



St. XAVIER'S
CATHOLIC COLLEGE OF ENGINEERING
(Autonomous)
Chunkankadal, Kanyakumari District, Tamil Nadu

RETAIL STORE STOCK INVENTORY ANALYTICS

NALAIYATHIRAN PROJECT BASED LEARNING

on

PROFESSIONAL READINESS FOR INNOVATION, EMPLOYABILITY AND ENTREPRENEURSHIP

A PROJECT REPORT

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BACHELOR OF ENGINEERING

IN

COMPUTER SCIENCE AND ENGINEERING

ST.XAVIER'S CATHOLIC COLLEGE OF ENGINEERING

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ABSTRACT

Inventory Management System is important to ensure quality control in businesses that handle transactions revolving around consumer goods. Without proper inventory control, a large retail store may run out of stock on an important item and it's also easy to lose its possible customer if they do not have sufficient stocks in the store.

A good Inventory Management System will alert the retailer when it is time to reorder. Inventory Management System is also an important means of automatically tracking the stocks of their product. For example, if a business orders ten pairs of socks for retail resale, but only receives nine pairs, this will be obvious upon inspecting the contents of the package, and error is not likely. On the other hand, say a wholesaler orders 100,000 pairs of socks and 10,000 are missing. Manually counting each pair of socks is likely to result in error. An automated Inventory Management System helps to minimize the risk of error. In retail stores, an Inventory Management System also helps track theft of retail merchandise, providing valuable information about store profits and the need for theft-prevention systems. The product quantity is updated by the store operator every time a product is bought/received. This information is then tracked by a central computer system. The Inventory Management System can serve a variety of functions in this case. It can help in identifying the overstock and understock products prior. It also provides sales insights and stock reports in the form of graphs/ charts which will be useful for easier visualization. All of this data works in tandem to provide businesses with real-time inventory tracking information. Inventory Management Systems make it simple to locate and analyze inventory information in real-time with a simple database search.

INTRODUCTION

It is important for retail stock store inventory analysis to be conducted on a regular basis in order to ensure that the correct level of stock is maintained. This will help to avoid overstocking or under stocking of items, which can lead to lost sales or excess inventory costs. The analysis can be used to identify trends in customer demand and to predict future stock needs.

Analytics is the discovery and communication of meaningful patterns in data. As a topic, analytics has found its way from being discussed at the sidelines of industry and technology conferences, to the top of the corporate agenda. With the existing promise of delivering performance improvements not seen since the redesign of core processes in the 1990s, these tools are likely to change the competitively and scope in many industries in they are to come.

Big Data is all about the non-traditional ways of dealing with the modern digital data. We exist in an ocean of digital data. It includes data stored in piles of well-structured databases residing with organizations, streams of data generated from the dynamic social networks, various understandable and intangible signals generated by all kinds of digital equipment all over the place. For an organizational, Big Data can be about identifying the right datasets from large amount of data commonly defined by the three Vs. -Volume, Velocity and Variety; transforming them into readily consumable models; and then extracting meaningful insights for devising business strategies. These insights can be used to improve different aspects of the business - from marketing and sales, to research and operations, and customer services.

Big Data enables clients in the retail Industry to track and better understand a variety of information from many different sources like CRM, AdWord/AdSense analytics, inventory management system, emails, transactional data, sensors data etc. Industry can identify the current trends, re-order supplies for hot-selling items, adjust the prices in real time and also manage and control product distribution across different stores to channelize their sales in more effective manner. This provides retail industry with entirely different perspectives of looking towards the datasets available at their disposal. By collating these organizational datasets with social media data streams, they can also use it for better sales predictions, designing relevant campaigns to suit their profitable customers and there by ensuring customer satisfaction.

Retail inventory management is the process of ensuring you carry products 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. Inventory management is vital for retailers because the practice helps them increase profits.



They are more likely to have enough inventory to capture every possible sale while avoiding overstock because too much inventory means working capital costs, operational costs, and a complex operation. Based on the inventory management analysis we can manage how much inventory is required for selling the product based on which they can calculate the profit and losses.

Our data set contains a lot of historical sales data of a Brazilian Top retailer.

Basic Questions of every retailer: How much inventory should I carry? 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.

This is why short-term forecasting is so important in the retail and consumer goods industry.

OBJECTIVE

By the end of this Project, you will:

Know fundamental concepts and can work on IBM Congo's Analytics. Gain a broad understanding of plotting different visualization to provide suitable solution, Able to create meaningful Visualization and Dashboard(s).

Primary objective:

1. To Achieve cost-efficient operations:

Inventories allow a retail store to sell the variety goods in normal course of business. Secondly, it maintains a safe level of items throughout the year even when there is seasonal demand for the retail's output. Thirdly, having large stock of items in stores enable the stores to spread some fixed costs like transportation, electricity, maintenance & supervision cost over a larger number of items, thereby decreasing the selling cost per unit. Finally, suppliers often offer extra discount for bulk purchases. To take advantage of extra discount, normally stores go for bulk buying. In this way the selling price per unit comes down resulting in enabling the store to adopt low pricing policy.

2. To Minimize inventory investment:

When a retailer is able to maintain its inventory to the lower amounts, can use this saved money in other productive areas where comparatively return is very high. In order to know how well a retail store/outlet is managing its inventory, inventory turnover ratio can be used. Inventory turnover is a ratio of the total cost of

goods sold in a year to the average inventory level in rupees. The benefit of using this ratio is to know how quickly the retail store is getting its inventories and how quickly customers get the order placed to the stores.

3.Measuring the gaps in customer service:

Customer service has become a necessary part of retail trade. Customer service is largely a function of perception, customer expectations, and the level of service quality provided. If the customer expects a desired level of customer service (be it after sales or otherwise), and the service provided by a retailer fails to match the customer's expectations, service provided by retailer would be termed as ineffective/poor service. Now question arises how the gap between customer services can be measured.

4.Overstocking and Under stocking:

Overstocking is when you have more inventory than you can sell. This can tie up your cash and prevent you from being able to invest in other areas of your business. Overstocking can also lead to spoilage if you have perishable items.

Under stocking includes shortfalls and out-of-stock items that cause unfulfilled orders to build up. You may not be fully aware of the impact until it's too late. Here are some of the issues that arise due to poor inventory management. Missed sales opportunities.

Retail Sales Goals:

Retail Sales measures the gross receipts of a retail store by selling durable and nondurable goods. The main components of retail sales are grocery, food & clothing and shoe retailing. In India, consumer spending roughly accounts for over 60% of GDP and is therefore, a vital element in the country's economic growth. Any change in retail sales pattern is important and is seen as the time liest indicator of wide consumption patterns. Retail sales may have short term and long term goals in nature. Short term retail sales goals are supposed to support and merge into long.

3.Ideation Phase

LITERATURE SURVEY

**1.TITLE: RETAILING AND RETAILING RESEARCHING THE AGE OF
BIGDATA ANALYTICS**

AUTHOR:MARNIK G. DEKIMP E

YEAR:2019

PROBLEM IDENTIFICATION

Big data analytics in retail not only has the potential to improve the operating margins of companies by 60% but revolutionize all areas of retail.

2. TITLE:BERKAH SWALAYAN (SME Market)

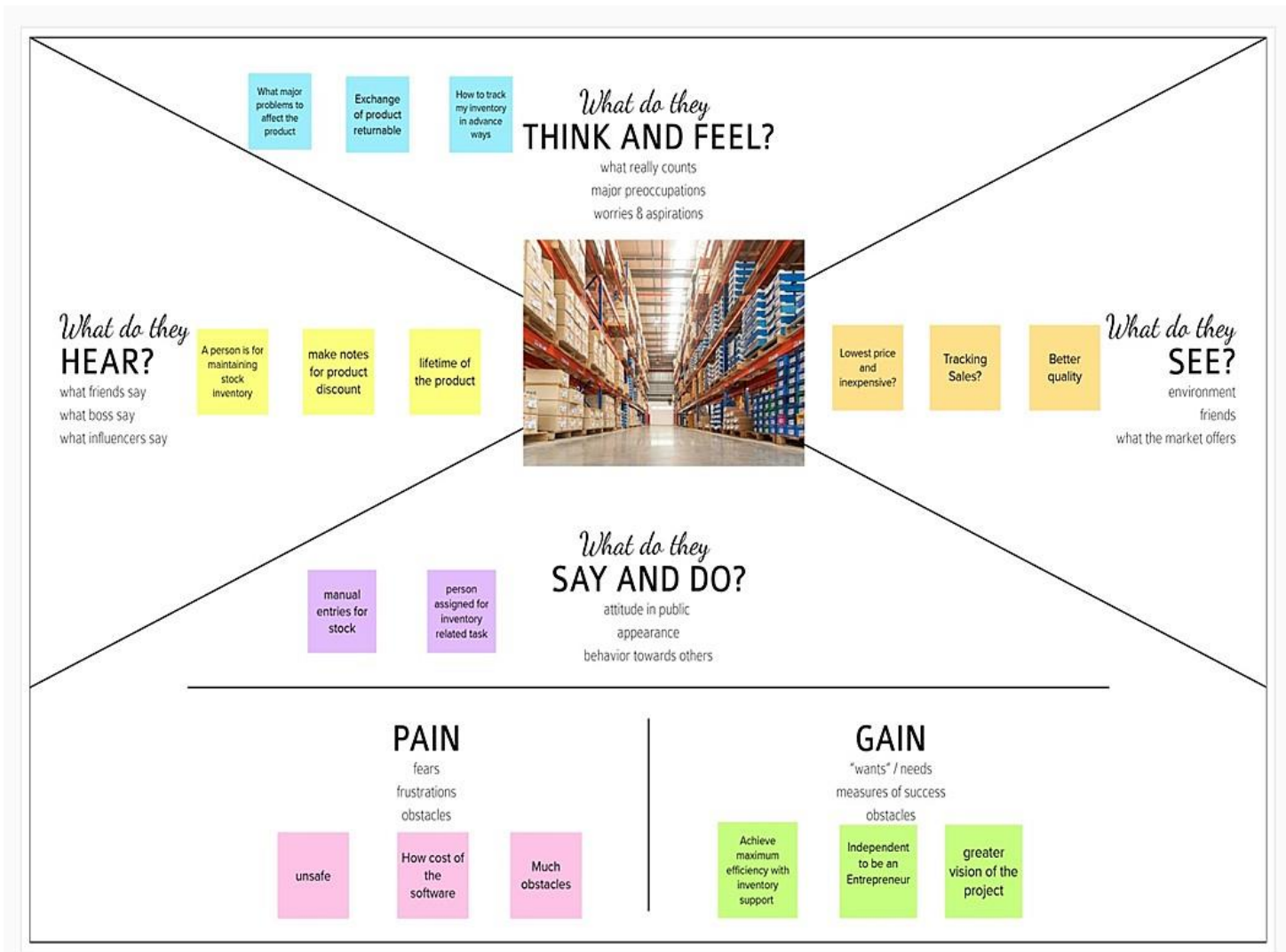
AUTHOR:AI - HUSAINIet al.

YEAR:2019

PROBLEM IDENTIFICATION

Information system of business and forecasting on sales, low –cost purchases , and minimize inventory.


EMPATHY MAP



IDEATION PHASE




Step1:

Template




Brainstorm & idea prioritization

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.


 10 minutes to prepare
 1 hour to collaborate
 2-8 people recommended


[Share template feedback](#)




Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.


 10 minutes

**Team gathering**

Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.


**Set the goal**

Think about the problem you'll be focusing on solving in the brainstorming session.

**Learn how to use the facilitation tools**


Use the Facilitation Superpowers to run a happy and productive session.


[Open article](#)




Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.


 5 minutes


**How might we (your problem statement)?**





Key rules of brainstorming


To run a smooth and productive session


 Stay in topic.
















































 Encourage wild ideas.

 Defer judgment.

 Listen to others.

 Go for volume.

 If possible, be visual.



Step2:

2

Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

TIP

You can select a sticky note and hit the pencil (switch to sketch) icon to start drawing!

Madhumitha R

Combine sales and inventory data

Rate of consumption of materials

Effects on retail store stock

Increased customer satisfaction

Financial factors

Abisha M

On-Shelf Availability

The process of ordering and allocating the inventory

Shelf Replenishment

Not fit to the shelf are return to the backroom

Careful placement of products

Thiruthamizhi T

Availability of product

Frequent on the sales

Regular Analysis of Product

To avoid the unsold product for future

Improves forecasting

Deepika S

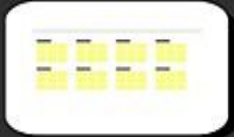
Identify the stock location

Determine the dead stock procedure

Inventory Management

Build a stock receiving process

Create a system for returns



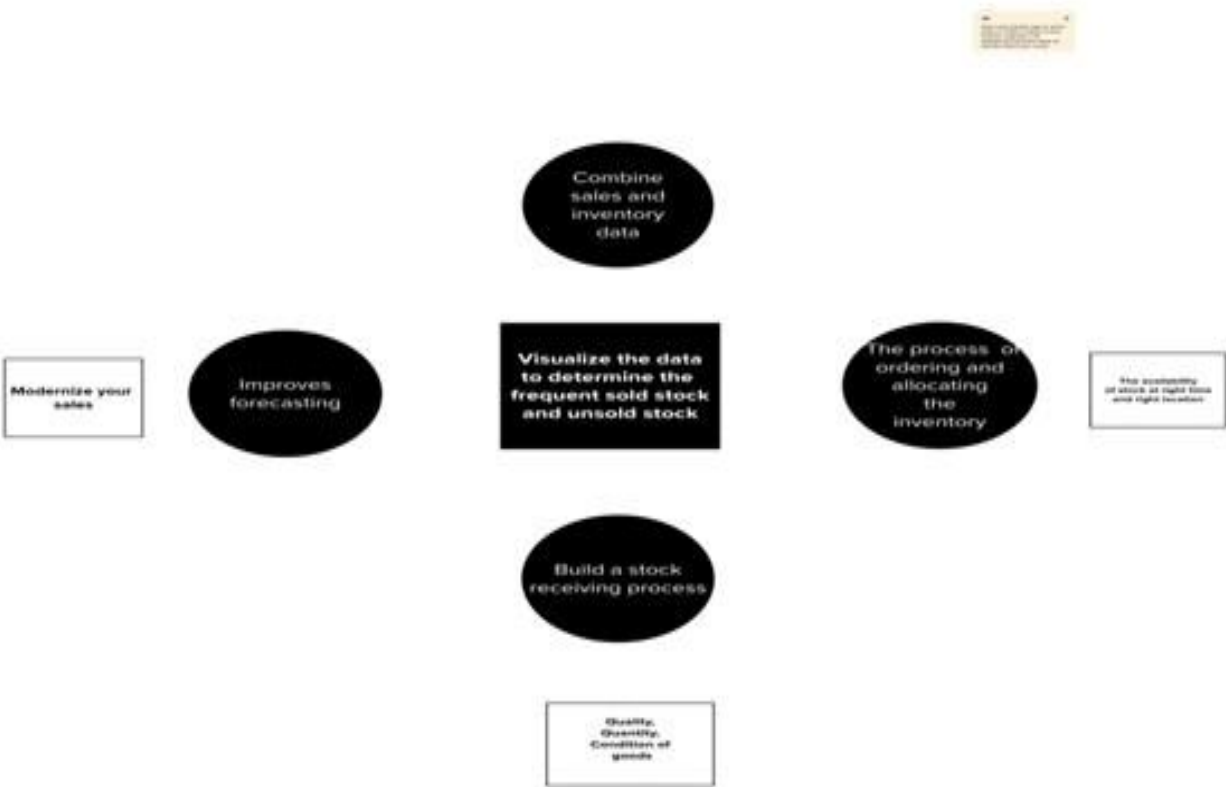
Step3:

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

20 minutes



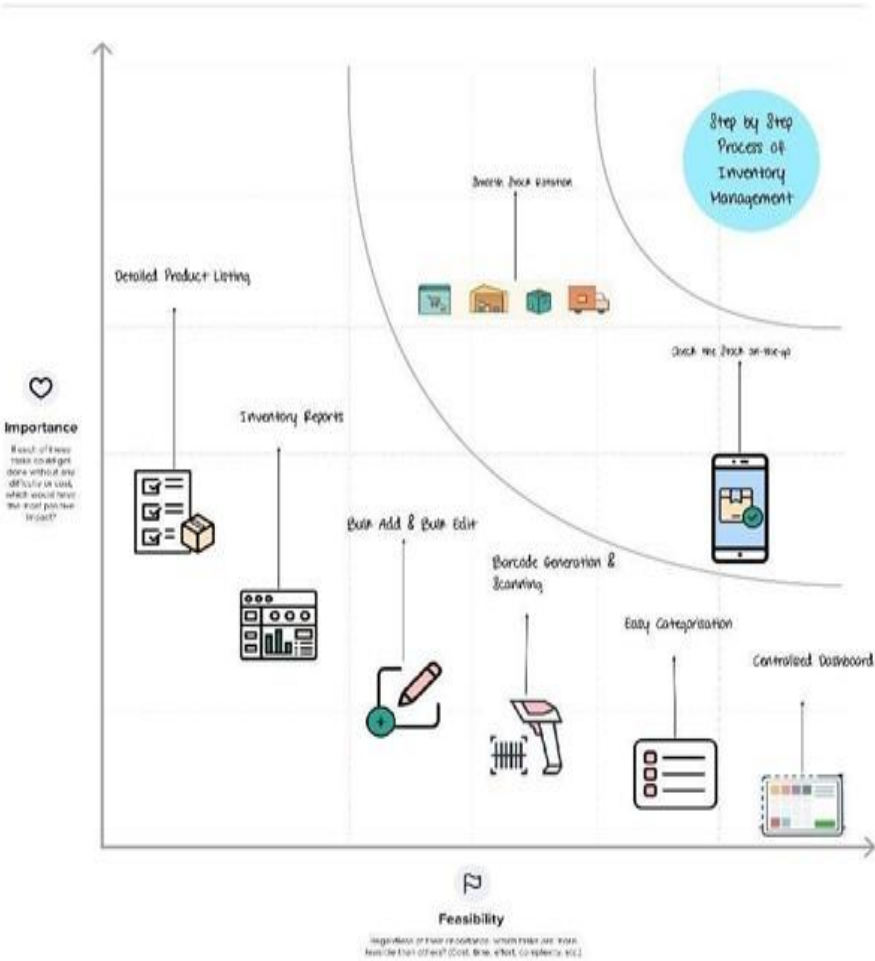
Step4:

4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes



5

After you collaborate

You can export the mural as an image or pdf to share with members of your company who might find it helpful.

