RETAIL STORE STOCK INVENTORY ANALYTICS

NALAIYA THIRAN IBM PROJECT REPORT

TEAM ID : **PNT2022TMID08113**

Submitted By

GOWRITEJESH A P
BHASKAR
GIRISH BABU N
DHINESH M

in partial fullfillment for the award of the degree
of
BACHEOR OF ENGINEERING
in
Department Of Electronics and communication
Engineering,

Adhiyamaan college of engineering

Hosur

CONTENT

INTRODUCTION:

Today, people are shopping in ways never before imagined as they piece together the online and in-store shopping experience to best meet their needs. It's more important than ever tomeet your customers where they prefer to shop and put them at the centre of your marketing and customer experience. In this guide, you'll learn how to better connect with customers on these new shopping journeys and drive more sales. We've collected the most useful tools, product recommendations, and consumer insights to help you achieve your business and marketing objectives. Whether you're looking to optimise your existing marketing mix or make a game plan for the holiday season, this guide has you covered. Inventory management is an essentialpart of running a successful retail business. It's important to have a solid strategy to avoid overselling, stocking out, and keeping track of your inventory levels. The project contains the dashboard, report and story.Embed dashboard, report and story in html page and web app.

PROJECT OVERVIEW:

The retail industry has gone through tremendous technological changes in the past few decades. The advent of e-commerce and online retail websites has pushed retail companies to embrace technology. However, few companies still employ traditional business methods.Eventually, only those companies which adopt technology can optimise their business growth. Paper based processes can curb the growth of your retail business. Especially, inventory Management without the use of technology can be cumbersome.Inventory is a vital aspect of any retail enterprise. If it is not managed efficiently, it could have a ripple effect on other retail in- store processes. The retail inventory management software would help you handle complex inventory processes easily.The retail world involves constant competition, to get consumers' attention, and ultimately convince them to make a purchase. This is why you need retail inventory software that makes life behind the scenes easier and more automated.With automationin production, simplified stock tracking, and integrations for sales, accounting, and shipping. It's ideal for owners who want a wider view of their business, and more time to focus on long-term growth. 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.Retailers are witnessing a historic shift in the way consumers shop. Today's consumers can

easily compare prices, research products, and make purchasing decisions that align with their lifestyle. Whether online or instore, retail customers have come to expect shopping experiences to be personalised to their unique needs and preferences, order fulfilment and returns that are hassle-free, and responsive customer service available via multiple channels. Analytics for retailers enables a data-driven approach to meet these expectations. Online retail inventorymanagement Empty digital store shelves represent lost sales opportunities and can cause customers to migrate to competitors who are able to consistently keep desired products in stock. With potentially hundreds or thousands of items for sale, traditional threshold based models of inventory management are not sufficient. Modern retail analytics programs are capable of analysing past purchasing and stock data as well as data from third-party and public sources suchas weather data and point-of-sale data to more accurately predict demand for individual items.

PURPOSE:

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 businesstasks.

ELIMINATES ERRORS:

Traditional retail inventory processes can be vulnerable to errors. Inventory processerrors in retail would not only increase your expenses but would also impact your business reputation. The retail inventory software would make sure to minimise human intervention in theprocess. 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 labour 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.

LITERATURE SURVEY

EXISTING PROBLEM:

UNCLEAR COMMUNICATION

Even in straightforward business processes, miscommunication can cause irreversible damage to efficiency. You can only imagine the far-reaching impact it would have on a complex and multifarious process, like inventory management. As inventory management has numerous components, clear communication is vital for a seamless flow. For instance, having the correct prices is critical to print the price labels for the products in the inventory. However, if an update in the prices is not communicated before printing the labels, the products would go out with the wrong price labels. The revisions for such errors would take a lot of time. Furthermore, if the miscommunication is not detected in time, it would affect the sales and profitability of the company. Automation can help you streamline your communication flow across the departments. A retail inventory automation software would provide real-time information about the inventory.

Correct and timely information would decrease events of miscommunication.

INADEQUATE ACCESS

Generally, insufficient access to information would lead to miscommunication issues. Every department needs to have access to data that is crucial to their processes. Hence, the impact of the lack of proper access is not limited to individual processes. But it also affects the complete retail inventory management. In the absence of adequate access, your team would resemble disconnected groups. Lack of access would leave them uninformed, which, in turn, affects their productivity. Therefore, better access would improve the efficiency of inventory and other business processes. You can simplify your accessibility issue with retail inventory management software. The software can efficiently manage the access of the users, which would, in turn, improve the quality of the process.

INEFFICIENT WAREHOUSE MANAGEMENT

Warehouse management is a core component of brick-and mortar retail inventories. Hence, ineffective warehouse management would affect the complete retail inventory process. A decentralised inventory management system would comprise the accuracy of the operations. Many aspects of warehouse management would be vulnerable to errors without integrated software. Inept warehouse management could lead to lost orders, delays in order fulfilment, and errors in shipment. It also causes incorrect stock counts, inaccurate barcodes and labels, increased storage costs, and misplaced products. The problem will only deteriorate if multiple warehouses support your retail operations. Barcoding technology is a boon to manage complex warehouse operations. A retail inventory management software with a barcode scanning tool could be an effective solution to manage warehouse processes efficiently.

OVERSELLING

What is worse than not being able to sell your entire product inventory?

It has to be overselling your product and not being able to meet customers' demands. Selling more than you can deliver could stain your business' reputation for a long time. Overselling is a result of flawed communication and process flow of your inventory management. This issue can also be a result of incorrect stock counting. For instance, retail businesses keep a reserve of inventories beyond the necessary stock, referred to as safety stock.

This safety stock would come to the rescue in a scenario when you are not able to meet the customers' demands with the regular stock. However, If you miscount your inventory, even safety stock may not be able to rescue your business from a chaotic situation.If you could get notifications about the level of the stock in your inventory, you would minimise the chances of overselling. A retail inventory solution can provide real-time updates about your inventorylevels.

