ASSIGNMENT 2 FRONT SHEET

Qualification	**BTEC Level 5 HND Diploma in Computing**		
Unit number and title	Unit 14: Business Intelligence		
Submission date	25 December 2023	**Date Received 1st submission**	
Re-submission Date	2 January 2024	**Date Received 2nd submission**	
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Class	GCC1001	**Assessor name**	DOAN DINH HO
Student declaration I certify that the assignment submission is entirely my own work and I fully understand the consequences of plagiarism. I understand that making a false declaration is a form of malpractice.			
		Student's signature	Truong Duong Hong Phuoc

Grading grid

P3	P4	P5	P6	M3	M4	D3	D4

☼ **Summative Feedback:**	☼ **Resubmission Feedback:**	
Grade:	**Assessor Signature:**	**Date:**
IV Signature:		

Assessment Brief

Student Name/ID Number	
Unit Number and Title	**14: Business Intelligence**
Academic Year	2018
Unit Tutor	
Assignment Title	**Assignment 2: Apply BI tools & techniques and their impact**
Issue Date	
Submission Date	
IV Name & Date	

Submission Format
Part I: Project submission. This should be a zip / rar folder of your project, including all necessary files to run your project. There should be a link to your Tableau work on Tableau Public cloud. Part II: The submission is in the form of a group written report. This should be written in a concise, formal business style using single spacing and font size 12. You are required to make use of headings, paragraphs and subsections as appropriate, and all work must be supported with research and referenced using the Harvard referencing system. Please also provide a bibliography using the Harvard referencing system. Part III: Team needs to present their point of view about how business intelligence tools can contribute to effective decision-making as well as the legal issues involved in exploiting user data for business intelligence. You may need to research for specific examples of organizations that use BI tools to enhance or improve their business and evaluate how they can use BI tools for extend their target audience and make them more competitive within the market.

Unit Learning Outcomes
LO3 Demonstrate the use of business intelligence tools and technologies
Assignment Brief
(Continued from previous scenario) Your next task is to demonstrate to the board of directors about the ability of applying business intelligence in the company's current business processes. To demonstrate BI, you need to prepare a presentation about BI and related tools & techniques and a demonstration on real company dataset. For the presentation, you need: - Explain general concept of what is BI - Introduction to some tools / techniques for BI and their application in general For the demonstration, you need: - A (some) data set(s) extracted from the company's business processes. Explain the dataset. - Show how you pre-process data for later analysis, explain each step and it purpose - Design dashboards to show your analysis on pre-processed data. Explain clearly purpose of dashboards and charts. Suggestions should be made after analysis During the demonstration, you need collect feed-back and comments from users to review how well your dashboards design meet user or business requirement and what customization needed for future use. Team needs to present their point of view about how business intelligence tools can contribute to effective decision-making as well as the legal issues involved in exploiting user data for business intelligence. You may need to research for specific examples of organizations that use BI tools to enhance or improve their business and evaluate how they can use BI tools for extend their target audience and make them more competitive within the market. To summary, you need to submit a report in PDF includes 4 parts: your presentation, result of demonstration and review of user feedback, point of view on BI contribution and legal issues.

Learning Outcomes and Assessment Criteria		
Pass	**Merit**	**Distinction**
LO3 Demonstrate the use of business intelligence tools and technologies		D3 Provide a critical review of the design in terms of how it meets a specific user or business requirement and identify what customisation has been integrated into the design.
P3 Determine, with examples, what business intelligence is and the tools and techniques associated with it. P4 Design a business intelligence tool, application or interface that can perform a specific task to support problem-solving or decision-making at an advanced level.	M3 Customise the design to ensure that it is user friendly and has a functional interface.	
LO4 Discuss the impact of business intelligence tools and technologies for effective decision-making purposes and the legal/regulatory context in which they are used		D4 Evaluate how organisations could use business intelligence to extend their target audience and make them more competitive within the market, taking security legislation into consideration
P5 Discuss how business intelligence tools can contribute to effective decision-making. P6 Explore the legal issues involved in the secure exploitation of business intelligence tools	M4 Conduct research to identify specific examples of organisations that have used business intelligence tools to enhance or improve operations.	

Contents

I. Introduction

In this Report, I am going to delve into the intricate realm of Business Intelligence (BI) tools and technologies, exploring their multifaceted role in shaping contemporary business landscapes. As organizations strive to remain competitive and adaptive, the strategic use of information has become paramount. BI tools offer a transformative approach, enabling businesses to gather, analyze, and interpret data to inform critical decision-making processes. This exploration will unfold in two main sections. Firstly, we will unravel the essence of BI by examining its definition and the diverse array of tools and techniques associated with it. Concrete examples will illustrate the practical applications of these tools, providing insights into the dynamic landscape of business data utilization.

Secondly, we will journey into the design aspect of BI, contemplating the creation of interfaces and applications tailored for specific tasks. This not only underscores the versatility of BI tools but also underscores their capacity to address unique organizational needs through intuitive and purpose-driven design.

Moving beyond the technical aspects, we will scrutinize the impact of BI tools on decision-making processes, emphasizing their contribution to the formulation of effective strategies. However, this transformative power comes with a set of legal considerations. Therefore, we will navigate the legal and regulatory landscape surrounding the secure exploitation of BI tools, shedding light on the potential challenges and obligations that businesses must navigate.

As we traverse this comprehensive exploration, the paper seeks to unravel the strategic significance of BI tools in the modern business landscape, emphasizing the need for a nuanced understanding of their capabilities and the imperative importance of legal compliance in their utilization.

II. Demonstrate the use of business intelligence tools and technologies (LO3)

II.1 Determine, with examples, what business intelligence is and the tools and techniques associated with it (P3)

1. Business Intelligence

- Definition

Business Intelligence (BI) encompasses the procedural and technological framework responsible for gathering, storing, and examining data generated through a company's operations. This inclusive term involves activities such as data mining, process analysis, performance benchmarking, and descriptive analytics. BI effectively processes all business-generated data, offering easily understandable reports, performance metrics, and trends to guide managerial decision-making.

The objective of BI is to enhance the precision, promptness, and volume of data, ultimately leading to improved decision-making. It aids in identifying problems, recognizing market trends, and uncovering new revenue or business opportunities. (FRANKENFIELD, 2022)

- Benefit

According to (canvasintelligence, n.d.) the benefit of Business intelligence are:

- ❖ Enhanced Sales: BI has the capability to recognize patterns in sales, potential enhancements for products, customer preferences, and business prospects, facilitating increased sales and supporting negotiations.
- ❖ Precise Reporting: BI systems can produce precise reports, presenting data visually or in written form by utilizing financial, operational, and sales data from an organization.
- ❖ Enhanced Decision-Making: Accurate reporting systems empower businesses to make impactful decisions.
- ❖ Identification of Opportunities and Trends: Through BI, companies can evaluate market conditions and recognize trends by comparing their strengths and weaknesses with competitor organizations.
- ❖ Operational Streamlining: BI simplifies various data sources, contributing to overall operational efficiency and saving management time in information retrieval.
- ❖ Waste Reduction: BI can scrutinize inter-departmental transactions, identifying inefficiencies, losses, or wasteful practices.
- ❖ Optimized Inventory Management: For organizations involved in supplying goods, BI can oversee inventory, ensuring timely and accurate placement of orders.
- ❖ Revenue Increase: Businesses effectively utilizing BI software can amplify marketing and sales activities, optimize operations, and benchmark, resulting in increased revenues.
- ❖ Enhanced Data Quality: Automation of data collection, reporting, and analysis through BI reduces human error, elevates data accuracy, and improves operational efficiency.

- How business intelligence works:

According to (tableau, n.d.) business intelligence works is:

- ❖ Data Collection: BI systems gather unprocessed data from diverse business systems.

- ❖ Data Processing and Storage: The acquired data undergoes processing and is subsequently stored in various locations such as data warehouses, the cloud, applications, and files. A data warehouse consolidates data from multiple sources into a central system, supporting business analytics and reporting.

- ❖ Data Analysis: BI software interrogates the data warehouse, presenting outcomes to users through reports, charts, and maps. Data warehouses may incorporate an online analytical processing (OLAP) engine for multidimensional queries.

- ❖ Data Visualization: BI platforms provide tools for visualizing data, transforming it into charts or graphs, suitable for presentation to key stakeholders or decision-makers.

- ❖ Insight Generation: Users can scrutinize this information to gain a deep understanding of the business's performance. These insights serve to enhance decision-making, pinpoint issues, identify market trends, and uncover new business opportunities.

- Real examples of how to apply BI on business

In the fast-paced world of e-commerce, understanding customer behavior is crucial for sustained success. Lotte.com, the leading internet shopping mall in Korea boasting 13 million customers, faced a significant challenge: a high rate of shopping cart abandonment among its more than 1 million daily site visitors. In response, the company's executives sought

to unravel the mystery behind customer attrition and turned to Business Intelligence (BI) as a solution.

