Project Report

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1. INTRODUCTION

1.1 PROJECT OVERVIEW :

In a globalized economy, the goal of multinational corporations is to find a more efficient flow of goods and services for corporate or individual consumers. The search for new sources and, the acquisition of increasingly competitive advantages, have been a constant challenge in today's highly competitive world in its marketing, finance, operations, logistics and sourcing. The main challenge for retail managers is to provide items on the shelf, matching replenishment and demand, for several different products on various stores while overcoming out-of stocks and excess at the same time. As inventory must be allocated optimally across the stores, regarding the total available inventory, supply chain management is a complex task which requires careful planning and execution . Retail inventory models, when exploited appropriately, lead to significant profits increase once it reduces stock over at stores and ensures customer service level as well as improves the company's assets and capital expenses.

1.2.PURPOSE :

An automated inventory replenishment system recommends order quantities to the store manager every order cycle but, system inadequacy arises because inventory management in a retail store is a complex problem involving many constraints and varying product attributes. For the most part, management's understanding of the effect on safety stocks of uncertainty in lead time is based on an approximation of the demand during lead time using the normal distribution. The context of our research involves the inventory replenishment problem for products follows with demand rate fluctuation, seasonality, automated ordering system for stores replenishment, lead time variability, periodic delivery, monthly forecast and purchase with occasionally supplier product unavailability. Thus, this paper seeks out to identify inventory procedures and metrics that ensure stores replenishment towards stock reduction.

2.LITERATURE SURVEY :

2.1 EXISTING PROBLEM :

The research was carried out using a deductive logic starting from the literature review for a better acquaintance with inventory management theory and the current academic debate. A deductive approach is concerned with developing a hypothesis based on existing theory, and then designing a research strategy to test the hypothesis. The deductive approach can be explained by means of hypotheses, which can be derived from the propositions of the theory deducing conclusions from premises or propositions.

The inventory management theory from literature review was then tested on a single case study regarding a specific department of the retail stores' chain. Reference defines the case study approach as a research strategy which focuses on understanding the dynamics presented within single settings through multiple levels of analysis and multiple types of data collection. The inventory management theory from literature review was then tested on a single case study regarding a specific department of the retail stores' chain.
In retailing, a variety of products competes to be displayed in the limited shelf space since it has a significant effect on demands. To affect customers' purchasing decisions, retailers properly make decisions about which products to display and how much to allocate the stocked at the stores.
According to the pressure to reduce inventory investments in supply chains increases as competition expands and product variety grows. In order to do so, managers seek for inventories reduction without hurting the provided service level. To compensate the increased risk, which is a fruit of the turbulence of recent periods, companies need to develop programs to mitigate and eliminate them. The great challenge of logistics management is to structure a good responsiveness and flexibility to respond to changes in business strategy and impacts generated by external events, while it earns through lean production.

2.2 REFERENECES

- https://www.yourarticlelibrary.com/retailing/inventory-manageme nt-in-retail-store/48143
- https://mybillbook.in/inventory-management-software
- https://www.zoho.com/in/inventory/

2.3 PROBLEM STATEMENT DEFINITION

Customer Problem Statement Template: Create a problem statement to understand your customer's point of view. The Customer Problem Statement template helps you focus on what matters to create experiences people will love. A well-articulated customer problem statement allows you and your team to find the ideal solution for the challenges your customers face. Throughout the process, you'll also be able to empathize with your customers, which helps you better understand how they perceive your product or service.

I am	Describe customer with 3-4 key characteristics - *who are they?*	Describe the customer and their attributes here
I'm trying to	*List their outcome or "job" the care about - what are they trying to achieve?*	List the thing they are trying to achieve here
but	Describe what problems or barriers stand in the way – *what bothers them most?*	Describe the problems or barriers that get in the way here
because	Enter the "root cause" of why the problem or barrier exists – *what needs to be solved?*	Describe the reason the problems or barriers exist
which makes me feel	Describe the emotions from the customer's point of view – *how does it impact them emotionally?*	Describe the emotions the result from experiencing the problems or barriers

