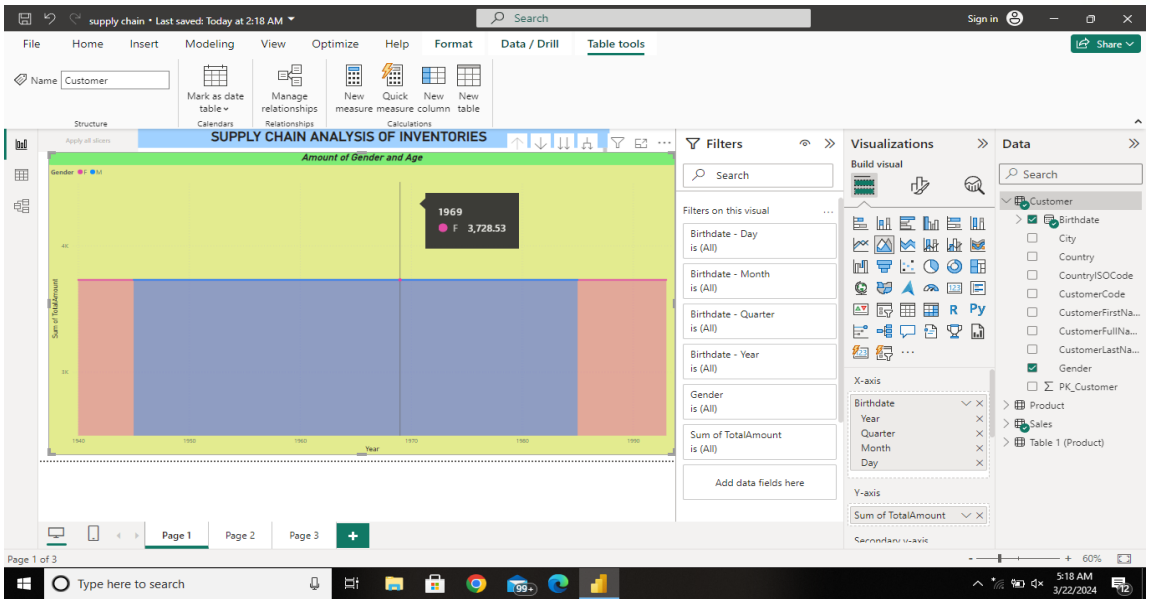
Notice that the Gender and age of the client are missing from the data. These can be formulated from the birth number YYMMDD where at months (the 3rd and 4th digits) greater than 50 means that client is a Female. We can create a column for Gender.

For birthday, we need to reduce the birth month of the female by 50 and then change the date format to DD/MM/YYYY adding 1900 to the year.

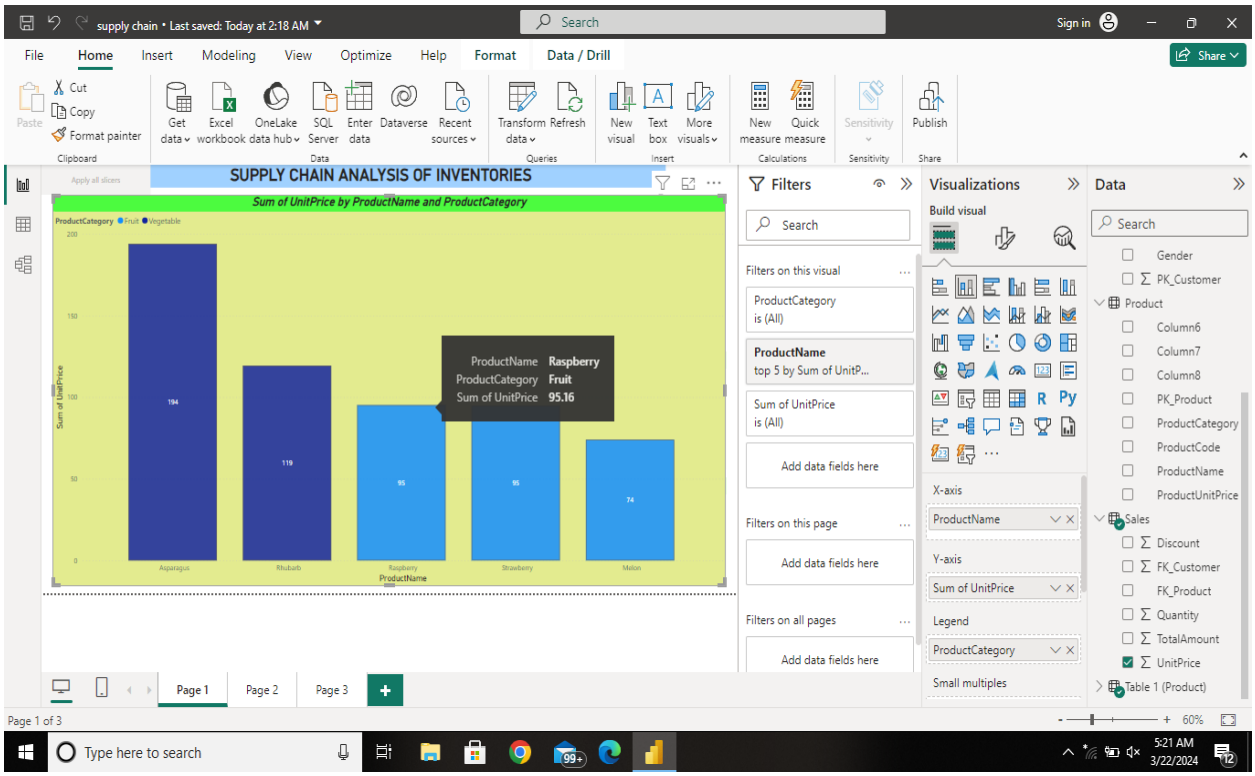
For Age, we shall assume it is year 1999 as explain previously and use it to minus from the birth year.

