RETAIL STORE STOCK INVENTORY ANALYTICS

A PROJECT REPORT

Submitted by

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on

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ABSTRACT

Retail Store Stock Inventory analytics helps to keep track of stock in inventory and make sure there is surplus goods to satisfy the customer need and maximise profit avoiding both overflow and underflow. Inventory management System is important to ensure quality control in business that handle transactions revolving around consumer goods, Without proper inventory control, a large retail store may run out of stock which leads to loss of customers. Inventory Management System is a important means of tracking the stock in the retail store automatically. An automated inventory system helps to minimize the risk of error. In retail stores it also helps to track theft of retail merchandise, it also provides valuable information for increasing the profits of retail store. This system helps to prevent overflow of product in inventory leading to loss and wastage of material. It helps to avoid underflow of goods disabling to meet customer requirement. It also provides sales insights and stock reports in the form of graphs/ charts which helps in visualization. All of this data helps in providing businesses with real-time inventory tracking information. Inventory Management System predicts the sales the upcoming days. It also enables the retailer to understand the flow of goods and sales. Inventory Management System makes it simple to locate and analyse inventory information in real time with a simple database search.

CHAPTER 1

INTODUCTION

1.1 PROJECT OVERVIEW

The main objective of Retail Store Stock Inventory analytics is to keep track of stock in inventory and make sure there is surplus goods to satisfy the customer need and maximise profit avoiding both overflow and underflow. This system helps to prevent overflow of product in inventory leading to loss and wastage of material. It helps to avoid underflow of goods disabling to meet customer requirement. It also provides sales insights and stock reports in the form of graphs/ charts which helps in visualization. All of this data helps in providing businesses with real-time inventory tracking information. Inventory Management System predicts the sales the upcoming days. It also enables the retailer to understand the flow of goods and sales.

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 dataset contains a lot of historical sales data of a Brazilian top retailer.

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 organisational datasets with social media data streams, they can also use it for better sales predictions, designing relevant campaigns to suit their profitable customers and thereby ensuring customer satisfaction.

1.2 PURPOSE

- The purpose of Retail Store Stock Inventory analytics is to keep track of stock in inventory and make sure there is surplus goods to satisfy the customer need and maximise profit avoiding both overflow and underflow.
- This system helps to prevent overflow of product in inventory leading to loss and wastage of material.
- It helps to avoid underflow of goods disabling to meet customer requirement.
- Inventory Management System predicts the sales the upcoming days.
- It also enables the retailer to understand the flow of goods and sales.

CHAPTER 2

LITERATURE SURVEY

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S.No.	Title	Author	Year of publica-tion	Problem identification	Drawbacks
1	Data-driven segmentation of customer behavior in the retail industry	Carmichael, Chen & Luo	2018	Customer segmentation has become an important part of marketing analytics because it allows the customers to be grouped based on their purchase behaviors, segment demographics, and behavioral evolvement. This segmentation is used to create tailored marketing campaigns based on the target customers to have an idea of the effectiveness of a campaign for each segment.	Gathering enough data to analyze it for each segment has been the main limitation here
2	Management of Multi-Item Retail Inventory Systems with Demand Substitution	Stephen A. Smith	2017	It presents the problem of determining the optimal capacity of a storage system with respect to some specified criteria.	It faces problem in choosing the correct criteria with which we are going to determine the optimal storage capacity of a system
3	Recommendation systems using recommender algorithms	Chavan & Mukhopadhyay	2017	Systems use the past purchase history and the customer's search data to supply relevant recommendations for the customer. An effective recommendation system can increase sales manifold, by presenting users with items that they would need before the user even recognizes they need it.	Building hybrid recommendation algorithm is a big deal.
4	Retailing and retailing research in the age of	Marnik G. Dekimpe	2019	Big data analytics in retail not only has the potential to improve the operating margins of companies by 60% but revolutionize all areass of retail .	In the retail industry, big data analytics hel ps companies collect and analyze customer purchase

	big data analytics				history and preference data .
5	Inventory Management Explained	David J	2019	Calculations for forecasting, lot sizing, and safety stock are well known to the inventory management community, but are generally not understood to the level necessary to effectively use them	This lack of understanding results in incomplete calculations, incorrect inputs, flawed logic, or a fallback to less effective
6	International Journal of Production Economics	Mario Pena	2019	Inventory analytics refers to tracking metrics that gauge the movement and performance of your physical products. The ongoing assessment and evaluation of inventory provides the insights. organizations, and especially those performing activities in the retail sector, face multiple challenges in the planning and management of their resources.	The limitations of a perpetual inventory system include a false sense of reliability and dependence on human entry
7	Retailing Sector and Business Retailing Types	Kujtim Hameli	2009	The economic factors that most affect the demand for consumer goods are employme nt, wages, prices/inflatio n, interest rates, and consumer confidence .	The biggest problem with retail business is that profit margins of this business is fixed which ranges from 5 to 20 percent depending upon the brand of the product which retailer is selling and also unlike wholesaler who can expand business.
8	An analysis of influencing factors	Nripendra P. Rana	2022	Significant factors include past experiences, a variety of cognitive biases, an escalation of commitment and sunk outcomes, individual differences, including age and socioeconomic status, and a belief in personal relevance.	Influencing factors can be used as control variables to determine the key influencing factors of an object.
9	Metadata Analysis	Mario Pena	2019	A problem with metadata arise s when one sends an email or a document unwittingly disclosing confidential information.	Data sets can gain unwanted attention from hackers and important information can be leaked to competitors
10	Predictive Analysis of Big Data in Retail Industry	Hamza Belarbi	2016	Predictive analytics is a branch of advanced analytics that makes predictions about future outcomes using historical data combined with statistical modeling, data mining techniques and machine learning .	Even if a company has sufficient data, critics argue that compute rs and algorithms fail to consider variables