Problem Statement (PS)	**I am (Customer)**	**I'm trying to**	**But**	**Because**	**Which makes me feel**
PS-1	Customer	Find the products	Where itis located?	Running outof time	Tension
PS-2	Customer	Purchase from online	Expected not arrival	Low quality or Out of stock	Upset

3.IDEATION & PROPOSED SOLUTION :

3.1.EMPATHYMAP CANVAS :

3.2. IDEATION & BRAINSTORMING :

We chose as we inventory and POS software because it enabled him to stay on top of various parts of his business, including stock levels, accounting, and ecommerce, for a fraction of the cost that he would've spent with a traditional system. Doing so, according to Andrey, enabled them to "reduce costs and most importantly, scale"

"**Within less than a year of starting we were able to open another shop in Oxford (our f first is in Cambridge). The startup costs of a new shop were tiny compared to other similar businesses because we didn't need to buy bulky equipment or pay huge fees. In we went, and started selling straight away**!" - ANDREY PRONIN - PODAROK

Think of this step as creating an inventory wish list. A modern retail store, for example can write down their inventory management needs in this format: • Must have the capabilities to run on tablets • Must be able to generate inventory reports on margins and top-sellers • Must be able to connect with accounting software • Must integrate with online shopping cart

“All our inventory was on one computer! It had taken us many, many hours to upload all our inventory info, so when we lost it all in one go, it felt like a big Setback ,”

- MICHELLE WALES - CONCIOUS VIBES

Product Name - This is the name or title you give to each item. Keep it descriptive, but brief and accurate, so it’s easy to find or remember (e.g., [Brand name] Maxi Skirt).
Product Description - Write a statement or two to describe the item. Will your customers see these product descriptions (i.e., will they be displayed on your ecommerce site)? If so, inject some personality into them.
Product Image - If you can, also upload product images into your inventory system. Doing so will make it easier for you to find items when you’re ringing up sales. This will also be helpful if you have an ecommerce integration, as the images you have in your inventory or POS system will be displayed on your site.
SKU - The stock keeping unit, aka SKU, is a unique identifier for each of your products. If you have existing barcodes or supplier-barcoded products, you can simply scan or enter them into the system. You also have the option of creating your own barcodes.

Create a flow chart

Start by putting your inventory management process on paper. This sounds basic, but don’t skip it. Documenting your procedures enables you get a better handle on how inventory flows in your store. It keeps you organized and makes it easier to spot inefficiencies or areas for improvement. Lay out your procedures—from placing stock orders and receiving merchandise to replenishing shelves and completing stock takes—then create a flowchart detailing how everything takes place.

Save time and reduce errors

Go through your inventory process and find tasks to automate. Are there are any manual parts of the procedure that can be handled by your inventory software? Or, can you delegate particular steps to an app instead of a person? For instance, if your process requires copying purchase orders from your inventory program to your accounting software, you may want to consider integrating the two solutions so they can “talk” to each other and automatically sync data and make reconciliations easier. Or, if you’re running both a physical store and an ecommerce site and you’re spending time manually updating stock levels whenever a shoppers purchases something from one storefront, you should consider integrating the two channels so the data is automatically transferred.

Maintain inventory accuracy

Schedule it

You can't conduct a physical inventory count during normal business hours, as stock levels will be in flux. Not to mention, you won't be able to serve your customers when you're busy counting items in the back.

Prepare stock-taking materials and procedures :

The first thing you'll need is a physical inventory count sheet. This is where you'll enter the items that you've counted along with their quantities and prices. Check to see whether your inventory software has a template or tool that you can use for this.

Enlist additional help if necessary

Will you be needing help with the task? If so, plan out the details early on. Who will assist you with counting? How will they get paid? What would their job description be? Give your staff an orientation well before inventory counting day (. Show them your count sheet and make sure they know how to properly fill it out. Give them a copy of the map and see to it that they know where they are assigned.

Start counting

Proceed to doing a physical count of your merchandise. The finer details of this process will depend on your store, the materials that you're using, and the procedure that you and your staff talked about.