The sheer volume of daily site visitors presented Lotte.com with a challenge – a considerable number of customers were abandoning their shopping carts, leaving the company perplexed. Determined to address this issue, company executives aimed to comprehend the underlying reasons behind cart abandonment, recognizing it as a key factor influencing revenue growth. To tackle the challenge at hand, the assistant general manager of the marketing planning team took a pioneering step by implementing customer experience analytics – the first online behavioral analysis system applied in Korea. This BI solution enabled the company to gain unprecedented insights into customer behavior. By leveraging this newfound knowledge, Lotte.com aimed to implement targeted marketing strategies and transform its website to better align with customer expectations. The implementation of the BI analytics program yielded remarkable results within a year. Armed with a comprehensive understanding of customer behavior, Lotte.com successfully identified key pain points contributing to shopping cart abandonment. Among the issues identified were a lengthy checkout process and unexpected delivery times.
Armed with this valuable information, the marketing team swiftly remedied these issues, implementing changes to streamline the checkout process and providing more accurate delivery time estimates. These strategic adjustments led to a significant increase in customer loyalty and, perhaps most importantly, a remarkable boost of $10 million in sales.

Lotte.com's journey exemplifies the transformative power of Business Intelligence in the realm of e-commerce. By investing in understanding customer behavior, the company not only addressed the challenge of cart abandonment but also experienced a substantial increase in revenue. The successful integration of BI analytics not only highlights the importance of data-driven decision-making but also serves as an inspiration for other businesses navigating the dynamic landscape of online retail. In an era where customer experience is paramount, Lotte.com's success story stands as a testament to the positive impact of leveraging BI to enhance the overall customer journey.

2. BI tool
    - Power BI

Figure 1.PowerBI

Overview: Power BI comprises a suite of software services, applications, and connectors that collaborate to transform disparate data sources into cohesive, visually engaging, and interactive insights. Its main application is in the realm of business intelligence. (microsoft, 2023)

According to (CFI, n.d.) key feature of Power BI are:

Feature	**Description**
Monthly Product Updates	Power BI has undergone continuous development since its launch in July 2015, receiving monthly feature updates.
Extract Insights from Large Datasets	Power BI compresses data, enabling the extraction of insights from large datasets. It supports analysis of datasets with over 100 million rows.
Create Custom Visualizations with R and Python	Power BI supports standard data visualizations and allows the creation of custom visualizations using R and Python.
Analyze Your Datasets in Excel (Pro/Premium)	This feature, allowing dataset analysis in Excel, is available in Pro or Premium versions of Power BI.

Table 1 Key feature of power BI

According to (data-flair, n.d.) Pros and Cons

Pros	Cons
Affordability: Power BI is affordable and relatively inexpensive. The Power BI Desktop version is free of cost.	Cost: Power BI is a premium service, and the cost might vary depending on the version and features needed.
Custom Visualizations: Power BI offers a wide range of custom visualizations i.e. visualizations made by developers for a specific use.	Steep Learning Curve: Particularly for individuals who are unfamiliar with Microsoft products or data analysis techniques, Power BI has a steep learning curve.
Excel Integration: In Power BI, you also have the option to upload and view your data in Excel.	Limited Customization: Although Power BI offers a large variety of visualization possibilities, some users can discover that the tool only offers a few customization options.

Table 2 advantages and disadvantages of Power BI

- Tableau

Figure 2 Tableau

Overview:
Tableau is a visual analytics tool that revolutionizes the utilization of data for problem-solving, enabling individuals and businesses to maximize the value of their data. It simplifies raw data, presenting it in a highly comprehensible format. Tableau facilitates the creation of data that is accessible to professionals across all levels within an organization. (tableau, n.d.)
Key feature (tableau, n.d.):

Key Features of Tableau	
Remarkable Visual Image Capabilities	Tableau provides superior data visualization quality
Ease of Use	Tableau is user-friendly and does not require extensive technical background or coding knowledge
Live and In-memory Data	Tableau ensures connectivity to both live data sources or data extraction from external data sources as in-memory data
Collaboration and Sharing	Tableau provides convenient options to collaborate with other users and instantly share data in real-time

Table 3 key feature of tableau

Pros and cons (data-flair.training, n.d.)

Pros of Tableau	Cons of Tableau
Affordability: Tableau is affordable and relatively inexpensive	Cost: Power BI is a premium service, and the cost might vary depending on the version and features needed
Custom Visualizations: Tableau offers a wide range of custom visualizations	Steep Learning Curve: Particularly for individuals unfamiliar with Microsoft products or data analysis techniques, Power BI has a steep learning curve
Excel Integration: In Tableau, you can upload and view your data in Excel	Limited Customization: Although Power BI offers a large variety of visualization possibilities, some users may find that the tool has limited customization options

Table 4 advantages and disadvantages of tableau

- QlikSense

Figure 3 Qlink Qsense

Overview:

QlikSense stands as a contemporary cloud analytics platform, providing AI-assisted insights and predictions to users of varying skill levels. Its distinctive associative analytics engine enables users to delve into their data, revealing valuable insights. QlikSense caters to a comprehensive spectrum of analytics needs, encompassing data governance, precise reporting, and collaborative analytics. (qlik, n.d.)

Key feature (data-flair.training, n.d.):

Key Features of QlikSense	
Associative Model	QlikSense uses an associative model where all loaded data, regardless of the source, can be linked and associated
Smart Visualizations and Analytics	QlikSense offers smart and advanced visualizations that respond quickly to user selections
Self-Service Creation	QlikSense provides drag-and-drop features for easy app creation, data preparation, and data loading
Centralized Sharing and Collaboration	In QlikSense, reports and applications can be shared with other users through a centralized and unified hub

Table 5 Qlink key feature

Pros and cons (data-flair.training, n.d.):

Pros of QlikSense	Cons of QlikSense
Data Integration: The associative model simplifies data integration and linking	Cost: Some users dislike the licensing cost
Smart Analytics: QlikSense offers system-guided analytics like the Insight Advisor	Large Data Sets: Users find that QlikSense isn't efficient in loading large datasets
Compatibility: QlikSense is compatible with various devices like desktops, tablets, laptops, and mobile phones	Technical Knowledge: Despite being user-friendly, some users may find it challenging without a technical background

Table 6 pros and cons of Qlik

- Dundas

Figure 4Dundas BI

Overview (dundas, n.d.):

Dundas BI stands as a cutting-edge embeddable business intelligence platform, designed for activities such as data exploration, visual analytics, and the creation and sharing of dashboards and reports. It offers the flexibility to serve as the primary data portal for your organization or seamlessly integrate into an existing website as part of a customized or embedded business intelligence solution. Dundas BI is highly adaptable, catering to a diverse range of user needs and preferences

Key feature (dundas, n.d.)

Key Features of Dundas BI	
Self-Serve Business Intelligence	Dundas BI empowers users to perform data exploration, analysis, run ad hoc queries, and create dashboards and reports without involving technical or IT staff
Fully Open APIs	Dundas BI is built on a completely open API platform, designed for extensibility, integration, and embedding
HTML5, Mobile & Touch	The client-side of Dundas BI is based on the latest web standards, including HTML5, JavaScript, and CSS
Data Visualizations	Dundas BI offers a diverse range of data visualization types, including a comprehensive chart library, maps, tables, gauges, relationship diagrams, and more

Table 7 Dundas key feature

Pros and cons (businessintelligencemarket, n.d.)

Pros of Dundas BI	Cons of Dundas BI
Supportive Documentation: Users appreciate the extensive and helpful documentation	Learning Curve: Users find that there is a learning curve
Available Charts and Visualizations: Many users like the variety of charts and visualizations available	User Permissions: Some users express a desire for more options in user permissions
Great Value: Users believe the software offers great value	Limited Online Support Options: Users note a lack of options for online support

Table 8 dundas BI pros and cons

- Sisense

Figure 5 Sisense

Overview: Sisense stands as a comprehensive business intelligence (BI) and data analytics platform, empowering organizations to collect, analyze, and visualize data from diverse sources. Tailored to facilitate informed decision-making, it offers a user-friendly interface for seamless data exploration and reporting. Sisense excels at simplifying intricate data, converting it into robust analytic applications that can be easily shared or embedded across various platforms. (sisense, n.d.)

Key feature (sisense, n.d.):

Key Features of Sisense	
Data Integration	Sisense can seamlessly connect to a diverse array of data sources, including databases, spreadsheets, cloud services, and web applications
Data Preparation	The platform provides robust data preparation tools, assisting users in cleaning, transforming, and shaping their data for analysis
Data Analysis	Sisense boasts a powerful analytics engine, empowering users to create intricate queries and calculations to uncover valuable insights from their data
Visualization	Sisense offers a variety of visualization options, such as charts, graphs, and interactive dashboards

Table 9 Sisense key feature

Pros and cons (financesonline, n.d.)

Pros of Sisense	Cons of Sisense
Ease of Use: Lay users find Sisense accessible for BI tasks	Learning Curve: Users note a learning curve
Accurate Data Analysis in Real Time: Sisense ensures accurate real-time data analysis, reducing errors due to multiple data sources	User Permissions: Some users express a desire for more options in user permissions
Great Support Team: Users appreciate the support team's excellence, including the Sisense community and their responsive help desk	Limited Online Support Options: Users mention a lack of options for online support

Table 10 pro and cons of sisense

3. BI techniques
    - Analytics

Technique	Description
Data Mining	This encompasses the examination of extensive data sets to discern patterns and trends. Employing databases, statistics, and machine learning, it aims to reveal insights within large datasets. (tableau, n.d.)
Reporting	This involves disseminating data analysis to stakeholders, enabling them to draw conclusions and make informed decisions. Tasks encompass data preparation, reporting, analysis, reconciliation, and interpretation of substantial datasets. (tableau, n.d.)
Performance Metrics and Benchmarking	This pertains to the comparison of current performance data with historical data to monitor performance against objectives. It commonly utilizes personalized dashboards and involves activities such as establishing data integration, crafting dynamic dashboards and scorecards, and designing key performance indicators. (meirc, n.d.)
Data Warehousing	This is the procedure of creating and utilizing a data warehouse. It involves integrating data from diverse sources to support analytical reporting, structured or ad hoc queries, and decision-making processes. (synder, n.d.)