SPOILED GOODS

Inventory management is more complicated for retail companies that deal with perishable goods. Expiration dates become crucial in the inventory tracking process. Inefficient inventory tracking can cause considerable stock and monetary loss for retail businesses. For instance, the warehouse staff sends out a shipment of products with a later expiration date while warehousing considerable stock with an earlier expiration date. This error would not only hamper the process cycle but would also increase the risk of spoilage of the product with an earlier expiration date.You can manage this issue with the introduction of technology. A retail inventory management solution can track the status of perishable goods and help you reduce spoilage.

REFERENCES

[1] R. Ishfaq, C. C. Defee, B. J. Gibson, y U. Raja, "Realignment of the physical distribution process in omnichannel fulfilment", International Journal of Physical Distribution & Logistics Management, vol. 46, núm. 6/7, pp. 543–561, jul. 2016, doi: 10.1108/IJPDLM-02-2015-0032.

[2] J. Kembro y A. Norrman, "Exploring trends, implications and challenges for logistics information systems in omnichannels : Swedish retailers' perception", International Journal of Retail and Distribution Management, vol. 47, núm. 4, pp. 384–411, 2019, doi:10.1108/IJRDM-07-2017-0141

[3] G. Hançerlioğulları, A. Şen, y E. A. Aktunç, "Demand uncertainty and inventory turnover performance: an empirical analysis of the US retail industry", International Journal of Physical Distribution and Logistics Management, vol. 46, núm.6–7,pp.681–708,2016,doi:10.1108/IJPDLM-12-2014-030

[4] J. D. Sterman y G. Dogan, "'I'm not hoarding, i'm just stocking up before the hoarders get here.': Behavioural causes of phantom ordering in supply chains", Journal of Operations Management, vol. 39, pp. 6– 22, 2015.

[5] Y. Wang, S. W. Wallace, B. Shen, y T.-M. Choi, "Service supply chain management: A review of operational models", European Journal of Operational Research, vol. 247, núm. 3,pp. 685–698, 2015.

[6] S. Mahar y P. D. Wright, "The value of postponing online fulfilment decisions in multichannel retail/e-tail organisations", Computers & operations research, vol. 36, núm. 11, pp.3061–3072, 2009

[7] A. Hübner, A. Holzapfel, y H. Kuhn, "Operations management in multi-channel retailing: an exploratory study", Operations Management Research, vol. 8, núm. 3–4, pp.84–100, 2015.

[8] A. Hübner, H. Kuhn, J. Wollenburg, y A. Trautrims, "From bricks-and mortar to bricks-and-clicks–logistics networks in omni-channel grocery retailing", Empirical Studies in MultiChannel and OmniChannel Retail Operations and Logistics, p. 102, 2018.

[9] A. Fink, Conducting research literature reviews: From the internet to paper. Sage publications, 2019

[10] A. Cooke, D. Smith, y A. Booth, "Beyond PICO: the SPIDER tool for qualitative evidence synthesis", Qualitative health research, vol. 22, núm. 10, pp. 1435–1443, 2012

PROBLEM STATEMENT DEFINITION

Effective loss prevention and asset protection efforts are essential to minimising these values—known as stock loss, inventory shrink or simply shrink—and preserving profitability. The challenge is a significant one, however, because while robberies are relatively infrequent for the average business, shoplifting/ORC and employee theft can accommodate for more than two- thirds of shrink. Human error, paperwork snafus, spoilage, and other factors account for the remaining third.With inventory levels under assault in both cyberspace and the real world,effective inventory management requires a sophisticated and strategic approach in order torecover value—or prevent its loss in the first place.

Isn't It Time You Cut Your Losses?

If your business is still tracking and planning its inventory by hand or with outdated tech, even a banner year can become a Pyrrhic victory when stock loss bites into your profits.Integrating an automation powered inventory management solution into your ERP makes it possible to take control of your inventory, meet demand more efficiently and effectively, and reduce costly losses.

SUB-PAR WAREHOUSE MANAGEMENT

Large, often labyrinthine, and difficult to organise manually, warehouses can create significant pain points, and serious losses, if managed inefficiently.Manual data collection, paired with a lack of a centralised data management strategy, can create a breeding ground for:

● Lost orders

● Inaccurate inventory counts

● Inaccurate or duplicated barcodes and stock keeping unit (SKU) numbers

● Slow order fulfilment

● Shipping errors

● Inaccurate or incomplete returns

● No connection between purchase orders, shipping documents, and invoices sent

● High storage costs and less space for more successful products due to excess inventory

A high amount of dead stock, or older, less popular products that aren't necessarily spoiled, damaged, or destroyed, but simply not in demand. As with excess inventory of current products, this can consume storage space and resources better spent on housing items that are in demand.That same lack of centralised data management and poor communication can also create inventory discrepancies across multiple locations, creating an exponentially expensive inventory management disaster

IDEATION & PROPOSED SOLUTION

When ideation is used internally, businesses seek to gather ideas from their employees, who work on and develop the products and services. Internal ideation often consists of group activities such as brainstorming sessions and prototyping (depending on the industry).When ideation is used externally, businesses usually target their pool of existing customers since who knows their product better than those who actually use it!? Customers have the knowledge to provide businesses with ideas on product/service improvements, so most external ideation efforts are directed this way.

HOW IDEATION CAN

Ideation is one of the most necessary components of a business strategy, and if you don't have a process for ideation, it's unlikely that your business will see constant improvement and

will therefore be unable to deliver what your customers actually want.While it's important to get ideas internally, it's more important that ever to get ideas from your customers.Statistics show that price, while important, isn't the only reason why customers feel loyal towards a brand. In fact, 80% of customers are willing to pay more for a better customer experience. So, price aside, other factors that can increase brand loyalty are:

- Value
- Quality
- Experience

EMPATHY MAP CANVAS

THE VALUE OF EMPATHY MAPS

As your team identifies what they know about the user and places this information on a chart, you gain a more holistic view of your user's world and the problem or opportunity space. By having a more holistic view, you gain insights that add layers of context about the relationships between the users and their experiences. A more holistic view can also reveal the ways in which your user most naturally engages with what your team designs and builds. In other words, your designs should reach out to the user. Empathy maps can help you do that.