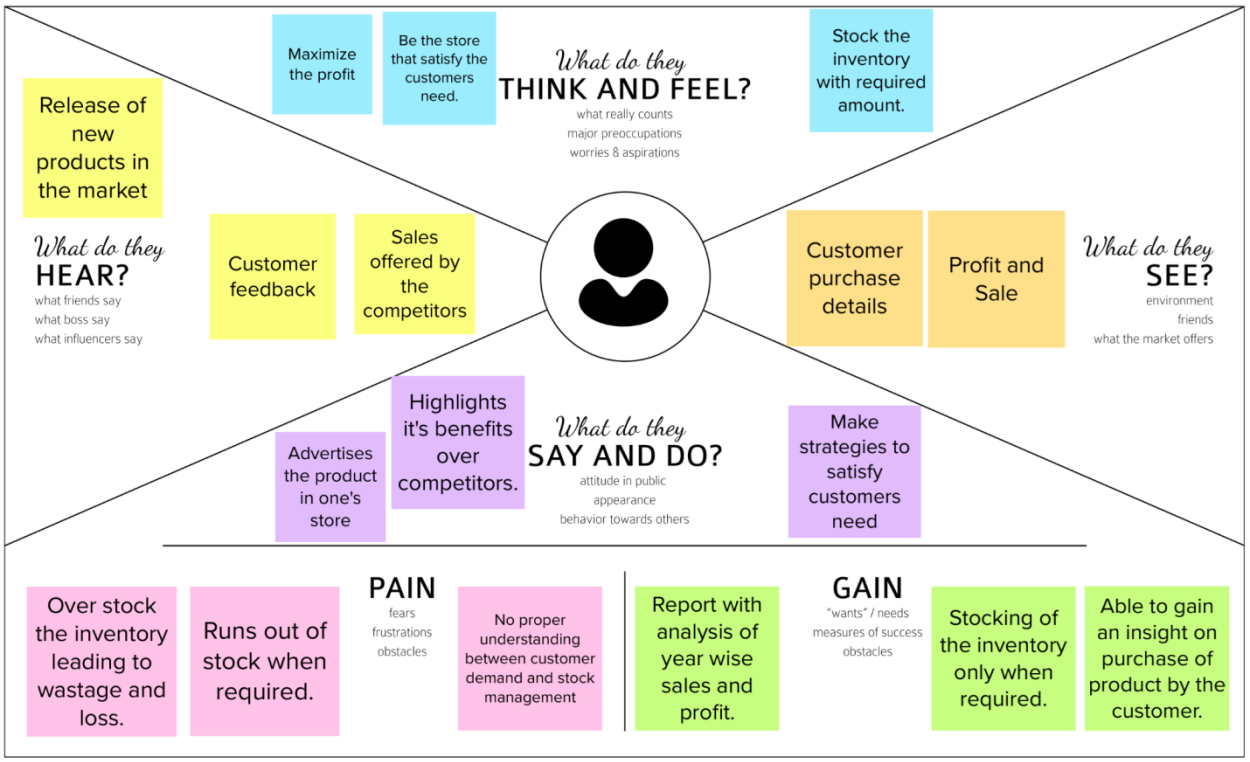
2.1 PROBLEM STATEMENT DEFINITION

CHAPTER 3

IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behavior and attitudes. It is a useful tool to understand their users. Creating an effective solution requires understanding the true problem and the person who is experiencing it.



3.2 IDEATION & BRAINSTORMING

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.

1

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

PROBLEM

To enhance the inventory control management in retail stores

Key rules of brainstorming

To run an smooth and productive session

- Stay in topic.
- Defer judgment.
- Go for volume.
- Encourage wild ideas.
- Listen to others.
- If possible, be visual.

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!

S. Abinaya

- Unsold stock
- Loss in business
- Effects of overstock
- Product expioration
- Warehouse space insufficiency

A. Jeba Jebas

- Ability to go with trend
- Regular interaction with customers
- Customer Satisfaction
- Information of stock sold
- Give alerts during under stock

T. Lekhapriyadharshini

- Alert demand stock
- Helps to set offers on over stock
- Frequent analysis of data
- Improves retailers satisfaction
- Price optimization

J. Rufina

- Real time dynamic price list module
- Product history management
- Live stock report
- Detailed product listing
- Prevents spoilage and obsoleseence

S.V. Shruthi

- Effective cost management
- Future performance prediction
- Demand and Sales forecasting
- Supplier details management
- Analysing the product preference by customers

3

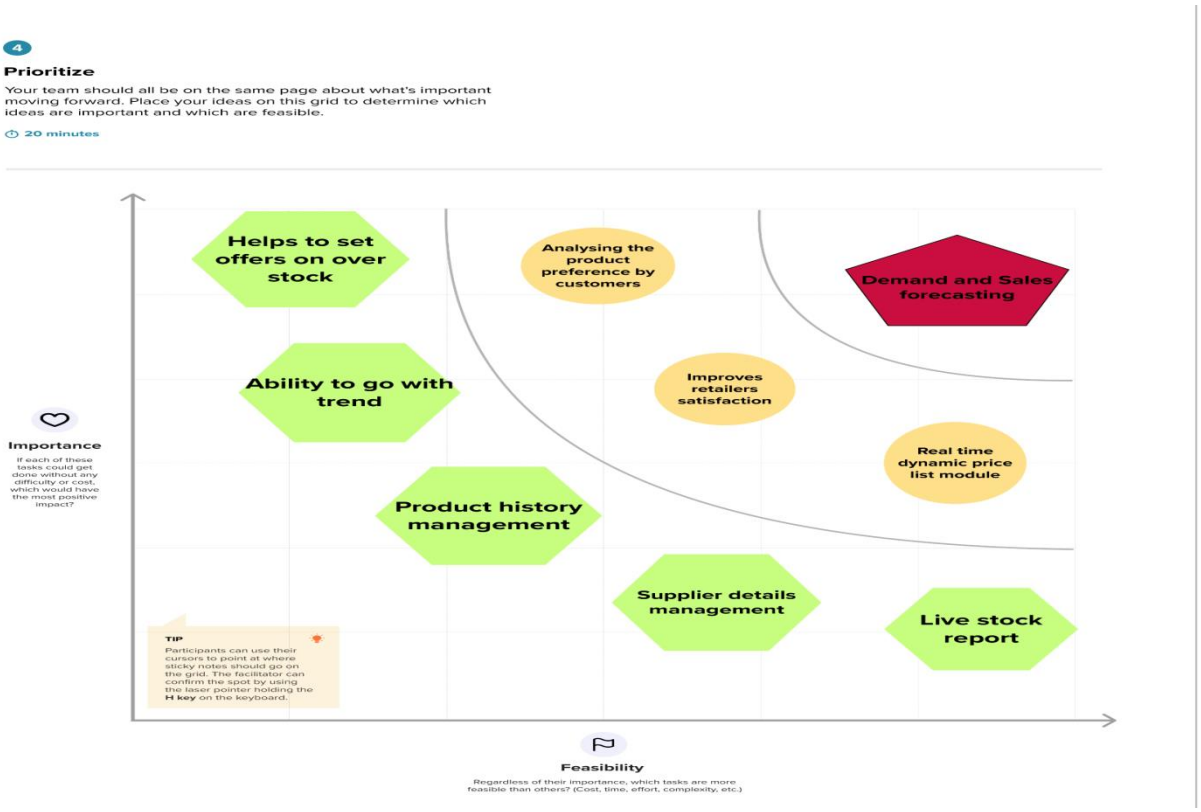
Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, 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