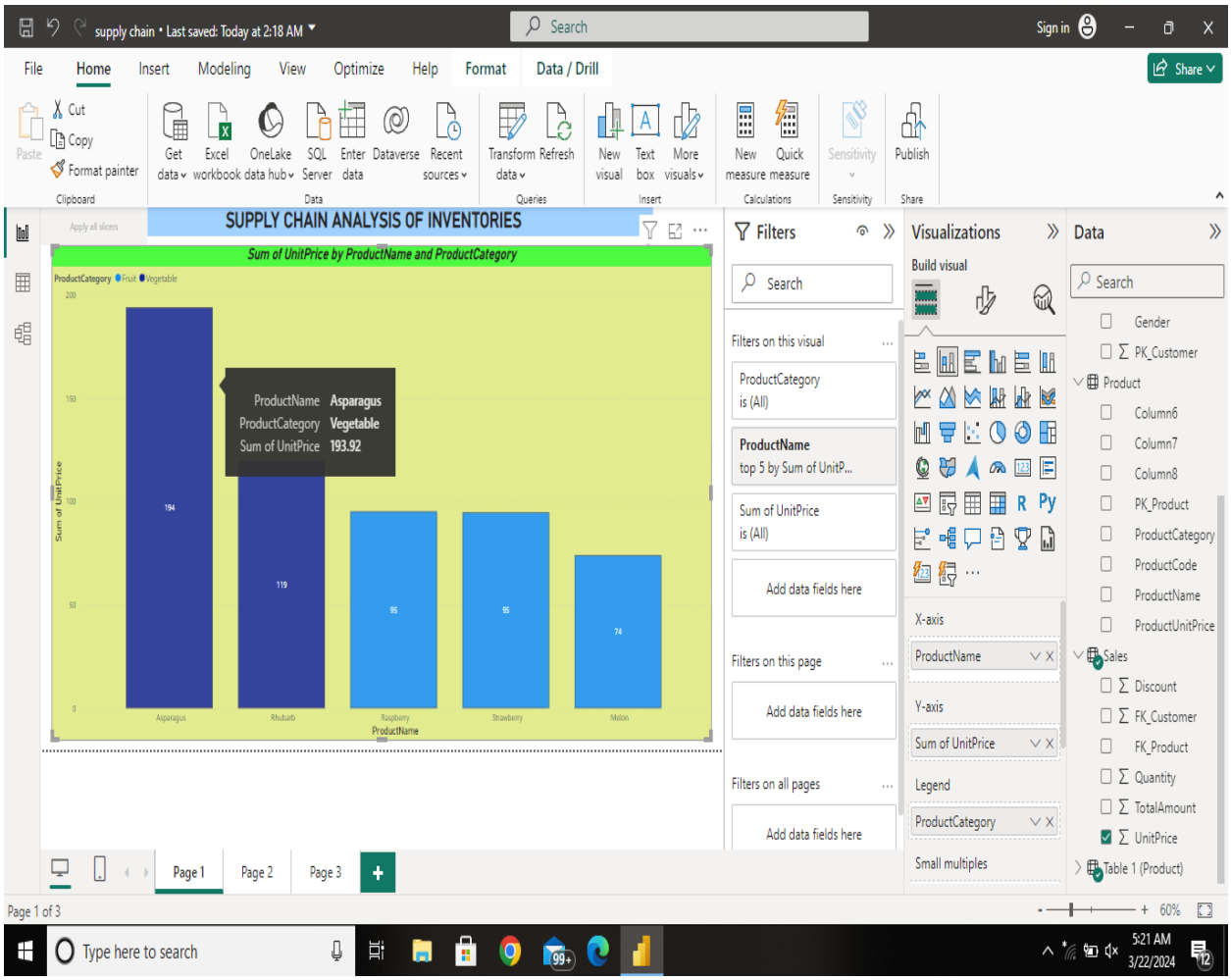


PK_Customer	CustomerCode	CustomerFirstName	CustomerLastName	Country	CountryISOCode	City	Gender	Birthdate
1	N79H709	Arnaud	Gastelblum	Belgium	BE	Mouscron	M	Friday, April 9, 1982
2	Z92R903	Pauline	Peanut	France	FR	Villefranche sur mer	F	Wednesday, June 23, 1993
3	H59L252	Antoine	Legrand	Nederland	NL	Rotterdam	M	Friday, June 8, 1984
4	O30R794	Coralie	Brent	Nederland	NL	Maastricht	F	Friday, April 20, 1962
5	B42W912	Julien	Pomodoro	France	FR	Roubaix	M	Wednesday, November 27, 1985
6	I85S191	Sarah	Croche	France	FR	Paris	F	Monday, May 11, 1959
7	L75A698	Mike	Jeff	Nederland	NL	Amsterdam	M	Sunday, December 12, 1976
8	K49A336	Amina	Loo	Belgium	BE	Brussels	F	Wednesday, October 23, 1940
9	Q44B467	Bjorn	Bio	Belgium	BE	Charleroi	M	Thursday, August 23, 1945
10	Z91K849	Lisa	Dagusti	Belgium	BE	Antwerp	F	Thursday, November 28, 1957
11	K74L961	Theresa	Limande	France	FR	Strasbourg	F	Wednesday, June 12, 1974
12	V17E452	Hilde	Vanderelst	Nederland	NL	Amsterdam	F	Sunday, October 19, 1969