Table 11 analystic techniques

- Predictive Modelling

Predictive modeling is a statistical method employed to forecast the result of future events by analyzing historical data. (qlik, n.d.)
Techniques:

Model	Description
Regression Models	Statistical models that analyze the relationship between a dependent (target) and independent variable(s) (predictor). This analysis is utilized to predict the future value of the target variable.
Time Series Models	Models that forecast the future value of a series of data points in time, such as stock prices or weather conditions.

Classification Models	Models that predict the class or category of a case or an event. For example, determining whether an email is spam or not spam

Table 12 Models predictive model

(netsuite, n.d.)

- OLAP

OLAP, or Online Analytical Processing, is a software technology that allows for the performance of multidimensional analysis at high speeds on large volumes of data (ibm, n.d.)

Term	Description
Consolidation	Involves the aggregation of data, allowing for the accumulation and computation of information in one or more dimensions.
Drill-down	A technique that enables users to navigate through the details of data, providing a more granular view.
Slicing and Dicing	A feature that allows users to extract (slicing) a specific set of data from the OLAP cube and examine (dicing) the slices from different perspectives.

Table 13 OLAP Term

(wikipedia, n.d.)

- Data Mining

Data mining is the process of extracting and discovering patterns in large data sets involving methods at the intersection of machine learning, statistics, and database systems (geeksforgeeks, n.d.)

Technique	Description
Association Rule Learning	A dependency modeling method utilized to discover interesting associations or correlation relationships among a set of items in large databases.
Classification	A technique employed for generalizing known structures to apply to new data. For instance, classifying an email as either 'spam' or 'not spam.'
Clustering	A technique for grouping and structure discovery. It organizes a set of objects in a manner where objects in the same group (a cluster) are more similar to each other than to those in other groups.

Table 14 Data mining techniques

(geeksforgeeks, n.d.)

- Model Visualization

Model visualization is a crucial aspect of machine learning and data science. It involves representing machine learning models, data, and their relationships through graphical or interactive means (neptune, n.d.).

Visualization Technique	Description
Histograms	Used to visualize how the distribution of tensors in the model graph has changed over time.
Weight and Bias Monitoring	Visualizes the weights and biases during training time on histograms.
Activation Monitoring	For gradient descent to perform optimally, this technique monitors the node outputs before the activation functions, ensuring they are usually distributed.

Table 15 model visuallizeation

- Reporting

Reporting in data science refers to the process of collecting unprocessed data from different sources, which is later organized into meaningful and digestible pieces of information to gain valuable insights into business performance. (databox, n.d.)

Reporting Technique	Description
Descriptive Reporting	Involves reporting the basic features of the data in a study, providing simple summaries about the sample and the measures.
Exploratory Data Analysis	An approach to analyzing data sets to summarize their main characteristics, often employing visual methods.
Visual Reporting	Involves the use of graphical representations, such as charts, graphs, and maps, to present data.

Table 16 reporting technique

(databasetown, n.d.)

II.2 Design a business intelligence tool, application or interface that can perform a specific task (P4)

1. Introduce the company

We are pleased to introduce Super Store, a distinguished retail establishment dedicated to providing an exceptional shopping experience for our discerning clientele. Located in an undisclosed yet accessible corner of the globe, Super Store emerges as a beacon of quality and convenience. At Super Store, we specialize in curating an extensive selection of household essentials, encompassing a spectrum of home goods and culinary delights. Our commitment to offering a comprehensive range of products reflects our dedication to meeting the diverse needs of our esteemed customers. Our product portfolio spans household necessities, kitchenware, and a thoughtfully curated assortment of food items. Each item on our shelves is meticulously chosen to uphold our standards of quality and affordability, ensuring that our patrons receive unparalleled value with every purchase.

Beyond the vast array of products, Super Store is committed to cultivating a shopping environment characterized by professionalism and warmth. Our courteous and knowledgeable staff is at your disposal, ensuring that your visit is not only a transaction but an engaging and enjoyable experience. Super Store is more than a retail destination; it is a commitment to the fusion of convenience and sophistication. We invite you to embark on a journey through our aisles, where you will encounter not only the finest products but a commitment to excellence that defines our brand.

2. Explain the data set
   - ❖ Row ID: An exclusive identifier assigned to each data row.
   - ❖ Order ID: A distinct code associated with each individual order.
   - ❖ Order Date: The date of order placement.
   - ❖ Ship Date: The date when the order is dispatched.
   - ❖ Ship Mode: The chosen method of shipment.
   - ❖ Customer ID: A unique code assigned to each customer.
   - ❖ Customer Name: The name of the customer.
   - ❖ Segment: The market category to which the customer belongs.
   - ❖ Country: The location country of the customer.
   - ❖ City: The city of the customer's residence.
   - ❖ State: The state of the customer's residence.
   - ❖ Postal Code: The postal code corresponding to the customer's location.
   - ❖ Region: The geographic region where the customer is situated.
   - ❖ Product ID: An exclusive code assigned to each product.
   - ❖ Category: The overarching classification to which the product is assigned.
   - ❖ Sub-Category: The specific classification within the broader category to which the product belongs.
   - ❖ Product Name: The designated name of the product.
   - ❖ Sales: The total revenue generated from the product sale.
   - ❖ Quantity: The number of units of the product sold.
   - ❖ Discount: The reduction applied to the sale.
   - ❖ Profit: The financial gain derived from the sale.
3. Statistic criteria

Introducing our comprehensive dataset capturing the intricacies of our business operations. Each row in this dataset is uniquely identified by a 'Row ID,' providing a systematic structure for easy reference. 'Order ID' distinguishes individual orders, while 'Order Date' marks the initiation of transactions and 'Ship Date' signifies the timely dispatch of goods. For a profound understanding of customer interactions, we've incorporated 'Customer ID' and 'Customer Name,' offering a personalized perspective. 'Segment' categorizes customers into distinct market segments, enhancing our strategic approach. Geographical details are meticulously documented, including 'Country,' 'City,' 'State,' 'Postal Code,' and 'Region,' providing a comprehensive overview of customer demographics. Delving into our product offerings, each product is uniquely identified by a 'Product ID.' 'Category' classifies products into overarching groups, and 'Sub-Category' further refines classifications. 'Product Name' ensures clarity in product identification. The financial aspects of transactions are thoroughly represented, with 'Sales' reflecting total revenue, 'Quantity' detailing the units sold, 'Discount' indicating applied reductions, and 'Profit' quantifying the financial gains derived from each sale. This dataset serves as a robust foundation for in-depth analyses, allowing us

to glean valuable insights into customer behavior, operational efficiency, and overall business performance.

Criteria:

- Line Chart of Order Trends Over Time
- Top 5 Cities with the Most Orders
- Total Quantity of Products Sold by category
- Scatterplot of Sales Value vs. Quantity filter by category:
- Top 5 Best Selling Products:
- Line Chart of Revenue Trends Over Time:
- Top 5 Most Profitable product:
- Scatterplot of Sales vs. Profit:
- Top 5 States with the Most Orders:
- Cumulative Profit Over Time:
- Pie Chart of Quantity Distribution by Category:
- Distribution of Quantity Ordered by Sub-Category:
- Top 5 Products with the Highest Sales:
- Line Chart of Sales Trends Over Time for a Specific Category filter:
- Line Chart of Profit Trends Over Time for a Specific Sub-Category:

4. Explain pre-process steps on dataset

At first I check the data missing, Check for missing or inconsistent data. Handle missing values appropriately (e.g., imputation, deletion). Ensure that all data types are correct. Convert categorical variables into numerical variables if necessary (e.g., one-hot encoding). Normalize or standardize numerical variables if required. For example I have turn order date into order year

5. Design business intelligence interface:

Link: Free Data Visualization Software | Tableau Public

Dashboard 1: Order Overview

- Total Number of Orders by year:

Line Chart of Order Trends Over Time:

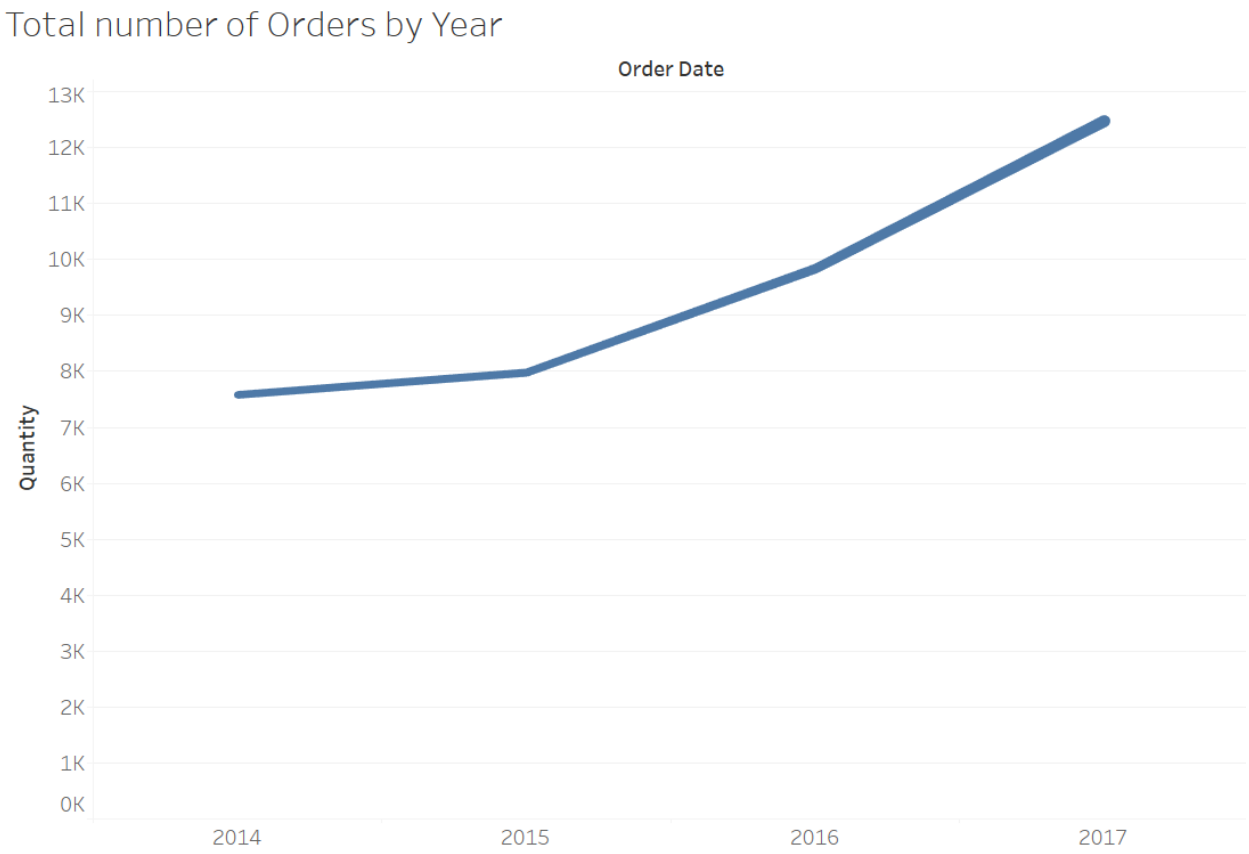

Figure 6 total number of order by year

- Top 5 Cities with the Most Orders:

Top 5 Cities with the Most Orders: SUM(Quantity) and City

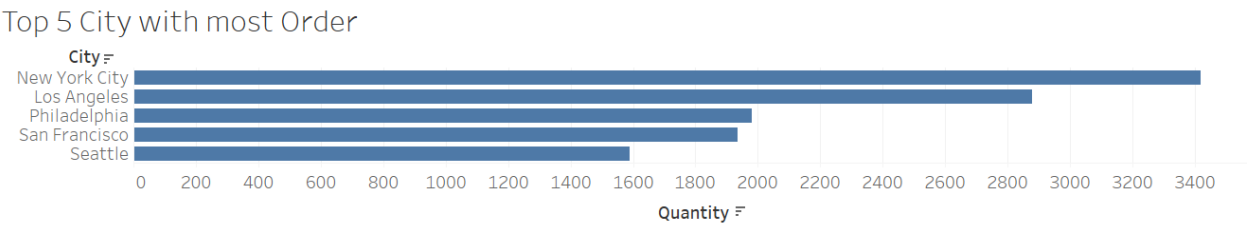

Figure 7 top 5 cities have most order

- Total Quantity of Products Sold by category:

Data from the 'Quantity' field.

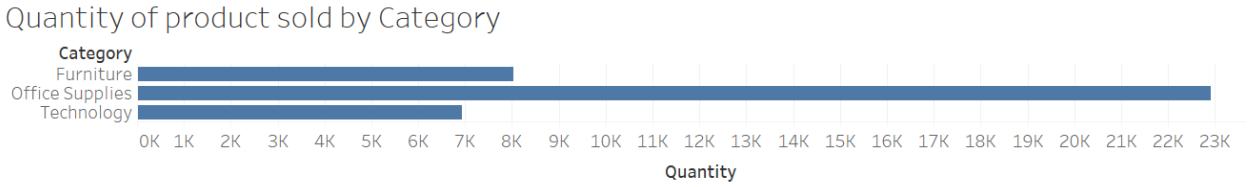

Figure 8 total quantity of production sold by category

- Scatterplot of Sales Value vs. Quantity filter by category:

Data from the 'Sales' and 'Quantity' fields.

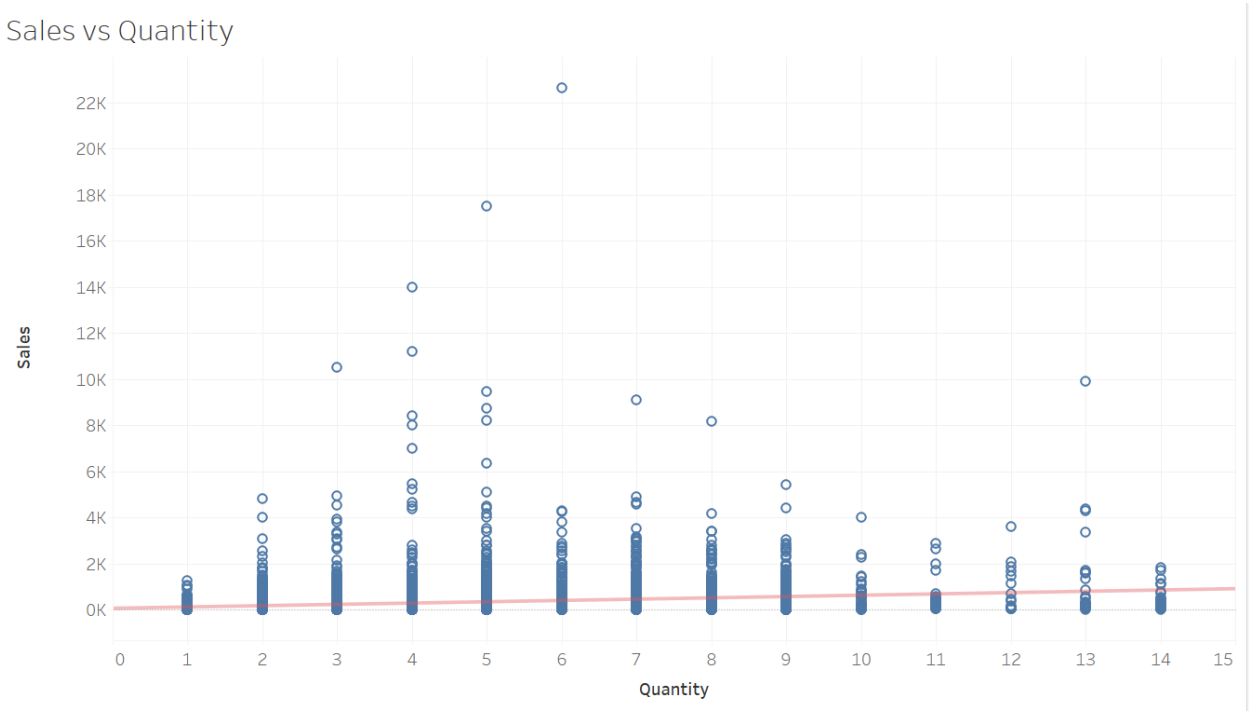

Figure 9 Scatterplot of salve value and quantity filler by category

- Top 5 Best Selling Products:

Column Chart. Data from the 'Product Name' or 'Product ID' fields.

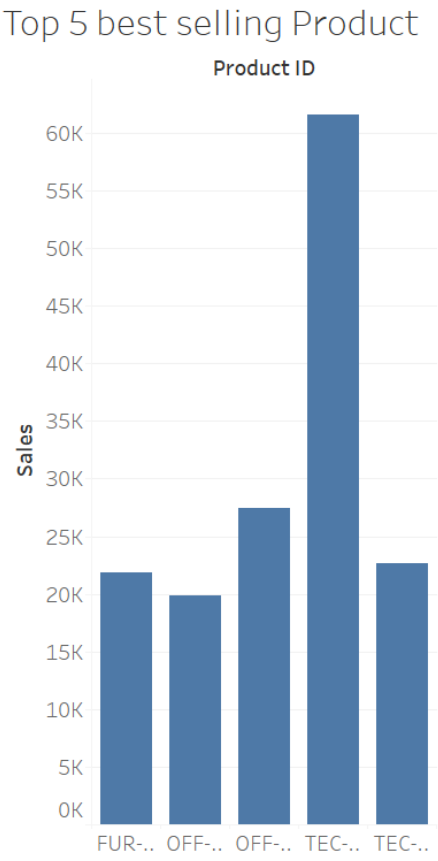

Figure 10 top 5 best selling product

Dashboard 2: Revenue and Profit Analysis

- Line Chart of Revenue Trends Over Time:

Data from the 'Sales' and 'Order Date' fields.

