Project Overview:

Retail inventory management is the process of ensuring you carry merchandise that shoppers want, with neither too little nor too much on hand. By managing inventory, retailers meet customer demand without running out of stock or carrying excess supply. In practice, effective retail inventory management results in lower costs and a better understanding of sales patterns. Retail inventory management tools and methods give retailers more information with which to run their businesses, including:

- Product locations
- Quantities of each product type
- Which stock sells well and which doesn't, by location and sales channel.
- Profit margin by style, model, product line or item
- Ideal amount of inventory to have in back stock and storage
- How many products to reorder and how often
- When to discontinue a product
- How changing seasons affect sales

PURPOSE:

One of the most valuable assets of a company is its inventory. In various industries, such as retail, food services, and manufacturing, a lack of inventory can have detrimental effects. Aside from being a liability, inventory can also be considered a risk. It can be prone to theft, damage, and spoilage. Having a large inventory can also lead to a reduction in sales.

Regardless of the size of your company, having a proper inventory management system is very important for any business. It can help you keep track of all your supplies and determine the exact prices. It can also help you manage sudden changes in demand without sacrificing customer experience or product quality. This is especially important for brands looking to become a more customer-centric organization.

EXISTING SYSTEM:

Inventory Management System is extremely beneficial to business owners, as they allow shops to properly store sales and purchase records. When inventory is mismanaged, it leads to dissatisfied consumers, slower sales, too much cash on hand, and warehouses. This inventory system reduces manual work, human mistake, and manual delays while simultaneously speeding up the process. This inventory management system will be able to track sales information as well as inventories. Inventory management system is a web application for Windows that focuses on inventory and sales clearance. It was created for Windows operating systems. The inventory management system has a number of features. This web application has logical tools for evaluating ideal inventory levels and selecting the appropriate replenishment strategies automatically. It also has capabilities like the ability to identify stock levels, compute reorder points automatically, and highlight potential stock-outs. This technique eliminates the risk of stock-outs of fast-moving goods by minimizing delays.

LITERATURE SURVEY:

REFERENCES

1)Inventory management for retail companies Cinthya Vanessa Muñoz Macas, Jorge Andrés Espinoza Aguirre, Rodrigo Arcentales-Carrión, Mario Peña / 2021 presented that The primary outcomes of this study are the leading inventory management systems and models and the benefits and challenges for choosing or adopting an efficient inventory control and management system.

2)Inventory management for retail companies: A literature review and current trendsCinthya Vanessa Munoz Macas, Jorge Andres Espinoza Aguirre / 2021 discussed that The primary outcomes of this study are the leading inventory management systems and models. Findings indicate that SMEs do not invest resources in sophisticated systems; instead, a simple Enterprise Resource Planning (ERP) system or even programs such as Excel or manual inventories are mainly used.

3) Inventory Management System Varalakshmi G S1 , Asst Prof. Shivaleela S2 Student, Dept of MCA, Dr.Ambedkar Institute of Technology, Bengaluru560056, Karnataka, India /2021presented that This web application has logical tools for evaluating ideal inventory levels and selecting the appropriate replenishment strategies automatically. It also has capabilities like the ability to identify stock levels, compute reorder points automatically, and highlight potential stockouts.

4) Pricing and Inventory Decisions of Multi-item Deteriorating Inventory System under Stock, Time and Price Sensitive Demand Policy Abhijit Barman, Rubi Das, Pijus Kanti De Department of Mathematics, National Institute of Technology Silchar, Silchar, Assam, India / 2020 presented that The model is developed under a known initial inventory. An iterative algorithm has been incorporated to find the optimal procedure. The prime objective of this model is to determine the selling price, time length up to zero inventory, optimal lot size so that the profit of the retailer will be maximized.

5) ANALYSIS AND DESIGN OF SALES AND INVENTORY MANAGEMENT SYSTEM FOR YOCHANG GENERAL MERCHANDISE Dianne S. Acosta, Maria Lavelle R. Alquizar, Cj Alexes Junio ,Dyrien Cris Talara, Mark Van Bulada co/ 2020 discussed that The design of the interfaces is also categorized as user-friendly due to lack of workplace IT experience. The software "Sales and Inventory System" developed for a company was designed to achieve maximum efficiency and reduce the time required to handle all the tra.

6) STUDY OF SMART INVENTORY MANAGEMENT SYSTEM BASED ON THE INTERNET OF THINGS (IOT) Souvik Paul, Atrayee Chatterjee; Digbijay Guha / 2019 discussed that This system has great advantages compared to the traditional mode, and we expect good prospects for its development. As companies turn global and have thousands of components and hundreds of warehouses the inventory becomes a nightmare and a lot

of time is spend in tracking inventory and ensuring right shipments.

7) Inventory management in retail industry - Application of big data analytics Hien Vu University of Auckland / 2018 presented that The report finds the prospects of integrating BDA in the conventional inventory management techniques and promoting the viability and appropriateness of these models in the big-data era. However, the limitations of BDA underlie data challenges, processing challenges and management challenges.

8) NVENTORY CONTROL SYSTEM Rashmi Mishra, Puneet Shukla/ 2018 discussed that n the present paper , an attempt is made to provide an up-to-date and complete review of existing literature, concentrating on descriptions of the characteristics and types of inventory control models that have been developed by Indian as well as Foreign authors

9) Perishables Inventory Management Model with Backroom Effect Zhang Zhenmin/ 2018 presented that this paper considers two storage locations in supermarket selling perishable products. Due to the backroom effect, freshness-and-shelf level-sensitive consumers purchase the products according to their "perceived average freshness" of displayed fresh products.

10) Predictive Analysis of Big Data in Retail Industry Hamza BELARBI, Abdelali TAJMOUATI LMEET, FST of Settat, Hassan 1st University Settat, Morocco / 2016 discussed that The uses of big data analytics are not exclusive to one industry. In retail we can use big data to make decision about pricing and merchandising. In this paper we provide a summary the state-of-the-art research on big data analytics.

11) Inventory Management V.Vijaya Lakshmi Asst. Professor, GNITS, Hyderabad, INDIA K. Ranganath / 2016 presented that An efficient inventory management ensures continuous production by maintaining inventory at a satisfactory level. It also minimizes capital investment and cost of inventory by avoiding stock-pile of product. Efficient and Effective Inventory Management goes a long way in successful running and survival of business firm.

12) Inventory Management System Anish Singh Maharjan, Mandip Humagain POKHARA UNIVERSITY / 2016 discussed that In this system we are solving different problem affecting to direct sales management and purchase management. Inventory Management System is important to ensure quality control in businesses that handle transactions resolving around consumer goods. Without proper inventory control, a large retail store may run out of stock on an important item.

13) NVENTORY MANAGEMENT UNDER UNCERTAINTY Serhii ZIUKOV Yurii Fedkovych Chernivtsi National University 2 Kotsjubynskyi str., Chernivtsi 58012 / 2015 presented that This paper analyzes possible parameters of existing models of inventory control. An attempt is made to provide an up-to-date review of existing literature, concentrating on descriptions of the characteristics and types of inventory control models that have been developed.

14) Modern inventory management Stephen Aro-Gordon Muscat College, Jaydeep Anil Gupte Atul Ltd / 2016 discussed that The paper concludes that the adoption of an appropriate combination of modern inventory management approaches can help practitioners to improve corporate service delivery in terms ensuring steady flow of

materials while also minimizing the attendant carrying costs.

15) SALES AND INVENTORY MANAGEMENT SYSTEM RAHMAT BEE ABDUL ALEEM / 2013 presented that This methodology wii perform the development stage in according to modules underlines in the scope of the project. Thus, version by version of the system will be developed before the whole complete system is ready to use.

PROBLEM STATEMENT:

Inventory is an important department in the Inventory Management System that needs to be well-managed in order for daily business operations to run successfully. However, because they do not have a computerized system to run their business, some businesses still do not comprehend the need of inventory management. As a result, the level of protection for all data, documents, and anything linked to everyday transactions and inventory is extremely low. For each good and each supplier, a large number of documents and data have been kept which takes a long time and is ineffective for future references, causing time-consuming. Furthermore, due to weak sales and inventory, the store has difficulty to determining the quantity sold per day for each item as well as the available inventory level of the items. It's difficult to keep the records manually. Another issue that has been noticed is that most customers who make purchases at the store do not obtain a suitable receipt as a reference, which makes it difficult for customers to swap their existing goods if there are any problems.