TIP

Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.



3.3 PROPOSED SOLUTION

PARAMETER	DESCRIPTION
Problem Statement (Problem to be solved)	To solve the problem faced by the retailers in their day to day life in managing the stock, satisfying the customer and obtaining profit.
Idea / Solution description	To fit into a regression model to predict the sales of products in the future.
Novelty / Uniqueness	To train the model using multiple linear regression to predict the sales in the near future based on the customer needs.
Social Impact / Customer Satisfaction	Make the product available whenever they need it.
Business Model (Revenue Model)	1. Forecasting intermediate inventory will raise the whole business model because it will determine the up and down of the goods prediction among the traditional system 2.Retailers are able to understand the deepest customer needs and adjust their offering to meet shoppers' demands.

Scalability of the Solution	The Scalability and feasibility of our solution is comparatively high from the existing market model. It will ensure the retailers engage the environment very easily and user friendly. It will allow the retailers to add or edit the bulk goods and inventory. It will make use of the environment space efficiently due to the appropriate prediction of the inventory sales goods.

3.4 PROBLEM OLUTION FIT

CHAPTER 4

REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Inventory Management	Maintaining stocks in warehouse Remove or add stocks in warehouse
FR-4	Sales Forecasting	Visualize the sales of the product from past data Predict customers demand
FR-5	Barcode Scanning	Scan the barcode in raw material package. Add the product details to the database when scanned.
FR-6	Admin Management	Add or remove retailers. Maintains retailer details.
FR-7	Report Generation	Displays the warehouse details in the dashboard. Notifies if stock is inadequate.

4.2 NON FUNCTIONAL REQUIREMENTS

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	The retail store management system has a simple and user friendly interface. Each user has their own dashboard. The system must fully support languages that business operates on.
NFR-2	Security	Users will be able to access only their own personal information and not that of others. Financial data must be secured with two factor authentication.
NFR-3	Reliability	The average time of failure for the system is 30 days. In the event that the server crashes, the system will take a week to be running again.
NFR-4	Performance	The average time of failure for the system is 30 days. In the event that the server crashes, the system will take a week to be running again.
NFR-5	Availability	This system will be available 24x7, with the exception of being down for maintenance no more than 3 hours a week. If the system crashes, it should be back up within a week.
NFR-6	Scalability	The system must support implementing new features and modules without disrupting existing processes. The system must support horizontal scaling launching new retail stores with multiple POS.
NFR-7	Maintainability	Any updates or defect fixes shall be able to be made on server-side computers only, without any patches required by the user.