Reduce inventory inaccuracies

If you find a lot of discrepancies in your inventory counts, you'll need to do a bit investigating to figure out the reasons behind the inaccuracies (aka: shrinkage). Common causes of shrinkage include administrative errors, employee theft, shoplifting, and supplier fraud. Find out which of these issues are causing shrink in your business and take the steps to prevent them. Here are a few ideas:

- Administrative errors
- Theft and Fraud

Identify and monitor important metrics

Also known as stock turn, this metric refers to the number of times that merchandise has sold out for a particular time period.

Forecast demand

Think of demand forecasting as a way to supercharge your inventory system. It's a strategy that forward-thinking retailers use so they're not just reacting to trends, but they're actually anticipating them.

BRAINSTORM :


Decreases Inventory Costs
Minimizes Out-of-Stocks
Improves Profit Margins
Eases Supply Chain Management
Improves Customers Satisfaction
Improves Forecasting
Establish a Process for Markdowns and Promotions
Stock Receiving Procedure
Determine a Dead Stock Procedure


Prevents Spoilage and Obsolescence
Simplifies Processes and Facilitates Growth
Reduces Shrinkage
Identify Stock Location
Do Regular and Accurate Stock Counts
Combine Sales Data With Inventory Data to Simplify Reporting
Pick Your Inventory KPIs
Economic Order Quantity
Safety Stock and Par Level

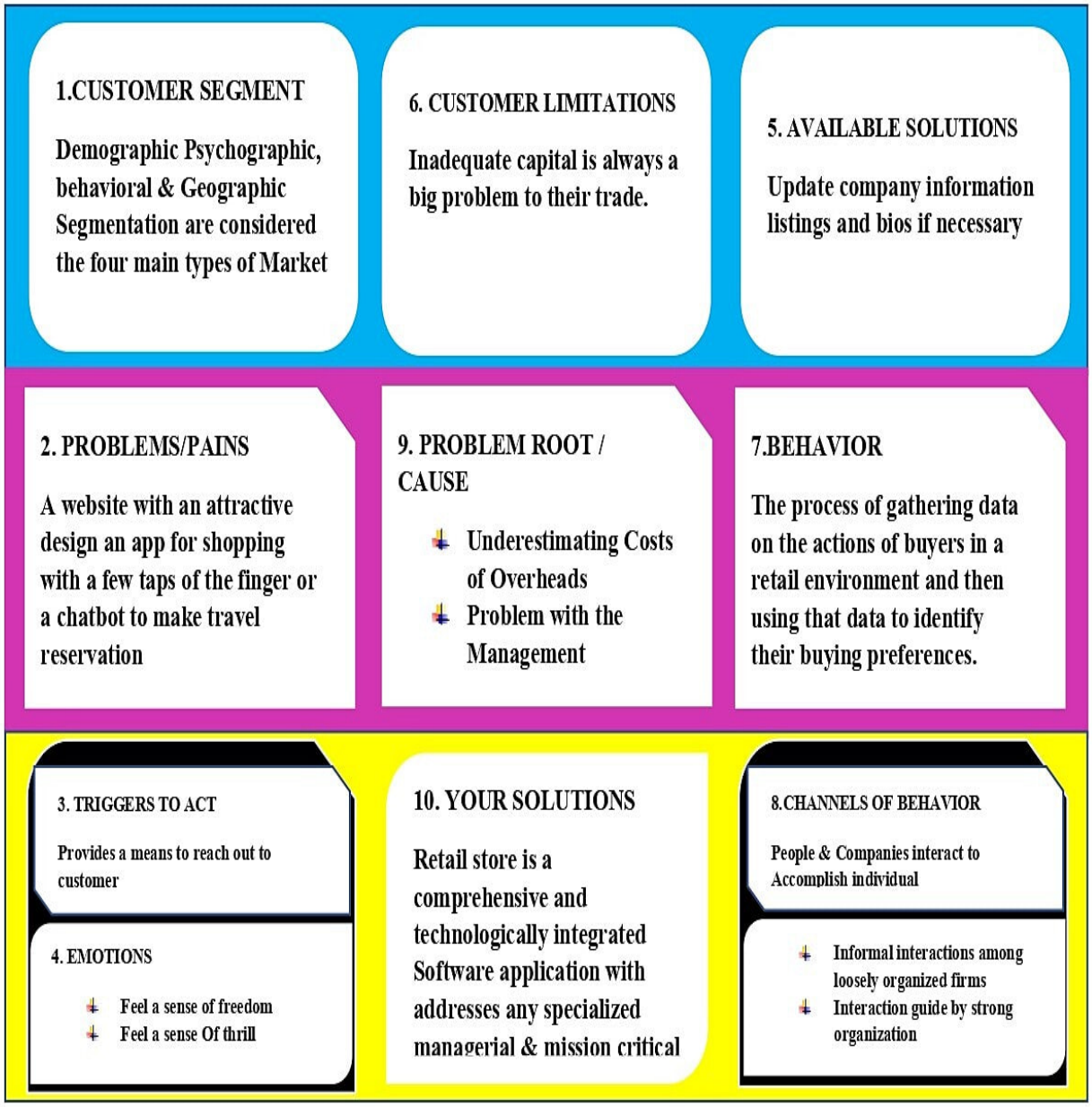
3.3 PROPOSED SOLUTION :