IDEATION & BRAINSTORMING

Brainstorming is the most frequently practised form of ideation. We recommend that you use it along with Brainwriting, Brainwalking, and Brain Dumping. Here, you'll learn the best practices from the very best experts from d-school and IDEO as well of the father of the Brainstorming technique, Alex Osborn. Brainstorming is a great way to generate a lot of ideas that you would not be able to generate by just sitting down with a pen and paper. The intention of brainstorming is to leverage the collective thinking of the group, by engaging with each other, listening, and building on other ideas. Conducting a brainstorm also creates a distinct segment of time when you intentionally turn up the generative part of your brain and turn down the evaluative part. You can use brainstorming throughout any design or work process, of course, to generate ideas for design solutions, but also any time you are trying to generate ideas, such as planning where to do empathy work, or thinking about product and services related to your project.
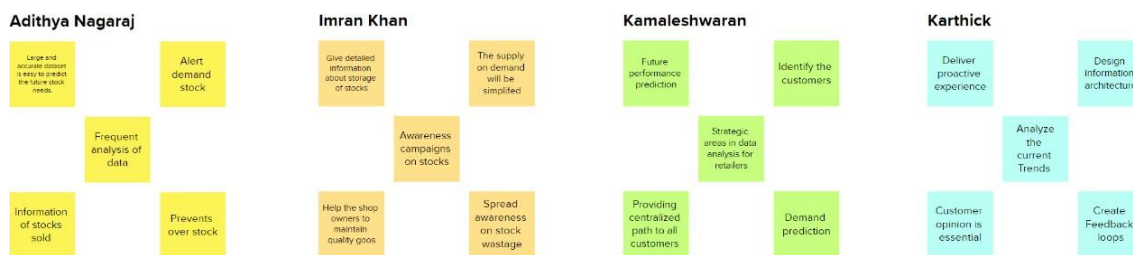
PROPOSED SOLUTION

1 PROBLEM STATEMENT

To create an application to Manage the inventory for Solution Description.This application is used to help stores and ecommerce sellers satisfy customers,Reduce costs and increase Profits.

2 UNIQUENESS

This application has theUniqueness of easy handling Of huge inventory and helps The merchants to maintain the Stock up to date.

3 CUSTOMER SATISFACTION

Their customers are very much Satisfied because of the easy Maintenance of the record

And which is also a paperless Approach.

4 BUSINESS MODEL

This model includes the Information like products or Services, the business plans To sell, target markets, and Any anticipated expenses.

5 SCALABILITY OF THE SOLUTION

This application is the measure of a system's ability To increase or decrease in performance and cost in response to changes in Application and system Processing demands.

S.No.	Parameter	Description
1	Problem Statement (Problem to be solved)	It is very difficult for the retailers to manage, analyse and track the stocks and purchase due to the huge mass of people because it consumes a lot of time.
2	Idea / Solution description	To develop a software that will be able to maintain stocks and purchase, forecast the sales, generate reports in less time.
3	Novelty / Uniqueness	It is helpful for retailers because the status of the stock, purchase, demand products can be accessed at any instant and decisions can be taken easily on the mobile.
4	Social Impact / Customer Satisfaction	Customers that are retailers can manage and forecast their business easily even without

		experience and make decisions quickly.
5	Business Model (Revenue Model)	Retailers are able to understand the shoppers needs deeply and adjust their offering to meet shoppers demands.
6	Scalability of the Solution	This solution is applicable for small retail stores as well as large departmental stores. It can also analyse a wide range of datasets and different types of visualisations can be done.

PROBLEM SOLUTION FIT

CUSTOMER SEGMENT(S)

The merchants are the Customer. The shop owners are the customers.

JOBS-TO-BE-DONE/PROBLEMS

The stocks to be maintained Up to date.Monitor the daily Sales, monthly sales and the Yearly sales and the overall Sales of the individual Stocks

TRIGGERS

The needs of the consumer(who buys the products from the shop) has to be satisfied.The big data Has to be stored and Maintained.

EMOTIONS : BEFORE/AFTER

Before the records have to be maintained in a paper and document which is in physical

form. After the implementation of this application the records can be online.

CONSUMER CONSTRAINTS

It requires less man power.It is budget friendly and does not require more amount for Installation and maintainence.It can be accessed in offline mode also.

AVAILABLE SOLUTIONS

The entered data will be automatically stored in the database.The user has no need to store the data every time only by just clicking the save button.This reduces the loss of the data.

BEHAVIOUR

It contains a chat box where the customer can ask their questions and the problems will be solved within a few hours

1.Customer Segment(s)	6.Consumer Constraints	5.Available Solutions
The merchants are the customer.The shop owners are the customers.	It requires less man power.It is budget friendly and does not require more amount for installation and maintainence.It can be accessed in offline mode also.	The entered data will be automatically stored in the database.The user has no need to store the data every time only by just clicking the save button.This reduces the loss of the data.
2.Jobs-to-be-done/Problems	9.Problem root cause	7.Behaviour
The stocks to be maintained up to date.Monitor the daily sales, monthly sales and the yearly sales and the overall sales of the individual stocks.	The poor internet connectivity is the root cause of the problem.	It contains a chat box where the customer can ask their questions and the problems will be solved within a few hours.
3.Triggers	10.Your solution	8.Channels of behaviour
The needs of the consumer(who buys the products from the shop) has to be satisfied.The big data has to be stored and maintained. 4.Emotions : Before/After Before the records have to be maintained in a paper and document which is in physical form. After the implementation of this application the records can be stored in the virtual mode and can be maintained in an easier way.	Using High speed internet is the solution for the poor internet connectivity problem.	8.1 Online The adding, deleting of the data and any other modifications and updating can be done only in the online mode. 8.2 Offline The data which is stored in the database can be viewed and the current price or cost of the stock can be viewed in the offline mode.

CHANNELS OF BEHAVIOUR

ONLINE

The adding, deleting of the data and any other modifications and updating can be done only in the online mode.

OFFLINE

The data which is stored in the database can be viewed and the current price or cost of the stock can be viewed in the offline mode.

PROBLEM ROOT CAUSE

The poor internet connectivity is the root cause of the problem.

YOUR SOLUTION

Using High speed internet is the solution for the poor internet connectivity problem.