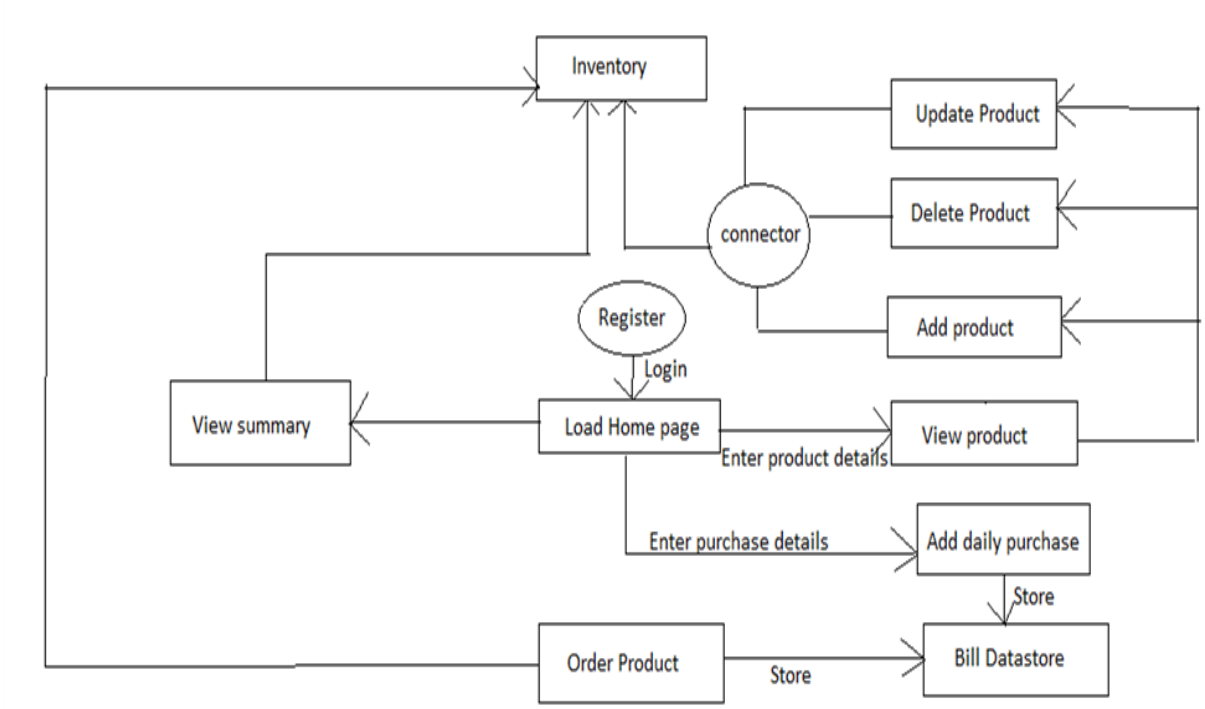
CHAPTER 5

PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS

1. A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system.

2. A neat and clear DFD can depict the right amount of the system requirement graphically.

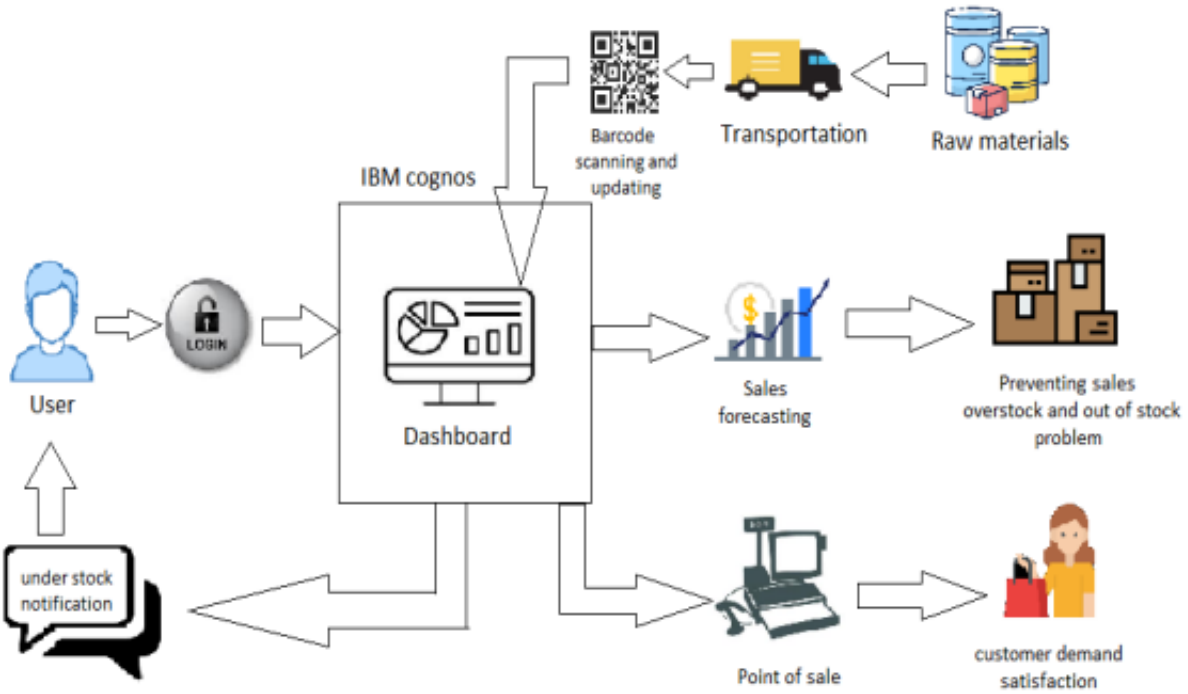


5.2 SOLUTION & TECHNICAL ARCHITECTURE

5.2.1 SOLUTION ARCHITECTURE

Goals of solution architecture is

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



5.2.2 TECHNICAL ARCHITECTURE

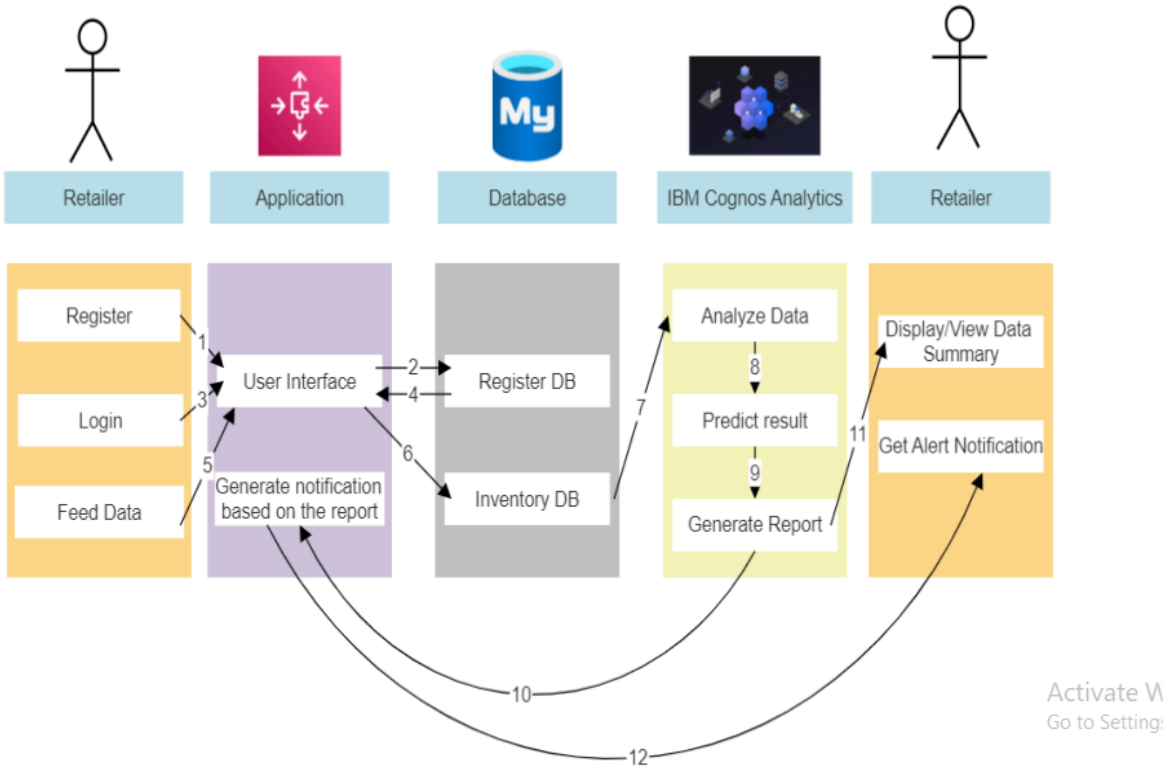


Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	Provides an interactive platform for Retailers to register,login and can enter inventory data such as stocks ,order.	HTML, CSS, JavaScript / Angular Js / React Js.
2.	Register	To create account for each retailer.	Python
3.	Login	Enter the credentials using UI and get authenticated through Register database	Python
4.	Feed Data -Inventory data	Enter the stock ,order details using AI and store it in the Inventory database.	Python,HTML,CSS,JavaScript.
5.	Generate notification	Intimate the retailers for understock and overstock by using the report Generated by IBM cognos analytics.	Python
6.	Register Database	The database contains details of the retailers	Mysql/IBM DB2
7.	Inventory Database	The database contains stock details and bill details that is sent as input to cognos analytics to generate reports.	Mysql/IBM DB2
8.	Analyze Data	Upload, Prepare and analyse the data.	IBM Cognos Analytics
9.	Predict result	Present the data.	IBM Cognos Analytics
10.	Generate Report	Generate the summary .	IBM Cognos Analytics

11.	Machine Learning	Model Forecast the need using multilinear regression	Python
12.	Infrastructure (Server / Cloud)	Gives the collection of hardware and software elements needed.	IBM Cloud

Table-2: Application Characteristics:

S.No	Component	Description	Technology
1.	Open-Source Frameworks	A platform where the inbuilt libraries are available to develop the UI and to do tests for our project.	React,Pytest,MySql Testing framework
2.	Security	Implementations To store the details of the retailer securely that can be done by encryption	Encrypting techniques
3.	Scalable	This is a 3 tier application, the retailer can add stocks, purchase and sales details how long the inventory is.	Architecture Mysql,Python,React
4.	Availability	The application is available at any time and anywhere.	IBM cloud
5.	Performance	The average time of failure for the system is 30 days.In the event that the server crashes, the system will take a week to be running again.	ML Algorithms

5.3 USER STORIES