S.No.	Parameter	Description
1.	Problem Statement (Problem to besolved)	How to meet customer demand without running out of stock of carrying excess supply?
2.	Idea / Solution description	The Inventory management system provides aquick and detailed glance of your inventory status and the full of stock in the presence of retail store
3.	Novelty / Uniqueness	The primary purpose of Retail stores to help their customer styles themselves in a way that is UNIQUE and DISTINCTIVE
4.	Social Impact / Customer Satisfaction	Customer will get more varietiesHigh availability of the products
5.	Business Model (Revenue Model)	Improve the decision making process orientedat reducing costs& increasing revenues
6.	Scalability of the Solution	Add new location ,Expand product line ,Invest inmodern methods of sales,Improve the shoppingexperience

3.4 PROBLEM SOLUTION FIT :

RETAIL STORE STOCK INVENTORY ANALYTICS

PROBLEM SOLUTION FIT



4.REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS :

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Input	Input should be needed by the user
FR-2	User Data	Data to be Processed for the precedence
FR-3	User Confirmation	Confirmation by the user upon the data

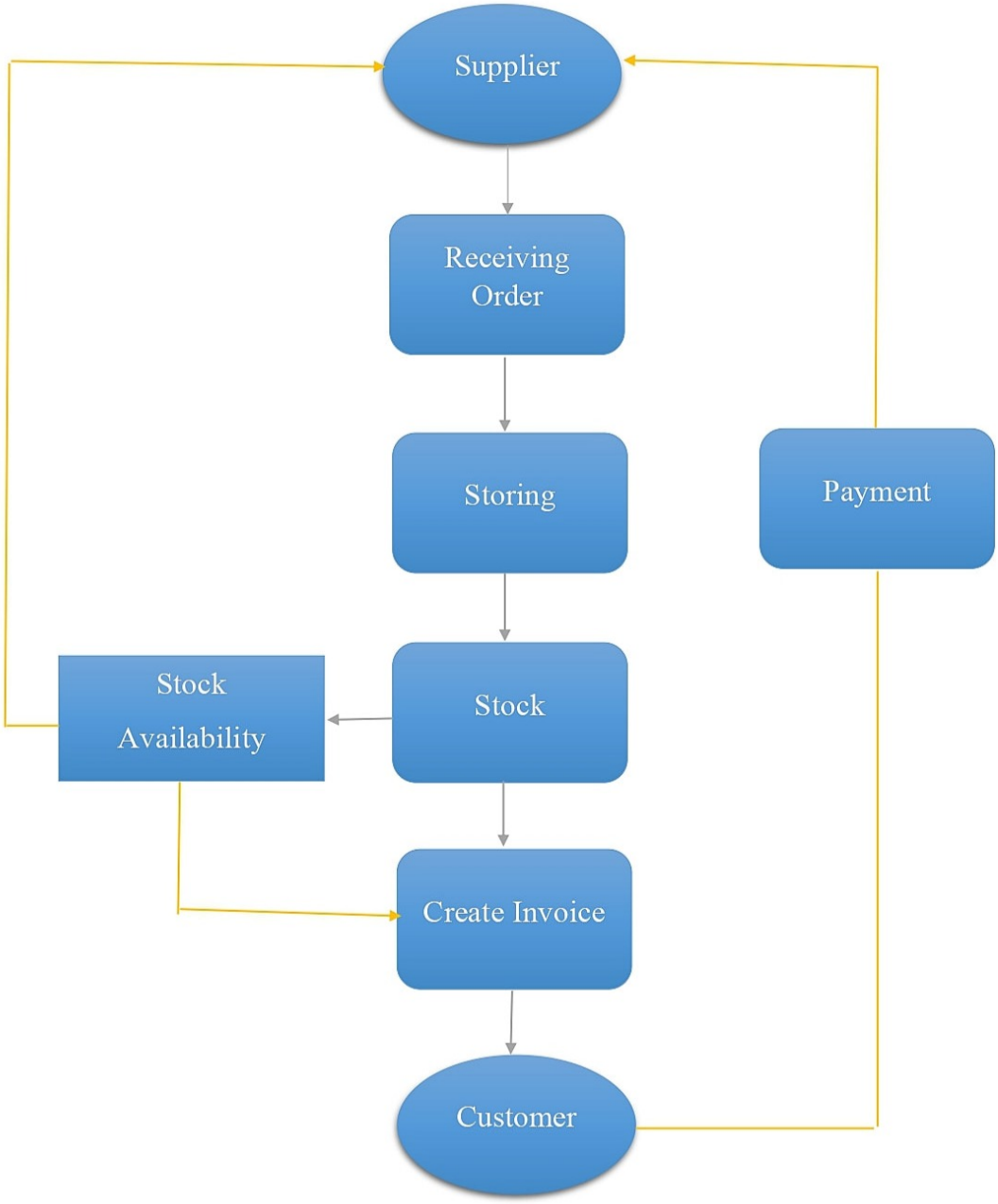
4.2 NON -FUNCTIONAL REQUIREMENTS :

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

NFR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The inventory management system provides a quick and detailed glance of your inventory status.
NFR-2	**Security**	The information entered in the software is 100%encrypted to prevent malware attacks.
NFR-3	**Reliability**	Tracking inventory, provides low stack alerts and other important remainders.
NFR-4	**Performance**	Improve the decision making process, easy to useinterface, centralized dashboard.
NFR-5	**Availability**	Customer will get more varieties and high availability ofthe product.
NFR-6	**Scalability**	Add new location, expand product line, invest in modernmethod of sales,improve the shopping experience.