REQUIREMENT ANALYSIS

FUNCTIONAL REQUIREMENT

Retail Management System has a modular nature, so it is logical to address requirements to different modules (some of the modules can be integrated into RMS as stand-alone solutions):

- Point of sale – manages sales in a retail store
- Scan item barcode and load the item info from the system
- Allow manual input and search of sale item
- Record sale, return, and exchange to the database
- Accept payment by cash, credit cards, iPay Print invoice
- Customer Relationship Management – consolidates information about customers

| FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Add product	Generate new product ID Enter the product name Enter Product price Enter Category Enter the stock limit (To notify if stock is less)
FR-2	Update product	Enter the product ID
FR-3	Delete product	Enter the product ID
FR-4	View products	View by product ID View by alphabetical order View by Category
FR-5	Add Category	Enter the category name
FR-6	Update Category	Select the Category name
FR-7	Delete Category	Select the Category name
FR-8	View Category	View by Category
FR-9	Order product	Enter Customer details Enter Product ID Enter Quantity Add to Bill data store
FR-10	View Summary	View Total orders View Stock details View Sales details (growth graph)
FR-11	View Bills	View by date View by customer View by amount

FR-12	Add Employee	Enter employee details Generate Login credentials
FR-13	Update Employee	Enter Employee user name
FR-14	Delete Employee	Enter Employee user name
FR-15	View Profile	Enter Employee user name
FR-16	Notify on low stock	Generate Message and display on home screen
FR-17	Add daily purchase	Enter the product ID Enter quantity

Non Functional Requirements

| FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Easy to understand, learn and use.The application interfaces are designed with end users in mind so that they are intuitive to use.
NFR-2	Security	Users' details need to be secure and safe, so that various algorithms from cryptography can be used to keep all the data confidential and Data integrity should be achieved at any cost.
NFR-3	Reliability	If there is any disaster, then it should be recovered in least time and the data should be maintained consistently.
NFR-4	Performance	The system needs to speed enough to assist the retailer.
NFR-5	Availability	The application should be language and platform independent.
NFR-6	Scalability	Even if new branches are added, the system should be capable of maintaining the records without any discrepancies.