User Type	Functional Requirement(Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer	Registration	USN-1	As a user, I can register for the application by entering my email, password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, after completing the registration I will receive confirmation email once I have registered for the web 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	Low	Sprint-2

				Facebook Login		
		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 (Web user)		USN-1	As a user, I can register for the web application entering my email, password and confirming my password.	I can access my account dashboard	High	Sprint-1
		USN-2	As a user, after completing the registration I will receive confirmation email once I have registered for the web application	I can receive confirmation email & click confirm	High	Sprint-1
Administrator		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

CHAPTER 6

PROJECT PLANNING & SCHEDULING

6.1 SPRINT PLANNING & ESTIMATION

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	The dataset is collected and observed to understand the data for further data cleaning and exploration.	2	High	JebaJebas A Lekhapriyadharshini T Rufina J Abinaya S Shruthi S V
Sprint-1	Data Preparation	USN-2	The data preparation is done to clean the data and for better visualization for user understanding. The data preparation is done to clean the data and for better visualization for user understanding.	3	High	Jeba Jebas A Lekhapriyadharshini T Rufina J Abinaya S Shruthi S V
Sprint-2	Data Exploration	USN-3	The data is visualized to understand about the sales, revenue and stock on a daily	8	High	Jeba Jebas A Lekhapriyadharshini T Rufina J Abinaya S Shruthi S V

			basis.			
Sprint-3	Dashboard creation	USN-4	The dashboard is created to view different visualization charts about sales, stock, and revenue.	8	High	Jeba Jebas A Lekhapriyadharshini T Rufina J Abinaya S Shruthi S V
Sprint-4	Story creation	USN-6	The user can view the story to get the better understanding of the sales, stock,revenue and price. The user can make decisions based on the story.	8	High	Jeba Jebas A Lekhapriyadharshini T Rufina J Abinaya S Shruthi S V

Project Tracker, Velocity & Burndown Chart:

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	5	4 Days	31 Oct 2022	03 Nov 2022	5	19 Nov 2022
Sprint-2	8	4 Days	05 Nov 2022	08 Nov 2022	8	19 Nov 2022
Sprint-3	8	4 Days	10 Nov 2022	13 Nov 2022	8	19 Nov 2022
Sprint-4	16	5 Days	15 Nov 2022	19 Nov 2022	16	19 Nov 2022

Velocity:

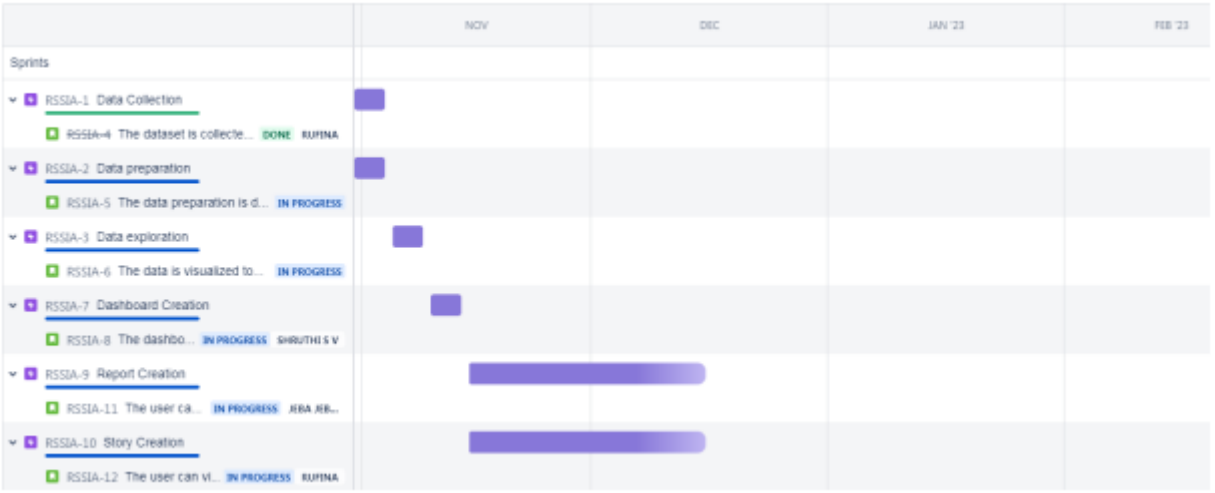
Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = sprint\ duration / velocity = 20/10 = 2$$