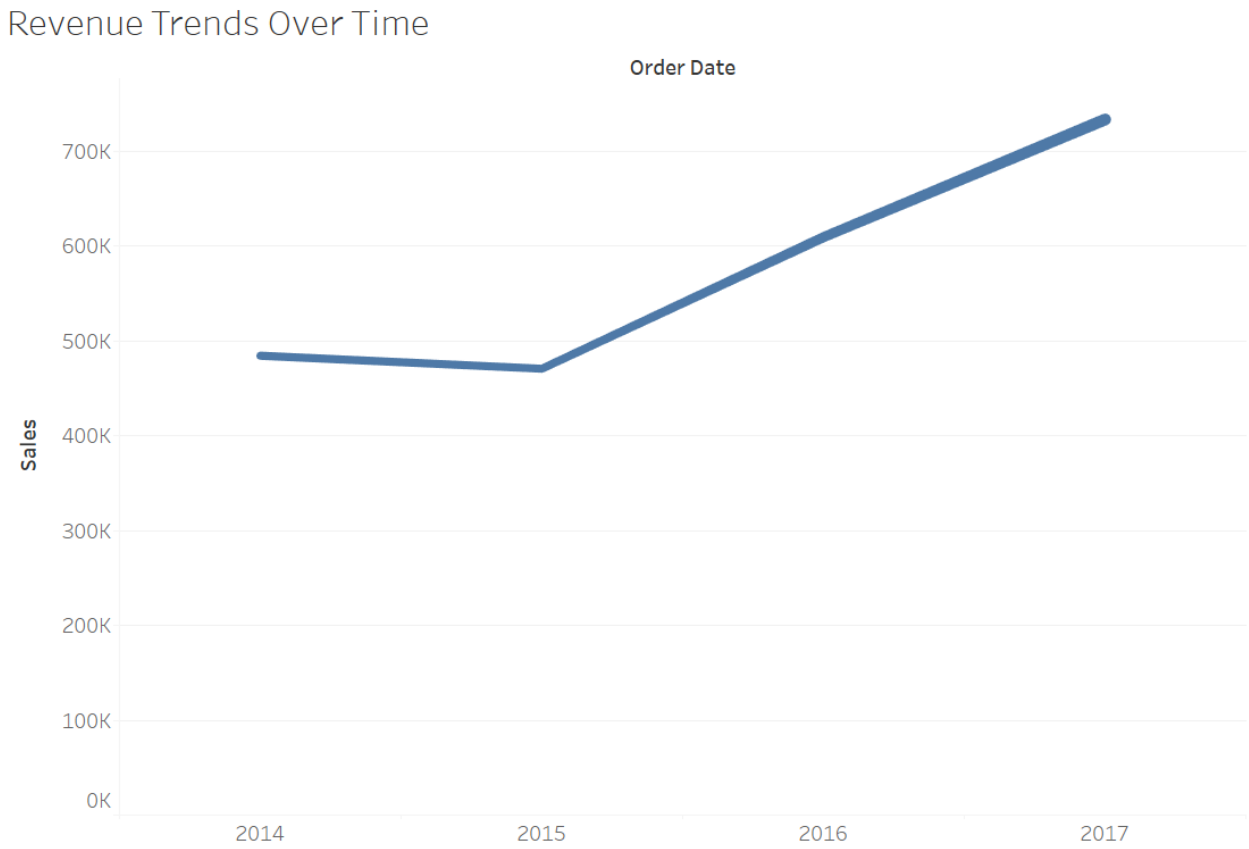

Figure 11 Revenue trends over time

- Top 5 Most Profitable product:

Column Chart. Data from the 'Profit' and 'Order ID' fields.

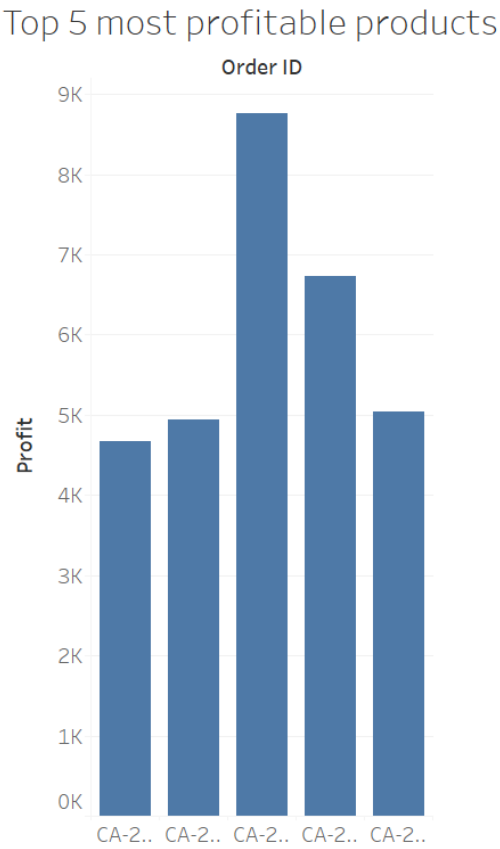

Figure 12 top 5 most profiitable product

- Scatterplot of Sales vs. Profit:

Data from the 'Sales' and 'Profit' fields.

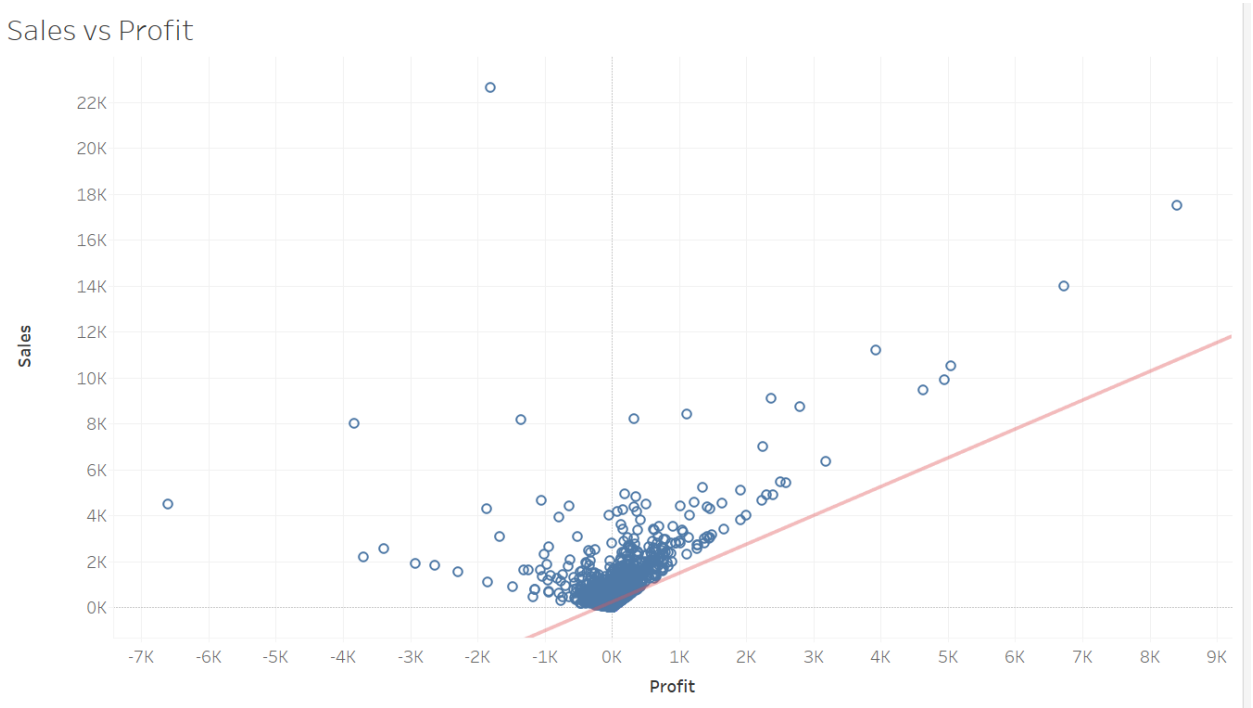

Figure 13 scatterplot of sale and profit

- Top 5 States with the Most Orders:

Data from the ‘State’ and 'Order ID' fields.

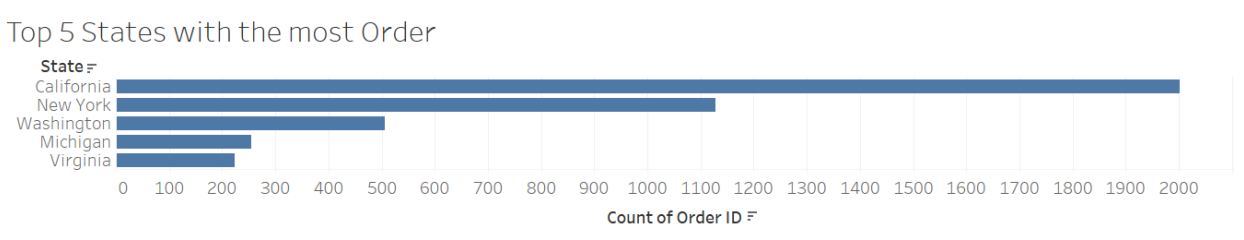

Figure 14 top 5 states with most orders

- Cumulative Profit Over Time:

Data from the 'Profit' and 'Order Date' fields.