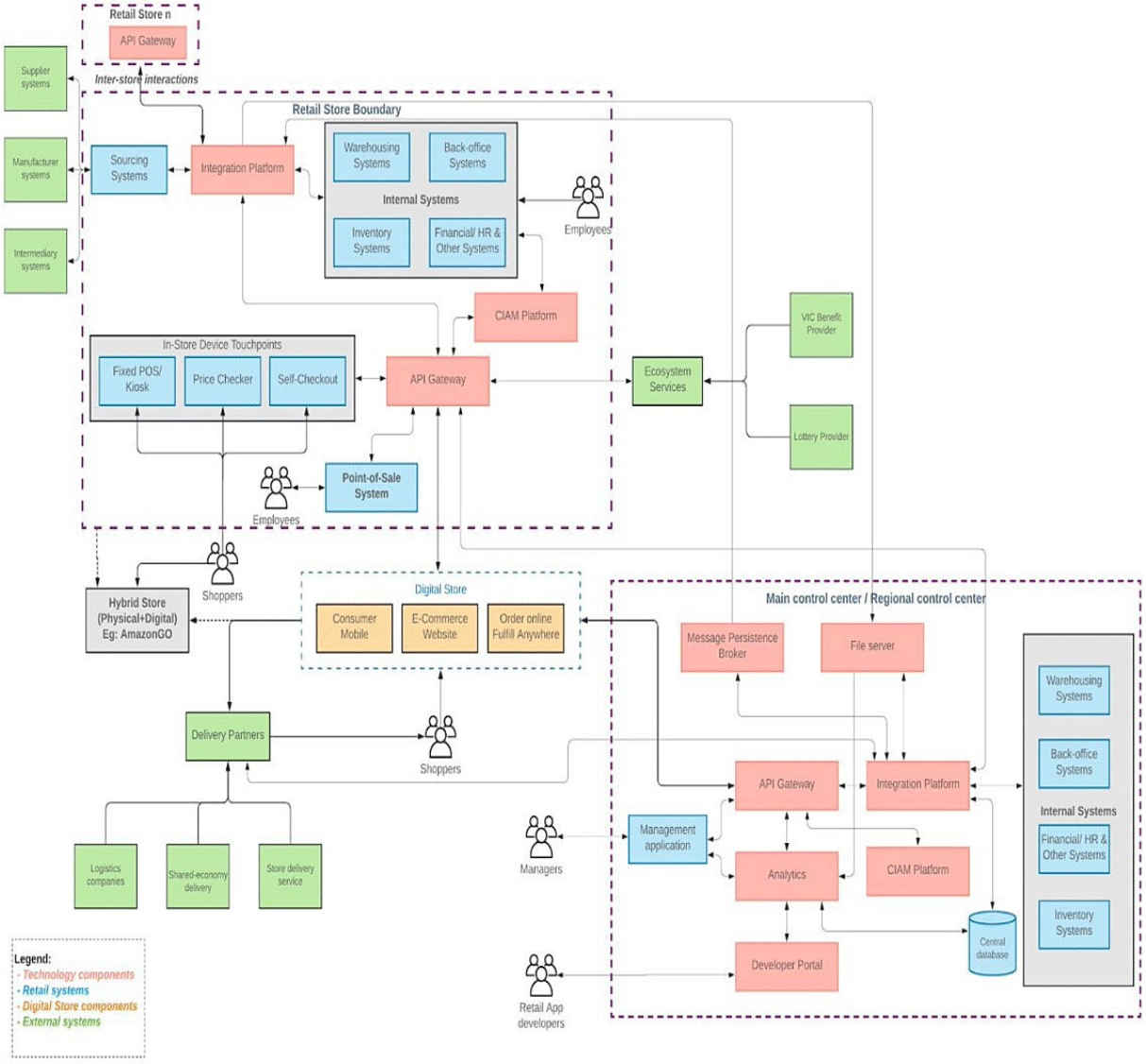
5.PROJECT DESIGN :

5.1 DATA FLOW DIAGRAMS :



5.2 SOLUTION & TECHNICAL ARCHITECTURE :

Technology Architecture



5.3 USER STORIES

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority
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
		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
		USN-3	As a user, I can register for the application	I can register & access the dashboard	Low
		USN-4	As a user, I can register for the application		Medium