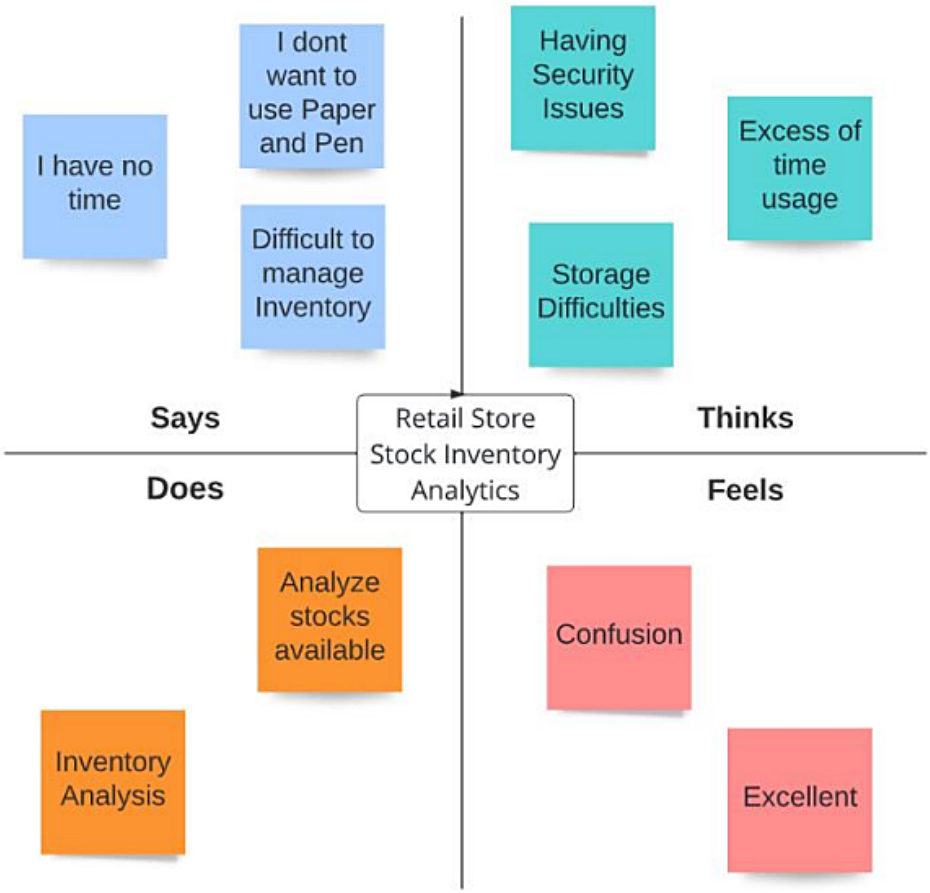
IDEATION AND PROPOSED SOLUTION:

Empathy map Canvas

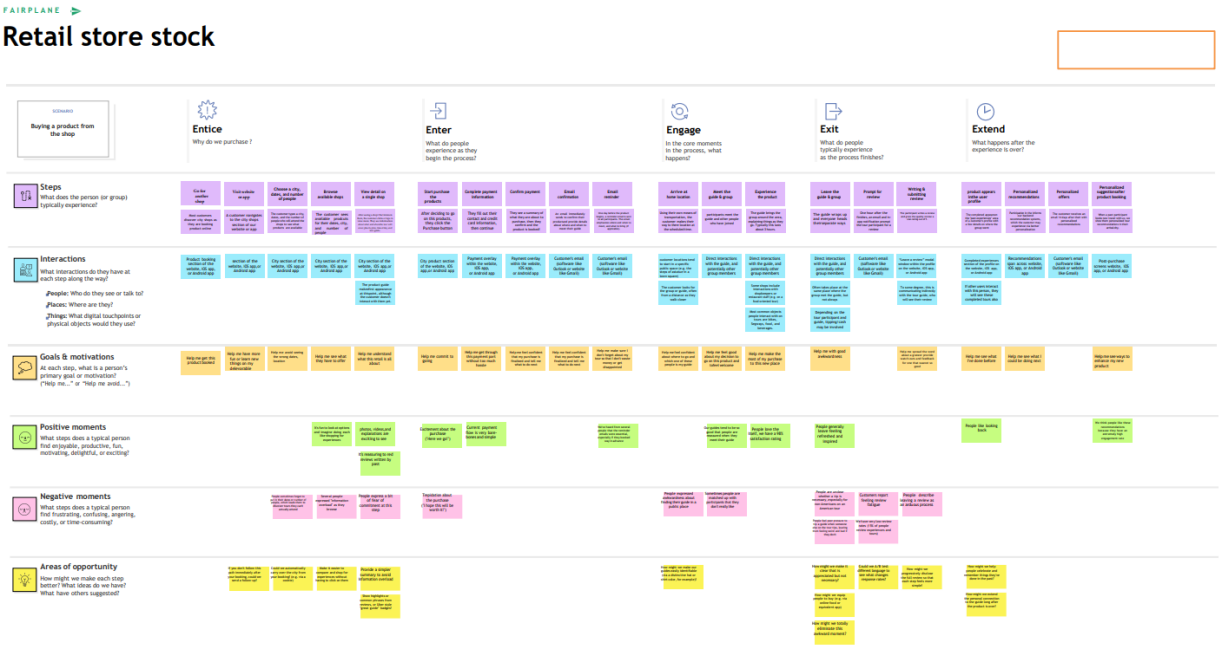
An empathy map is **a collaborative tool teams can use to gain a deeper insight into their customers**. Much like a user persona, an empathy map can represent a group of users, such as a customer segment. The empathy map was originally created by Dave

Gray and has gained much popularity within the agile community.

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes. It is a useful tool to helps teams better understand their users. Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.



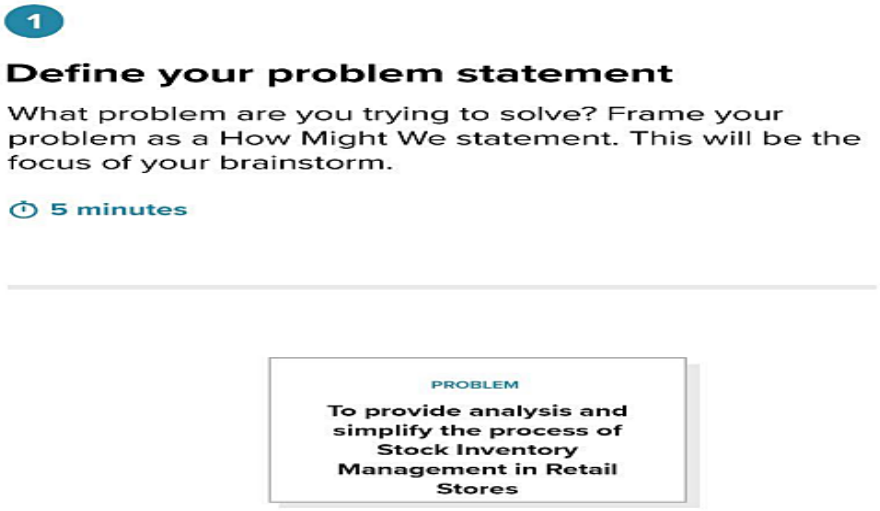
CUSTOMER JOURNEY MAP:



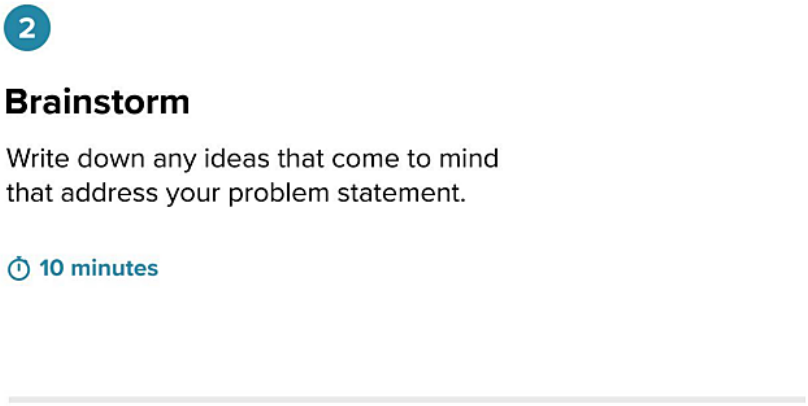
Brainstorm & Idea Prioritization:

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich number of creative solutions. Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

Step-1: Team Gathering, Collaboration and Select the Problem Statement



Step-2: Brainstorm, Idea Listing and Grouping



Vasanth R

- Analyze the price history of items
- Prevent Understock/ Overstock
- Easy to Use
- Correctness of actual stock
- Proper Alerts to the retailer on restocking
- Analytical Tools to predict Items in demand