Modeling for Sum of Unitprice by ProductName and Productcategory

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Sign in
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Home
Insert
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View
Optimize
Help
Format
Data / Drill
Share
SUPPLY CHAIN ANALYSIS OF INVENTORIES
Sum of UnitPrice by ProductName and ProductCategory
ProductCategory Fruit Vegetable
ProductName Asparagus
ProductCategory Vegetable
Sum of UnitPrice 193.92
Sum of UnitPrice
ProductName
Asparagus
Rhubarb
Raspberry
Strawberry
Melon
194
119
95
95
74
Filters
Filters on this visual
ProductCategory is (All)
ProductName top 5 by Sum of UnitP...
Sum of UnitPrice is (All)
Add data fields here
Filters on this page
Add data fields here
Filters on all pages
Add data fields here
Visualizations
Build visual
X-axis
ProductName
Y-axis
Sum of UnitPrice
Legend
ProductCategory
Small multiples
Data
Search
Gender
PK_Customer
Product
Column6
Column7
Column8
PK_Product
ProductCategory
ProductCode
ProductName
ProductUnitPrice
Sales
Discount
FK_Customer
FK_Product
Quantity
TotalAmount
UnitPrice
Table 1 (Product)
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Page 3
Page 1 of 3
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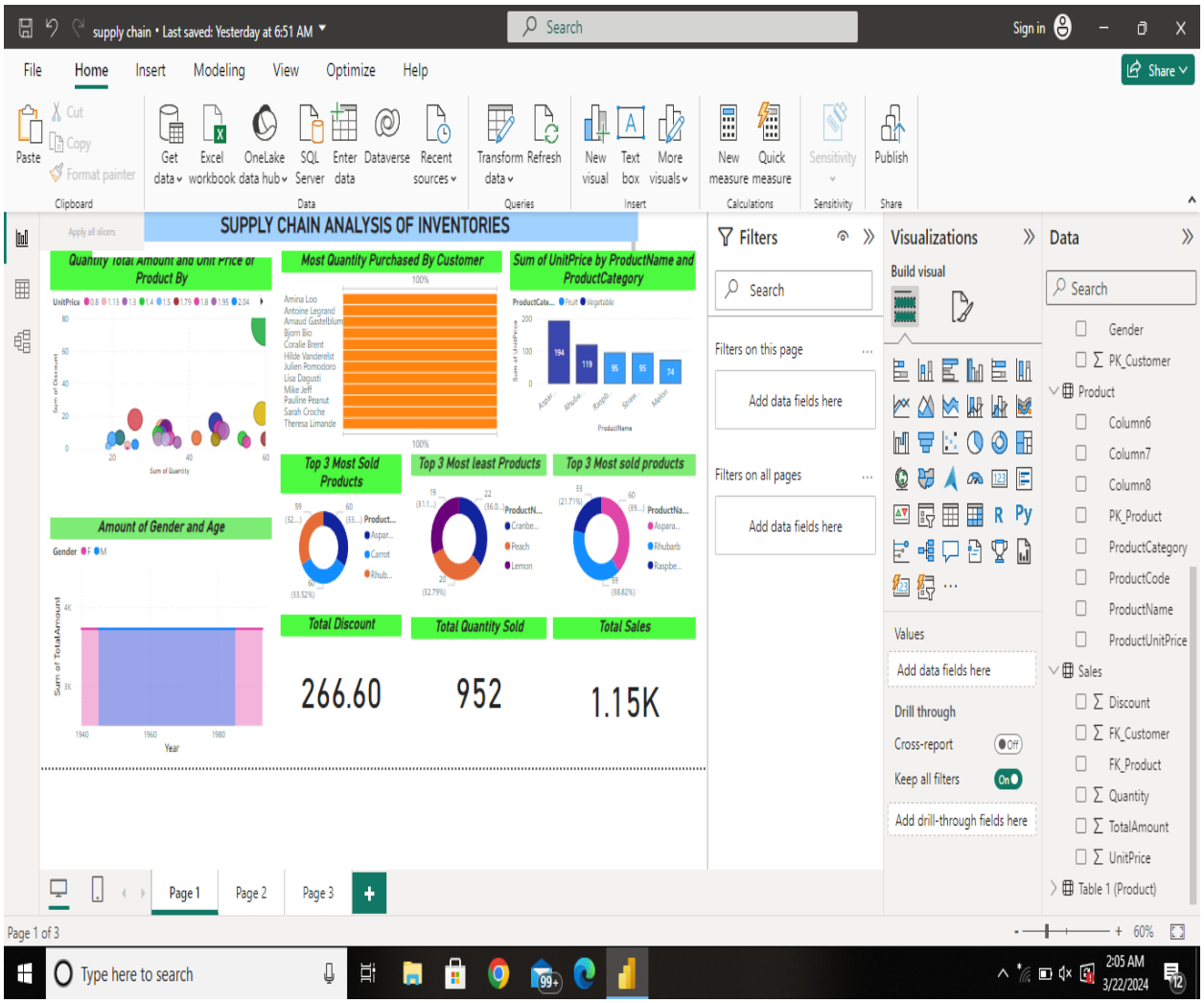
Dashboard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File
Home
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Help
Share
SUPPLY CHAIN ANALYSIS OF INVENTORIES
Most Quantity Purchased By Customer
Sum of UnitPrice by ProductName and ProductCategory
Top 3 Most Sold Products
Top 3 Most least Products
Top 3 Most sold products
Amount of Gender and Age
Total Discount
Total Quantity Sold
Total Sales
266.60
952
1.15K
Filters
Filters on this page
Add data fields here
Filters on all pages
Add data fields here
Visualizations
Build visual
Values
Add data fields here
Drill through
Cross-report
Keep all filters
Add drill-through fields here
Data
Search
Gender
PK_Customer
Product
Column6