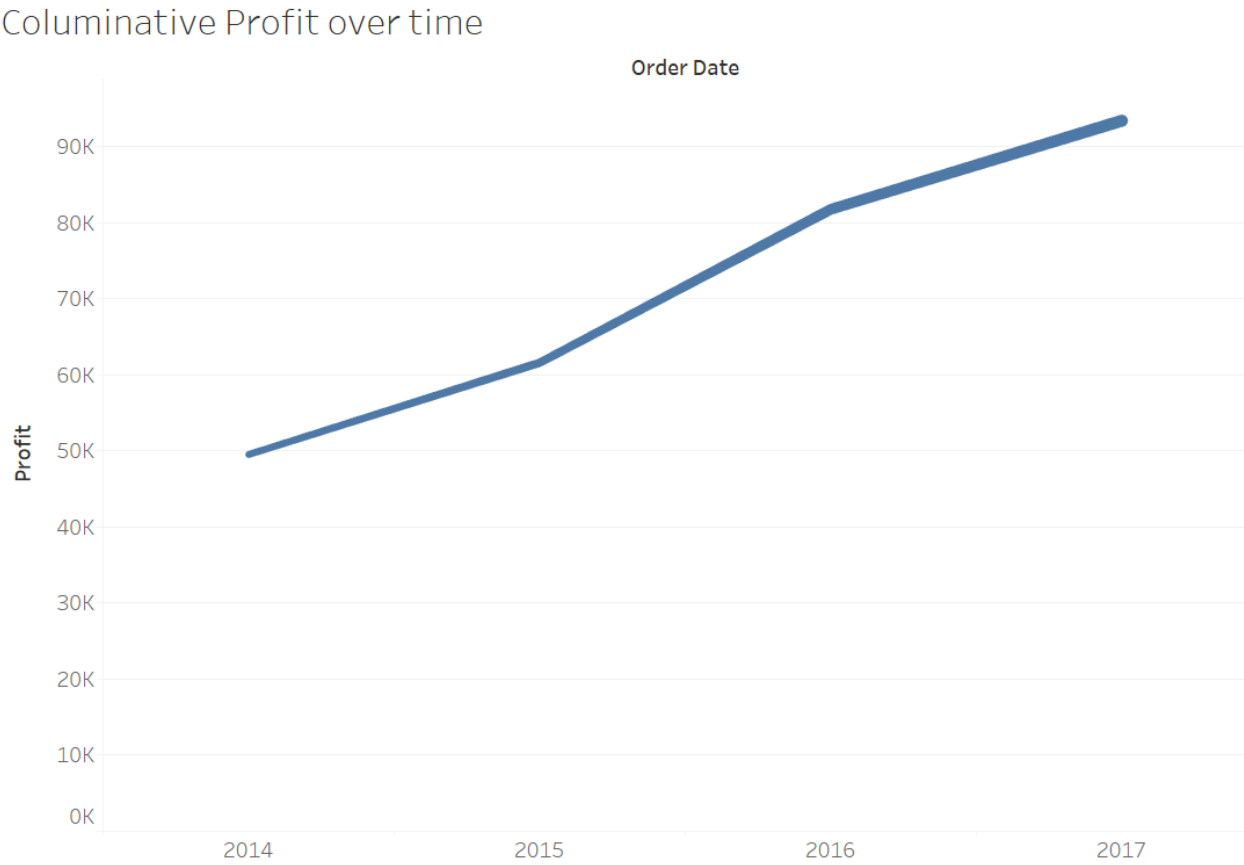

Figure 15 cumlative profit ovet time

Dashboard 3: Product and Category Details

- Pie Chart of Quantity Distribution by Category:

Data from the 'Category' and 'Quantity' fields.

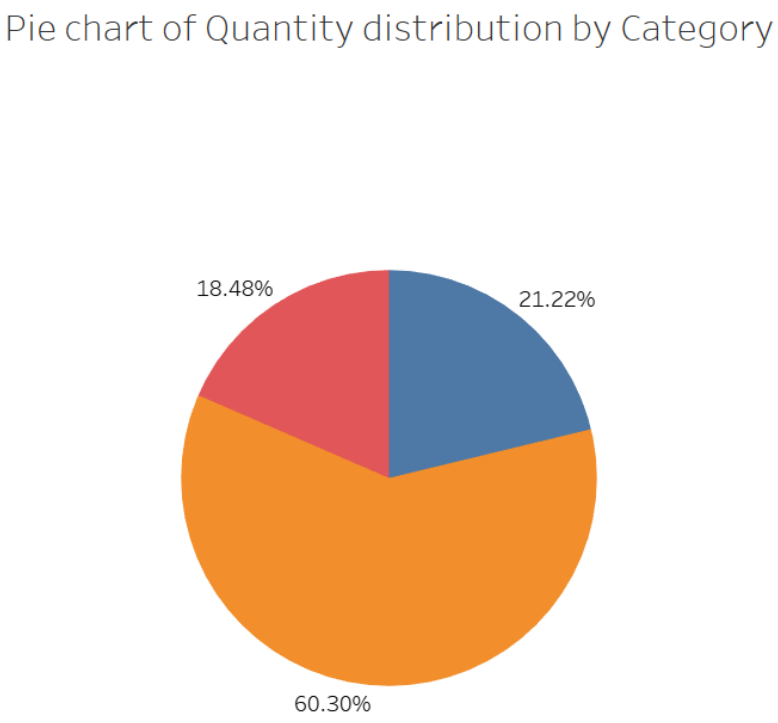

Figure 16 quantity distribution by category

- Distribution of Quantity Ordered by Sub-Category:

Data from the 'Sub-Category' and 'Quantity' fields.

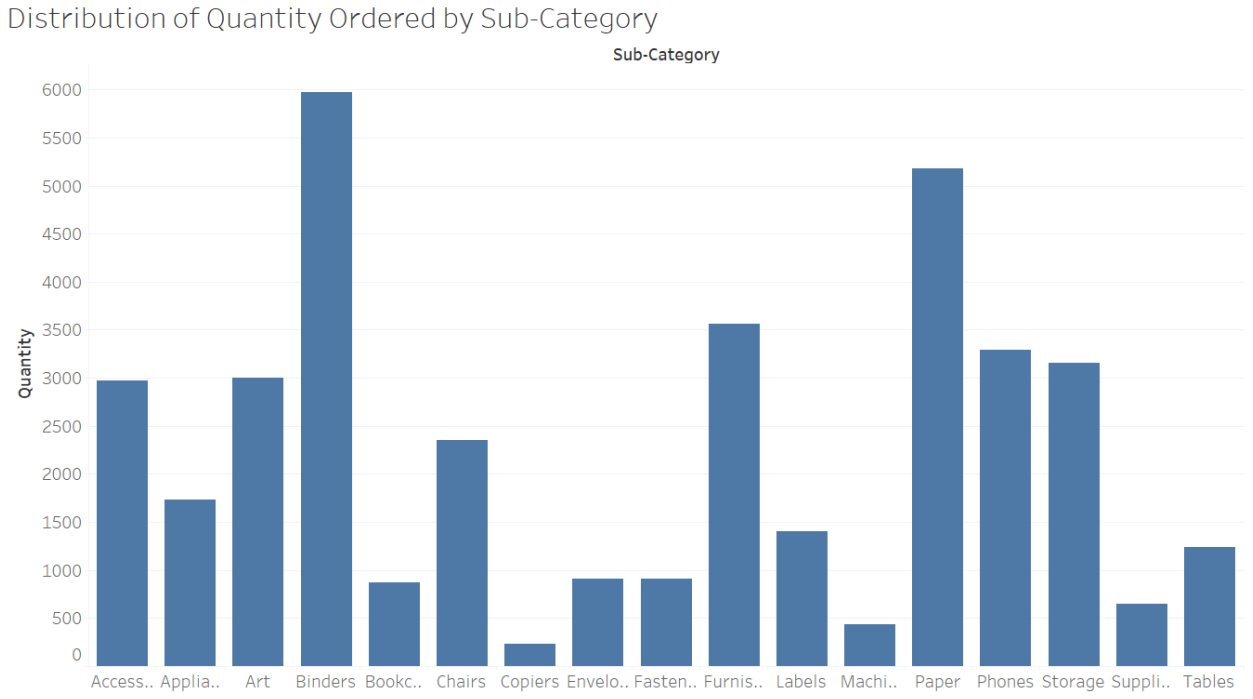

Figure 17 distribution of quanitty ordered by sub category

- Top 5 Products with the Highest Sales:

Data from the 'Product Name' or 'Product ID' and 'Sales' fields.

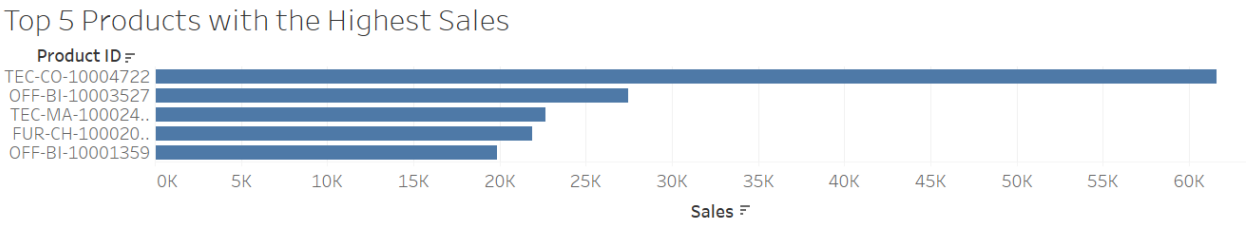

Figure 18 top 5 product with the highest sales

- Line Chart of Sales Trends Over Time for a Specific Category filter:

Choose a specific category and use data from the 'Sales' and 'Order Date' fields.