Madhan C

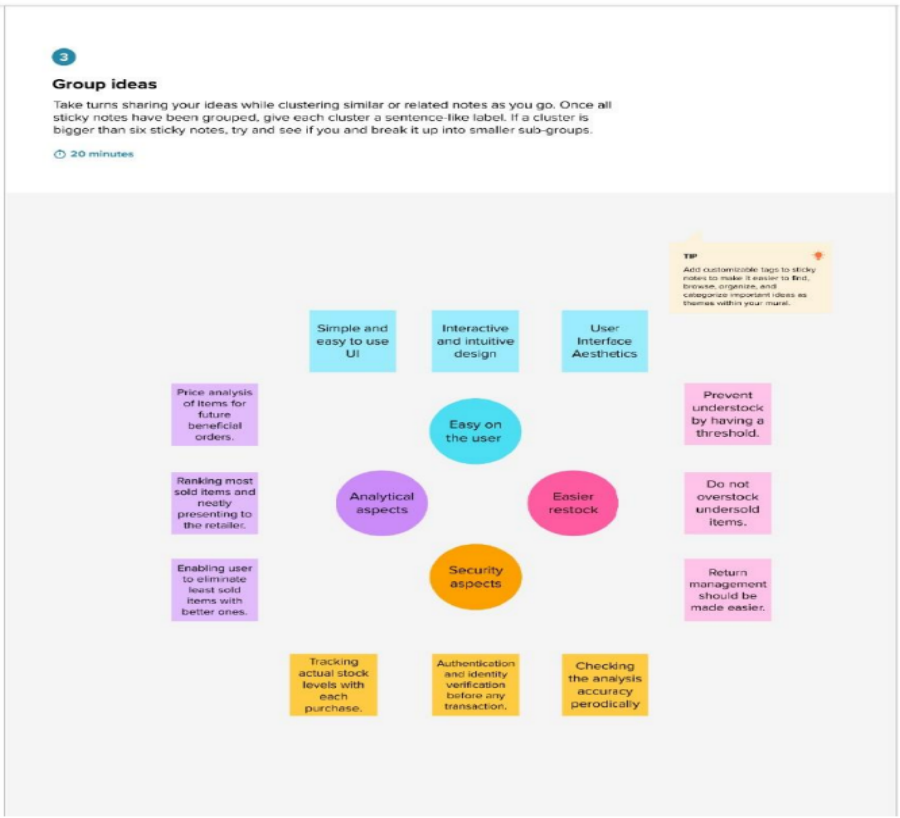
- Automate the process of restocking
- Clean interface and easy to use
- Check the equality of the physical stocks.
- Identify the items which are in demand
- Predict whether there is a need to increase the stock storage
- Improve Sales prediction algorithm to restock goods

Sanjeev Kumar M

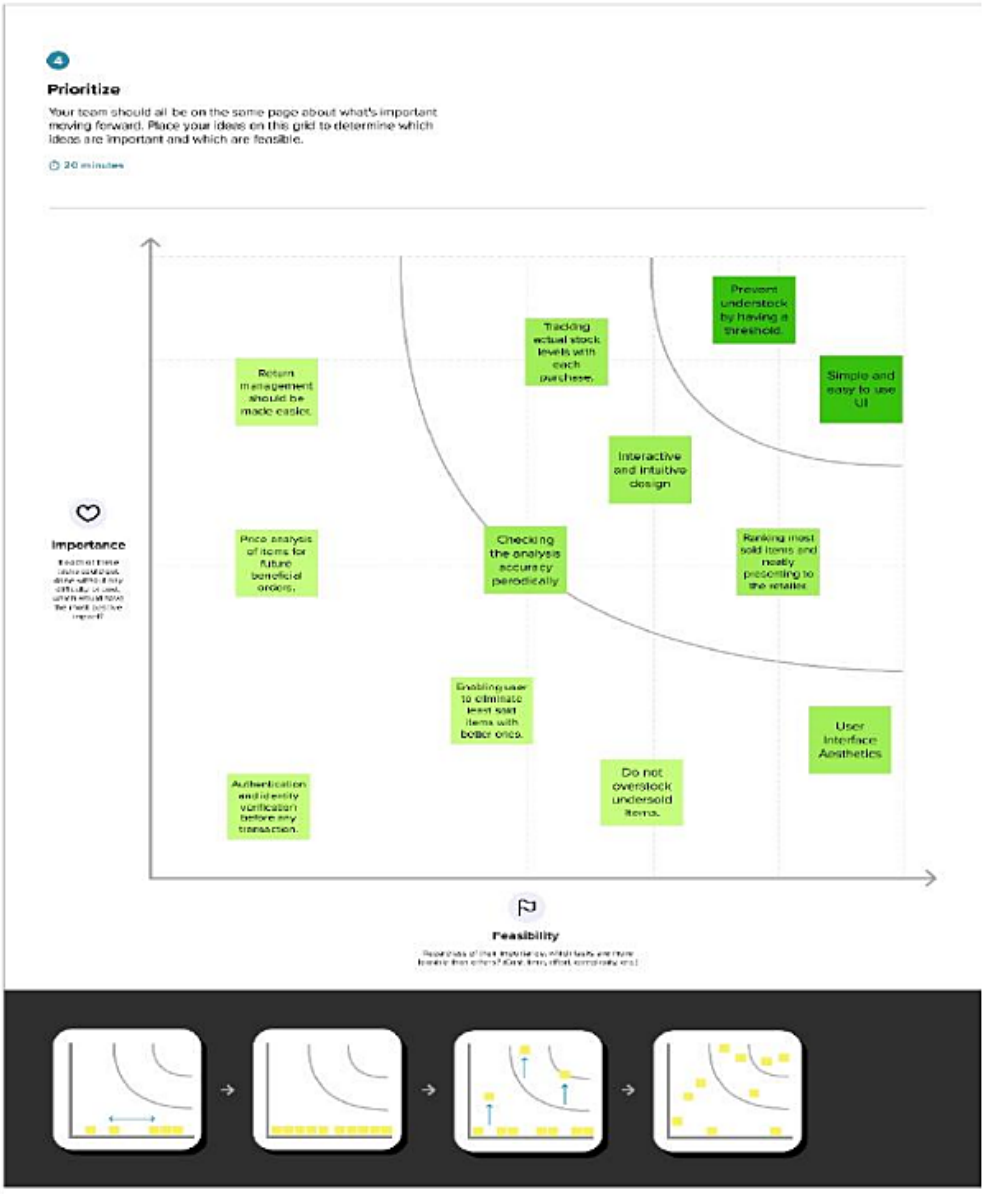
- Ensure User experience metrics are followed
- Restocking of goods before a threshold
- To assign unique ID to each store item for security
- Applying typography measures to the UI
- Proper visualization of available Stocks
- Integrity of the Data being provided.

Matheshwara Kumar K

- Simplified and easy to understand UI
- Analyze stock value and item prices
- Examine gross margin trend to satisfy user expectation
- Tracking Stock levels over time with each transaction
- Tracking location inorder to minimize/ prevent theft
- Having a clear return management system to



Step-3: Idea Prioritization



PROPOSED SOLUTION:

Proposed Solution Template:

Project team shall fill the following information in proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	The retailer should know about how much inventory should he carry, because too much inventory means working capital costs, operational costs and a complex operation, lack of inventory leads to lost sales, unhappy customers and a damaged brand.
2.	Idea / Solution description	The Stocks are analysed and give the data which amount of stocks is enough to make more profitable. Analysing of selling which stock at which time is also required. Also analyse the more profitable stock in less time
3.	Novelty / Uniqueness	New features will be extracted from given data by analysing. With these new features, more information can be gained and better decision will be taken to increase profit for retailers
4.	Social Impact / Customer Satisfaction	• Perception of profit about particular stock • Perception of changing stocks to save from losses • Perception of Fast-selling stocks • Perception of stock selling in particular location
5.	Business Model (Revenue Model)	• Dashboard will be created to view stocks selling in required location. • Better decision will be made by retailers.
6.	Scalability of the Solution	This solution can be used by every retailers. This solution can be processed with less memory and quickly. The solution can be used as open source so everyone can use it.

PROBLEM SOLUTION FIT:

Template:
Project Title: Retail Store Stock Inventory analytics **Project Design Phase-I - Solution Fit Template** **Team ID:** PNT2022TMID20096

Define CS, fit into CC

1. CUSTOMER SEGMENT(S)
Who is your customer? CS

The main customers for our project is:

- Retailers who are struggling how much inventory has to be carried

6. CUSTOMER CONSTRAINTS
What constraints prevent your customers from taking action or limit their choices of solutions?

- Not having required stocks at required time.
- Having thoughts that stocks may be damaged.
- Lack of knowledge of retailers for the required stocks

5. AVAILABLE SOLUTIONS AS
Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have?

Solutions:

Pros:
- Providing the stocks based on the requirements of the customers.
- Prediction gets easier with the help of current time period.