PROJECT DESIGN

DATA FLOW DIAGRAM
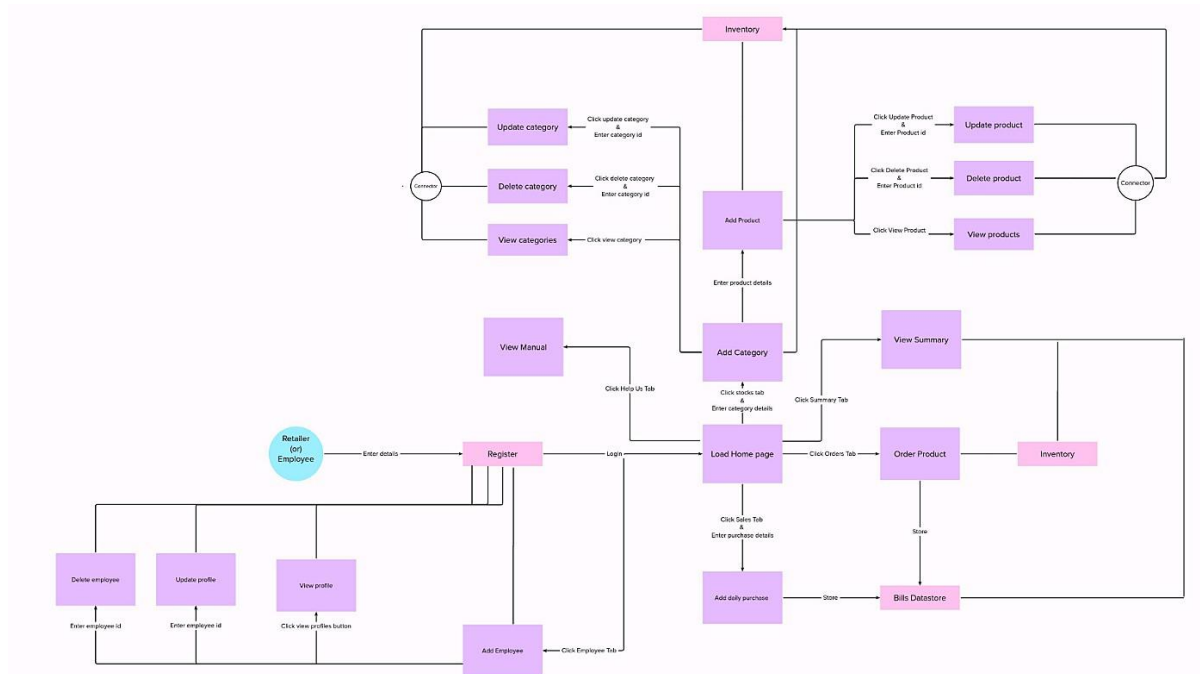
SOLUTION & TECHNICAL ARCHITECTURE

This solution Architecture has the customer, who interact with the merchant online (web or mobile), with pickup or delivery, or physically at the stores, whether it is by interaction with a store employee, or via self-service machines.Store managers, who want to have visibility into how products and product categories are selling, get predictive insights such as inventory consumption and drive automatic actions, e.g. automated procurement.Upper management, who is interested in advanced real-time analytics with visualisation, reporting and AI capabilities.Data scientists, working on big data, with growing data quantity and number of sources, requiring fast processing and flexibility to easily deploy models .Low-code developers, working on existing and new data-driven applications, with a focus on simplicity and with the least possible time spent managing security and operations.
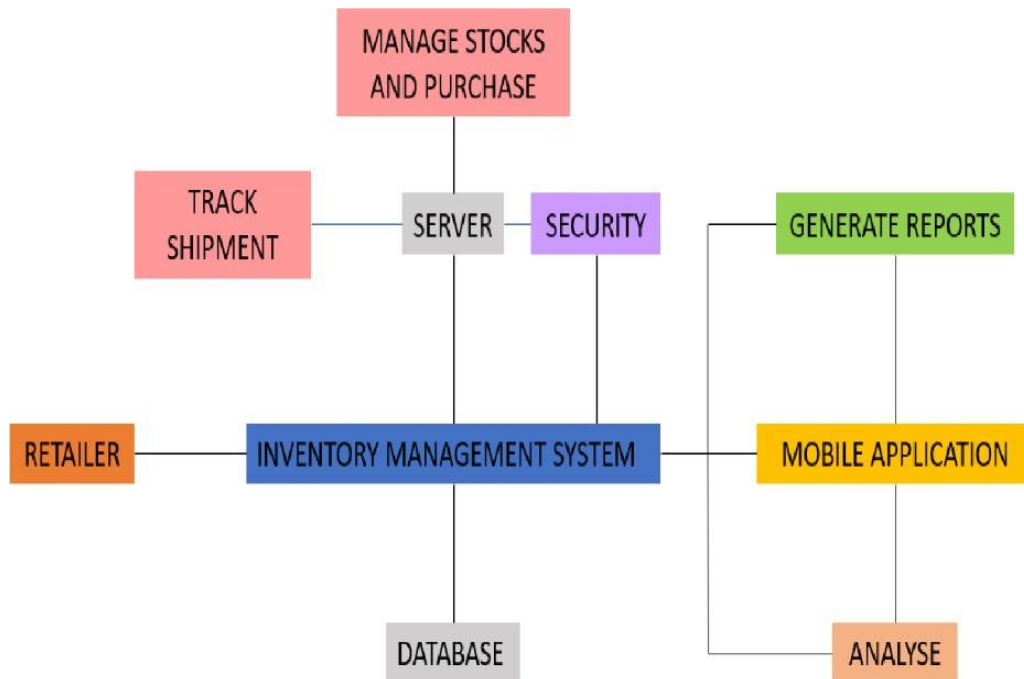
USER STORIES

A user story is a small, self-contained unit of development work designed to accomplish a specific goal within a product. A user story is usually written from the user's perspective and follows the format: "As [a user persona], I want [to perform this action] so that [I can accomplish this goal]."

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Retailer (Web user)	Login	USN-1	As a Retailer, I can log into the application by entering email & password (provided by developer)	I can access my account / dashboard	High	Sprint-1
	Add Product	USN-2	As a Retailer, I will be able to add the product by entering their details(product name,price and category).	I can view the added products by clicking the view products button.	High	Sprint-2
	Update product	USN-3	As a Retailer, I can able to update the product details by entering the product id(product id- Known by clicking view product button,Generated by the system while adding)	I can update the product details.	low	Sprint-2
	Delete product	USN-4	As a Retailer, I can able to delete the product as it is no longer needed by entering the product id(product id- Known by clicking view product button,Generated by the system while adding)	I can delete the product from the system.	low	Sprint-2
	View products	USN-5	As a Retailer I am able to view the list of products by clicking the view product button in the stocks tab.	I can view the list of products.	High	Sprint-2
	Add category	USN- 6	As a Retailer I am able to add category by entering category details (Category name)	I can create a new category.	High	Sprint-1
	Update category	USN-7	As a Retailer, I am able to update the category details by selecting the category name.	I can update the category details.	Low	Sprint-1

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
	Delete category	USN-8	As a Retailer, I am able to delete the category details by selecting the category name as it is no longer needed.	I can delete the category if it is no longer needed.	Low	Sprint-1
	Order product	USN-9	As a Retailer I am able to order the products by entering customer details,product id and quantity.	I can forecast the stocks needed by pre-ordering.	High	Sprint-2
	View Summary	USN-10	As a Retailer I can view the summary of the inventory such as total orders,stock details and sales details.	I can view the Total inventory details.	High	Sprint-2
	View Bills	USN-11	As a Retailer I can view bills based on the amount,date and customer.	I can view the Bills.	Medium	Sprint-2
	Add Employee	USN-12	As a Retailer I can add employees by Entering their details.	I can generate employee login credentials.	High	Sprint-3
	Update Employee	USN-13	As a Retailer I can Update the employee details by entering their id.	I can access the Employee details.	Low	Sprint-3
	Delete Employee	USN-14	As a Retailer I can Delete the employee as it is no longer needed.	I can delete the employee details .	Low	Sprint-3
	View profile	USN-15	As a Retailer I can View list of employees and their details by clicking the view profile button.	I can view the employees profile.	Medium	Sprint-3
	Notify on critical stock	USN-16	As a Retailer I can view the notification (due to understock and overstock) via mobile phone and dashboard(Home page).	I am aware of understock and overstock.	High	Sprint-3
	Add daily purchase.	USN-17	As a Retailer I can add the daily purchase by Entering the product Id and quantity.	I can keep track of stocks.	High	Sprint-3
Employee(Website)	Login	USN-18	As a Employee I can log into the application by entering email & password (provided by developer)	I can access the system.	High	Sprint-1

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
	Order product	USN-19	As an Employee I am able to order the products by entering customer details,product id and quantity.	I can enter the pre - order details.	High	Sprint-4
	View summary	USN-20	As an Employee I can view the summary of the inventory such as total orders,stock details and sales details.	I can view the Total inventory details .	High	Sprint-4
	View Bills	USN-21	As an Employee I can view bills based on the amount,date and customer.	I can view the Bills.	Medium	Sprint-4
	Add daily purchase	USN-22	As an Employee I can add the daily purchase by Entering the product Id and quantity.	I am aware of stock availability.	High	Sprint-4

PROJECT PLANNING & SCHEDULING

The planning process requires a thorough look into the Retail Store motives to determine what strategies to implement. While it may be time-consuming, drafting a detailed plan isessential for successful execution. Retailers can begin by following seven general steps-

SET GOALS

Businesses need to set specific short and long-term goals. Instead of setting a general objective to increase sales, management should set benchmarks regarding which product performances need to improve, specific revenue goals, and ideal profit margins for each item. Retail Store can further break down their goals into two categories

INTERNAL OBJECTIVES

Retail management should pull reports and set practical sales and revenue goals based on product performance. Organisations can set clear monthly, quarterly, and annual targets to motivate employees and keep them focused on boosting sales.