Column7
Column8
PK_Product
ProductCategory
ProductCode
ProductName
ProductUnitPrice
Sales
Discount
FK_Customer
FK_Product
Quantity
TotalAmount
UnitPrice
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CONCLUSION

The project "Supply Chain Analysis of Inventories" using Power BI has successfully demonstrated the potential of data analytics. The supply chain analysis data has provided valuable insights into customer behavior, preferences, and trends, thereby facilitating informed decision-making. The interactive dashboards and reports have offered a comprehensive view of customer data, enabling the identification of patterns and correlations. The project has also highlighted the importance of data visualization in making complex data more understandable and accessible. The use of Power BI has made it possible to present data in a visually appealing and easy-to-understand format, there by aiding in better decision-making.

FUTURE SCOPE

The future scope of this project is vast. With the advent of advanced analytics and machine learning, Power BI can be leveraged to predict future trends based on historical data. Integrating these predictive analytics into the project could enable the bank to anticipate customer needs and proactively offer solutions. Furthermore, Power BI's capability to integrate with various data sources opens up the possibility of incorporating more diverse datasets for a more holistic view of customers. As data privacy and security become increasingly important, future iterations of this project should focus on implementing robust data governance strategies. This would ensure the secure handling of sensitive customer data while complying with data protection regulations. Additionally, the project could explore the integration of real-time data streams to provide even more timely and relevant insights. This could potentially transform the way banks interact with their customers, leading to improved customer satisfaction and loyalty.