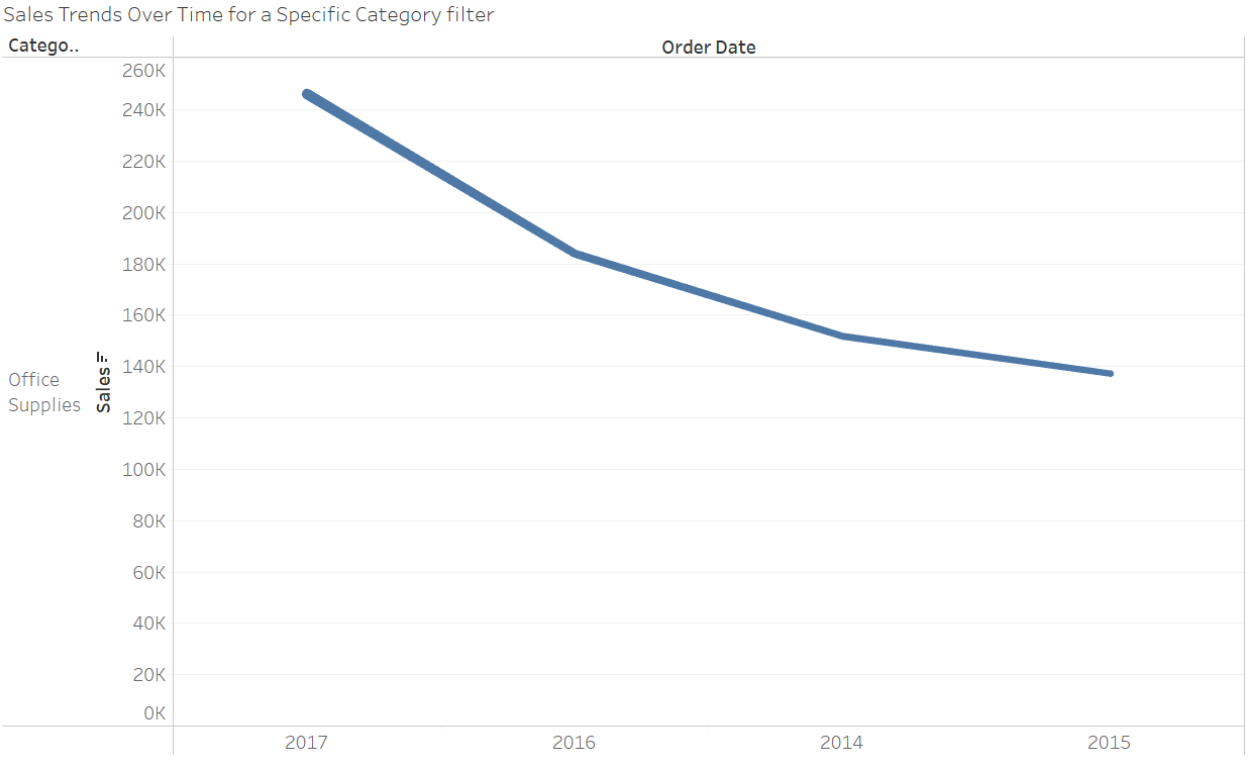

Figure 19 line chart of sales trends over time for specific category

- Line Chart of Profit Trends Over Time for a Specific Sub-Category:

Choose a specific sub-category and use data from the 'Profit' and 'Order Date' fields.

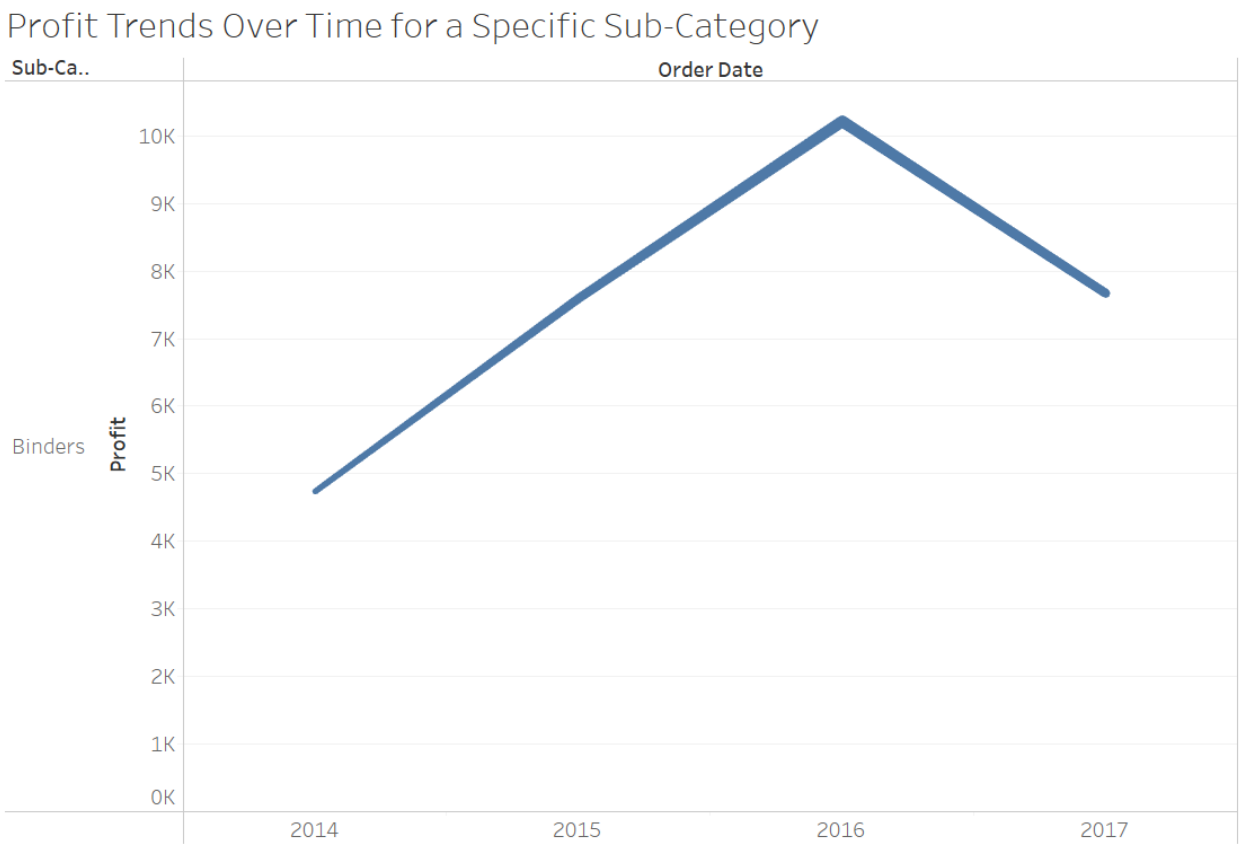

Figure 20 profit trends over time for sub category

III. Discuss the impact of business intelligence tools and technologies for effective decision-making purposes and the legal/regulatory context in which they are used (LO4)

III.1 How business intelligence tools can contribute to effective decision-making (P5)

How business intelligence tool can help in decision making

According to (Niche, 2023) business intelligence tool can contribute the effective decision Business Intelligence (BI) tools empower decision-makers by providing both real-time and historical insights across various data dimensions, expediting fact-based decision-making processes. These tools, by automating data collection and analysis, not only save time but also mitigate the potential for human errors inherent in traditional decision-making methods. Consequently, organizations equipped with BI tools can adeptly respond to emerging market trends and dynamic customer preferences, securing a competitive edge.

For instance, in the manufacturing sector, a savvy use of business intelligence tools transforms how companies monitor production processes. By scrutinizing data related to machine performance, quality control, and maintenance requirements, these tools enable managers to pinpoint bottlenecks, enhance production efficiency, and allocate resources judiciously. Furthermore, when it comes to quality control, BI tools play a pivotal role in augmenting the effectiveness of business operations. Through the analysis of various factors,

these tools facilitate informed decision-making in quality control, thereby assisting businesses in maintaining and enhancing product and service standards.

In a broader context, BI tools provide comprehensive insights into key performance indicators (KPIs), financial trends, and customer behaviors. This enables organizations to not only streamline their operations but also devise strategies to meet and exceed customer expectations. By harnessing BI tools effectively, businesses can navigate complexities, make informed decisions, and ensure sustained growth in an ever-evolving business landscape.

Some business intelligence impact in business decision:

- Impact of BI Tools on Enhanced Data Accessibility

The adoption of business intelligence (BI) tools has significantly transformed data accessibility, providing decision-makers with unprecedented advantages. These tools empower professionals with effortless access to extensive datasets, regardless of their diverse sources or formats. Through seamless integration with various data repositories such as databases, data warehouses, and cloud-based platforms, BI tools streamline the retrieval and analysis of information, ensuring decision-makers have access to a comprehensive, up-to-date, and accurate pool of data.

Example:

Illustratively, within the retail sector, the implementation of business intelligence tools has had a profound impact on how companies manage and utilize sales data. By leveraging BI tools, a retail company can efficiently collect and analyze sales data from multiple locations. This capability allows executives to discern regional trends, gain insights into customer preferences, and strategically optimize inventories. As a result, the impact of BI tools extends beyond mere data accessibility, influencing the precision and timeliness of decision-making processes, ultimately contributing to enhanced operational efficiency and strategic agility.