EXTERNAL OBJECTIVES

External goals refer to a retailer's overall performance according to customers and their experience. This can include customer service, retention, loyalty, and product pricing. Retail stores should aim to create a personalised experience that attracts and generates returning customers.

ANALYSE THE MARKET

Once the company's objectives are clearly defined, it is time to analyse the current market. Research can expose competitors' strategies, performance, and weaknesses, as well as

consumer expectations. This allows companies to develop a plan of action that fulfils customer needs and stands apart from the competition.

Research can also define any risks and opportunities the Retail Store may be exposed to and how to respond. Retailers can anticipate upcoming events through risk management and planning, so they are not caught off-guard. Through this process, businesses can analyse their own strengths and weaknesses, allowing them to improve the necessary areas. This may include financial planning, resource allocation, and staffing.

ANALYSE CUSTOMER BEHAVIOUR

If a Retail Store does not understand their target audience, they cannot correctly launch and promote products to attract customers. Therefore, retailers need to understand what consumers expect from products and brands. First, Retail stores must understand what types of demographics are in the market for their products. Then they can innovate customised experiences and brand images to attract audiences. However, retailers should continuously monitor customer feedback and preference to avoid becoming irrelevant or stagnant.Retail planning is vital for defining business objectives and maintaining a foothold in a competitive market. Without a detailed plan, retailers can exhaust time and resources on ineffective marketing tactics. A comprehensive retail plan ensures that employees are working in unison to provide the best service, products, and experience, boosting company revenue.

SPRINT PLANNING & ESTIMATION

Sprint planning is an event in scrum that defines what can be delivered in the upcoming sprint and how that work will be achieved.The sprint is a set period of time where all the work is done. However, before you can leap into action you have to set up the sprint. You need to decide on how long the time box is going to be, the sprint goal, and where you're going to start. The sprint planning session kicks off the sprint by setting the agenda and focus. If done correctly, it also creates an environment where the team is motivated, challenged, and can be successful. Bad sprint plans can derail the team by setting unrealistic expectations.

Sprint-2	Delete product	USN-4	As a Retailer, I can able to delete the product as it is no longer needed by entering the product id(product id- Known by clicking view product button,Generated by the system while adding)	1	Low	Kamaleshwaran P
Sprint-2	View products	USN-5	As a Retailer I am able to view the list of products by clicking the view product button in the stocks tab.	3	High	Imran Khan S Karthick S
Sprint-1	Add category	USN-6	As a Retailer I am able to add category by entering category details (Category name)	5	High	Imran Khan S Adithya Nagaraj R
Sprint-1	Update category	USN-7	As a Retailer, I am able to update the category details by selecting the category name.	3	Low	Adithya Nagaraj R
Sprint-1	Delete category	USN-8	As a Retailer, I am able to delete the category details by selecting the category name as it is no longer needed	2	Low	Karthick S Kamaleshwaran P
Sprint-2	Order product	USN-9	As a Retailer I am able to order the products by entering customer details,product id and quantity.	5	High	Imran Khan S
Sprint-2	View Summary	USN-10	As a Retailer I can view the summary of the inventory such as total orders,stock details and sales details.	13	High	Kamaleshwaran P

SPRINT DELIVERY SCHEDULE

In Agile product development, a sprint is a set period of time during which specific work has to be completed and made ready for review.Each sprint begins with a planning meeting. During the meeting, the product owner (the person requesting the work) and the development team agree upon exactly what work will be accomplished during the sprint. The development team has the final say when it comes to determining how much work can realistically beaccomplished during the sprint, and the product owner has the final say on what criteria need to be met for the work to be approved and accepted.The duration of a sprint is determined by the scrum master, the team's facilitator and manager of the Scrum framework. Once the teamreaches a consensus for how many days a sprint should last, all future sprints should be the same.Traditionally, a sprint lasts 30 days.After a sprint begins, the product owner must step back and let the team do their work. During the sprint, the team holds daily stand-up meetings to discuss progress and brainstorm solutions to challenges. The project owner may attend these meetings as an observer but is not allowed to participate unless it is to answer questions. (See pigs and chickens). The project owner may not make requests for changes during a sprint and only the scrum master or project manager has the power to interrupt or stop the sprint.At the end of the

sprint, the team presents its completed work to the project owner and the project owner uses the criteria established at the sprint planning meeting to either accept or reject the work.

VELOCITY

Sprint	Total Story Points	Duration	Average velocity
Sprint-1	12	6 Days	12/6 = 2
Sprint-2	33	6 Days	33/6 = 5.5
Sprint-3	20	6 Days	20/6 = 3.3
Sprint-4	18	6 Days	18/6 = 3
Over All	83	24 Days	83/24 = 3.45

REPORTS FROM JIRA

The Jira is very useful for creating milestones which shows the project sprint timelines clearly; the sprints are planned and completed within the given time limit.

CODING & SOLUTIONING

FEATURE 1

Dataset from External API are uploaded and DB is created using IBM cloud.Then Dashboard, Story, Report is created using the external API imported dataset and the IBMDB2 cloud database is used to create the dashboard, story, report.

FEATURE 2

Embedded Dashboard, Story, Report is created using the external API imported dataset and the IBMDB2 cloud database is used to create the embedded dashboard, story, report.

DATABASE SCHEMA

The database schema is for retailDB2 connection of the data server.