Cons:
- Poor prediction leads to loss in the business

Explore AS, differen

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS
Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides. J&P

- Solves the problem of getting losses by not buying too much stocks.
- Simpler making stock available based on their requirements.
- Simpler to identify necessary stocks at necessary period.
- Filtering stocks easily.

9. PROBLEM ROOT CAUSE RC
What is the real reason that this problem exists? What is the back story behind the need to do this job?
i.e. customers have to do it because of the change in regulations.

- Sometimes wrong stocks were bought for sale which leads to loss.
- More number of stocks or less number of stocks are also leads to loss

7. BEHAVIOUR BE
What does your customer do to address the problem and get the job done?
i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace)

- Get irritated by lack of stocks.
- Time wastage because of non-updated content which will old stock details.

3. TRIGGERS TR
What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news.

- needy stocks
- required stocks instead of less or more stocks.

4. EMOTIONS: BEFORE / AFTER EM
How do customers feel when they face a problem or a job and afterwards?
i.e. lost, insecure > confident, in control - use it in your communication strategy & design.

BEFORE:
- lack of knowledge about the required stocks.
- Making more stocks available
- Person with esteemed talent in an undesirable job.

AFTER:
- Get updates about which stock is getting sold at the current period.
- Getting required number of stocks.

10. YOUR SOLUTION SL
If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality.
If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour.

- Predicting of which product will get sold the most using the past datas.
- Having 2nd plan will be more protectable in emergency times.
- Making customer friendly and gives good experiences which results in profit.

8. CHANNELS of BEHAVIOUR CH
8.1 ONLINE
What kind of actions do customers take online? Extract online channels from #7

- History of the stocks sold, not sold, etc.
- Provide details for required stocks.
- Prediction of required stocks.

8.2 OFFLINE
What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.

- Getting profit
- no lack of stock or more stock

FUNCTIONAL REQUIREMENTS:

Functional Requirements:

Following are the functional requirements of the proposed solution:

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	**User Registration**	Registration through Form Registration through Linked IN Registration through Website Registration through G-mail
FR-2	**User Confirmation**	Confirmation via Email Confirmation via OTP
FR-3	**User Login**	Login using user id or username and their respective password
FR-4	**Updation of Profile**	Update the user credentials Update the Contact details
FR-5	**Uploading Data**	Collect the user/customer details as well as product details. Upload the product details. This model predicts the best sold products and also analyzes the available stocks.
FR-6	**Recommendation**	User will request for Item. Get the Item recommendations
FR-7	**Ratings and Reviews**	The user i.e retailer of any shop can give their ratings and reviews about the models.

NON-FUNCTIONAL REQUIREMENTS:

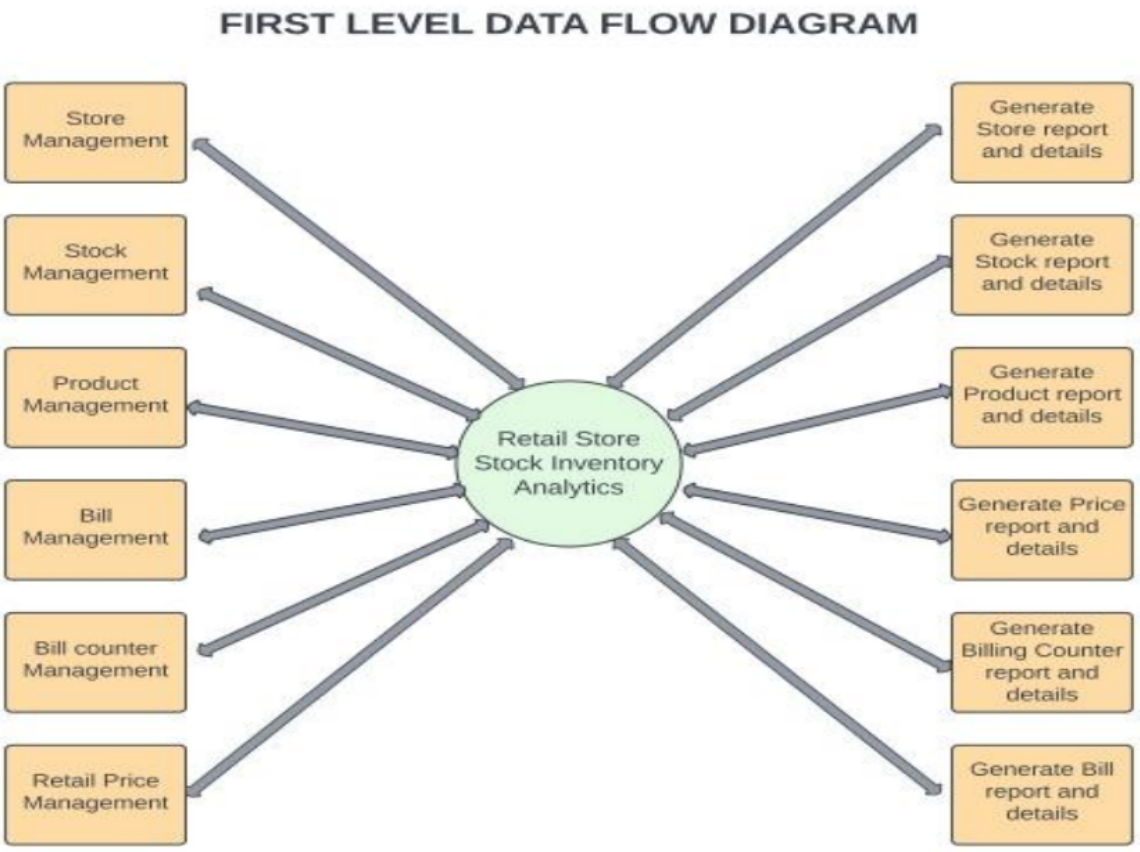
Non-functional Requirements:

Following are the non-functional requirements of the proposed solution:

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	They are more likely to have enough inventory to capture every possible sale while avoiding overstock and minimizing expenses. This model can be supported on both desktop and mobile browsers.
NFR-2	**Security**	This can be used only by the users who have their proper login credentials
NFR-3	**Reliability**	Avoid over or under stocking Ensure accurate inventory valuation Prevent order delays Reduce dead stock
NFR-4	**Performance**	In a departmental store, the billing technique is digitalized . The database of the customer that is the name of the customer, mobile number, address and the purchase details of the customer are included in the dataset. From this, the model can predict the dead stocks and highly profitable stocks. The accuracy of this model will be ensured by checking multiple times.
NFR-5	**Availability**	This model is suitable for all kind of retail stores. It can give retailers real-time visibility into stock levels,avoid stock outs, keep inventory carrying costs low and help meet customer expectations
NFR-6	**Scalability**	More users can be accessed at the same time without any issues. The feedback of the users will be taken and be proceeded further up to the satisfaction of the user.

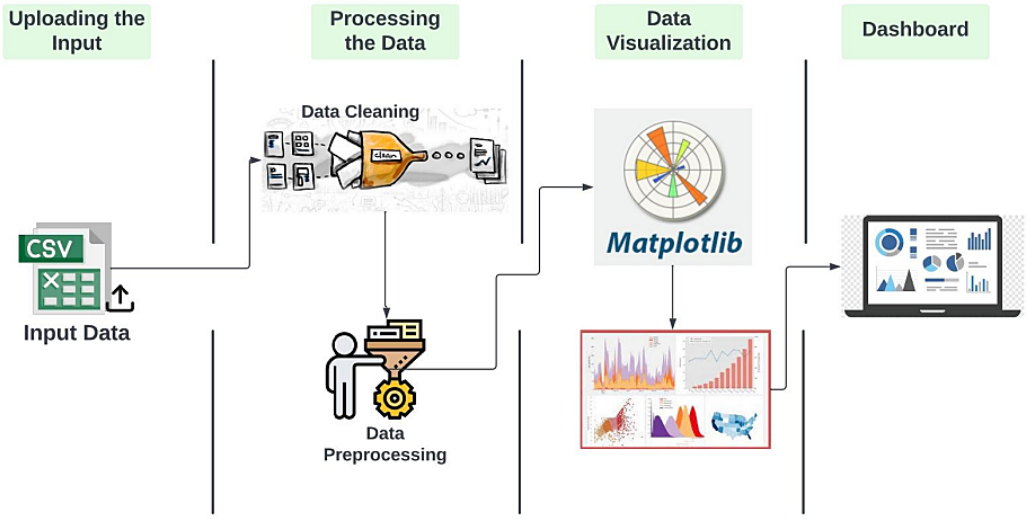
PROJECT DESIGN:

DATA FLOW DIAGRAM



ARCHITECTURE DIAGRAM

Technical Architecture:



Project Planning Phase
Milestone and Activity list

Date	24 October 2022
Team ID	PNT2022TMID20096
Project Name	Retail Store Stock Inventory Analytics

Milestone	Activity	Description	Date
Working with the Dataset	Understanding The Dataset	Understand the dataset to provide better visualization.	29 Oct 2022
	Loading the Dataset	Load the dataset into the IBM Cognos.	29 Oct 2022
	Prepare the dataset	Prepare the dataset in the IBM Cognos.	29 Oct 2022
Data visualization charts	Year Wise Price Using Line Graph	Visualize the year wise price using line graph in IBM Cognos.	05 Nov 2022
	Year Wise Stock Using Line Graph	Visualize the year wise stock using line graph in IBM Cognos.	05 Nov 2022
	Top10 Sales By Year Using Line Graph	Visualize the top10 sales by year using line graph in IBM Cognos.	05 Nov 2022
	Top10 Revenue By Year Using Line Graph	Visualize the top10 revenue by year using line graph in IBM Cognos.	05 Nov 2022
	Monthly Stock Using Heat Map	Visualize the monthly stock using Heat Map in IBM Cognos.	05 Nov 2022
	Monthly Sales Using Tree Map	Visualize the monthly sales using Tree Map in IBM Cognos.	05 Nov 2022
	Monthly Revenue Using Pie Chart	Visualize the monthly Revenue using Pie Chart in IBM Cognos.	05 Nov 2022

	Summary Cards of Total Revenue, Sales, Stock, Price	Visualize the summary cards of total Revenue, Sales, Stock, Price in IBM Cognos.	05 Nov 2022
Dashboard	Dashboard Creation	Create Dashboard for various visualization in IBM Cognos.	12 Nov 2022
Report	Report Creation	Create Report to visualize detailed report of sales, stock, price in IBM Cognos.	19 Nov 2022
Story	Story Creation	Create story to make on the data in IBM Cognos.	19 Nov 2022

UNDERSTANDING THE DATASET:

Understanding The Dataset

Understand The Dataset Retails Sales Forecasting with few header rows.

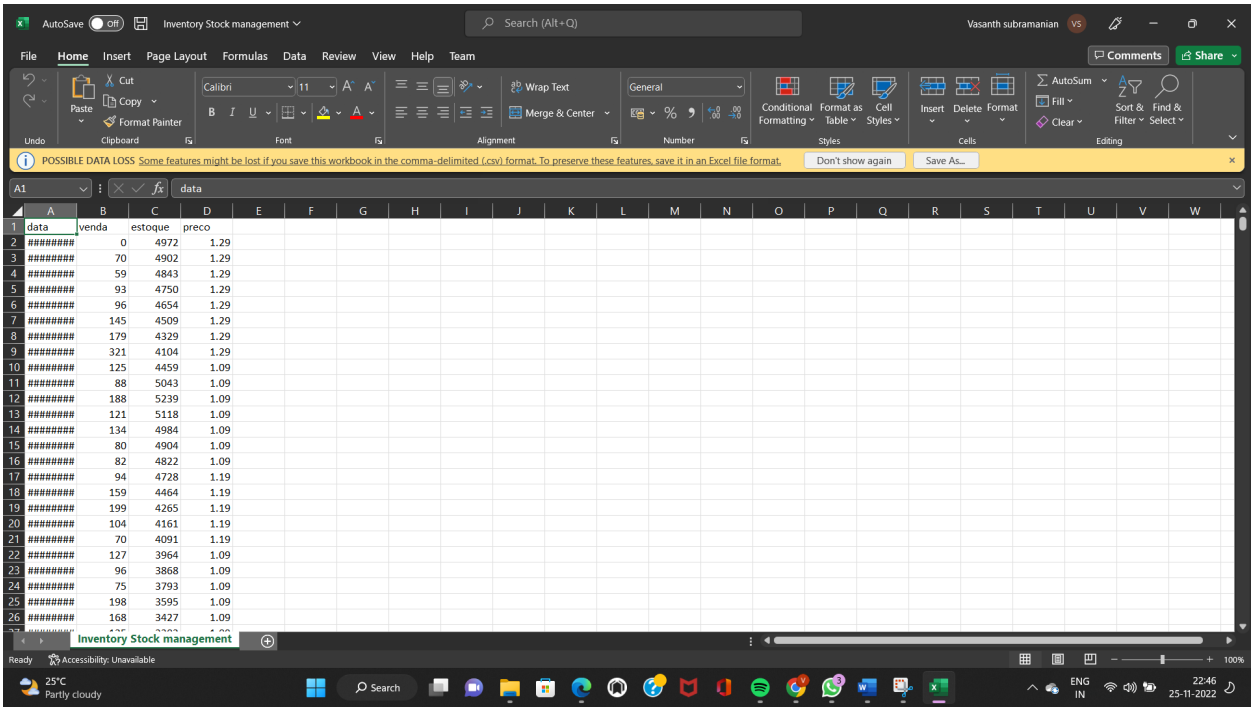
Data(Year)	Venda(Sales)	Estoque(Stock)	Preco(Price)
01-01-14	0	4972	1.29
02-01-14	70	4902	1.29
03-01-14	59	4843	1.29
04-01-14	93	4750	1.29

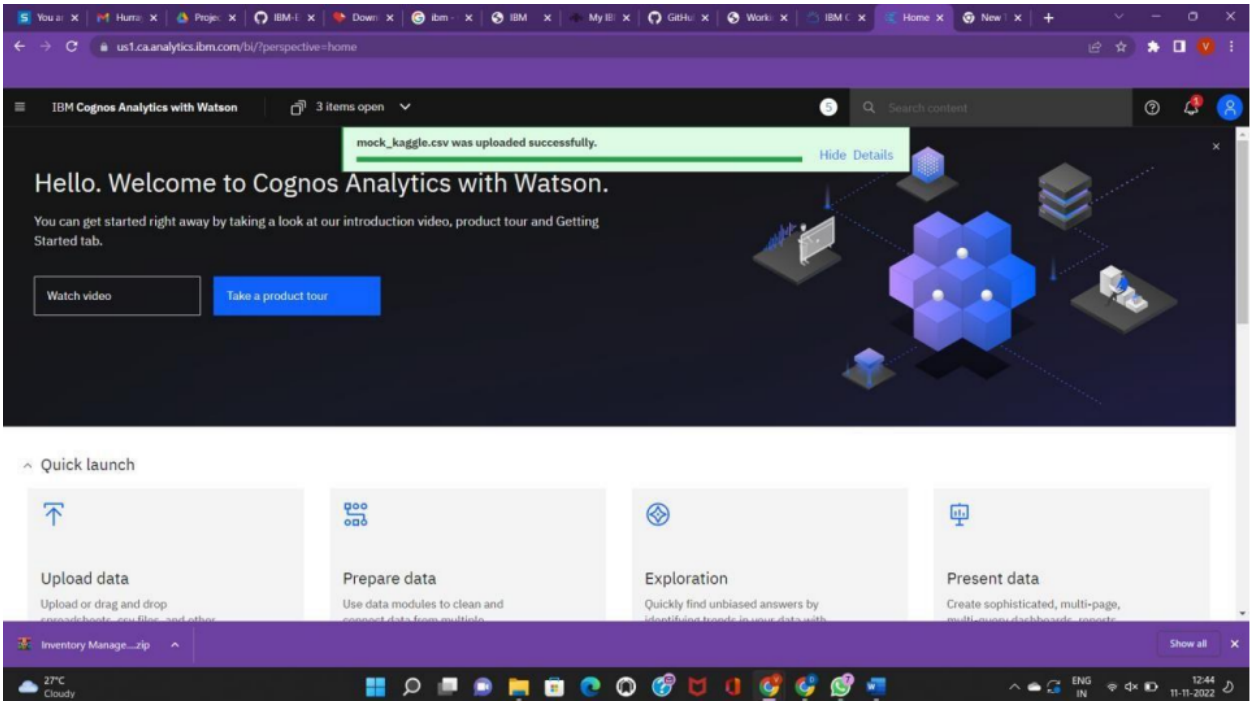
Loading The Dataset

Before you can build a view and analyze your data, you must first connect the data to IBM Cognos. Cognos supports connecting to a wide variety of data, stored in a variety of places.