Sprint	Story points	Duration	Average velocity
Sprint-1	5	4	1.25
Sprint-2	8	4	2
Sprint-3	8	4	2
Sprint-4	16	5	3.2
Total	37	17	2.17

6.2. REPORTS FROM JIRA

Jira project planning



7.Coding and Solutions

7.1 Feature 1

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
df= pd.read_csv("/content/mock_kaggle.csv")
df.head(10)
sns.countplot(data=df,x="preco")
import datetime
df['Date'] = pd.to_datetime(df['data'])
df['Date'] = df['Date'].dt.strftime('%d.%m.%Y')
df['year'] = pd.DatetimeIndex(df['data']).year
df['month'] = pd.DatetimeIndex(df['data']).month
df['day'] = pd.DatetimeIndex(df['data']).day
df['dayofyear'] = pd.DatetimeIndex(df['data']).dayofyear
df['weekofyear'] = pd.DatetimeIndex(df['data']).weekofyear
df['weekday'] = pd.DatetimeIndex(df['data']).weekday
df['quarter'] = pd.DatetimeIndex(df['data']).quarter
df['is_month_start'] = pd.DatetimeIndex(df['data']).is_month_start
df['is_month_end'] = pd.DatetimeIndex(df['data']).is_month_end
df['revenue'] = df.apply(lambda row: row.venda + row.preco, axis=1)
print(df.info())
df = pd.get_dummies(df, columns=['year'], drop_first=True, prefix='year')
df = pd.get_dummies(df, columns=['month'], drop_first=True, prefix='month')
df = pd.get_dummies(df, columns=['weekday'], drop_first=True, prefix='wday')
df = pd.get_dummies(df, columns=['quarter'], drop_first=True, prefix='qrtr')
df = pd.get_dummies(df, columns=['is_month_start'], drop_first=True, prefix='m_start')
df = pd.get_dummies(df, columns=['is_month_end'], drop_first=True, prefix='m_end')
df.info()
df.isna().sum()
x=df.drop(['data','venda','Date','revenue'],axis=1)
y=df['venda']
y
from sklearn.model_selection import train_test_split
```

```
# Split the data into training and testing sets
X_train, X_test, Y_train, Y_test = train_test_split(x, y, test_size = 0.2, random_state = 42)
from sklearn.linear_model import LinearRegression
from sklearn.metrics import r2_score
import matplotlib.pyplot as plt
import seaborn as sns
linreg=LinearRegression()
linreg.fit(X_train,Y_train)
y_pred=linreg.predict(X_test)
y_pred
Accuracy=r2_score(Y_test,y_pred)*100
print(" Accuracy of the model is %.2f" %Accuracy)
sns.regplot(x=Y_test,y=y_pred,ci=None,color ='red')
```

7.2 Feature 2

```
<html>
    <head>
        <title>Retail Store Stock Inventory Analytics</title>
        <meta charset="utf-8">
  <meta name="viewport" content="width=device-width, initial-scale=1">
  <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css">
  <script src="https://ajax.googleapis.com/ajax/libs/jquery/3.6.1/jquery.min.js"></script>
  <script src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></script>




        </style>
    </head>

    <body>
        <div class="container">
            <div class="page-header" style="background-color:lavender;">
              <h2>Retail Store Stock Inventory Analytics</h2>
            </div>
            <div class="container-fluid">
                <div class="row">
                    <div class="col-sm-4">
                        <img src="D:\sem 7\g1.png">
                    </div>
                    <div class="col-sm-4" >
                        <img src="D:\sem 7\g2.png">
                    </div>
                </div>
                <div class="row">
                  <div class="col-sm-4" >
                        <img src="D:\sem 7\g3.png">
                  </div>
                  <div class="col-sm-4">
                        <img src="D:\sem 7\g4.png">
                  </div>
                </div>
                <div class="row">
```

```
                        <div class="col-sm-4" >
                            <img src="D:\sem 7\g5.png">
                        </div>
                        <div class="col-sm-4">
                            <img src="D:\sem 7\g6.png">
                        </div>
                       </div>
                </div>
                <a href="C:\Users\Dell\index.html" class="btn btn-primary btn-block"
        role="button">Dashboard</a>

                </div>
              </body>
          </html>
```

7.3 Feature 3

```
<html>
            <head>
                <title>Retail Store Stock Inventory Analytics</title>
                <meta charset="utf-8">
            <meta name="viewport" content="width=device-width, initial-scale=1">
            <link rel="stylesheet"
          href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css">
            <script src="https://ajax.googleapis.com/ajax/libs/jquery/3.6.1/jquery.min.js"></script>
            <script src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></script>
            <script>
              (function ($) {
                  $.fn.countTo = function (options) {
                          options = options || {};

                          return $(this).each(function () {
                                  // set options for current element
                                  var settings = $.extend({}, $.fn.countTo.defaults, {
                                          from:            $(this).data('from'),
                                          to:              $(this).data('to'),
                                          speed:           $(this).data('speed'),
                                          refreshInterval: $(this).data('refresh-interval'),
                                          decimals:        $(this).data('decimals')
                                  }, options);

                                  // how many times to update the value, and how much to increment the
          value on each update
                                  var loops = Math.ceil(settings.speed / settings.refreshInterval),
                                          increment = (settings.to - settings.from) / loops;