Quick add-ons

- Share the mural**
Share a view link to the mural with stakeholders to keep them in the loop about the outcomes of the session.
- Export the mural**
Export a copy of the mural as a PNG or PDF to attach to emails, include in slides, or save in your drive.

Keep moving forward

- Strategy blueprint**
Define the components of a new idea or strategy.
[Open the template](#)
- Customer experience journey map**
Understand customer needs, motivations, and obstacles for an experience.
[Open the template](#)
- Strengths, weaknesses, opportunities & threats**
Identify strengths, weaknesses, opportunities, and threats (SWOT) to develop a plan.
[Open the template](#)

[Share template feedback](#)



PROBLEM STATEMENT

RETAIL STORE STOCK INVENTORY ANALYSIS

By increasing inventories, retailers attempt to raise service levels, and thus increase sale. However, in addition to a positive impact on product availability and sale, higher inventory levels may cause problems in performing in-store activities. As poor backroom-to-shelf replenishment process emerges as one of the most common causes of stock-out situations, The comparison of store and on-shelf Fast Moving Consumer Goods product availability at Stock keeping Unit level in different stores of a single retailer. In relation to this, besides direct, we have also investigated the indirect effect of inventory level on sale, by using store and shelf out of -stocks as mediators. The results of the research showing much higher level of shelf- compared to store stock-out rate confirmed the existence of the problem in the realization of internal product flows within retail stores. However, despite the occurrence of this problem, besides direct positive effect of inventory level on sale, its indirect effect was positive as well .

4.PROJECT DESIGN PHASE1

PROPOSED SOLUTION

S.NO	Parameter	Description
1	Problem Statement	The problem faced by the retail store is they do not have any systematic system to record and keep their inventory data. It is difficult for the admin to record the inventory data quickly and safely because they only keep it in the log book and not properly organized
2	Solution description	The goal is to utilize the given data set about the Retail Store Stock Inventory and store the data in the cloud ,So the retail store can use this information to easily predict the inventory easily and quickly
3	Novelty/ Uniqueness	Complete a thorough analysis of our store; it leads to avoiding over

		stock and also analysis of the competitive relevant market. Gathering customer feedback and measuring our business results.
4	Social Impact / Customer Satisfaction	When customers get the products they want faster with fewer mistakes of out-of-stocks, it increases customer loyalty.
5	Business Model	Ad-based Revenue model- Awareness can be created for Optimize the use of inventory, reduce handling cost, optimize cash flow
6	Scalability Of the Solution	Retail store stock inventory can be predicted easily with the data's stored in their retail stores. It gives the best user experience and maintains the details

PROBLEM SOLUTION FIT

Project Title: Retail Store Stock Inventory		Project Design Phase-I - Solution Fit Template		Team ID: PNT2022TMD47336	
Define CS, fit into CC	1. CUSTOMER SEGMENT(S) CC What is your customer? Our Customer is a Grocery shop Owner	6. CUSTOMER CONSTRAINTS CC What constraints prevent your customers from taking action or limit their choices of solutions? Quality costs Storage costs Obsolete Inventory	9. AVAILABLE SOLUTIONS AC 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? Pros: Rational and scientific Reviews and ratings It's convenient and save time Cons: Convenience comes with a cost Quality of probability items may be subject	Explore AS, differentiate	Focus on AS, keep away from CC, understand BC
	2. JOBS-TO-BE-DONE / PROBLEMS JP Which jobs-to-be-done (or problems) do you address for your customers? Value the Customer Feedback Make Surprise and Delights Application for the Repeat Customer from the store Owner	8. PROBLEM ROOT CAUSE PC What is the real reason that this problem exists? What is the back story behind the need to do this job? People think that managing a inventory through a digital form will be difficult and the managing the software will cost too much money People have kept a mindset that increase/decrease of demand cannot be predicted before itself	7. BEHAVIOUR BC What does your customer do to address the problem and get the job done? They try the interface for overcoming of the problem but then if they find it complicated or not efficient enough they stop using it. Indirectly related will be their attending workshop where an effective inventory management technique will be shared information about		
Identify strong TM & EM	3. TRIGGERS TE What triggers customers to act? Loyalty to customer New product/Service Announcement	10. YOUR SOLUTION PS 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 With the mobile technology we are able to visualize and predict stock inventory, by the ultimate power Cognate Analytics Tool we will be able to properly create a dashboard for the customers to work with and visualize and analyze the retail store stock inventory on their work with limited knowledge	4. CHANNELS of BEHAVIOUR CH 4.1 ONLINE What kind of actions do customers take online? Utilize the given data Utilize the dataset 4.2 OFFLINE What kind of actions do customers take offline? A person who belongs to the work he should have or create some social contact in his/her surrounding that's will create a certain trust worthy thing in his business	Fit in W ML, Embrace Analytics	

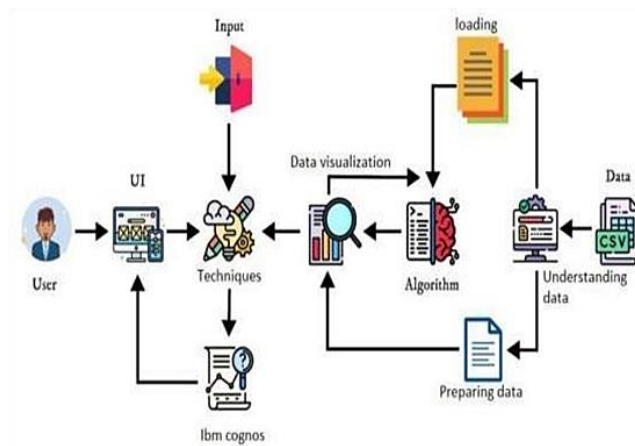
SOLUTION ARCHITECTURE

Solution Architecture:

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

1. Find the best tech solution to solve existing business problems.
2. Describe the structure, characteristics, behavior, and other aspects of the software to project stake holders.
3. Define features, development phases, and solution requirements.
4. Provide specifications according to which the solution is defined, managed, and delivered.

Example-Solution Architecture Diagram:



5.PROJECT

DESIGN PHASE2

CUSTOMER JOURNEY MAP



Customer experience journey map

Use this framework to better understand customer needs, motivations, and obstacles by illustrating a key scenario or process from start to finish. When possible, use this map to document and summarize interviews and observations with real people rather than relying on your hunches or assumptions.

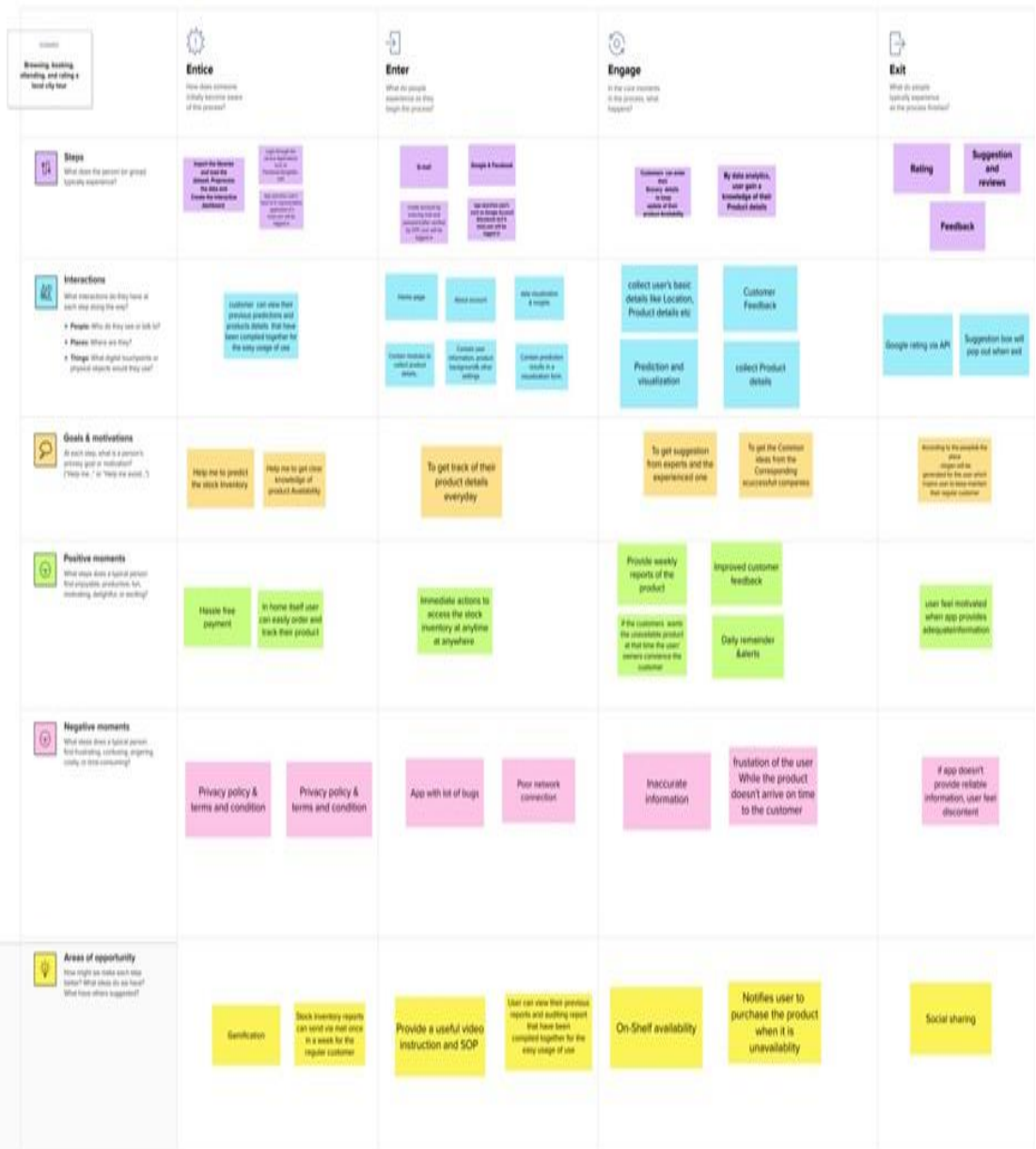
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Share template feedback

Document an existing experience
Team ID: PNT2022TMD47316
Project: Retail store stock inventory

10
As you fill steps in the experience, note each time. Place the words in right, depending on the context you're describing.



SOLUTION REQUIREMENTS

FRNo.	Functional Requirement (Epic)	Sub Requirement (Story/Sub-Task)
FR-1	UserRegistration	Registration through Form Registration through Gmail Registration through Linked IN Registration through Website
FR-2	UserConfirmation	Confirmation via Email Confirmation via OTP Confirmation via Mobile Number
FR-3	UserLogin	Login with Username Login with Password Login with Email
FR-4	ProfileUpdate	Update their Contact details Update their experience Update their Achievements
FR-5	UploadingData	Collect the Customer details Collect the Sales Count Collect the sales value This model helps to the predict the Profit/Loss count and future Sales value
FR-6	Ratings and Reviews	The User provide useful and constructive Feedback. User would feel free to give their reviews.

Non-functional Requirements:

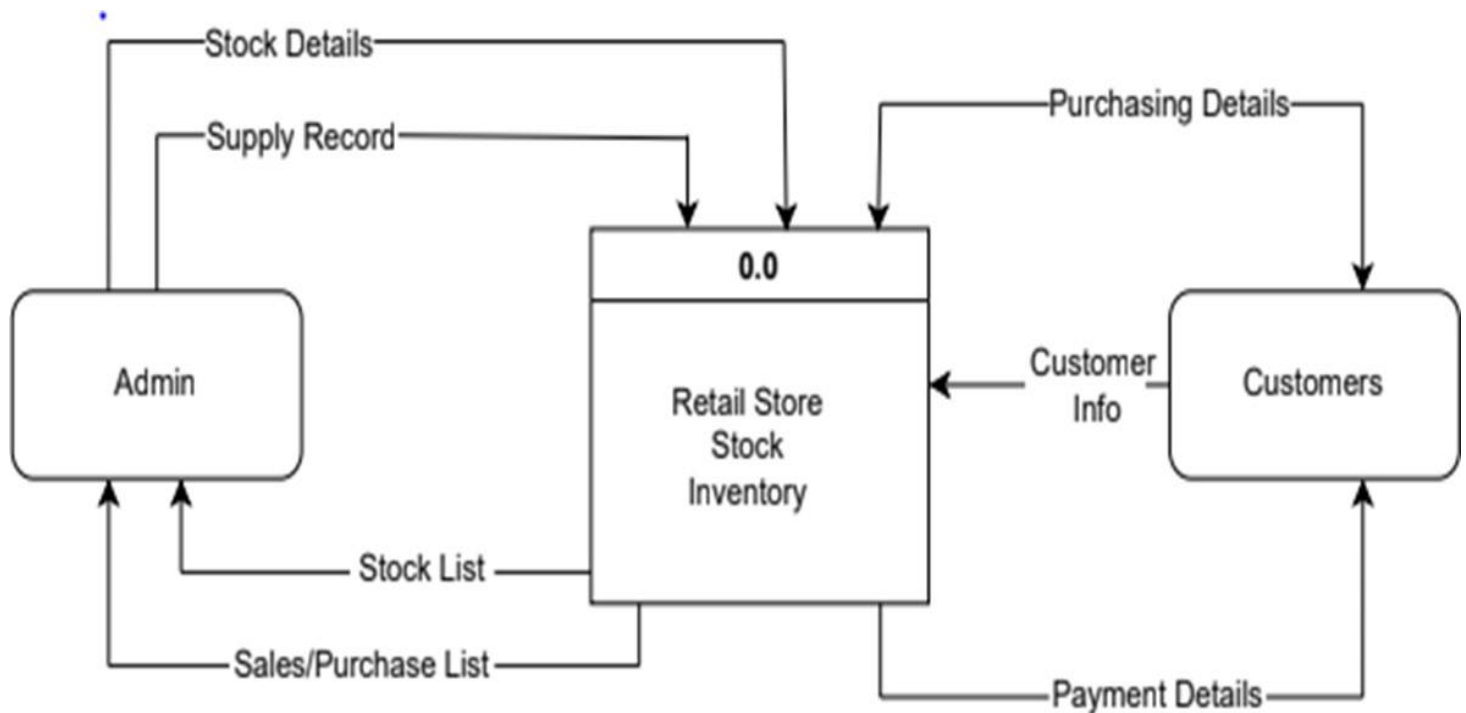
FRNo.	Non-Functional Requirement	Description
NFR-1	Usability	There are more likely to have enough inventory to capture very possible Scale While avoiding over stock and Minimizing expenses. This model can be supported on both Desktop and Mobile browser.
NFR-2	Security	The system allow to access client data , analytics and reports to only Authorized user. The rights to add or Correct data must be restricted for individual employees.
NFR-3	Reliability	This application we can use for low level RAM. It do not Consume more storage
NFR-4	Performance	The system must be capable of handling 100 employee Accounts and 10000 orders per day without affect in gets performance.
NFR-5	Availability	The model is suitable for all kind of retail stores. It can Give retailers real-time visibility into stock levels, avoid stock outs, keeps inventory carrying costs low and help meet customer expectations.
NFR-6	Scalability	The system must support implementing new features andmoduleswithoutdisruptingexistingprocesses. The system must support horizontal scaling for launching new retail Stores with multiple POS.

DATA FLOW DIAGRAM

Data Flow Diagram:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enter and leaves the system, what changes the information, and where data is stored.