The data might be stored on your computer in a spreadsheet or a text file, or in a big data, relational, or cube (multidimensional) database on a server in your enterprise.

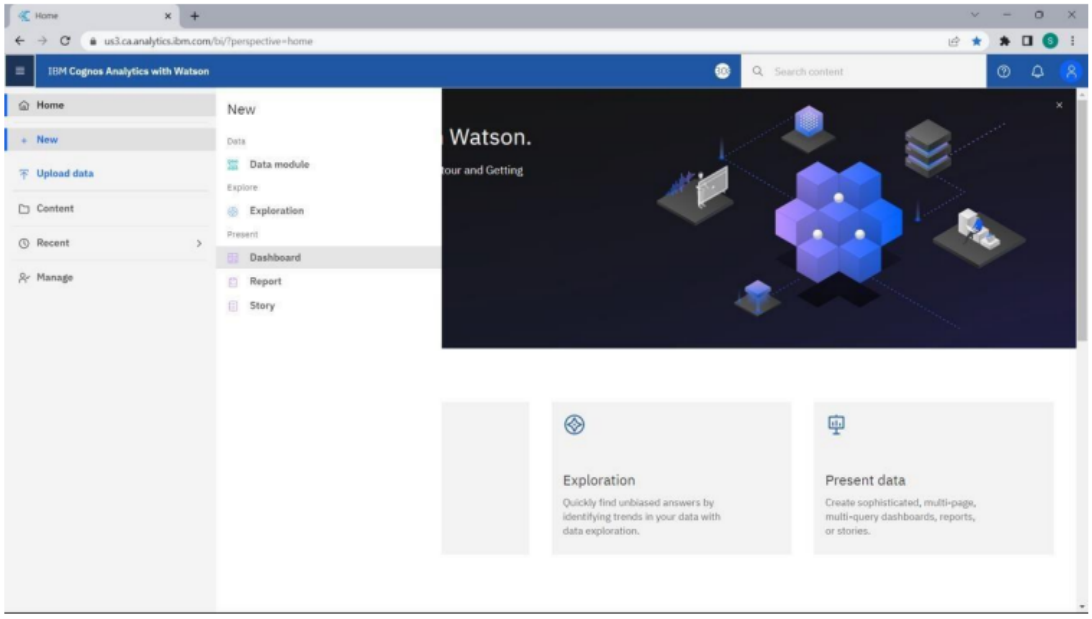
In our case, we will be using a spreadsheet or text file for making our analysis.

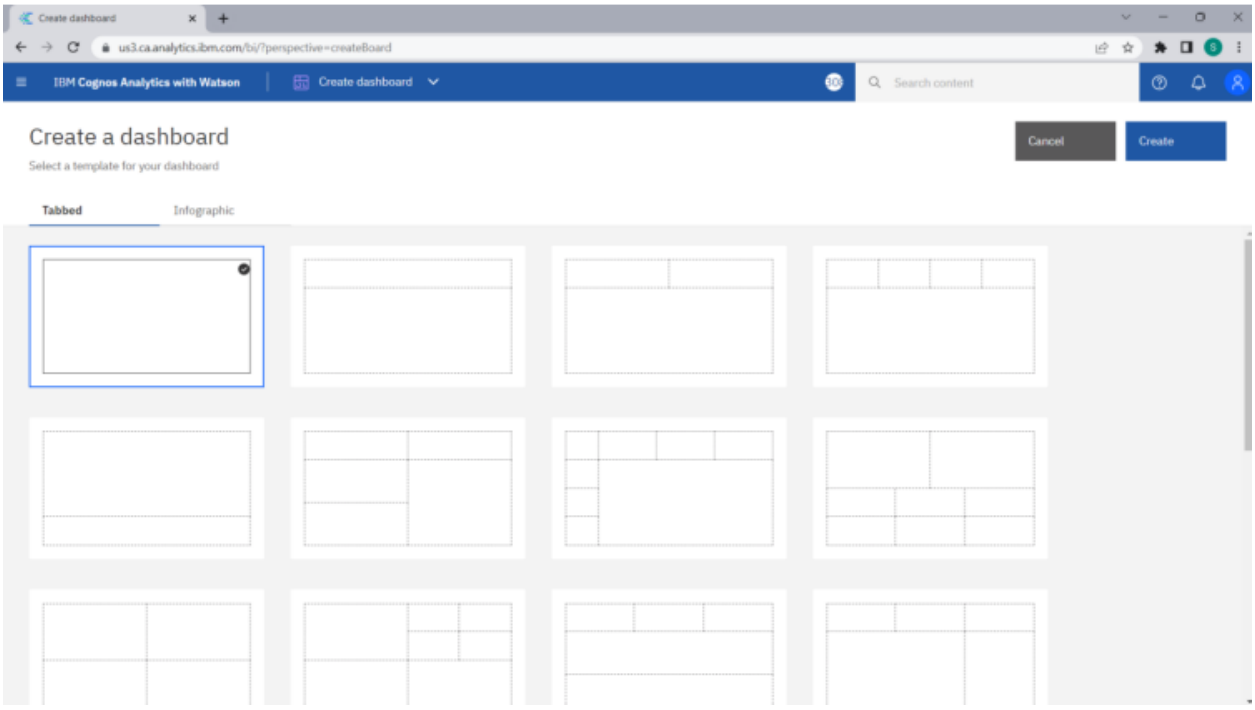




DASHBOARD CREATION:

Create Dashboard:





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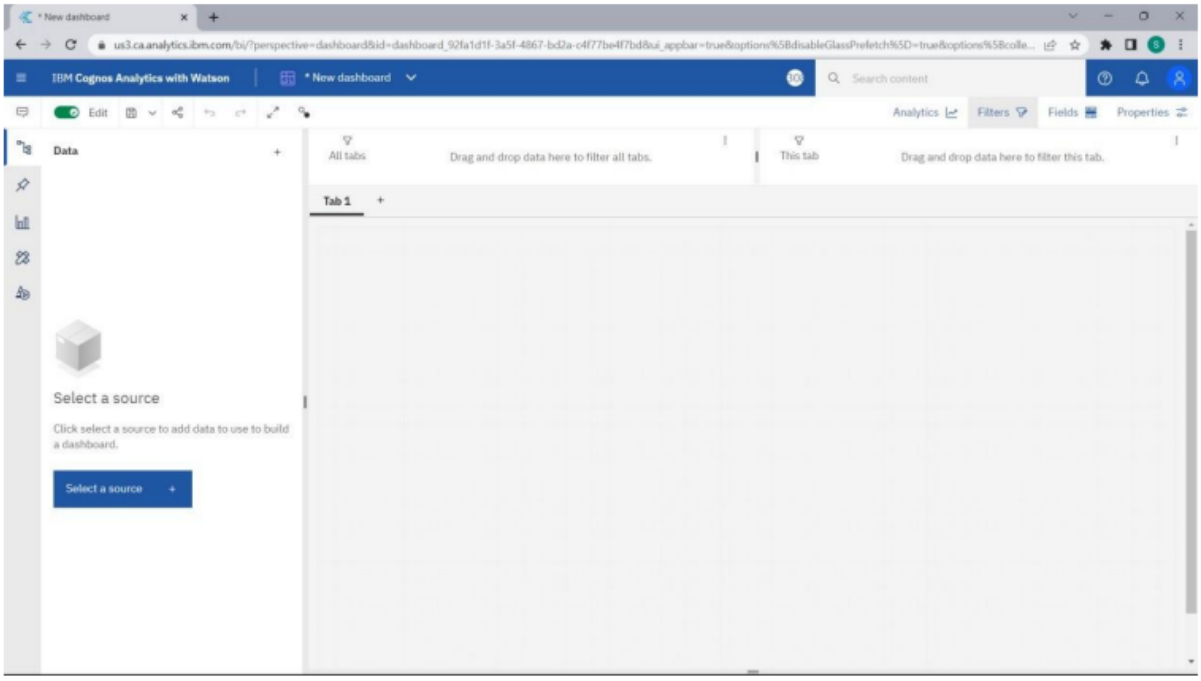
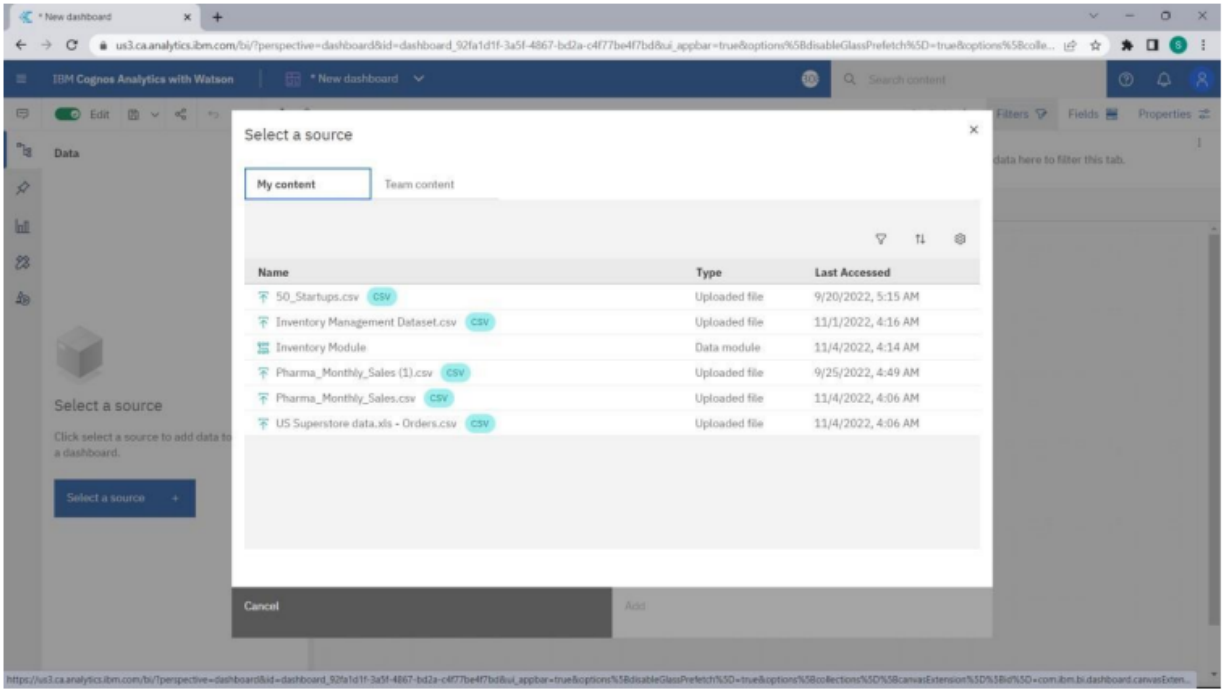
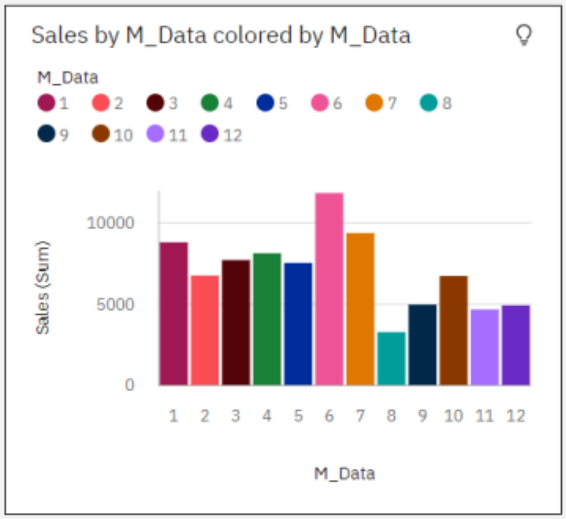
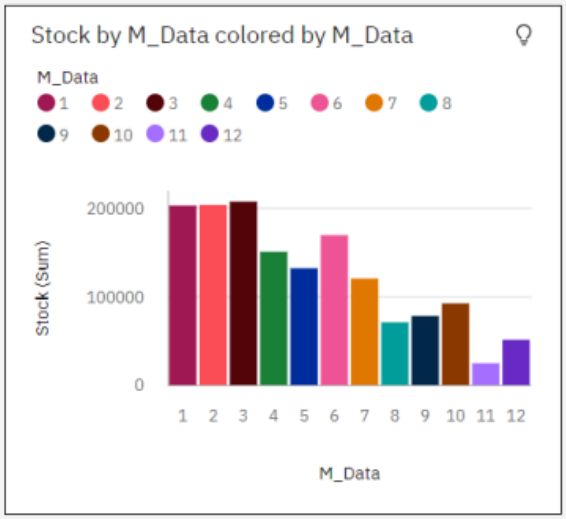
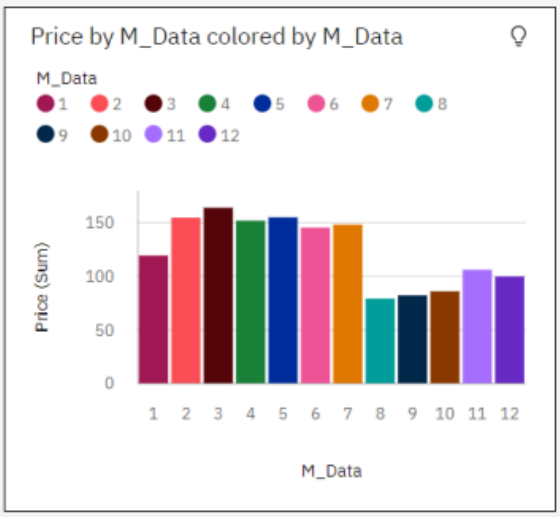


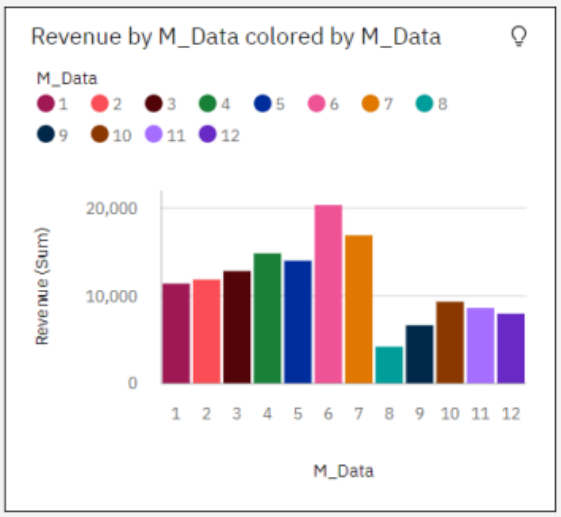


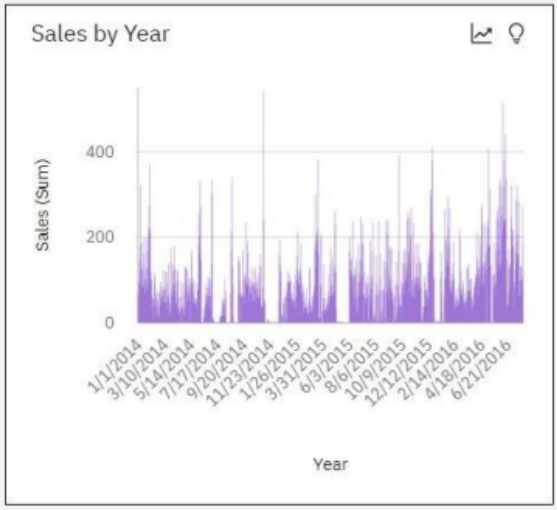
Dashboards:

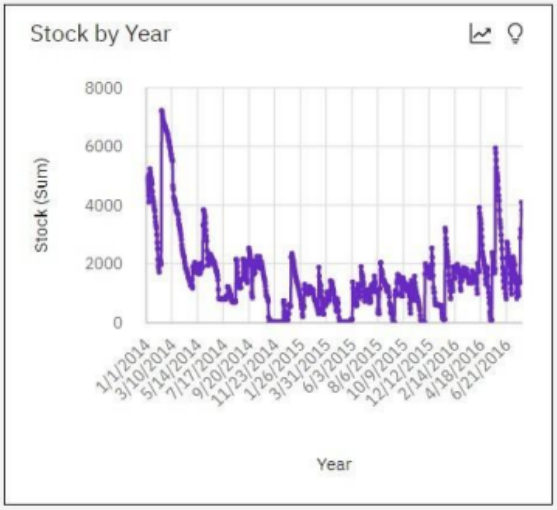

Sales by M_Data colored by M_Data
M_Data
1 2 3 4 5 6 7 8 9 10 11 12
Sales (Sum)
10000
5000
0
1 2 3 4 5 6 7 8 9 10 11 12
M_Data


Stock by M_Data colored by M_Data
M_Data
1 2 3 4 5 6 7 8 9 10 11 12
Stock (Sum)
200000
100000
0
1 2 3 4 5 6 7 8 9 10 11 12
M_Data