TESTING

TEST CASES
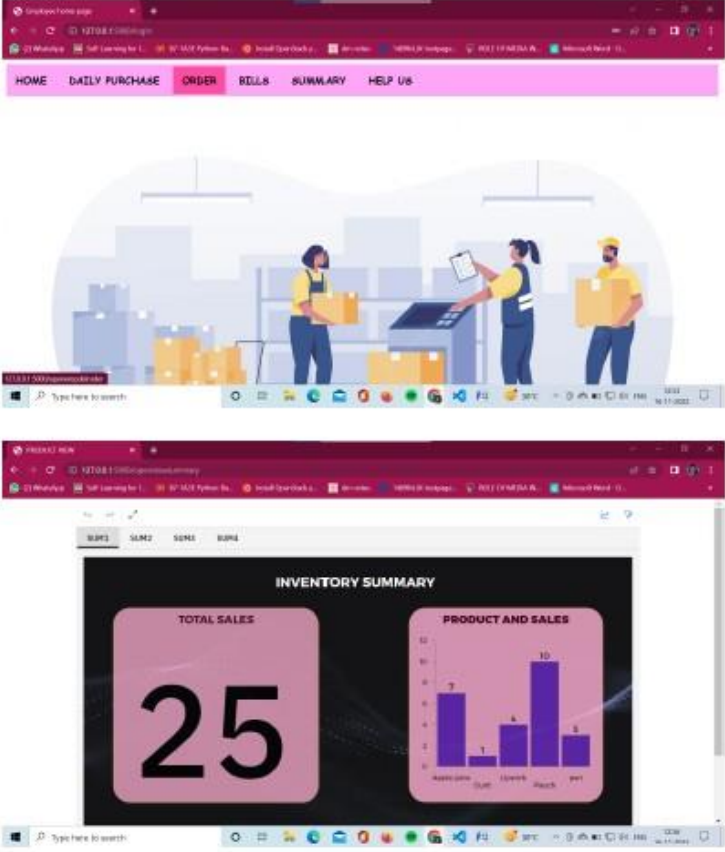
The test case is to download the dataset from an external API and connect DB2
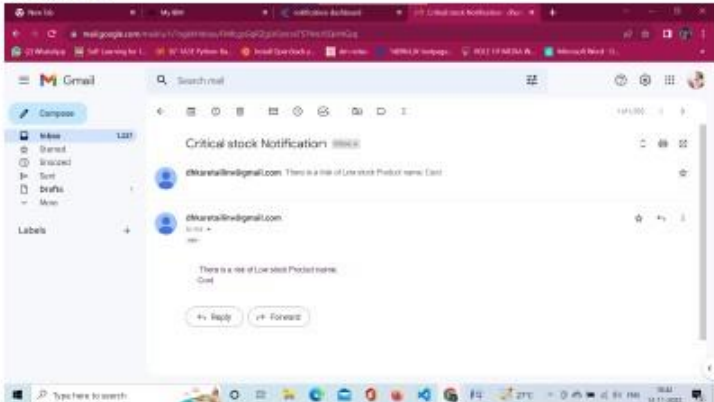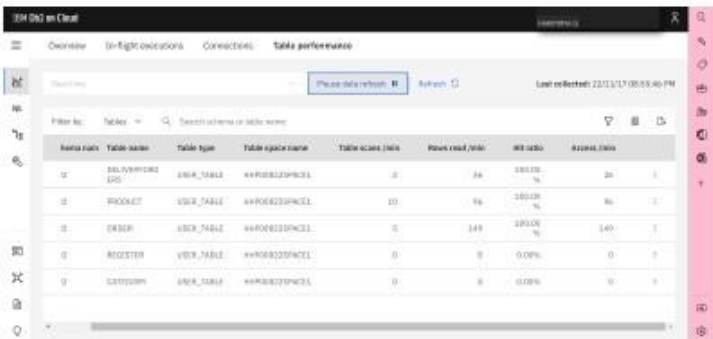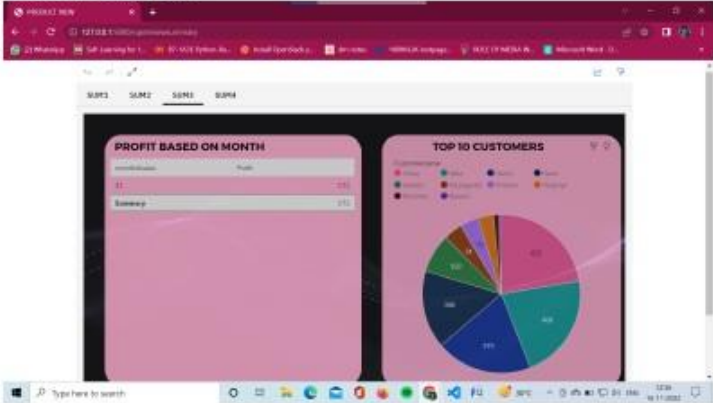
connectivity. Create a dashboard,report and story. Embed the dashboard, report and story to a simple html. Create an web app and embed the dashboard, report and story which you have created.
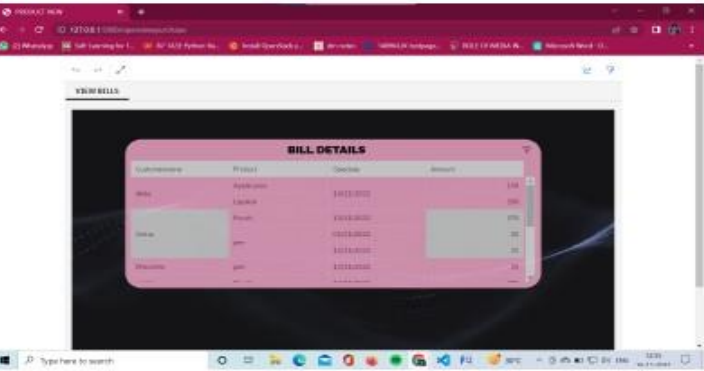
USER ACCEPTANCE TESTING

The test case report and UAT Execution & Report Submission are created.The test case report consists of feature type, component, test scenario, prerequisite, steps to execute, test data,expected result, actual result, status, comments, TC for automation, bug ID and executed by columns.UAT Execution & Report Submission consists of purpose of document, defect analysis and test case analysis.

S.No.	Parameter	Screenshot / Values
1.	Dashboard design	No of Visualizations -3

2.	Data Responsiveness	1.While ordering / booking products the product count in the table gets reduced and whenever the quantity reaches the low stock limit alert will be sent to the retailer mail regarding low stock.
		2.While Adding the daily purchase ,purchase details are stored in the ibm_db2 table.

3.	Amount Data to Rendered (DB2 Metrics)	Depending on the load of data by the retailer Range 1-10000
4.	Utilization of Data Filters	Top ten customers are filtered and visualized based on purchase amount

5.	Effective User Story	No of user stories - 4 1.order product 2.view summary' 3.view bills 4.Add daily purchase
6.	Descriptive Reports	No of Visualizations -1 1.List of bills

RESULTS

PERFORMANCE METRICS

The Performance testing consists of dashboard design, data responsiveness, amount of data to be rendered from the utilisation of data filters, effective user story and descriptive report.