Zero Level DFD



User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2

		USN-4	As a user, I can register for the application through Gmail	I can register & access the dashboard with Gmail login	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password after installing the web application	I can access the dashboard by login into the application	High	Sprint-1
	Dashboard	USN-6	As a user, I can view the charts and graphs representation of the dataset and the information shown in the dashboard.	I can analyse the stocks in my retail store	High	Sprint-1
Customer Care Executive		CCE-1	As a customer care executive, I will always be available for the interaction with the customer to clarify the queries.	An executive will analyse the customer complaints and rectify their problems	High	Sprint-2

Adminis trator		ADMI N-1	As an administrator, I will manage backup and recovery, data modelling and design, distributed computing, database system, and a data security	Administrator can evaluate, design, review and implementing a data and they are also responsible for updating and maintaining the data	High	Sprint-2
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TECHNOLOGY STACK

Technical Architecture:

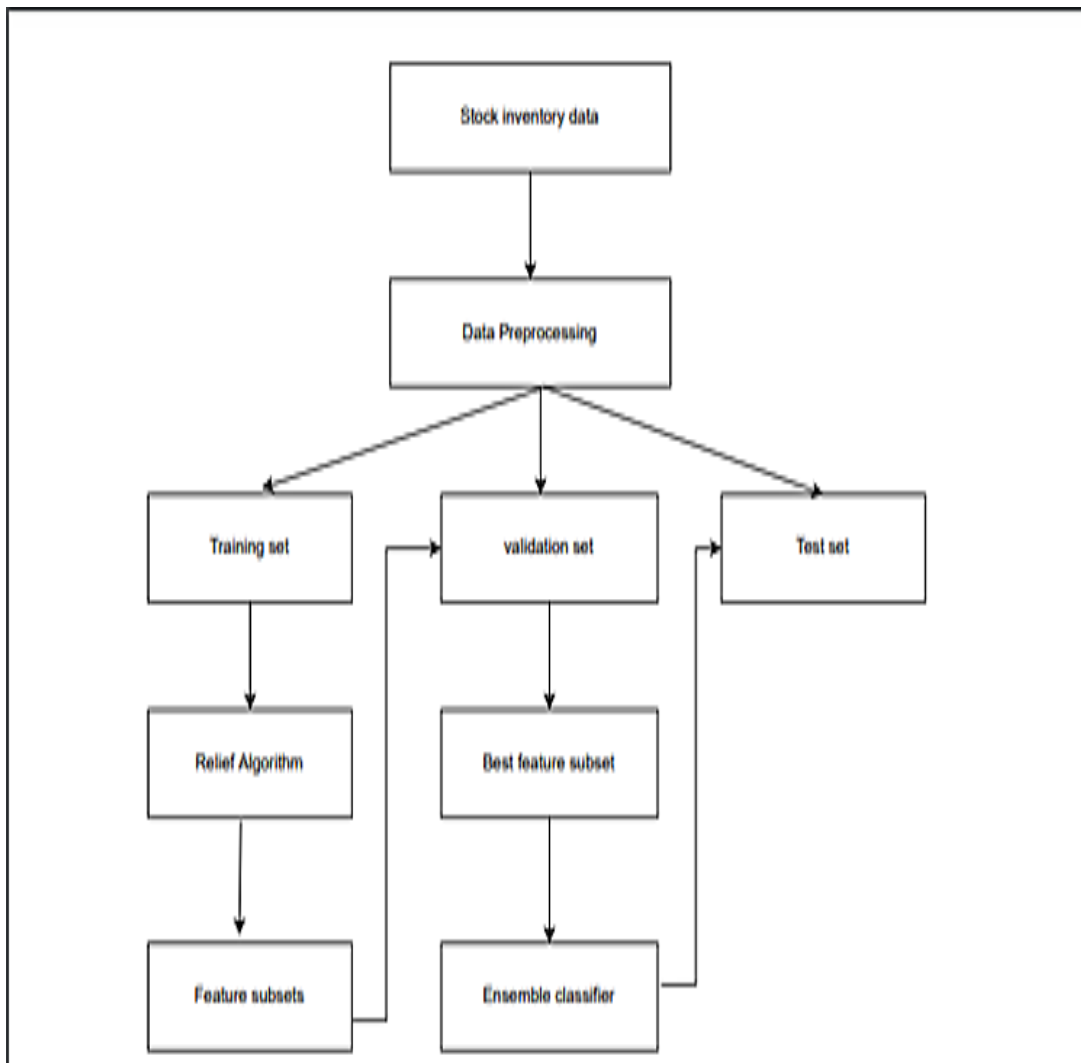


Table-1:Components&Technologies:

S. No	Component	Description	Technology
1.	User Interface	How user interacts with application e.g.WebUI, MobileApp, Chatbotetc.	HTML,CSS, JavaScript /AngularJs /ReactJs etc.
2.	Application Logic-1	Logic for a process in the application	Java/Python
3.	Application Logic-2	Logic for a process in the application	IBM Watson STT service
4.	Application Logic-3	Logic for a process in the application	IBM Watson Assistant
5.	Database	DataType, Configurations etc.	MySQL, NoSQL,etc.
6.	Cloud Database	Database Service on Cloud	IBMDB2, IBM Cloud ant etc.
7.	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local File system
8.	ExternalAPI-1	Purpose of External API used in the application	IBM WeatherAPI, etc.
9.	ExternalAPI-2	Purpose of External API used in the application	AadharAPI, etc.
10.	Machine Learning Model	Purpose Of Machine Learning Model	Object Recognition Model,etc.

Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frame works	Open-source frame works used	IBM Cognos Analytics, Python
2.	SecurityImplem entations	Request authentication using Encryptions	Encryptions
3.	ScalableArchite cture	Scalability consists of 3-tiers	Web Server – HTML,CSS, Javascript Application Server –Python DatabaseServer– IBM Cloud
4.	Availability	The application is available for cloud users	IBM Cloud Hosting
5.	Performance	The user can know how to maintain the inventory to increase profits.	ML algorithms

6. Project planning phase

PREPARE MILESTONE AND ACTIVITY LIST

TITLE	DESCRIPTION	DATE
Literature Survey & Information Gathering	Literature survey on the selected project & gathering information by referring the technical papers, research publications etc.	17 SEPTEMBER 2022
Prepare Empathy Map	Prepare Empathy Map Canvas to capture the user Pains & Gains, Prepare list of problem statements	17 SEPTEMBER 2022
Ideation	List the by organizing the brainstorming session and prioritize the top 3 ideas based on the feasibility& importance.	25 SEPTEMBER 2022
Proposed Solution	Prepare the proposed solution document, which includes the novelty, feasibility of idea, businessmodel, social impact,scalability of solution, etc.	25 SEPTEMBER 2022
Problem Solution Fit	Prepare problem - solutionfit document.	09 OCTOBER 2022
Solution Architecture	Prepare a solution architecture document.	09 OCTOBER 2022

SPRINT DELIVERY PLAN

Product backlogs,Sprint schedule,Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story/ Task	Story Points	Priority	Team Members
Sprint-1	Data Collection	USN-1	As a user, I can collect the dataset through the given dataset link.	2	High	Madhumitha, Abisha,
Sprint-1	Load the Dataset	USN-2	As a user, I can load the dataset with the tool IBM Cognos Analytics.	1	High	Deepika Thiruthamizhi
Sprint-2	DataPreparation	USN-3	As a user,I can prepare	2	Low	Abisha, Deepika

			the dataset to improve the charts.			
Sprint-2	Format the data	USN-4	As a user, I can format the data.	2	Medium	Madhumitha, Thiruthamizhi
Sprint-3	Data Exploration	USN-5	As a user I can explore the data for the given charts.	5	High	Deepika, Madhumitha, Thiruthamizhi Abisha
Sprint-4	Dashboard	USN-6	As a user ,I can create a dashboard from the prepared dataset for the given chart.	5	High	Deepika ,Madhumitha, Thiruthamizhi Abisha
Sprint-4	Develop a HTML Webpage	USN-7	As a user, I can access the	5	High	Deepika, Madhumitha,

	for the Dashboard		dashboard via a hyperlink on a web page.			Thiruthami zhi Abisha
Sprint- 4	Report	USN-8	Report Creation	5	High	Deepika, Madhumith a, Thiruthami zhi Abisha

Project Tracker, Velocity

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24Oct 2022	29 Oct2022	6	29Oct20 22
Sprint-2	20	6Days	31Oct 2022	05 Nov 2022	15	05 Nov 2022
Sprint-3	20	6Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity(AV) per iteration unit (story points per day)

$$AV = \frac{\text{sprint duration}}{\text{velocity}} = \frac{20}{10} = 2$$

Sprint	Totalstory Points	Duration	Average Velocity
Sprint-1	6	6Days	6/6=1
Sprint-2	15	6Days	15/6=2.5
Sprint-3	20	6Days	20/6=3.33
Sprint-4	20	6Days	20/6=3.33
Total	61	24Days	61/24=2.54

7.PROJECT DEVELOPMENT PHASE

DELIVERY OF SPRINT -1

Project Development Phase:

Sprint-1:

Data Collection

Data Preparation

Sprint 2:

Data Exploration

Sprint 3:

DashBoard Creation

Sprint 4:

Report Creation

Story Creation

Data Collection:

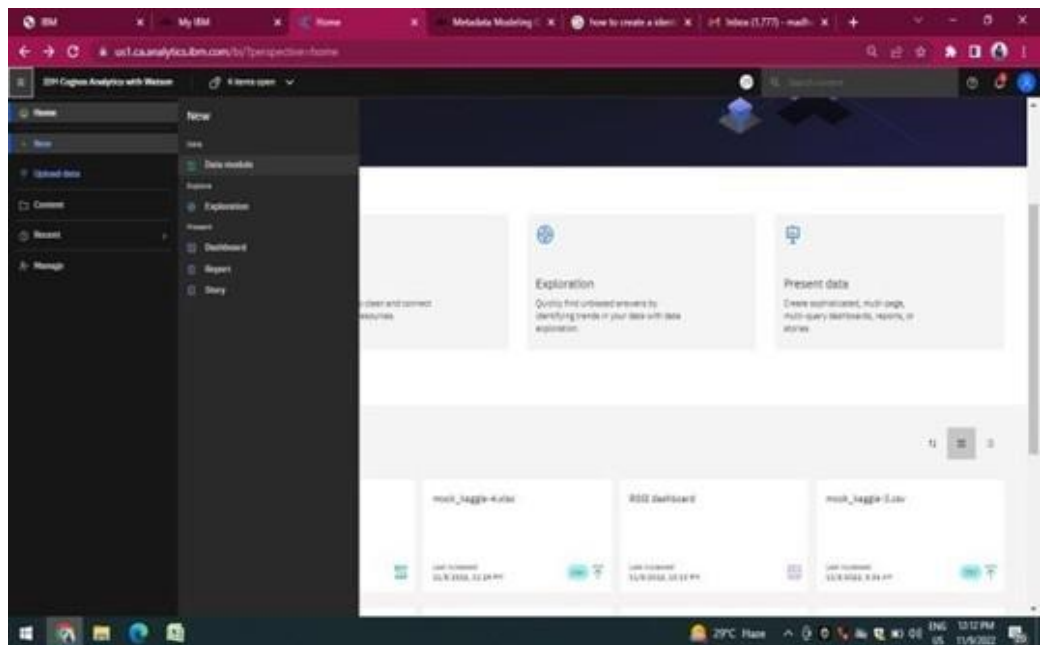
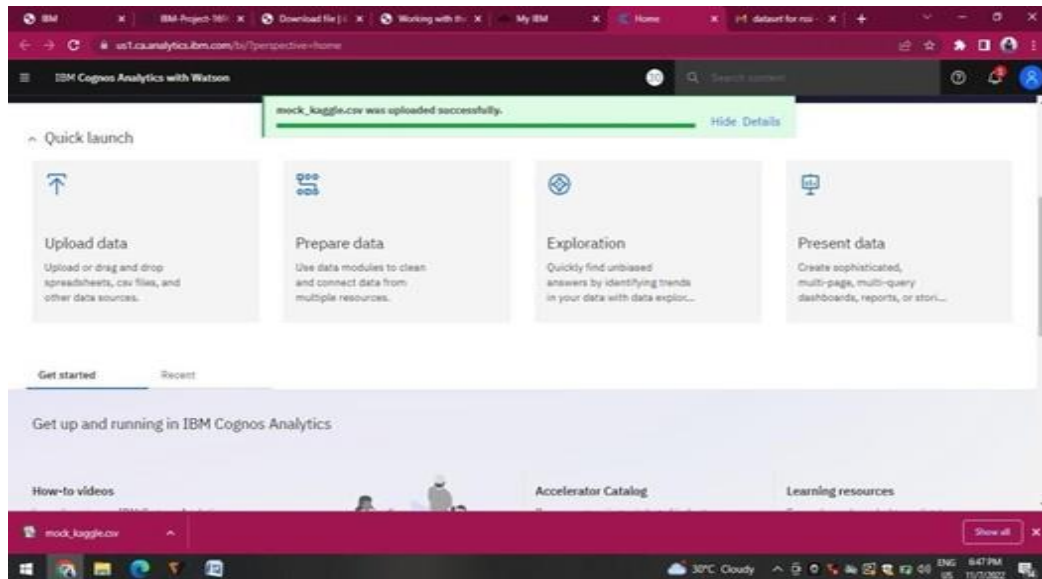
Download the Dataset

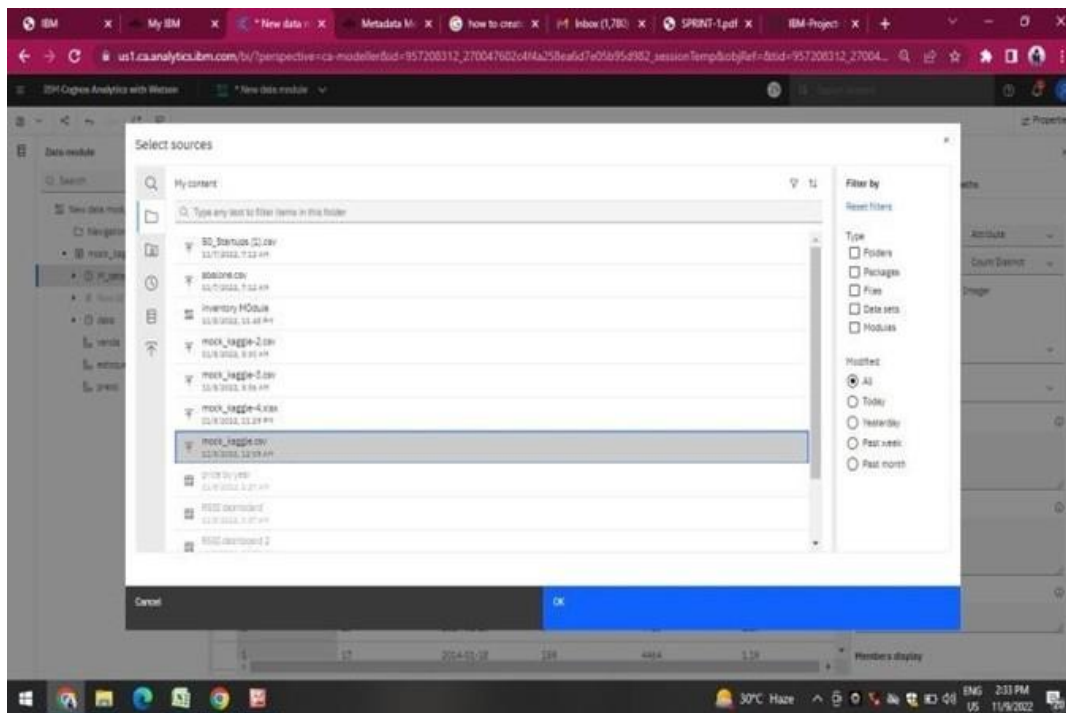
Dataset link-

<https://drive.google.com/drive/folders/1kiL-5CHJmQvbk9VyFsuUs-myAupBZGNy>

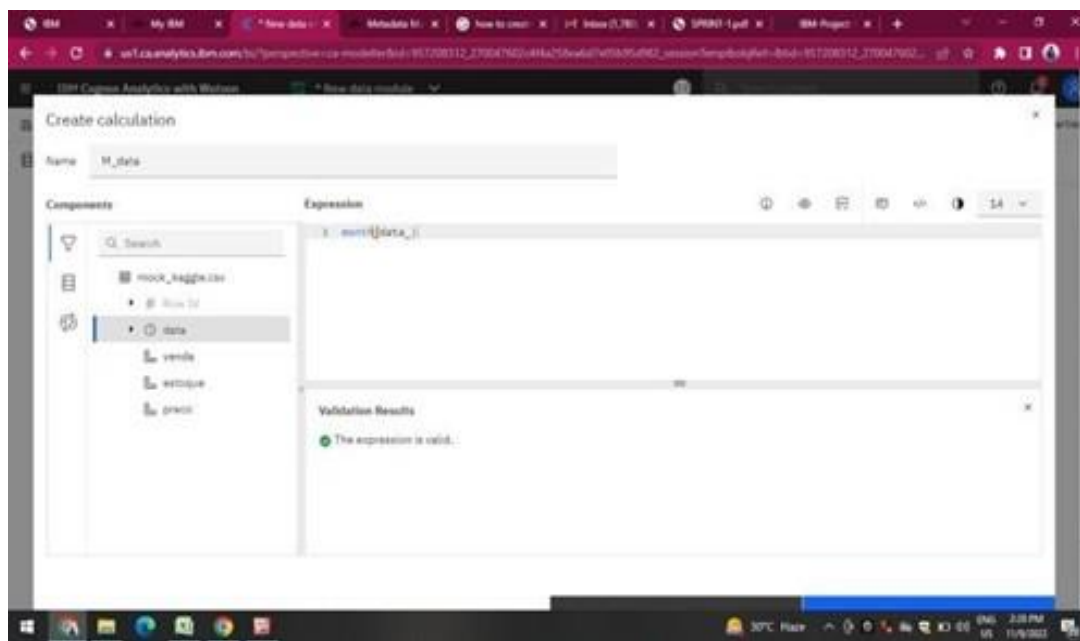
Load the Dataset:

Tool used–IBM Cognos





Month Data

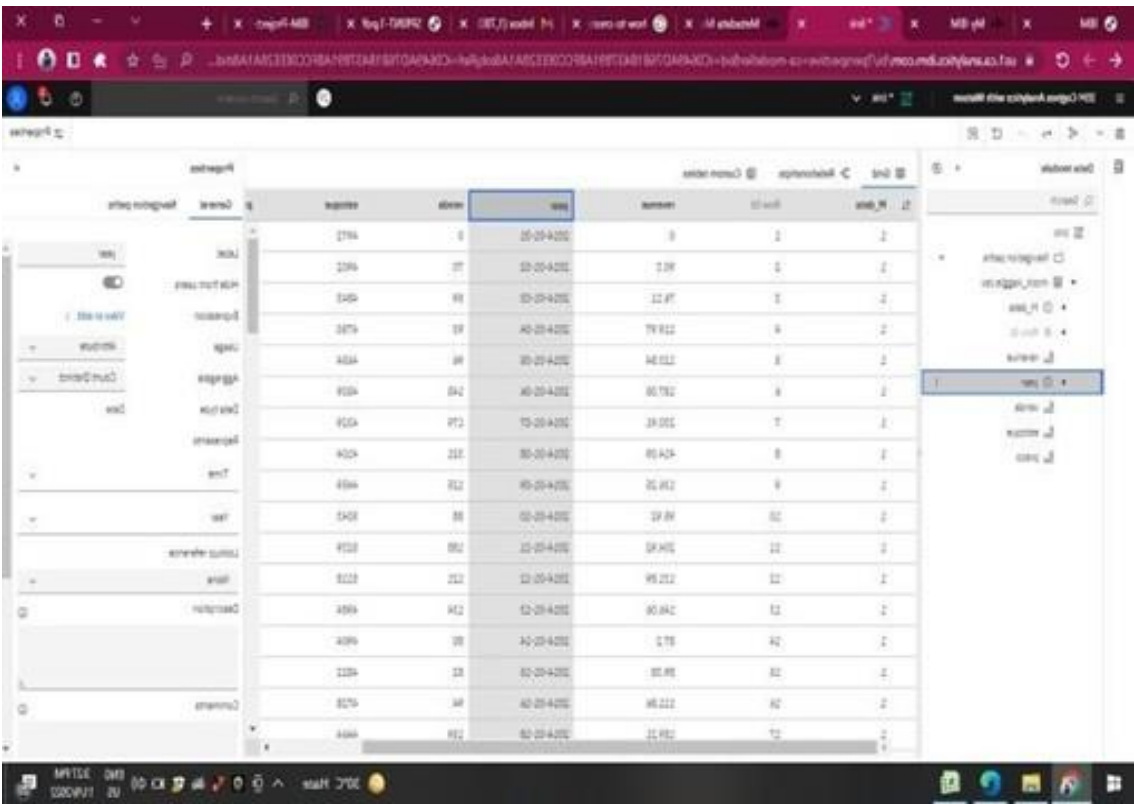


Item	Item Cat	Date	Month	Revenue	Profit
1	1	2014-01-01	1	4872	1,28
1	2	2014-01-02	1	4872	1,28
1	3	2014-01-03	1	4880	1,28
1	4	2014-01-04	1	4780	1,28
1	5	2014-01-05	1	4884	1,28
1	6	2014-01-06	1	4884	1,28
1	7	2014-01-07	1	4824	1,28
1	8	2014-01-08	1	4824	1,28
1	9	2014-01-09	1	4884	1,28
1	10	2014-01-10	1	4884	1,28
1	11	2014-01-11	1	4884	1,28
1	12	2014-01-12	1	4884	1,28
1	13	2014-01-13	1	4884	1,28
1	14	2014-01-14	1	4884	1,28
1	15	2014-01-15	1	4824	1,28
1	16	2014-01-16	1	4728	1,28
1	17	2014-01-17	1	4884	1,28

Revenue data

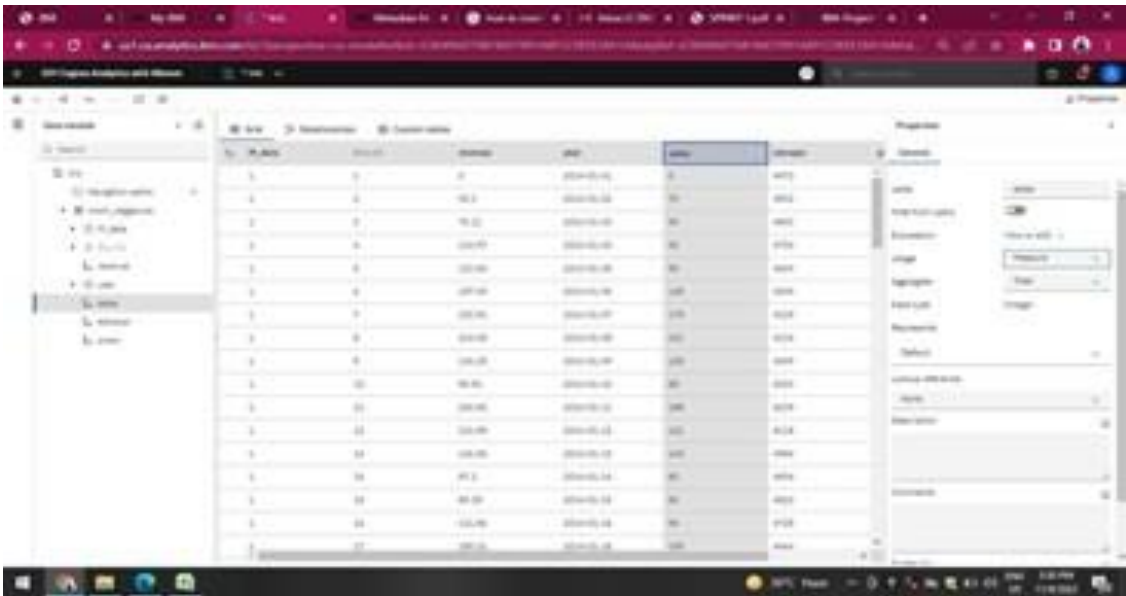
Item	Item Cat	Revenue	Date	Month	Profit
1	1	0	2014-01-01	1	4872
1	2	80,0	2014-01-02	1	4872
1	3	79,00	2014-01-03	1	4880
1	4	123,87	2014-01-04	1	4780
1	5	122,84	2014-01-05	1	4884
1	6	127,38	2014-01-06	1	4884
1	7	120,81	2014-01-07	1	4824
1	8	404,24	2014-01-08	1	4824
1	9	130,29	2014-01-09	1	4884
1	10	80,98	2014-01-10	1	4884
1	11	204,00	2014-01-11	1	4884
1	12	110,89	2014-01-12	1	4884
1	13	146,36	2014-01-13	1	4884
1	14	87,2	2014-01-14	1	4824
1	15	88,08	2014-01-15	1	4824
1	16	111,86	2014-01-16	1	4728
1	17	134,21	2014-01-17	1	4884

Year data



id	name	year	score	rank	status
1	1001	2019-01-01	100	1	1
2	1002	2019-01-01	100	2	1
3	1003	2019-01-01	100	3	1
4	1004	2019-01-01	100	4	1
5	1005	2019-01-01	100	5	1
6	1006	2019-01-01	100	6	1
7	1007	2019-01-01	100	7	1
8	1008	2019-01-01	100	8	1
9	1009	2019-01-01	100	9	1
10	1010	2019-01-01	100	10	1
11	1011	2019-01-01	100	11	1
12	1012	2019-01-01	100	12	1
13	1013	2019-01-01	100	13	1
14	1014	2019-01-01	100	14	1
15	1015	2019-01-01	100	15	1

Sales data



id	name	year	score	rank	status
1	1001	2019-01-01	100	1	1
2	1002	2019-01-01	100	2	1
3	1003	2019-01-01	100	3	1
4	1004	2019-01-01	100	4	1
5	1005	2019-01-01	100	5	1
6	1006	2019-01-01	100	6	1
7	1007	2019-01-01	100	7	1
8	1008	2019-01-01	100	8	1
9	1009	2019-01-01	100	9	1
10	1010	2019-01-01	100	10	1
11	1011	2019-01-01	100	11	1
12	1012	2019-01-01	100	12	1
13	1013	2019-01-01	100	13	1
14	1014	2019-01-01	100	14	1
15	1015	2019-01-01	100	15	1

Stock data

The screenshot shows the IBM Cognos Analytics interface. The main table displays stock data with the following columns: ID, M_date, Stock ID, revenue, year, sales, stock, and price. The 'price' column is highlighted in the Properties panel on the right.

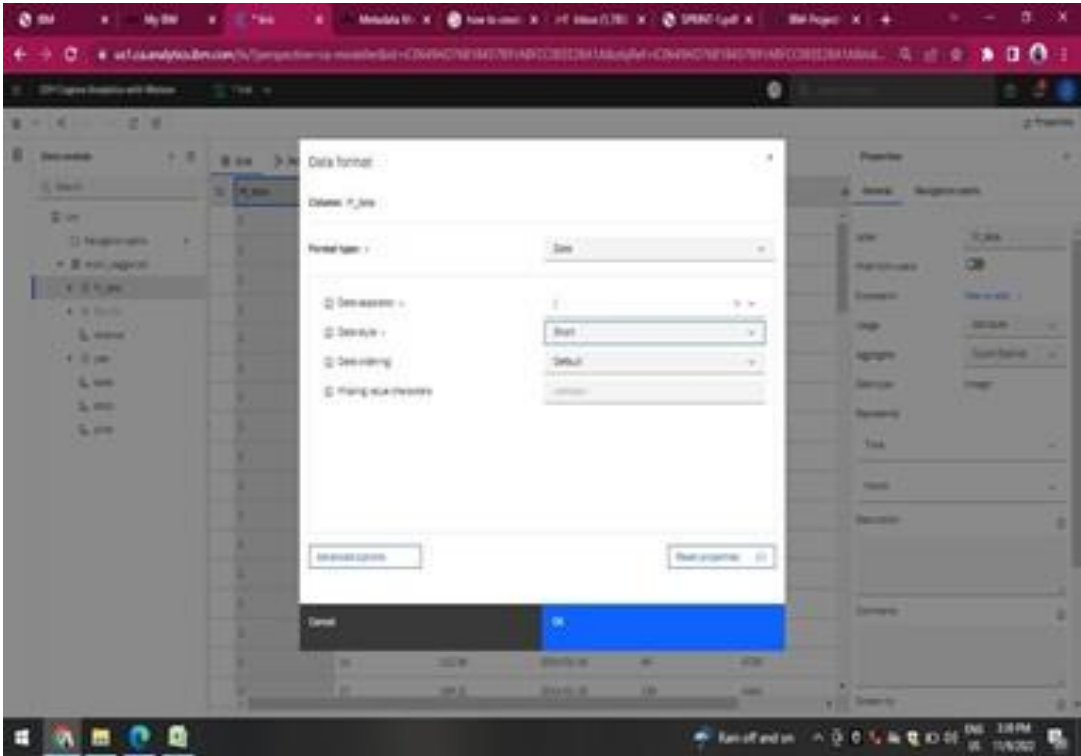
ID	M_date	Stock ID	revenue	year	sales	stock	price
1	1	0	2014-01-01	0	4971		1.29
1	2	80.8	2014-01-02	70	4980		1.29
1	3	76.12	2014-01-03	89	4960		1.29
1	4	118.87	2014-01-04	91	4700		1.29
1	5	123.84	2014-01-05	96	4634		1.29
1	6	127.35	2014-01-06	148	4609		1.29
1	7	120.41	2014-01-07	179	4119		1.29
1	8	418.39	2014-01-08	101	4104		1.29
1	9	128.25	2014-01-09	128	4489		1.29
1	10	85.40	2014-01-10	86	5040		1.29
1	11	108.92	2014-01-11	188	5224		1.29
1	12	110.34	2014-01-12	121	5118		1.29
1	13	144.36	2014-01-13	134	4984		1.29
1	14	87.2	2014-01-14	80	4904		1.29
1	15	89.18	2014-01-15	82	4812		1.29
1	16	111.86	2014-01-16	94	4718		1.29
1	17	109.21	2014-01-17	109	4464		1.29

Price data

The screenshot shows the IBM Cognos Analytics interface. The main table displays price data with the following columns: ID, Stock ID, revenue, year, sales, stock, and price. The 'price' column is highlighted in the Properties panel on the right.

ID	Stock ID	revenue	year	sales	stock	price
1	0	2014-01-01	0	4971		1.29
2	80.8	2014-01-02	70	4980		1.29
3	76.12	2014-01-03	89	4960		1.29
4	118.87	2014-01-04	91	4700		1.29
5	123.84	2014-01-05	96	4634		1.29
6	127.35	2014-01-06	148	4609		1.29
7	120.41	2014-01-07	179	4119		1.29
8	418.39	2014-01-08	101	4104		1.29
9	128.25	2014-01-09	128	4489		1.29
10	85.40	2014-01-10	86	5040		1.29
11	108.92	2014-01-11	188	5224		1.29
12	110.34	2014-01-12	121	5118		1.29
13	144.36	2014-01-13	134	4984		1.29
14	87.2	2014-01-14	80	4904		1.29
15	89.18	2014-01-15	82	4812		1.29
16	111.86	2014-01-16	94	4718		1.29
17	109.21	2014-01-17	109	4464		1.29

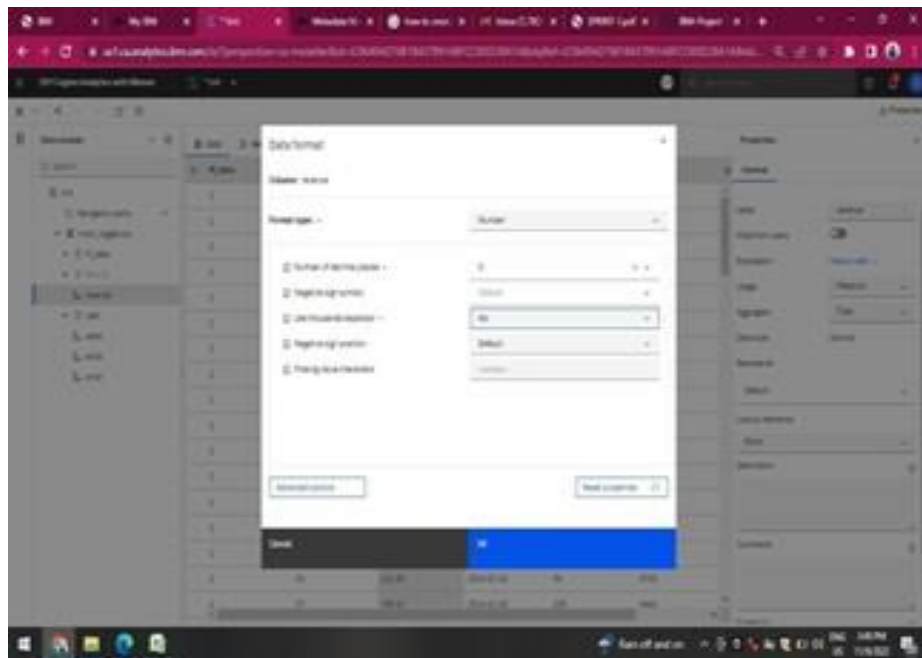
Month-Format Date



The screenshot shows the IBM Cognos Analytics interface with a data table displayed. The table has columns: H_date, Row ID, revenue, year, sales, and stock. The data is as follows:

H_date	Row ID	revenue	year	sales	stock
1/1/14	1	8	1/1/14	9	4972
1/2/14	2	90	1/2/14	70	4902
1/3/14	3	76	1/3/14	89	4843
1/4/14	4	135	1/4/14	92	4760
1/5/14	5	124	1/5/14	96	4654
1/6/14	6	187	1/6/14	148	4509
1/7/14	7	201	1/7/14	179	4329
1/8/14	8	404	1/8/14	321	4204
1/9/14	9	126	1/9/14	115	4439
1/10/14	10	96	1/10/14	88	5043
1/11/14	11	308	1/11/14	188	5239
1/12/14	12	132	1/12/14	121	5118
1/13/14	13	148	1/13/14	134	4984
1/14/14	14	87	1/14/14	80	4904
1/15/14	15	89	1/15/14	82	4822
1/16/14	16	112	1/16/14	94	4708
1/17/14	17	139	1/17/14	139	4464