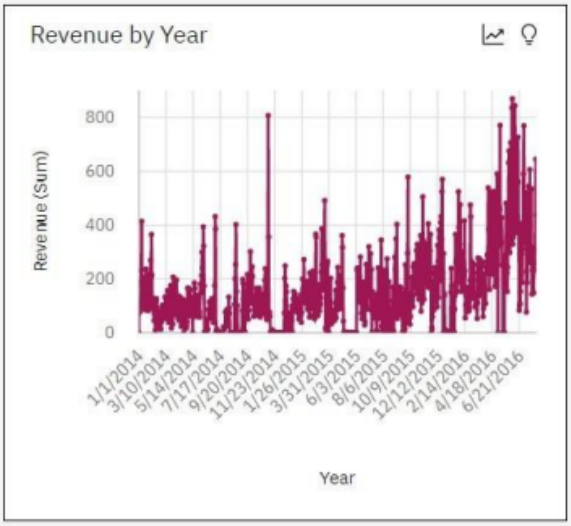

Price by M_Data colored by M_Data
M_Data
1 2 3 4 5 6 7 8 9 10 11 12
Price (Sum)
150
100
50
0
1 2 3 4 5 6 7 8 9 10 11 12
M_Data


Revenue by M_Data colored by M_Data
M_Data
1 2 3 4 5 6 7 8 9 10 11 12
Revenue (Sum)
20,000
10,000
0
1 2 3 4 5 6 7 8 9 10 11 12
M_Data


Sales by Year
Sales (Sum)
400
200
0
1/1/2014
3/10/2014
5/14/2014
7/17/2014
9/20/2014
11/23/2014
1/26/2015
3/31/2015
6/3/2015
8/6/2015
10/9/2015
12/12/2015
2/14/2016
4/18/2016
6/21/2016
Year


Stock by Year
Stock (Sum)
8000
6000
4000
2000
0
1/1/2014
3/10/2014
5/14/2014
7/17/2014
9/20/2014
11/23/2014
1/26/2015
3/31/2015
6/3/2015
8/6/2015
10/9/2015
12/12/2015
2/14/2016
4/18/2016
6/21/2016
Year


Price by Year
Price (Sum)
3
2
1
0
1/1/2014
3/10/2014
5/14/2014
7/17/2014
9/20/2014
11/23/2014
1/26/2015
3/31/2015
6/3/2015
8/6/2015
10/9/2015
12/12/2015
2/14/2016
4/18/2016
6/21/2016
Year


Revenue by Year
Revenue (Sum)
800
600
400
200
0
1/1/2014
3/10/2014
5/14/2014
7/17/2014
9/20/2014
11/23/2014
1/26/2015
3/31/2015
6/3/2015
8/6/2015
10/9/2015
12/12/2015
2/14/2016
4/18/2016
6/21/2016
Year

Sales

84830

Sales

Stock

1506938

Stock

Price

1492

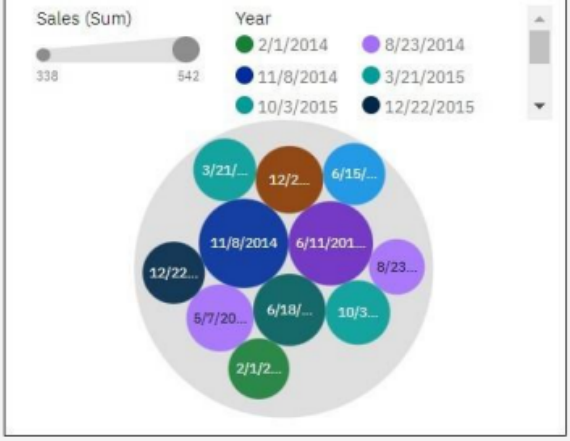
Price

Revenue

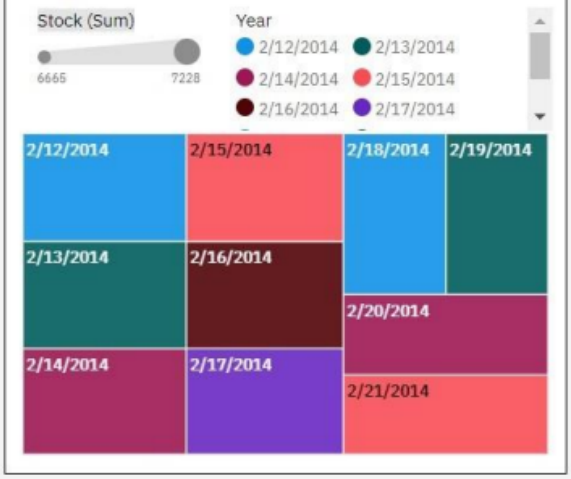
139K

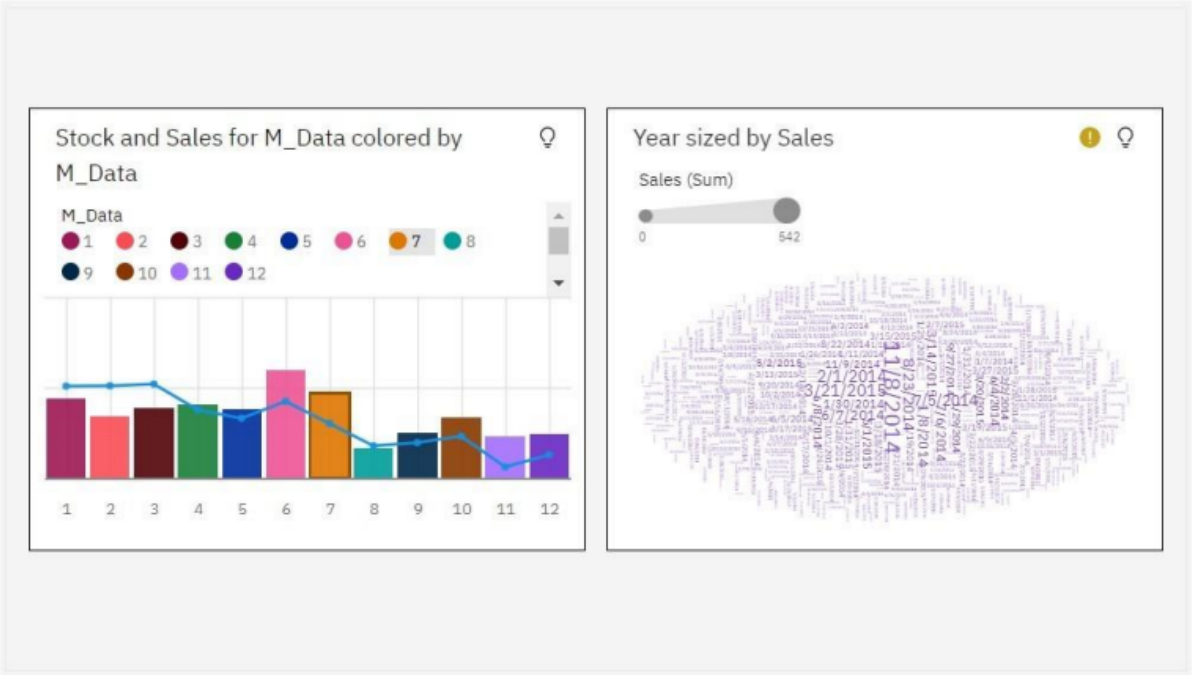
Revenue

Year hierarchy colored by Year and sized by Sales



Stock for Year hierarchy





ADVANTAGES:

Retail analytics is the process of collecting valuable data on inventory levels, supply chain movement, consumer demand, sales, and much more. All of which can be used for a variety of applications like maintaining procurement levels and making crucial marketing decisions.

Whether they're being used to enhance a scan-based trading partnership, or inform a sales strategy, these are the five top benefits offered by retail analytics.

1. Customer behavior insights

2. Improving Marketing ROI

3. Optimizing In-Store Operations

4. Managing the Basics

5. Enhancing Loyalty

DISADVANTAGES:

The inventory process involves multiple intricate aspects that drive accurate product delivery. Even a single error in the process can have expensive and long-term consequences. This will eventually affect the company's growth and reputation.

1. Unclear Communication

2. Inadequate Access

3. Inefficient Warehouse Management

4. Overselling

5. Spoiled Goods

CONCLUSION:

This project describes an Inventory Management System that stores sales using IBM cognos. It's a simple dashboard that links to the data from the dataset, allowing information to be refreshed and confirmed in the store. It also provides sales information on asked statements. This system makes inventory management a breeze. Increased income and profitability, a better employee climate, and an overall boost in customer satisfaction will be noticed as a result of the inventory management system.

FUTURE SCOPE:

This project looks at sales control, inventory management, and how to deal with business abnormalities. It examines the capacity to add new sales, update products and sales details, and see existing ones. It allows for faster operation by recording and automating manual processes.