                                  // references & variables that will change with each update
                                  var self = this,
                                          $self = $(this),
                                          loopCount = 0,
                                          value = settings.from,
                                          data = $self.data('countTo') || {};
```

```
                        $self.data('countTo', data);

                        // if an existing interval can be found, clear it first
                        if (data.interval) {
                                clearInterval(data.interval);
                        }
                        data.interval = setInterval(updateTimer, settings.refreshInterval);

                        // initialize the element with the starting value
                        render(value);

                        function updateTimer() {
                                value += increment;
                                loopCount++;

                                render(value);

                                if (typeof(settings.onUpdate) == 'function') {
                                        settings.onUpdate.call(self, value);
                                }

                                if (loopCount >= loops) {
                                        // remove the interval
                                        $self.removeData('countTo');
                                        clearInterval(data.interval);
                                        value = settings.to;

                                        if (typeof(settings.onComplete) == 'function') {
                                                settings.onComplete.call(self, value);
                                        }
                                }
                        }

                        function render(value) {
                                var formattedValue = settings.formatter.call(self, value,
settings);
                                $self.html(formattedValue);
                        }
                });
        };

        $.fn.countTo.defaults = {
                from: 0,               // the number the element should start at
                to: 0,                 // the number the element should end at
                speed: 1000,           // how long it should take to count between the target
numbers
                refreshInterval: 100,  // how often the element should be updated
                decimals: 0,           // the number of decimal places to show
                formatter: formatter,  // handler for formatting the value before rendering
                onUpdate: null,        // callback method for every time the element is
updated
                onComplete: null       // callback method for when the element finishes
updating
        };
```

```
        function formatter(value, settings) {
                return value.toFixed(settings.decimals);
        }
}(jQuery));
jQuery(function ($) {
  // custom formatting example
  $('.count-number').data('countToOptions', {
        formatter: function (value, options) {
          return value.toFixed(options.decimals).replace(/\B(?=(?:\d{3})+(?!\d))/g, ',');
        }
  });

  // start all the timers
  $('.timer').each(count);

  function count(options) {
        var $this = $(this);
        options = $.extend({}, options || {}, $this.data('countToOptions') || {});
        $this.countTo(options);
  }
});
  </script>
  <style>
    .counter {
    background-color:#f5f5f5;
    padding: 20px 0;
    border-radius: 5px;
}
.count-title {
    font-size: 40px;
    font-weight: normal;
    margin-top: 10px;
    margin-bottom: 0;
    text-align: center;
}
.count-text {
    font-size: 13px;
    font-weight: normal;
    margin-top: 10px;
    margin-bottom: 0;
    text-align: center;
}
.fa-2x {
    margin: 0 auto;
    float: none;
    display: table;
    color: #4ad1e5;
}
    .bg-1 {
      background-color: #FFFEF1;
      color: #ffffff;
    }
    </style>
```

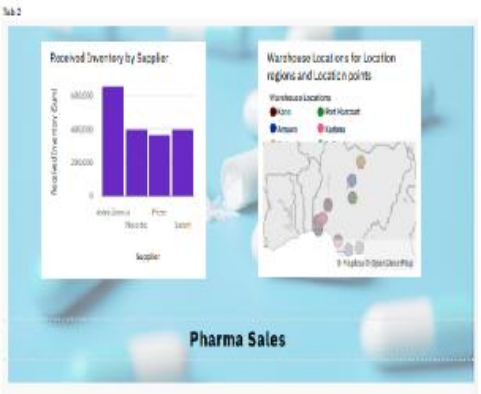
```
    </head>

    <body>
        <div class="container">
            <div class="page-header" style="background-color:lavender;">
              <h2>Retail Store Stock Inventory Analytics</h2>
            </div>
            <div class="row text-center">
                <div class="col">
                <div class="counter">
          <i class="fa fa-code fa-2x"></i>
          <h2 class="timer count-title count-number" data-to="84800" data-speed="1500"></h2>
           <p class="count-text ">Sales</p>
        </div>
                </div>
                  <div class="col">
                   <div class="counter">
          <i class="fa fa-coffee fa-2x"></i>
          <h2 class="timer count-title count-number" data-to="1490" data-speed="1500"></h2>
          <p class="count-text ">Price</p>
        </div>
                  </div>
                  <div class="col">
                      <div class="counter">
          <i class="fa fa-lightbulb-o fa-2x"></i>
          <h2 class="timer count-title count-number" data-to="1500000" data-
speed="1500"></h2>
          <p class="count-text ">Stock</p>
        </div></div>
    </div>
            <a href="C:\Users\Dell\graph.html" class="btn btn-primary btn-block"
role="button">Know your store more</a>