Section	Total Cases	Not Tested	Fail	Pass
Client Application	30	0	0	30
Security	3	0	0	3
Outsource Shipping	3	0	0	3
Exception Reporting	2	0	0	2
Final Report Output	4	0	0	4
Version Control	2	0	0	2

ADVANTAGES & DISADVANTAGES

ADVANTAGES

Easy access to market - in many ways the access to market for entrepreneurs has never been easier. Online marketplaces such as eBay and Amazon allow anyone to set up a simple online shop and sell products within minutes. See selling through online marketplaces.Reduced overheads - selling online can remove the need for expensive retail premises and customer- facing staff, allowing you to invest in better marketing and customer experience on your e- commerce site.

Potential for rapid growth - selling on the internet means traditional constraints to retail growth - eg finding and paying for larger - are not major factors. With a good digital marketing strategy and a plan to scale up order fulfilment systems, you can respond and boost growing sales. See planning for e- commerce.Widen your market / export - one major advantage over premises-based retailers is the ability to expand your market beyond local customers veryquickly. You may discover a strong demand for your products in other countries which you can respond to by targeted marketing, offering your website in a different language, or perhaps

partnering with an overseas company. See basics of exporting.

Customer intelligence - ability to use online marketing tools to target new customers and website analysis tools to gain insight into your customers' needs. For advice on improving your customer's on-site experience, read how to measure your online marketing.Website costs – planning, designing, creating, hosting, securing and maintaining a professional e-commerce website isn't cheap, especially if you expect large and growing sales volumes. See common e-commerce pitfalls.Infrastructure costs – even if you aren't paying the cost of customer-facing premises, you'll need to think about the costs of physical space for order fulfilment, warehousing goods, dealing with returns and staffing for these tasks. See fulfilling online orders.Security and fraud – the growth of online retail market has attracted the attention of sophisticated criminal elements. The reputation of your business could be fatally damaged if you don't invest in the latest security systems to protect your website and transaction processes. See e-commerce pitfalls – security weaknesses.

DISADVANTAGES

Legal issues – getting to grips with e-commerce and the law can be a challenge and you'll need to be aware of, and plan to cope with, the additional customer rights which are attached to online sales. See the law and selling online.Advertising costs – while online marketing can be a very efficient way of getting the right customers to your products, it demands a generous budget. This is especially true if you are competing in a crowded sector or for popular keywords. See pay-per-click and paid search advertising.Customer trust – it can be difficult to establish a trustedbrand name, especially without a physical business with a track record and face-to-face interaction between customers and sales staff. You need to consider the costs of setting up a goodcustomer service system as part of your online offering. See manage your customer service.

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
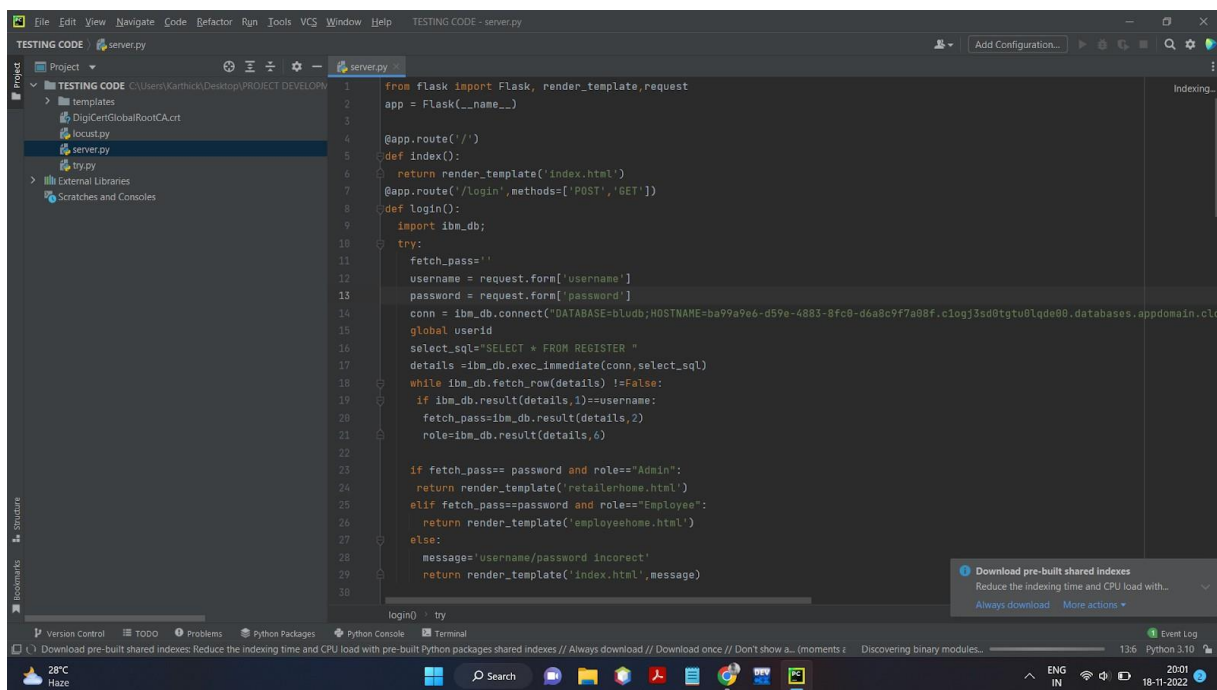
stock. It helps in saving time.Retail companies have acquired significant importance within several countries due to their high economic contribution. Therefore, the need to analyse their KPIs becomes highly significant, as well as their different systems, methodologies, and toolsused within inventory management and optimization.From the aspects mentioned above, the main trends in inventory management

FUTURE SCOPE

The enhanced version of the web application is created using the updated dashboard, report and story using the updated dataset and with better DB connectivity.

APPENDIX

SOURCE CODE

GITHUB LINK

[IBM-EPBL/IBM-Project-18132-1659679737: Inventory Managment System for Retailers (github.com)](github.com)