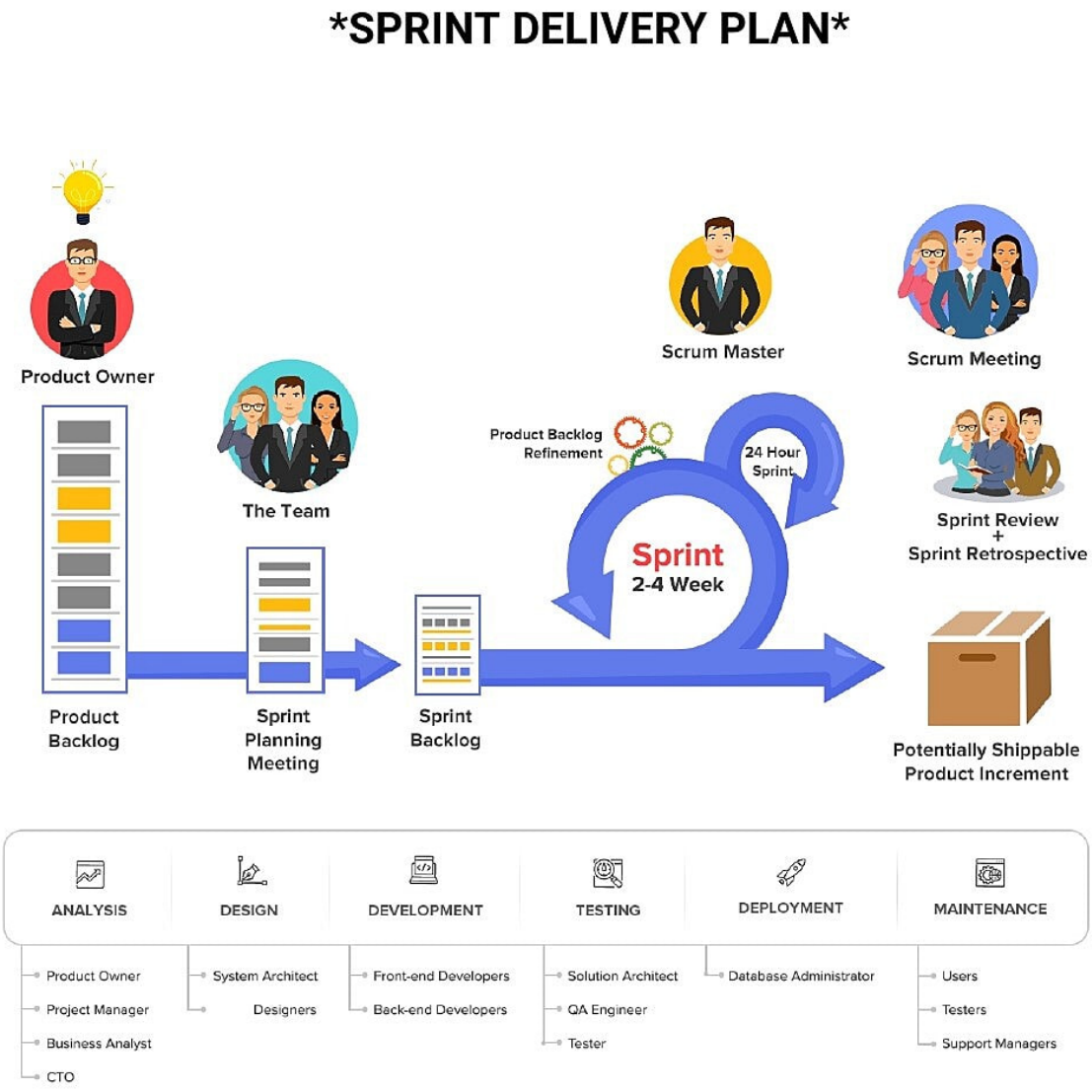
	Login	USN-5	As a user, I can log into the application by entering email & password		High
	Dashboard	USN-6	Customised dashboard for user		Medi um
Customer (Web user)	Login	USN-7	Register with mobile id		Medi um
Customer Care Executive	Services	USN-8		Providance with support	High

6.PROJECT PLANNING & SCHEDULING :

6.1 SPRINT PLANNING & ESTIMATION :

S.No.	Sprint	Details	Components
1	sprint-1	Process of dashboard,report & story	Table
2	sprint-2	Visualization data	IBM Cognos
3	sprint-3	Code for projects elaborative expressions	Collab
	sprint-4		

6.2 SPRINT DELIVERY SCHEDULE :



7.TESTING

7.1 TEST CASES

Test Case

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	7	0	0	7
Client Application	8	0	0	8
Security	2	0	0	2
Outsource Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

7.2 user acceptance test

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	10	4	2	3	20
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	20	37
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	24	14	13	26	77

8. RESULTS :

8.1 PERFORMANCE METRICES :

Model Performance Testing:

S.No.	Parameter	Screenshot / Values
1.	Dashboard design	No of Visualizations / Graphs - 4
2.	Data Responsiveness	● Product locations ● Quantities of each product type ● Which stock sells well and which doesn't, by location and sales channel. ● Profit margin by style, model,product line or item ● Ideal amount of inventory to have in back stock and storage ● How many products to reorder and how often ● When to discontinue a product ● How changing seasons affect sales
3.	Amount Data to Rendered (DB2Metrics)	● Inventory On Hand ● Low Stock ● Product Performance Report ● Sales Summary ● Sales Report Per Product and Product Type ● Sales Report Per Customer or Customer Group ● Sell-ThroughReport
4.	Utilization of DataFilters	● UnderstandRetail Store Inventory Metrics ● Outline Your Purchasing & Receiving Procedures
5.	Effective UserStory	No of Scene Added- 2
6.	Descriptive Reports	No of Visualizations / Graphs - 3

9. ADVANTAGES :

Increases productivity and efficiency :
Stock management devices such as bar-code scanners and stock management software can help drastically improve your efficiency and productivity. These tools will help eliminate manual processes so your employees can focus on other, more important areas of the business.