Revenue-Format Data

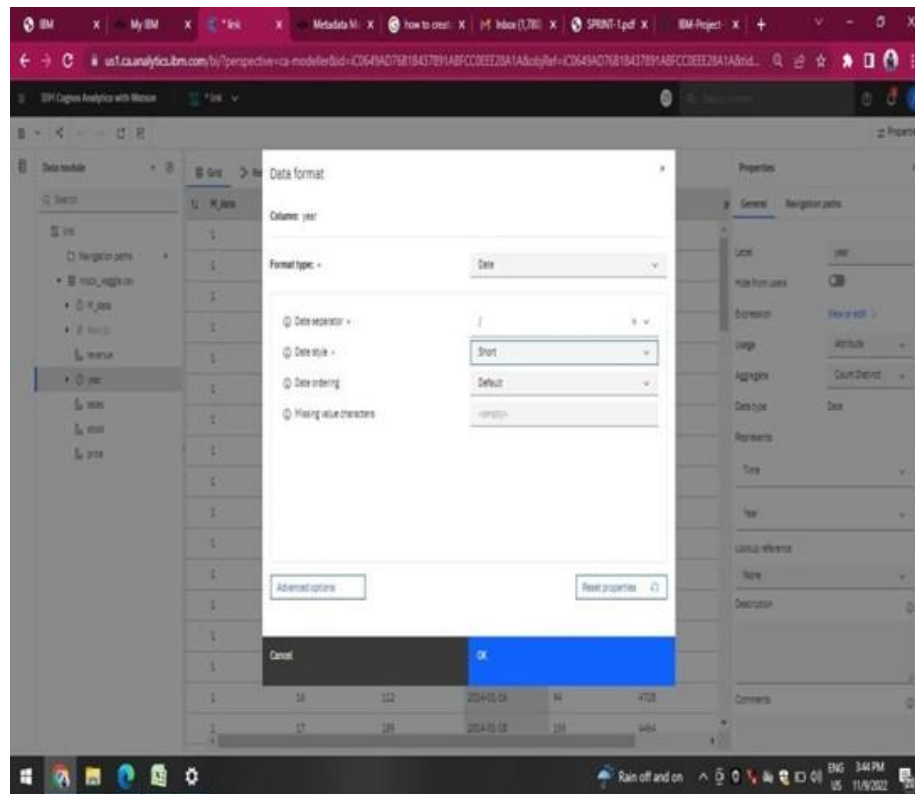


The screenshot displays the IBM Cognos Analytics interface. On the left, the 'Data module' pane shows a tree structure with 'link' as the root, containing 'Navigation paths', 'model_naggle.cub', 'H_date', 'Sales Id', and 'revenue'. The 'revenue' measure is selected. The main area shows a table with the following data:

H_date	Sales Id	revenue	year	sales	stock
1	1	0	1/1/04	0	4972
1	2	90	1/2/04	70	4902
1	3	76	1/3/04	89	4943
1	4	120	1/4/04	93	4780
1	5	124	1/5/04	96	4654
1	6	187	1/6/04	148	4609
1	7	231	1/7/04	178	4329
1	8	424	1/8/04	321	4204
1	9	126	2/9/04	125	4459
1	10	96	1/10/04	80	5043
1	11	205	1/11/04	188	5239
1	12	132	1/12/04	121	5118
1	13	148	1/13/04	134	4984
1	14	87	1/14/04	80	4904
1	15	89	1/15/04	82	4822
1	16	112	1/16/04	94	4728
1	17	189	1/17/04	159	4464

The right sidebar shows the 'Properties' panel for the 'revenue' measure. The 'General' tab is active, showing 'Measure' type and 'Total' aggregation. The 'Description' field is empty.

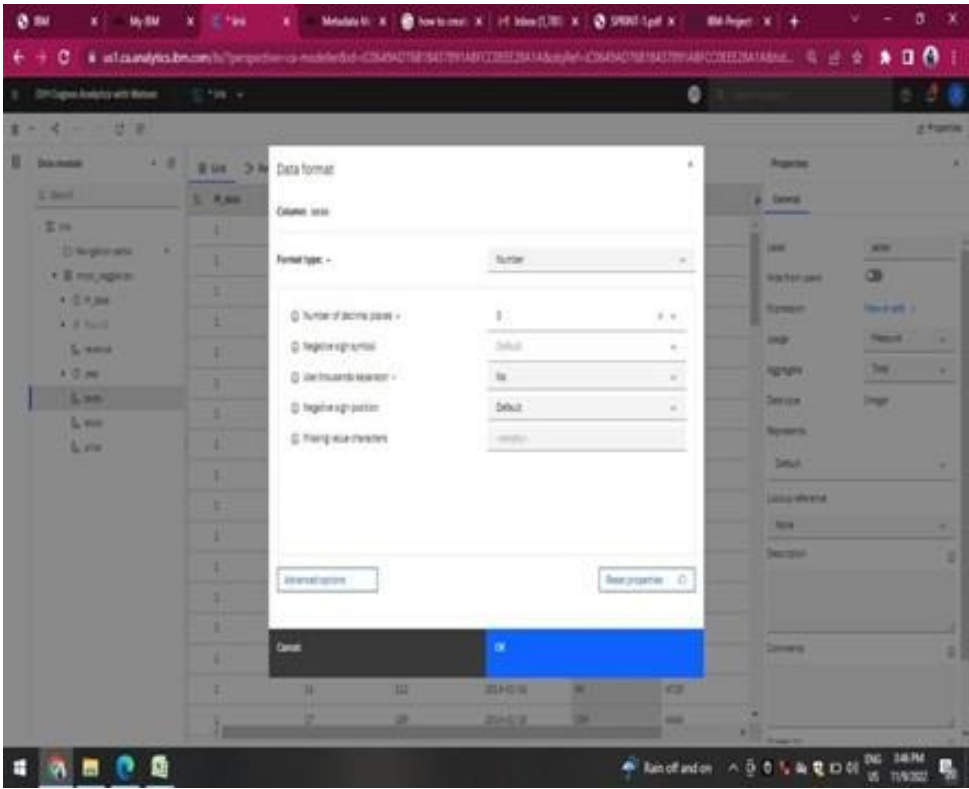
Year-Format Data



The screenshot shows the IBM Cognos Analytics interface with a data grid. The 'year' column is highlighted. The data grid contains the following data:

id	P_data	income	year	sales	stock
1	1	0	1/1/04	0	4972
1	2	90	1/2/04	70	4902
1	3	76	1/3/04	89	4943
1	4	120	1/4/04	90	4750
1	5	124	1/5/04	96	4684
1	6	187	1/6/04	145	4559
1	7	271	1/7/04	179	4329
1	8	404	1/8/04	321	4104
1	9	136	1/9/04	120	4489
1	10	96	1/10/04	88	5043
1	11	205	1/11/04	188	5209
1	12	112	1/12/04	120	5118
1	13	146	1/13/04	134	4984
1	14	87	1/14/04	80	4904
1	15	89	1/15/04	82	4822
1	16	112	1/16/04	94	4728
1	17	139	1/18/04	139	4464

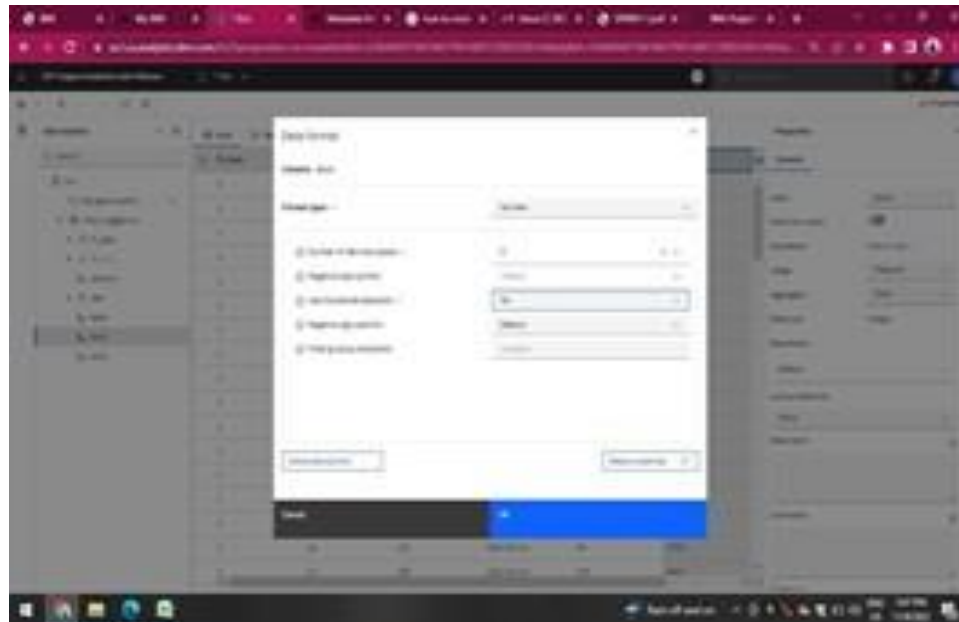
Sales Format Data



The screenshot shows the Qlik Sense Desktop interface with a table of sales data. The table has columns for 'Year', 'Quarter', 'Month', 'Sales', 'Profit', and 'Growth'. The data is organized by year and quarter, with rows for each month. The 'Sales' column shows values ranging from 100 to 1000. The 'Profit' column shows values ranging from 100 to 1000. The 'Growth' column shows values ranging from 100 to 1000. The table is displayed in a grid format with alternating row colors.

Year	Quarter	Month	Sales	Profit	Growth
2018	Q1	Jan	100	100	100
2018	Q1	Feb	200	200	200
2018	Q1	Mar	300	300	300
2018	Q2	Apr	400	400	400
2018	Q2	May	500	500	500
2018	Q2	Jun	600	600	600
2018	Q3	Jul	700	700	700
2018	Q3	Aug	800	800	800
2018	Q3	Sep	900	900	900
2018	Q4	Oct	1000	1000	1000
2018	Q4	Nov	1100	1100	1100
2018	Q4	Dec	1200	1200	1200
2019	Q1	Jan	1300	1300	1300
2019	Q1	Feb	1400	1400	1400
2019	Q1	Mar	1500	1500	1500
2019	Q2	Apr	1600	1600	1600
2019	Q2	May	1700	1700	1700
2019	Q2	Jun	1800	1800	1800
2019	Q3	Jul	1900	1900	1900
2019	Q3	Aug	2000	2000	2000
2019	Q3	Sep	2100	2100	2100
2019	Q4	Oct	2200	2200	2200
2019	Q4	Nov	2300	2300	2300
2019	Q4	Dec	2400	2400	2400

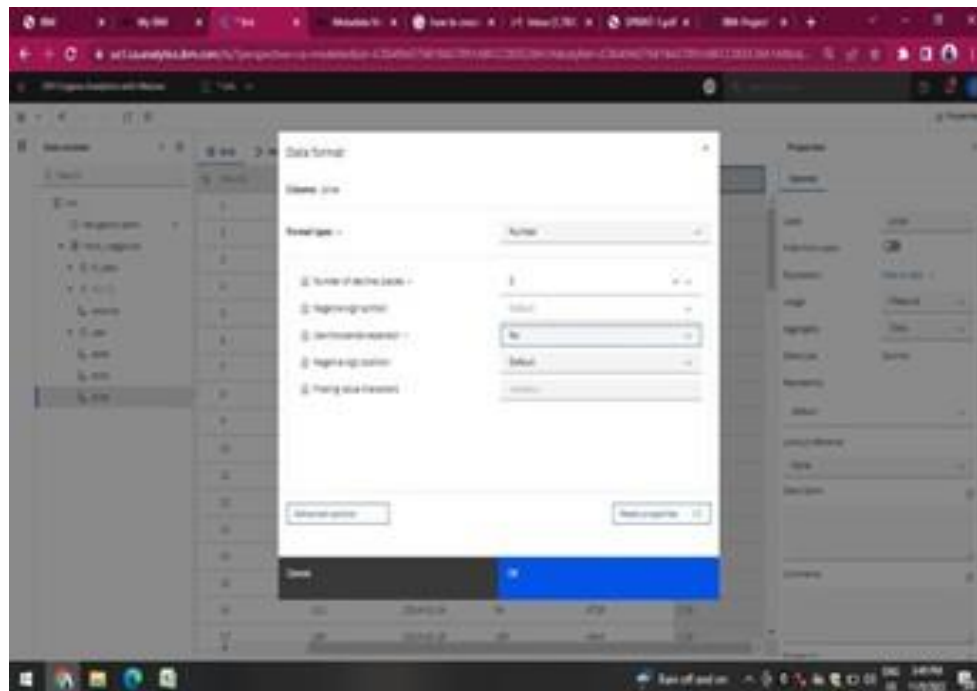
Stock-Format Data



The screenshot shows the D3.js Data Studio interface. The main table displays data with columns: Date, Time, Location, and Value. The 'Date' column is highlighted. The sidebar on the right contains filters for 'Date', 'Time', 'Location', and 'Value'. The 'Date' filter is set to 'All'. The 'Time' filter is set to 'All'. The 'Location' filter is set to 'All'. The 'Value' filter is set to 'All'. The table contains 17 rows of data.

Date	Time	Location	Value
1	1	1	100
1	2	1	100
1	3	1	100
1	4	1	100
1	5	1	100
1	6	1	100
1	7	1	100
1	8	1	100
1	9	1	100
1	10	1	100
1	11	1	100
1	12	1	100
1	13	1	100
1	14	1	100
1	15	1	100
1	16	1	100
1	17	1	100

Price-Format Data



The screenshot shows the Google Analytics 'Acquisition' report. The table lists various traffic sources and their performance metrics. The 'Direct' source is highlighted, showing a high number of clicks and conversions. The 'Organic Search' source also shows a high number of clicks and conversions. The 'Paid Search' source shows a high cost and a low conversion rate.

Source	Medium	Campaign	Ad Group	Ad	Clicks	Conversions	Cost
Direct					1	1	0.00
Organic Search					1	1	0.00
Paid Search					1	1	0.00
Referral					1	1	0.00
Social					1	1	0.00
Display					1	1	0.00
Video					1	1	0.00
Email					1	1	0.00
Partners					1	1	0.00
Search					1	1	0.00
Display					1	1	0.00
Video					1	1	0.00
Email					1	1	0.00
Partners					1	1	0.00
Search					1	1	0.00
Display					1	1	0.00
Video					1	1	0.00
Email					1	1	0.00
Partners					1	1	0.00
Search					1	1	0.00
Display					1	1	0.00
Video					1	1	0.00
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Partners					1	1	0.00
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Video					1	1	0.00
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Partners					1	1	0.00
Search					1	1	0.00
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Search					1	1	0.00
Display					1	1	0.00
Video					1	1	0.00
Email					1	1	0.00
Partners					1	1	0.00
Search					1	1	0.00
Display					1	1	0.00
Video					1	1	0.00
Email					1	1	0.00
Partners					1	1	0.00
Search					1	1	0.00
Display					1	1	0.00
Video					1	1	0.00
Email					1	1	0.00
Partners					1	1	0.00
Search					1	1	0.00
Display					1	1	0.00
Video					1	1	0.00
Email					1	1	0.00
Partners					1	1	0.00
Search					1	1	0.00
Display					1	1	0.0

DELIVERY OF SPRINT-2

SPRINT-2:

DATA EXPLORATION

- LOAD THE DATASET
- SALES ANALYSIS
- PRICE ANALYSIS
- STOCK AND PRICE FOR YEAR COLORED BY PRICE
PRICE FOR YEAR COLORED BY YEAR
- STOCK AND SALES FOR YEAR COLORED BY YEAR
- YEAR COLORED BY YEAR SIZED BY STOCK
- STOCK TREE SUN BURST
- SALES TO PRICE WITH LINE WIDTH PRICE
- STOCK USERS
- YEAR SIZED BY SALES
- PREPARED DATA LINK