        </body>
  </html>
```

8 . Testing

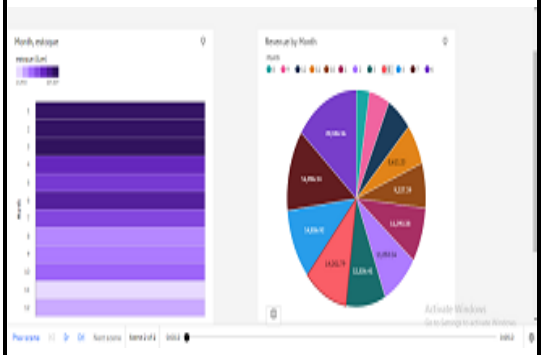
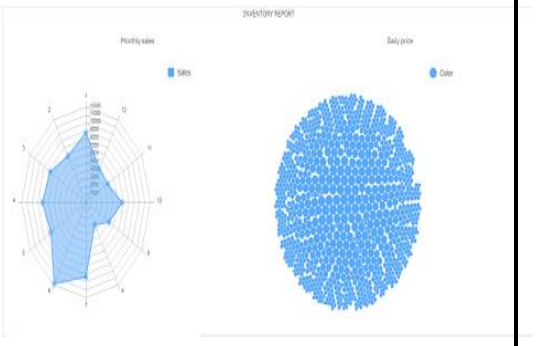
8. 1. Test Cases

Model Performance Testing

S.No	Parameter	Screenshot / Values

1.	Dashboard design	The dashboard is created for user to view the Sales, Price, and stock changes for day to day. 

		
2.	Data Responsiveness	The data is downloaded from an external API and uploaded in the IBM cognos analytics using Watson and a data module is created using cognos to view the dashboard, story and report.
3.	Amount Data toRendered (DB2Metrics)	The dataset which is downloaded from the external API and uploaded is rendered from the DB2.
4.	Utilization of Data Filters	The data filters are used for pre- processing the data i.e, cleaning of data , removing the null value. The unwanted columns are removed from the data-set and the additional data which are required areadded to the data-set.

5.	Effective User Story	The story is created with two scenes i.e. Introduction, sales by year & stock. 
6.	Descriptive Reports	The report is created with two visualizations i.e., result, sales greater than 350. 

8. 2. User Acceptance Testing

1. Purpose of Document

The purpose of the document is we can analysis the data easily and the method of analysis are detailed in the document we can create an analytics Report, Dashboard

and even the slide show story for Data analytics using cognos We can analysis the data using the Python all the data are elaborated in the document It is the main Purpose of the document.

2. Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and however they were resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	5	3	2	0	10
Duplicate	0	0	0	1	1
External	2	0	0	1	3
Fixed	6	2	0	0	8
Not Reproduced	0	1	1	0	2
Skipped	0	0	0	0	0
Won't Fix	0	0	0	0	0
Totals	13	6	3	2	24

3. Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested.

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	1	0	0	1
Client Application	2	0	0	2
Security	1	0	0	1
Outsource Shipping	1	0	0	1
Exception Reporting	1	0	0	1
Final Report Output	2	0	0	2
Version Control	2	0	0	2

9. Results

9.1. Performance Metrics

1. Demand Forecast Accuracy

An excellent inventory management metric for determining how strong collaboration is in a manufacturing operation, demand forecasting reflects the variation in real or actual demand and what is estimated at the factory level. Inventory metrics for manufacturing can make operations more effective by closing the gaps between forecasted demand and actual demand.

2. Customer Satisfaction Levels

Often measured in net promoter scores (NPS), customer satisfaction levels need to be evaluated across all distribution and selling channels. Best-in-class manufacturers measure selling and distribution separately, determining an NPS for each channel. This is to index your customers' order-to-delivery times and check to see if they're consistent with what you originally expected.

3. Fill Rate Effectiveness as a Percentage of All Orders

Measuring supply chain collaboration needs to be a priority when selecting inventory metrics and KPIs to manage your operation. Tracking fill rate effectiveness as a percentage of all orders directly reflects how many orders or requests for material from production centers are fulfilled. Taking this metric a step further provides insights into how well production centers are managing inbound inventories to meet customer delivery dates.

4. Gross Contribution Margins by Product, Production Facility and Business Unit

Best-in-class inventory management solutions provide gross contribution margin (GCM) performance levels across several different dimensions of business. GCM is one of the most effective metrics a business can use to evaluate how well collaboration is happening across business units.f you know the GCM attributable to a given production center, you can track performance and effectiveness levels by location

CHAPTER - 7

CODING & SOLUTIONING

CHAPTER – 8

TESTING

CHAPTER – 9

RESULTS

CHAPTER – 10

ADVANTAGES AND DISADVANTAGES

ADVANTAGES :

- **SAVES TIME**

  Paper-based retail inventory management can take a lot of time and effort.The retail inventory management software can cut short your in-store inventory process cycles through automation. Automation would give you time to focus on other productive business tasks.

- **Eliminates Errors**

  Traditional retail inventory processes can be vulnerable to errors. Inventory process errors in retail would not only increase your expenses but would also impact your business reputation. The retail inventory software would make sure to minimize human intervention in the process. Thus, it would reduce errors considerably.

- **Improves Transparency**

  In the retail industry, the visibility of the real-time status of the various items in the inventory is very critical. It would impact many other retail processes and important business decisions. It is challenging to keep track of multiple items in the inventory round the clock through a paper-based process. A retail inventory management system can give you 360-degree item information anytime.

- **Efficient Stock Counting**

  If done manually, stock counting is a tedious and error-prone process. The retail inventory management software can automatically count the items in your warehouse with better accuracy. Hence, it can provide you with updated inventory reports.

- **Process Efficiency**

  Inventory management is one of the crucial retail processes. Thus, any discrepancy in the inventory control would impact all other operations in your company. The retail inventory software can streamline the inventory processes, which would, in turn, improve the efficiency of your entire business.

- **Cost-Effective**

  Manual inventory control would increase your labor and process costs. The software would not only help you save time, but it would also help you reduce costs. As a result, the profitability of your business would improve. Also, you can invest the excess funds in activities that promote your business growth.

- **The Anywhere for Retail Advantage**

  Retail companies deal with the incredible volume of inventory on an everyday basis. The retail inventory management solution can be an asset to any retail company. Anywhere for Retails solution can optimize complicated and timesensitive inventory processes. And make your retail processes more effective and efficient.

DISADVANTAGES

Using this method, organizations will find that it is not possible to fully account for many inventory items such as unrecorded markdowns, returns merchandise waiting approval, merchandise in transit and unsold merchandise. This makes the retail inventory method unreliable for many organizations.

Excess inventory can lead to poor quality goods and degradation. If you've got high levels of excess stock, the chances are you have low inventory turnover, which means you're not turning all your stock on a regular basis. Unfortunately, excess stock that sits on warehouse shelves can begin to deteriorate and perish

CHAPTER – 11

CONCLUSION

For the success of the program, the managers of the retail stores must formulate a modern way of managing the inventory by instituting electronic systems to take care of the resources of the company. This ensures that they can be accounted for and there are proper records available all the time for reference to be made when the need arises. Besides, the retail management system is necessary for ensuring that there is accountability in the way the company handles its stock. It helps in saving time. Retail companies have acquired significant importance within several countries due to their high economic contribution. Therefore, the need to analyze their KPIs becomes highly significant, as well as their different systems, methodologies, and tools used within inventory management and optimization. From the aspects mentioned above, the main trends in inventory management within companies were defined.