- Impact of BI Tools on Data Visualization

The transformative impact of business intelligence (BI) tools extends to their adeptness in converting intricate datasets into visually compelling and easily digestible formats. Through the creation of interactive dashboards, charts, graphs, and heat maps, these tools amalgamate diverse metrics into intuitive visual representations. Such visualization not only simplifies the interpretation of complex data but also empowers decision-makers to swiftly discern patterns, trends, and correlations that might elude traditional data analysis methods.

Example:

For instance, within the realm of e-commerce, the utilization of business intelligence tools proves instrumental for an online retail company. By harnessing these tools, the company can generate real-time dashboards that vividly depict website traffic, conversion rates, and customer behavior. These visual cues become invaluable for the marketing team, offering immediate insights into the effectiveness of promotional efforts and enabling the optimization of customer engagement strategies. In essence, the impact of BI tools on data visualization transcends data complexity, providing a visual narrative that enhances decision-making processes and facilitates a deeper understanding of critical business dynamics.

- Enhanced Cost Optimization with BI Tools

The integration of business intelligence (BI) tools into organizational processes facilitates a nuanced approach to effective decision-making, particularly in the realm of cost

optimization. These tools play a pivotal role in identifying areas where costs can be judiciously minimized, resources reallocated, and processes streamlined. Through meticulous cost analysis and performance metrics, decision-makers gain insights into inefficiencies, enabling the reduction of waste and more efficient allocation of resources.

Example:

Illustratively, within the logistics sector, a forward-thinking company harnesses business intelligence tools to dissect critical components of its operations. By analyzing factors such as fuel consumption, vehicle maintenance costs, and driver performance, these tools unveil areas of inefficiency that may have otherwise gone unnoticed. Armed with this information, the company can optimize routes, curtail fuel costs, and enhance overall fleet management. This demonstrates the profound impact of BI tools in not only pinpointing opportunities for cost reduction but also fostering a culture of continuous improvement and resource efficiency.

III.2 Legal issues involved in the secure exploitation of business intelligence tools (P6)

- Privacy of clients

According to (legaldictionary, n.d.) Client privacy refers to the essential right of individuals to have their personal information treated confidentially, safeguarded from disclosure to others without their explicit consent. This principle is a fundamental element in various professional domains, including healthcare, law, and business.

In healthcare, for instance, when a patient shares their medical history with a doctor, there exists a legal obligation to maintain the confidentiality of this information. The doctor is prohibited from divulging the patient's medical details to third parties, even in the presence of law enforcement, except under specific circumstances. Upholding this privacy principle is vital for nurturing trust between clients and professionals, and any violation of this confidentiality may result in legal consequences.

A parallel scenario is evident in therapeutic settings, where confidentiality extends not only to the content of therapy sessions but often encompasses the mere acknowledgment that an individual is undergoing therapy. For example, therapists commonly refrain from acknowledging clients outside of therapy sessions to preserve the confidentiality of their therapeutic relationship. This commitment to confidentiality is integral to sustaining trust and fostering a secure environment for clients.

When applying Business Intelligence (BI) into business, data privacy and security become a significant legal issue. BI tools collect, process, and store vast amounts of data, some of which may be sensitive or personal. Businesses must ensure they are adhering to data protection laws and regulations, such as GDPR in Europe or CCPA in California. Failure to protect data can lead to legal repercussions, including hefty fines and damage to the company’s reputation.

- Data security

According to (ibm, n.d.) Data security involves the implementation of measures to safeguard digital information from unauthorized access, corruption, or theft throughout its entire lifecycle. This encompasses multiple facets, including the physical protection of hardware and storage devices, the establishment of administrative and access controls, and the logical security of software applications. Organizational policies and procedures are also integral components of data security.

To bolster data security, various tools and technologies are employed to enhance visibility into how a company's data is utilized. These tools employ processes like data masking, encryption, and redaction of sensitive information to protect data. A robust data security management and strategy process empower organizations to defend against cyberattacks, thereby minimizing risks associated with human error and insider threats, which are common causes of data breaches.
For instance, in the financial sector, a bank may employ data security measures to safeguard customer information. These measures could involve encrypting data to thwart unauthorized access, utilizing secure servers for data storage, and enforcing stringent access controls to ensure that only authorized personnel can access the information. Additionally, the bank might employ data masking techniques to conceal sensitive details, such as credit card numbers, when presenting data.

When applying business intelligent to business, the data security might be a huge problem for legal. For example, when the data of customer that be gathered store in a database, and the database is being attacked and all customer information is being public the business that store the customer information may face serious problem with Law, to solve this problem The organization may need to implement data masking techniques, encryption protocols, and access controls to protect sensitive customer information from unauthorized access. Additionally, the business should establish and enforce policies and procedures that align with relevant data protection laws, thereby mitigating the risk of legal complications related to data security and privacy.

- Compliance with laws and regulations

According to (legalbeagle, n.d.) Ensuring adherence to Laws and Regulations involves confirming that an organization's operations align with applicable international, federal, state, and local laws and regulations. This encompasses various domains, including employment practices, environmental regulations, data privacy, and financial reporting. Compliance is pivotal for upholding a company's standing, averting legal consequences, and nurturing trust among stakeholders.
For instance, a pharmaceutical firm must navigate a diverse array of laws and regulations. These encompass adhering to Food and Drug Administration (FDA) regulations for drug approval, complying with environmental standards for waste disposal, following employment laws to uphold fair labor practices, and meeting Securities and Exchange Commission (SEC) regulations for financial reporting. Non-compliance with any of these regulations could lead to penalties, legal repercussions, and harm to the company's reputation. Consequently, the company may establish a dedicated compliance department tasked with comprehending these laws and ensuring the alignment of all corporate practices with regulatory requirements.
Integrating Business Intelligence (BI) into business operations offers valuable insights for informed decision-making. However, this implementation also introduces the challenge of ensuring compliance with various laws and regulations. Adherence to international, federal, state, and local laws is crucial, spanning domains such as employment practices, environmental regulations, data privacy, and financial reporting. For instance, in the pharmaceutical industry, compliance with Food and Drug Administration (FDA) regulations, environmental standards, fair labor practices, and Securities and Exchange Commission (SEC) reporting is essential. Applying BI may inadvertently lead to legal issues if not aligned with these regulations, risking penalties and harm to reputation

- Employee Training

Business Intelligence (BI) tools are increasingly being used in employee training and development. These tools can analyze large amounts of data to identify patterns, trends, and insights that can help improve training programs. They can also be used to track employee performance, identify areas for improvement, and measure the effectiveness of training initiatives

In the context of employee training, BI tools can be used in several ways. For example, they can analyze data from employee assessments to identify skills gaps and tailor training programs accordingly. They can also track employee progress through training programs and identify those who may need additional support. Furthermore, BI tools can measure the impact of training on employee performance and business outcomes, providing valuable feedback that can be used to improve future training initiatives

However, the use of BI tools in employee training can also raise legal issues. For example, if these tools are used to make decisions about hiring, promotion, or termination, they could potentially violate employment laws if they result in discrimination or bias. Additionally, the use of AI and machine learning in these tools could potentially violate privacy laws if they collect, store, or use personal data without proper consent. Therefore, companies must be careful to ensure that their use of BI tools complies with all relevant laws and regulations. (americanbar, n.d.)

- Legal action

Business Intelligence (BI) tools are being increasingly used in legal actions. These tools can analyze large amounts of data to identify patterns, trends, and insights that can help in legal proceedings. They can also be used to track case progress, identify areas for improvement, and measure the effectiveness of legal strategies

In the context of legal action, BI tools can be used in several ways. For example, they can analyze data from legal documents to identify patterns and trends that can help in case strategy. They can also track the progress of a case and identify areas where legal action may be necessary. Furthermore, BI tools can measure the impact of legal strategies on case outcomes, providing valuable feedback that can be used to improve future legal actions

However, the use of BI tools in legal action can also raise legal issues. For example, if these tools are used to make decisions about legal strategies, they could potentially violate laws if they result in discrimination or bias. Additionally, the use of AI and machine learning in these tools could potentially violate privacy laws if they collect, store, or use personal data without proper consent. Therefore, legal professionals must be careful to ensure that their use of BI tools complies with all relevant laws and regulations (mitsloan, n.d.)

IV. Conclusion

In conclusion, this paper has provided a comprehensive exploration of the dynamic and transformative realm of Business Intelligence (BI) tools and technologies. The strategic importance of leveraging information for decision-making in today's competitive business environment cannot be overstated. Through our examination, we have gained insights into the definition of BI and a diverse set of tools and techniques, supported by real-world examples that underscore their practical applications.

The discussion has extended to the design phase, emphasizing the crucial role of interfaces and applications tailored to specific tasks. This aspect not only showcases the adaptability of

BI tools but also underscores their capacity to address unique organizational needs through intuitive design.

Moreover, the paper has shed light on the profound impact of BI tools on decision-making processes. The ability to gather, analyze, and interpret data has proven instrumental in formulating effective strategies, contributing to organizational growth and adaptability.

However, this transformative journey is not without legal considerations. The secure exploitation of BI tools necessitates a keen understanding of the legal and regulatory landscape. By navigating through potential challenges and obligations, organizations can ensure responsible and compliant utilization of these powerful tools.

In essence, as businesses continue to harness the strategic significance of BI tools, it is imperative to strike a balance between technological innovation and legal compliance. This delicate equilibrium not only safeguards against potential risks but also fosters a landscape where BI tools can truly thrive, contributing to a more informed, agile, and successful future for organizations across diverse industries.

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