DATA COLLECTION

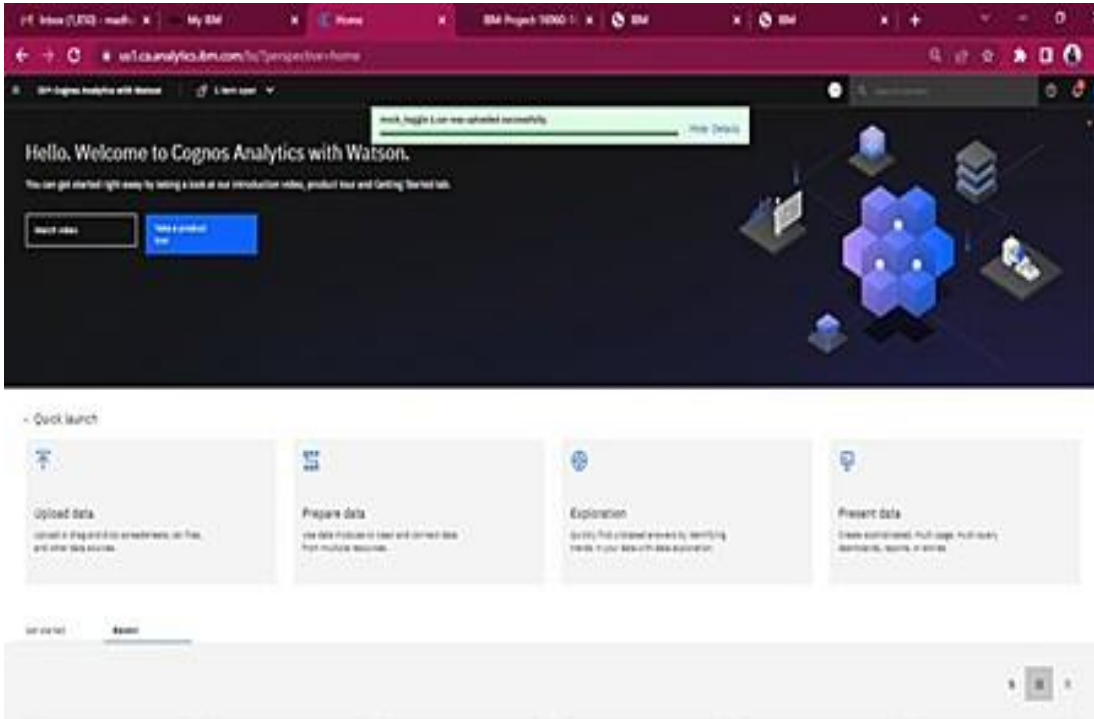
Download the Dataset

Dataset link-

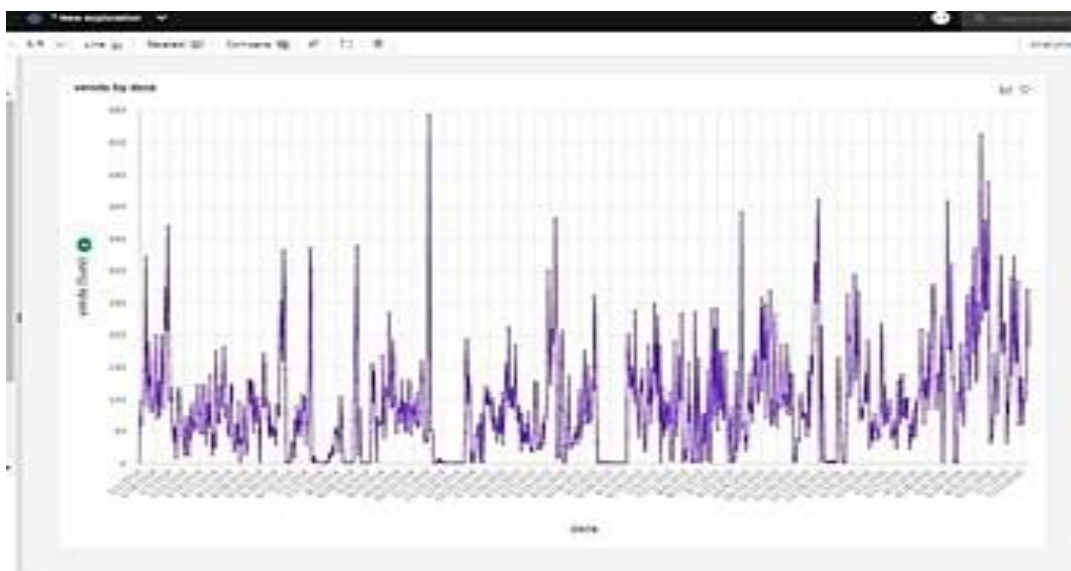
https://drive.google.com/drive/folders/1kiL5CHJmQvbk_9VyFsuUsmyAupBGNY

LOAD THE DATASET

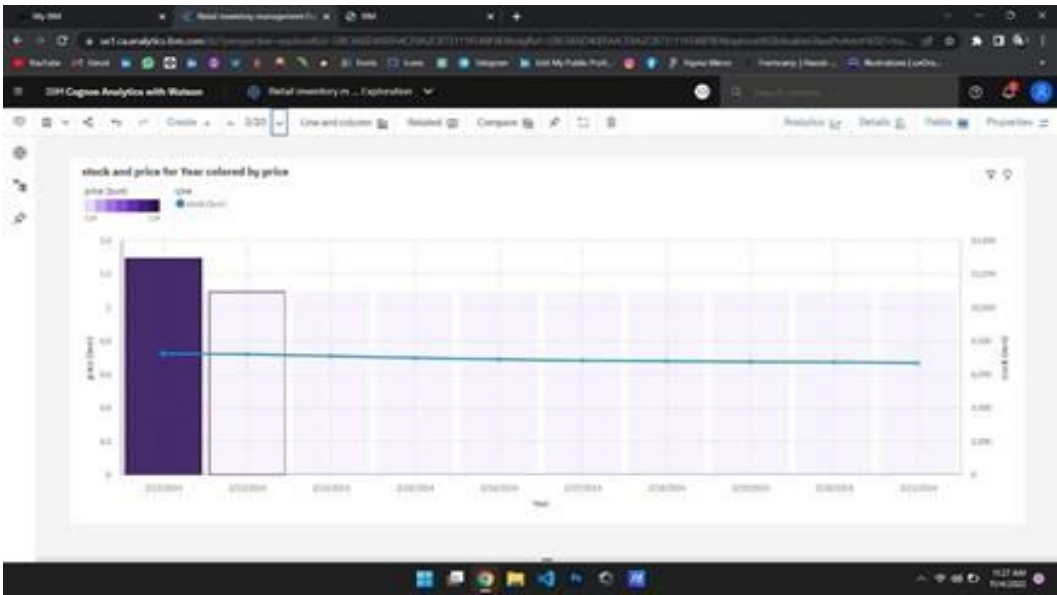
Tool used–IBM Cognos



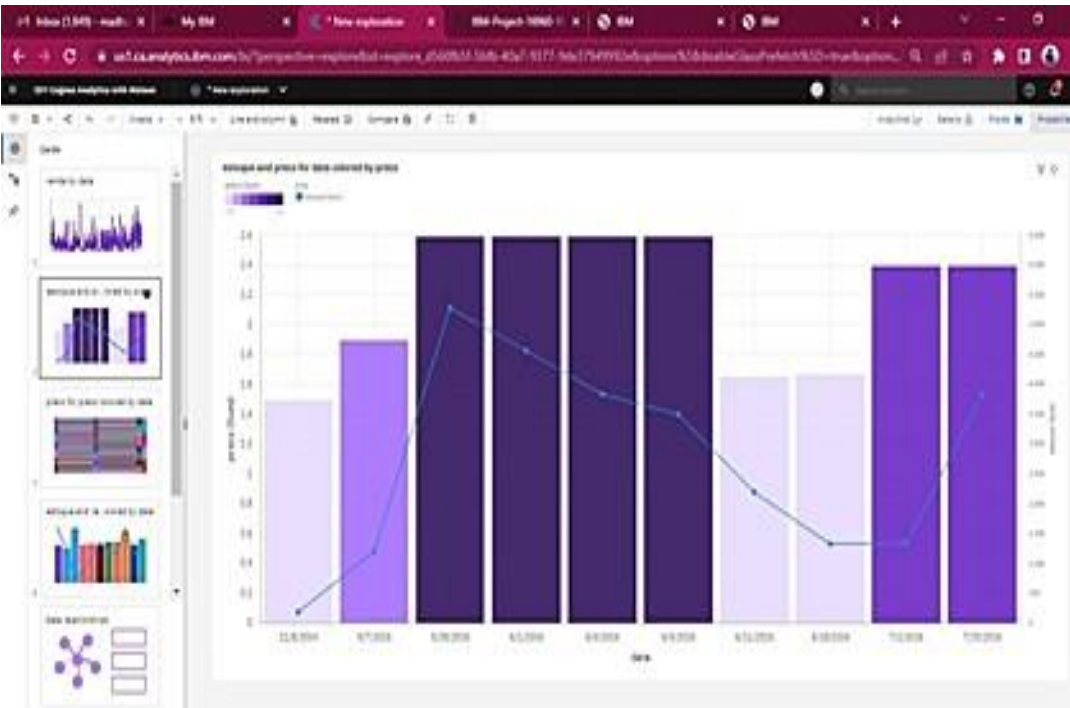
SALES ANALYSIS



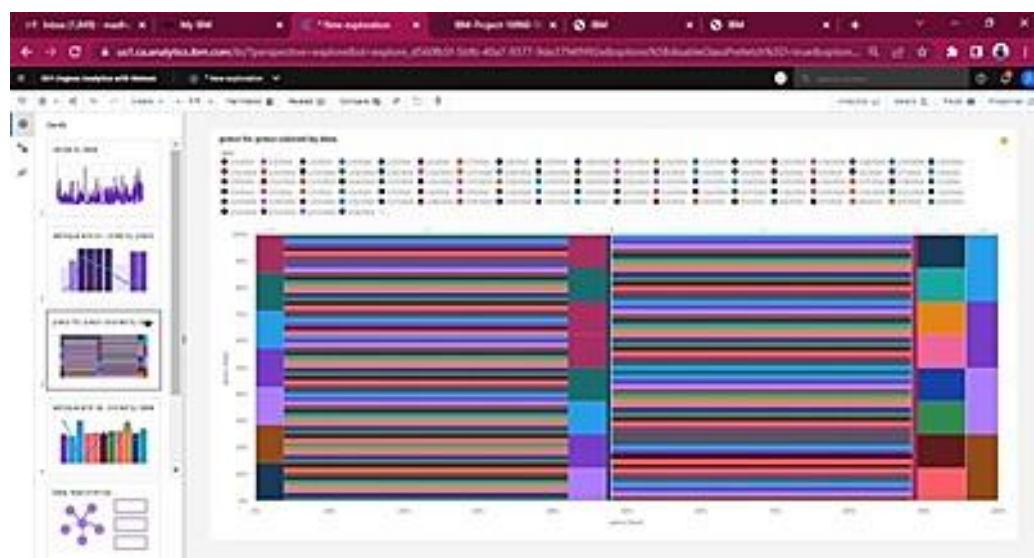
PRICE ANALYSIS



STOCK AND PRICE FOR YEAR COLORED BY PRICE



PRICE FOR YEAR COLORED BY YEAR



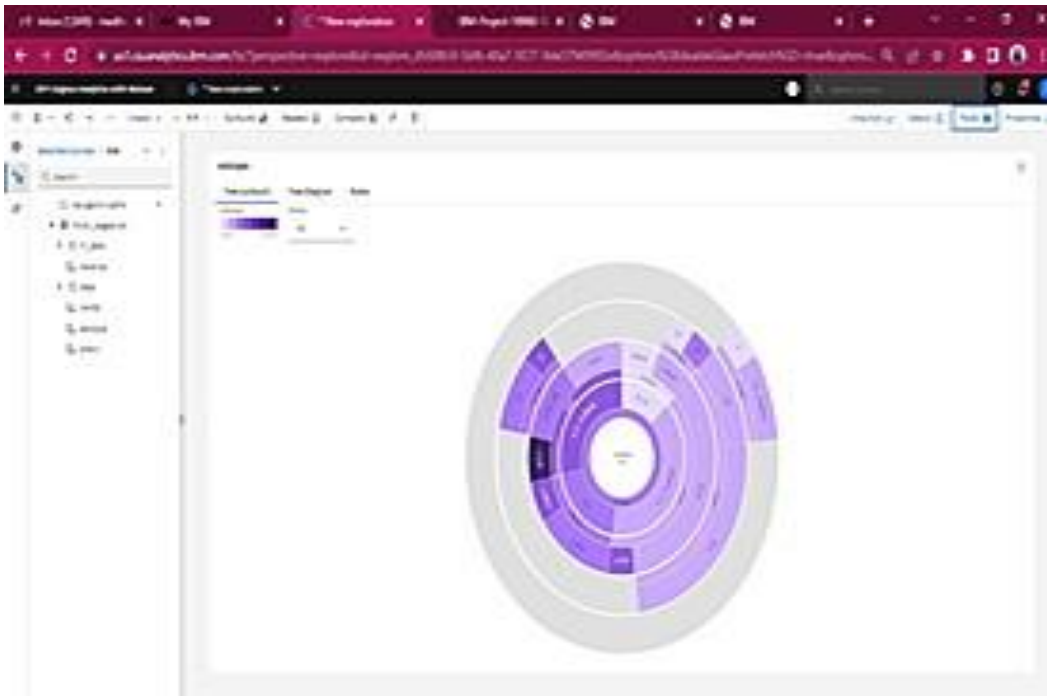
STOCK AND SALES FOR YEAR COLORED BY YEAR



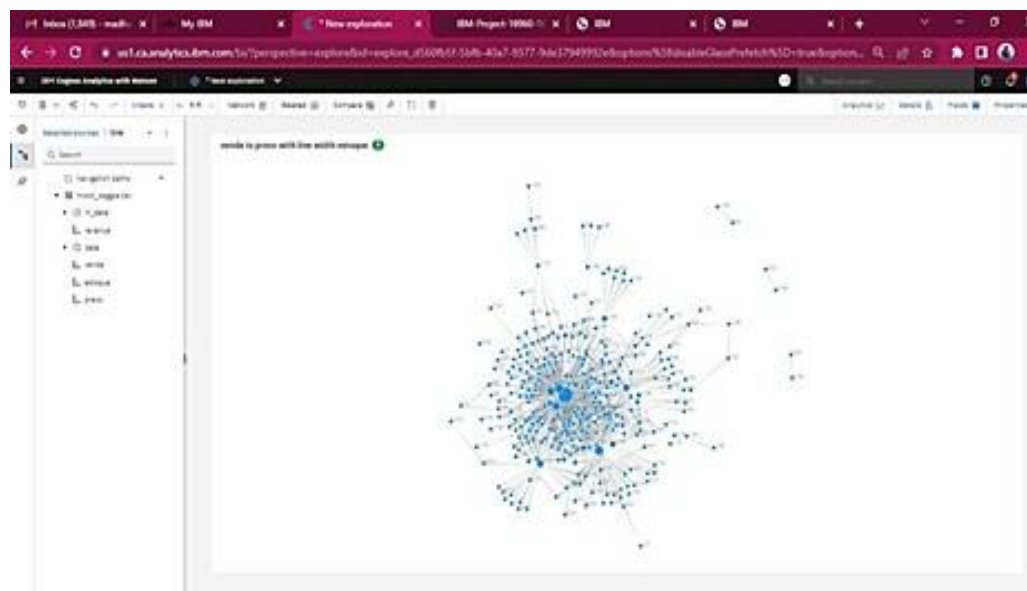
YEAR COLORED BY YEAR SIZED BY STOCK



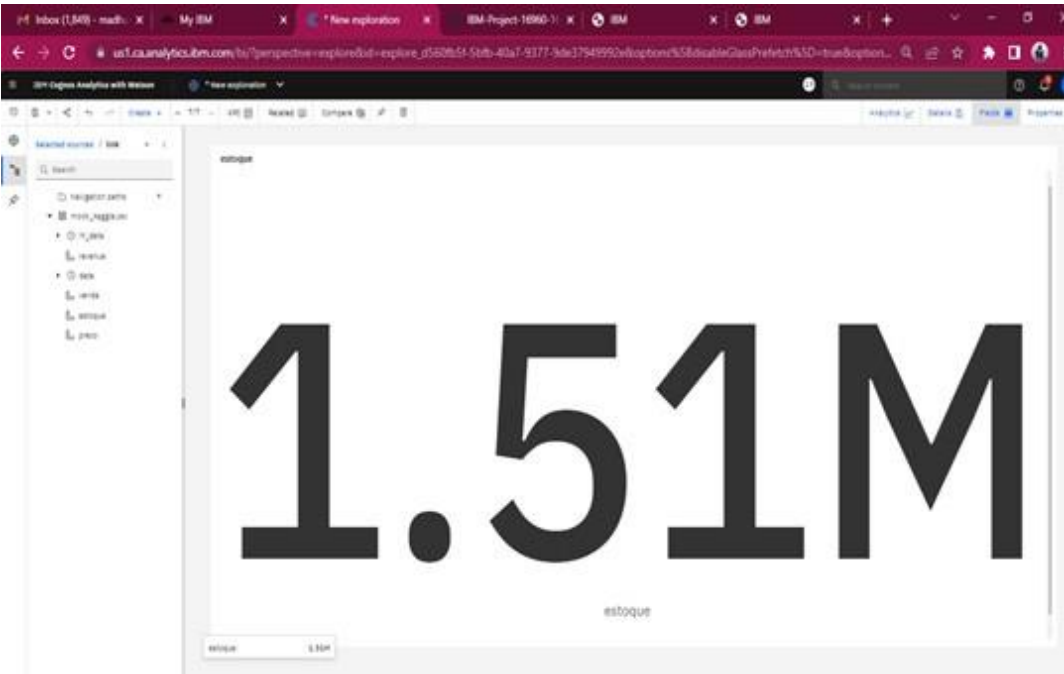
STOCK TREE SUNBURST



SALES TO PRICE WITH LINE WIDTH PRICE



STOCK USERS



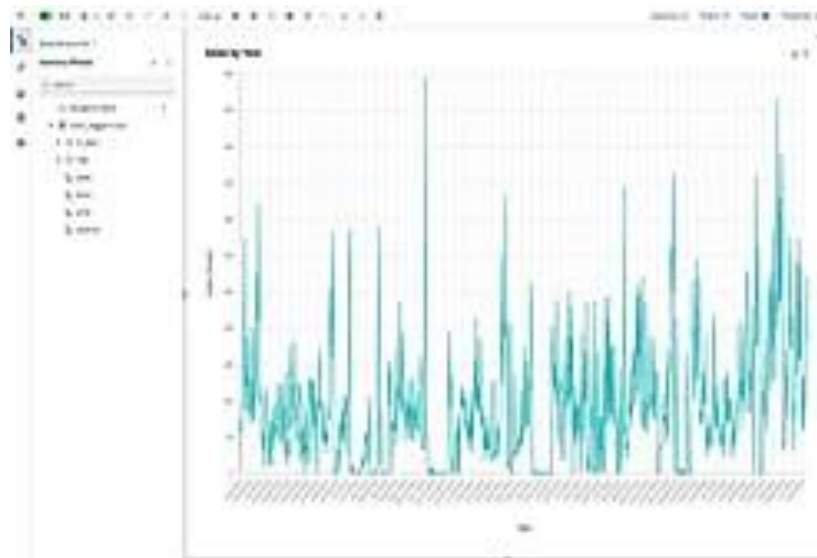
YEAR SIZED BY SALES



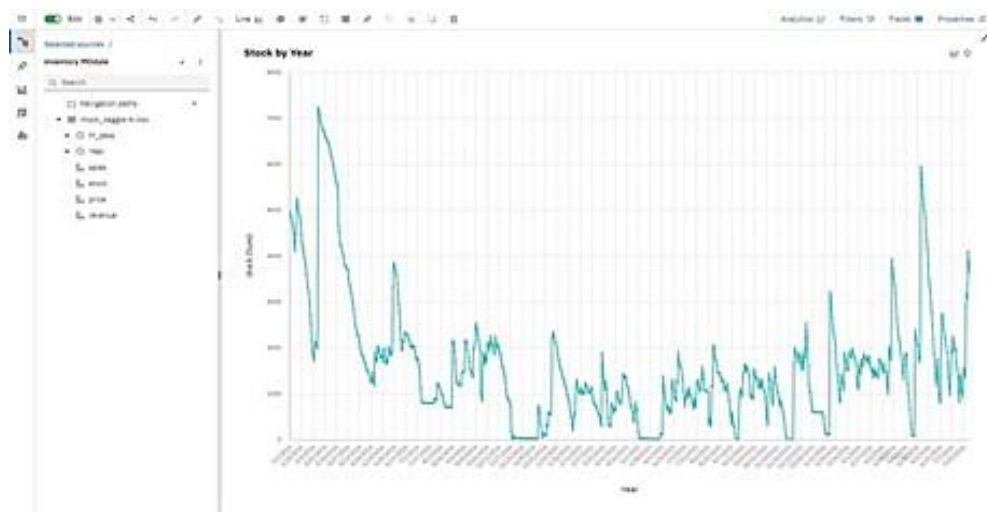
DELIVERY OF SPRINT-3

Dashboard Creation

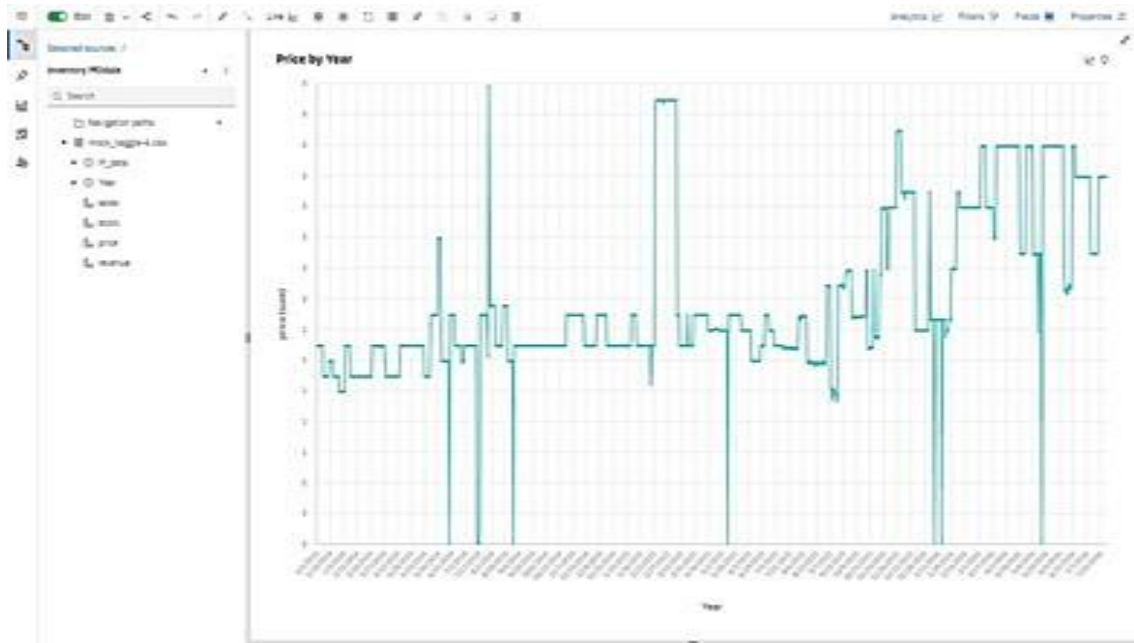
Sales by Year Line Chart



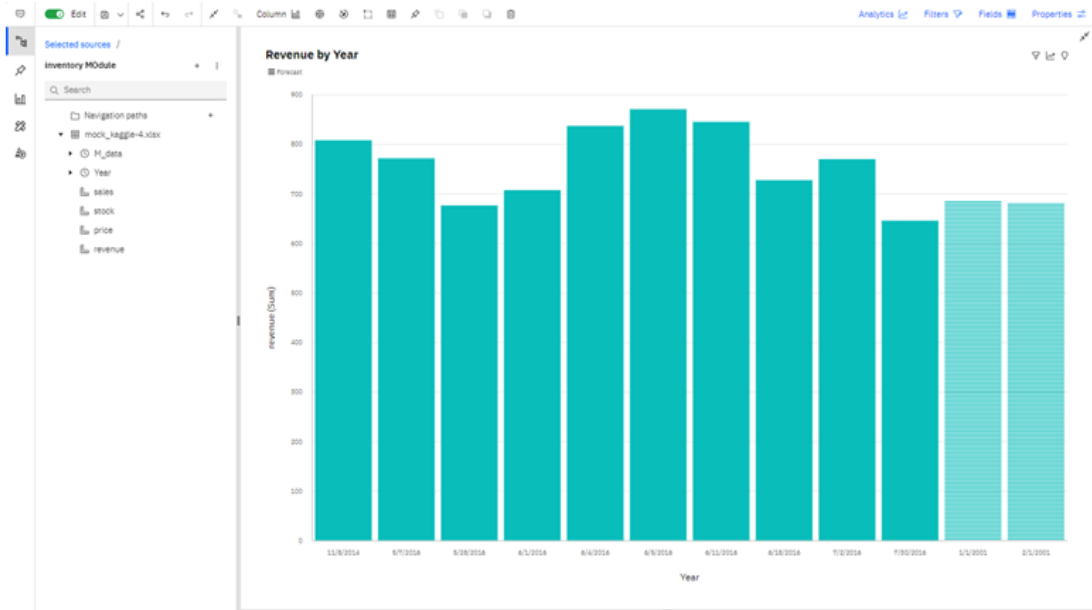
Stock by Year a Line Visual



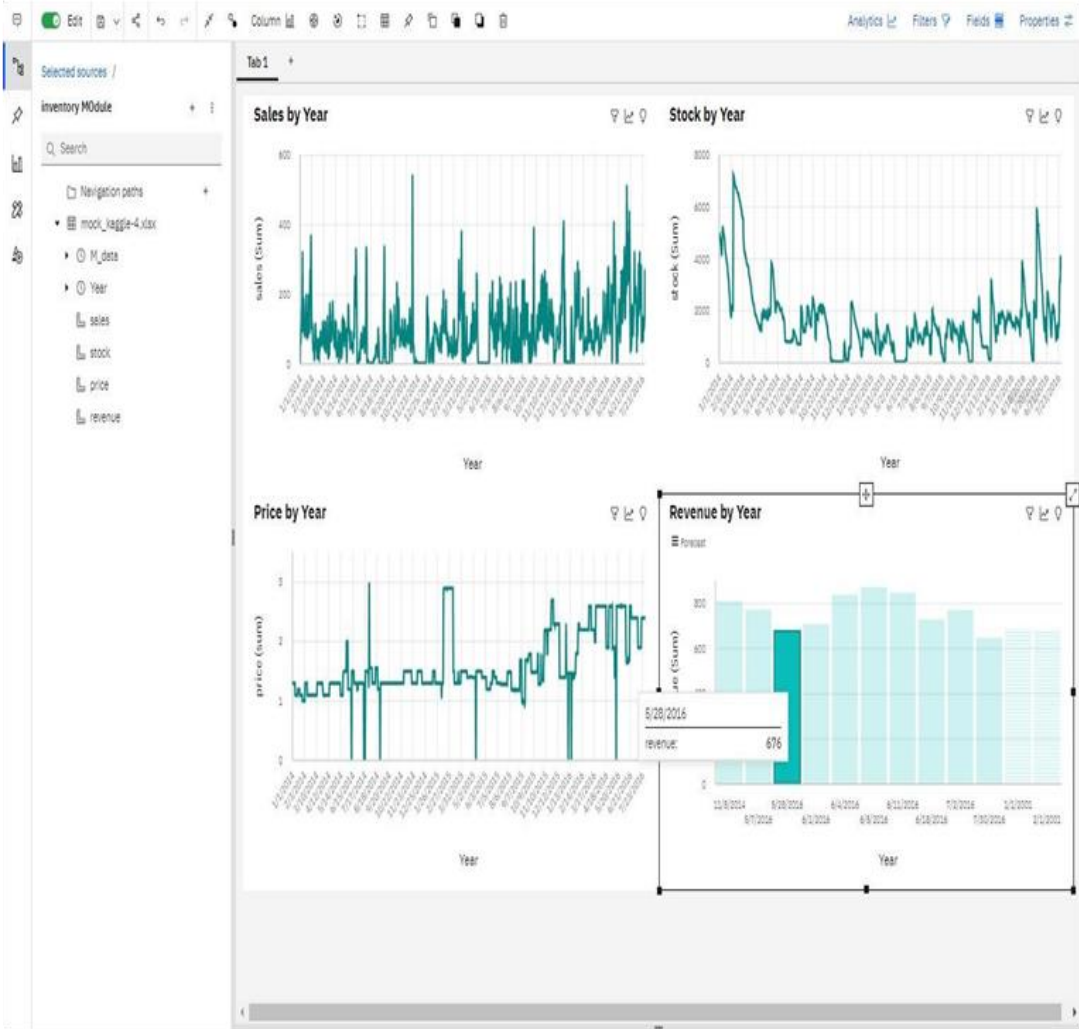
Price by Year Line visual



Revenue by Year Column Forecast visual.



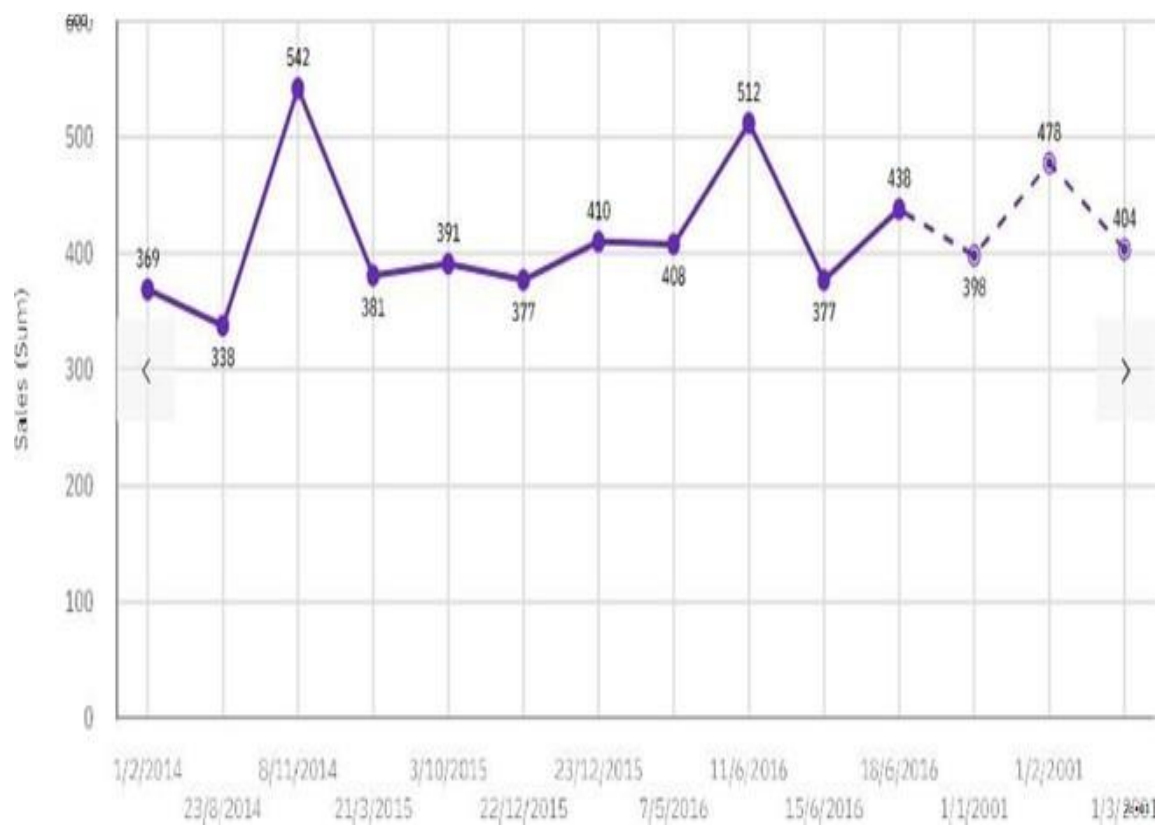
Dashboard creation



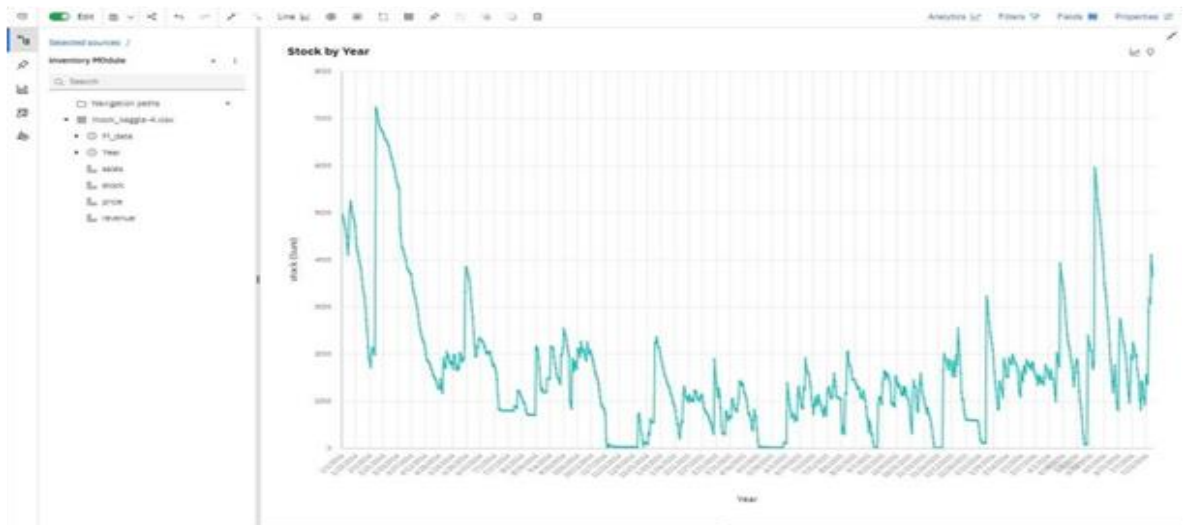
Dashboard:

Stock inventory dashboard

1.Forecast by years:



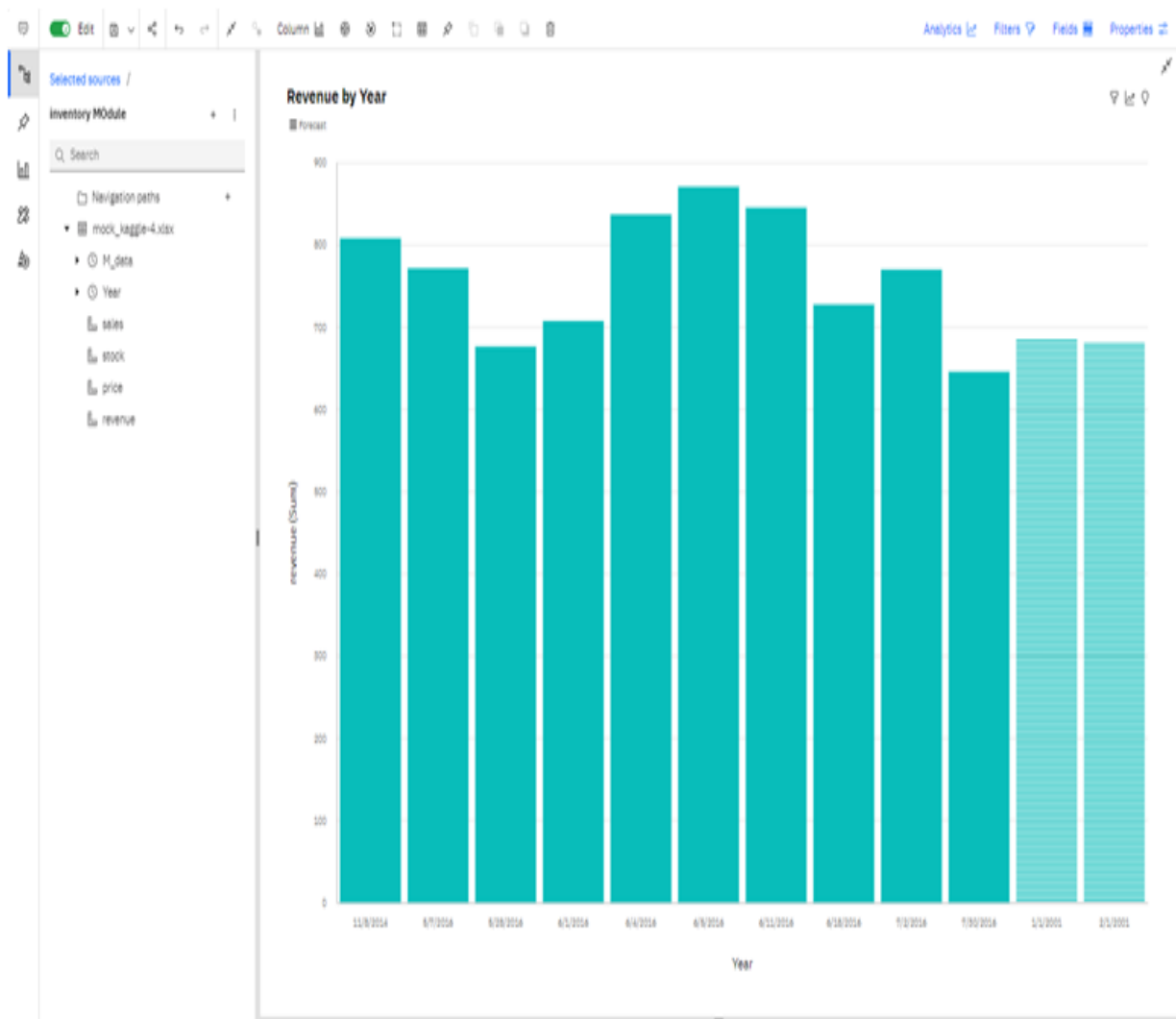
2. Stocks by years:



3. Price by years:

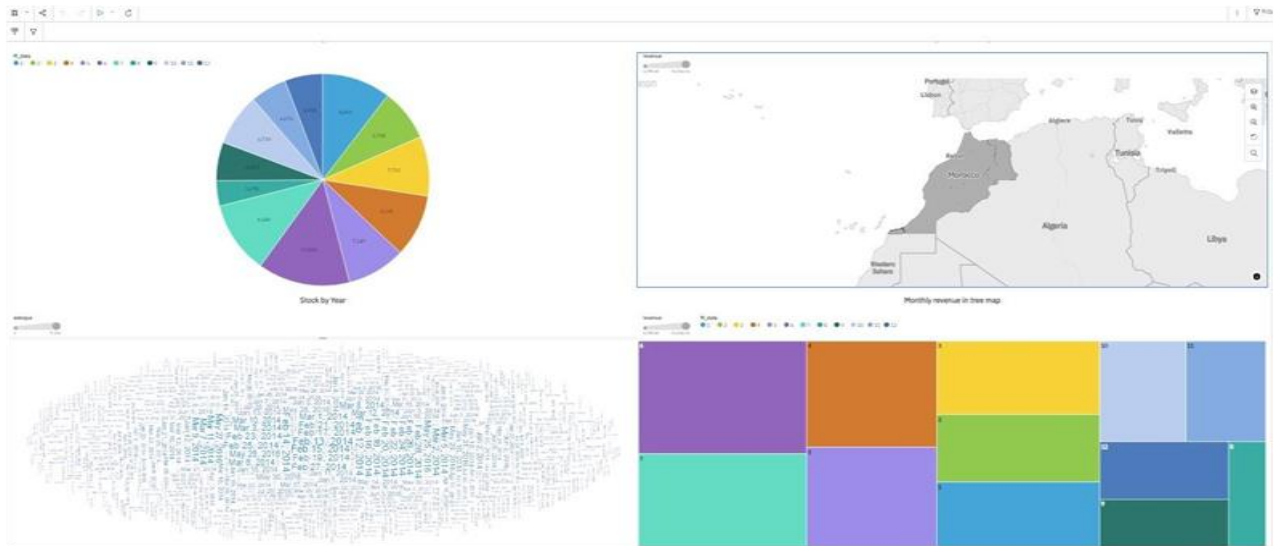


4. Revenue by year:



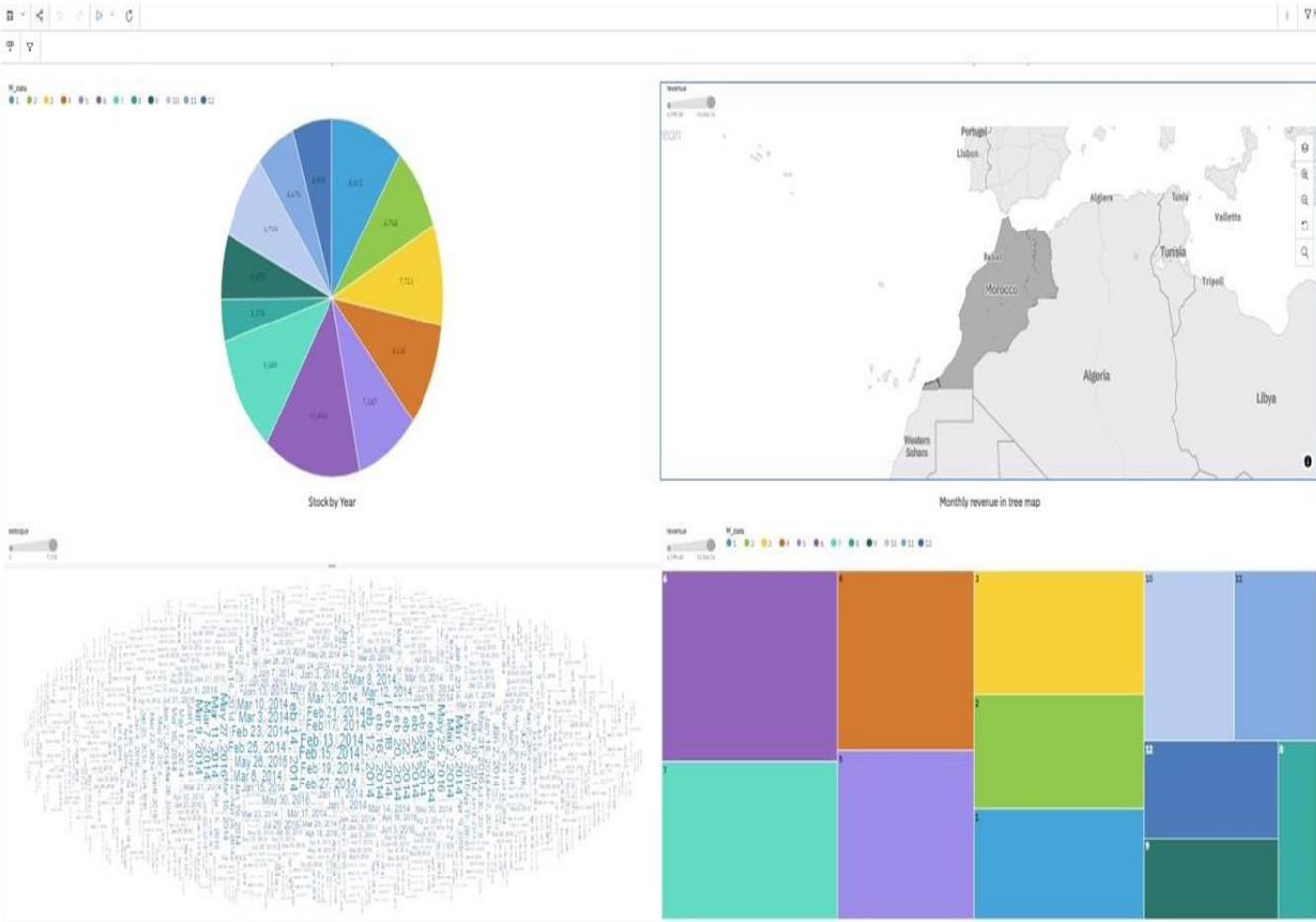
DELIVERY OF SPRINT 4

Retail store stock inventory analytics report

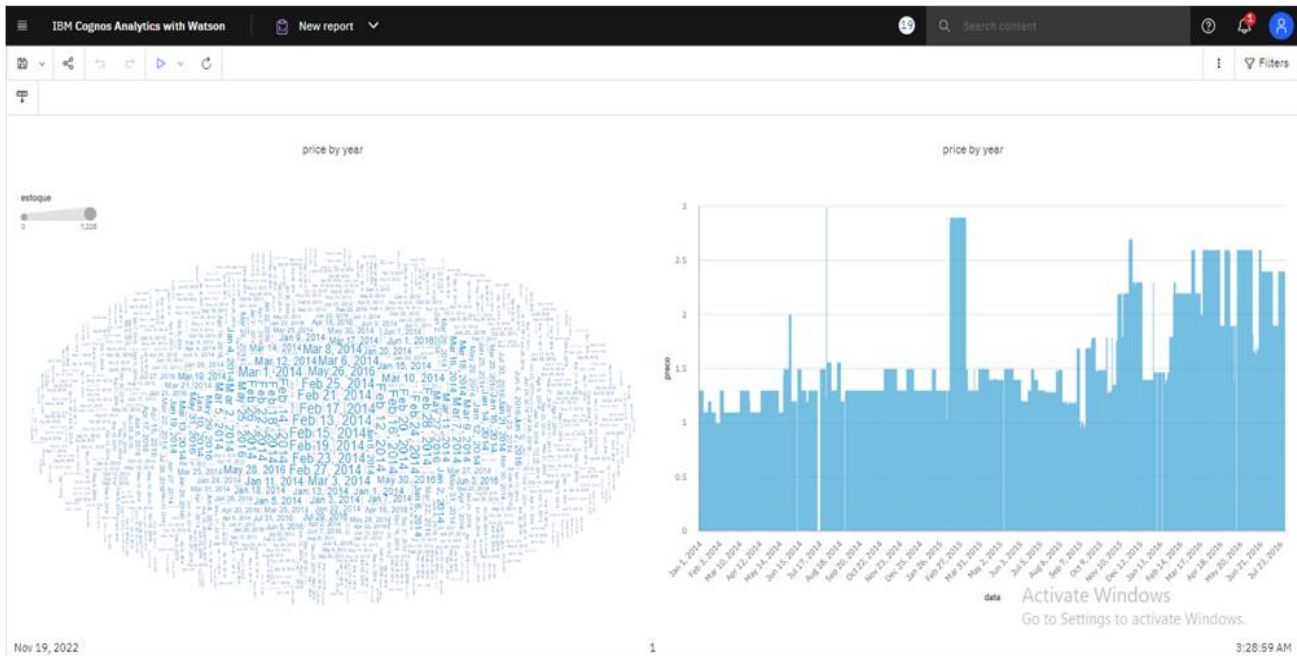
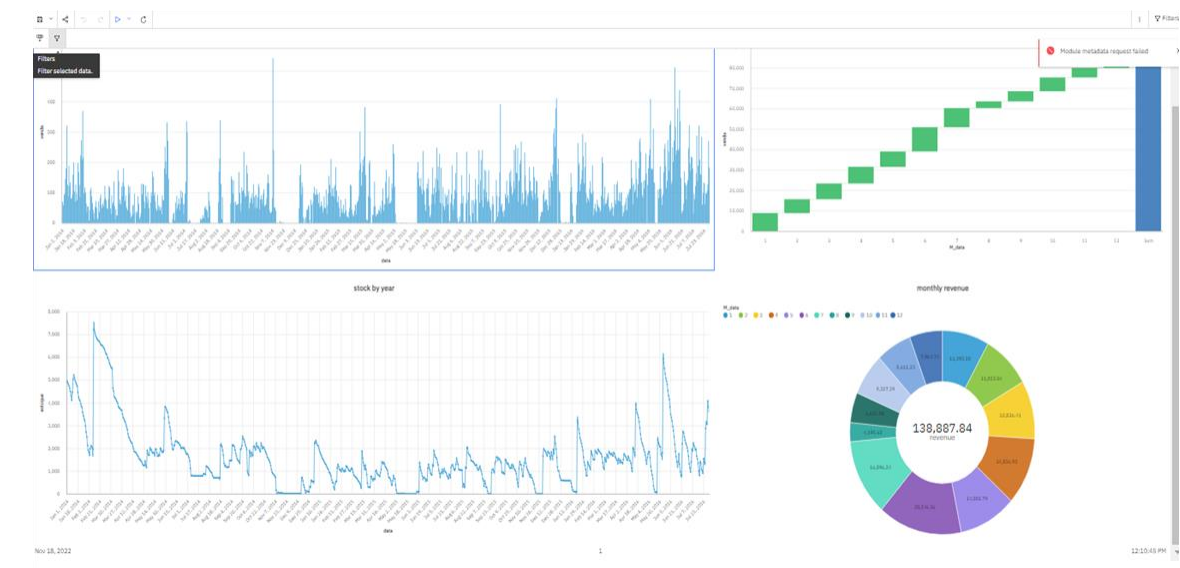


Report Creation:

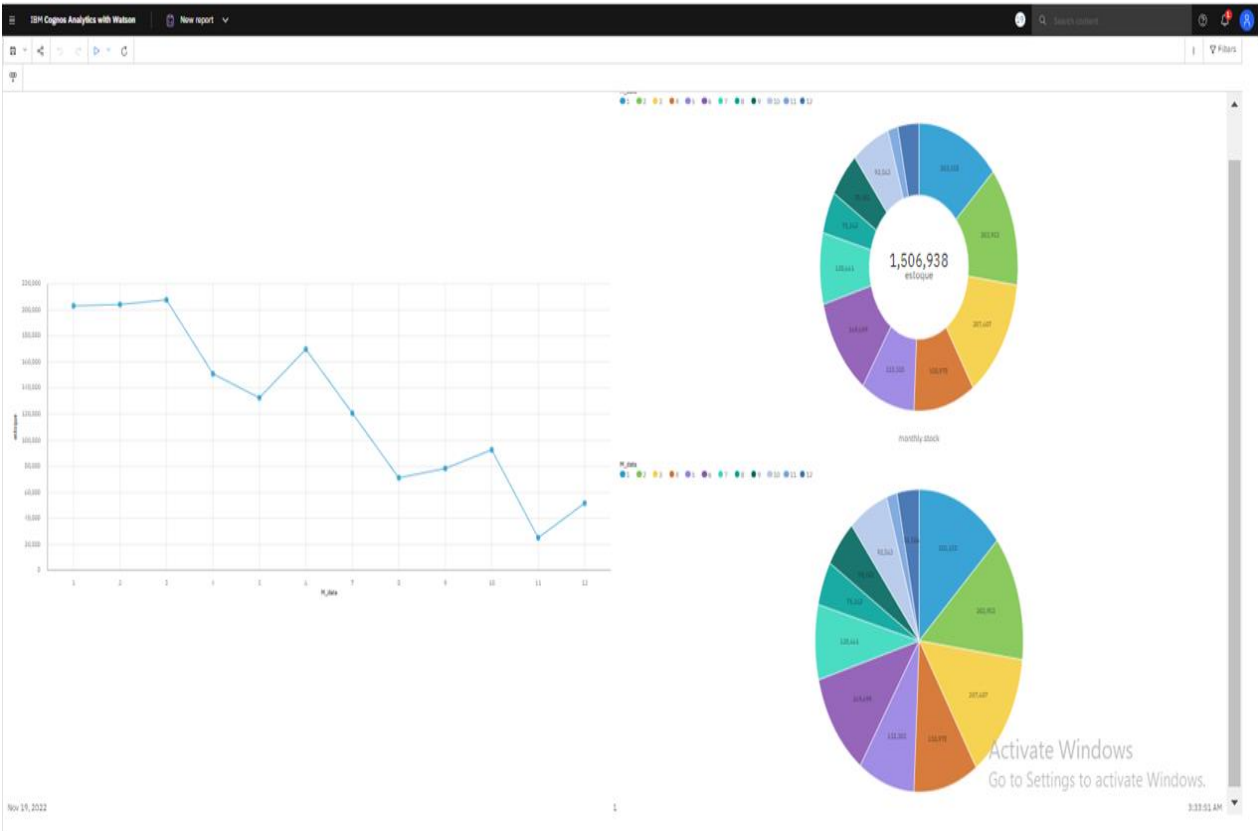
Monthly Sales, Montly Revenue, Stock by Year



Sales by year ,Monthly sales ,Stock by year, Monthly revenue



1.MONTHLY STOCKS



CONCLUSION

In conclusion, the data clearly illustrates that the respondents seem to be clear about what they do in the inventory management and are well conversant with the control systems. The impression that that the employees at Glencore Rustenburg Smelter trust their superiors and believe in their style of leadership also supports the fact that they are allowed to work independently. The personnel employed in the supply chain understand their role within the inventory management and supply chain discipline as illustrated by the data. The data also showed that the effectiveness of the inventory management and control system is high and helps Glencore Rustenburg Smelter keep track of their inventory. The data highlights clearly that the employees are compliant with the policies of inventory and supply chain management and their practices of the inventory management and control system are effective. The study showed no statistically significant difference with most of the variables in the tool except for age versus the statement that “I find it useful to reconcile the monthly inventory expenditure through the monitoring tool”. Age only became a factor on this statement above. There was a statistically significant difference between race and the following four statements: “Inventory management is a Centralized Function”; “I understand all the 3 Levels of Supply Chain Management”; “I have been trained on all the policies, and SOP in the unit; The Company has a tracking system to manage inventory and monitor turnaround times”.

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