Creates a more organized warehouse :
A good stock management strategy supports an organised warehouse. If your warehouse is not organised properly, you will have a hard time managing your inventory. Many companies choose to optimise their warehouses by placing the best selling products together and in easily accessible places in the warehouse. This, in turn, helps to speed up the order fulfillment process and keeps customers happy.

Helps save time and money :
Inventory management can have time and monetary benefits. By keeping track of which products you have in stock and ordered, you can save yourself the effort of having to do an additional stock take to ensure your records are accurate. A good stock management strategy also helps you save money that could otherwise be wasted on slow-moving products.

Improves accuracy of inventory orders :
Good stock management also helps you calculate exactly how much inventory you need to have on-hand at any time. This helps prevent product shortages and allows you to keep just enough inventory without having a surplus of stock in the warehouse.

Keeps customers coming back for more :
It’s a fact that good stock management leads to returning customers. If you want your hard-earned customers to come back for your products and services, you need to be able to meet customer demand quickly and efficiently. In this way, stock management helps you meet demand by giving you the tools to have the right products as soon as your customers require them.

Increased Customer Satisfaction :
In comparing the extremes of running out of stock and holding more inventory than you need, stock outs are definitely worse. If customers come to your business and you don't have goods they want, you risk alienating them and losing them to competitors. Carrying extra inventory in your retail storage area or in a nearby distribution center helps keep shelves fully stocked during periods of peak customer demand, and is one of key benefits of holding stock.

Supplier Price Discounts :
One reason some resellers bite the bullet and carry extra inventory is because of the cost

advantages from buying in bulk, points out Management study guide. Typically, if you order larger product lots, you get a lower cost per unit. This strategy improves your potential gross profit, since a lower cost of goods sold means you make more on each sale.
Alternatively, if you operate as a low-cost provider, you could pass the discounts on to your customers and potentially increase your sales volume. Ordering in larger volumes from your suppliers can also help you negotiate better credit and payment terms or bump you up in their production schedule.

DISADVANTAGES :

Changing Demand :

Customer demand is constantly shifting. Keeping too much could result in obsolete inventory you're unable to sell, while keeping too little could leave you unable to fulfill customer orders. Order strategies for core items, as well as technology to create and execute an inventory plan, can help compensate for changing demand.

Limited Visibility :

When your inventory is hard to identify or locate in the warehouse, it leads to incomplete, inaccurate or delayed shipments. Receiving and finding the right stock is vital to efficient warehouse operations and positive customer experiences

Increases competition :

Globalized supply chains are subject to unpredictable economic shifts and market forces that impact the competition for raw materials. Small businesses are sometimes faced with choosing between competing for high-demand materials or holding enough inventory to control costs.

Inventory loss :

The loss of inventory due to spoilage, damage or theft can be a supply chain problem. It requires identifying, tracking and measuring problem areas.

Inefficient process :

Low-tech, manual inventory management procedures don't seem like a daunting challenge when inventory is small and there's only one warehouse location to manage. But as sales volume increases and inventory expands, inefficient, labor-intensive and low-tech standard operating procedures are difficult to scale.

10.CONCLUSION :

Inventory management is a very complex but essential part of the supply chain. **An effective inventory management system helps to reduce stock-related costs such as warehousing, carrying, and ordering costs .It can help you keep track of all your supplies and determine the exact prices**. It can also help you manage sudden changes in demand without sacrificing customer experience or product quality.

11.FUTURE SCOPE :

The future of retail includes **embracing ecosystems and the experience economy, reconfiguring stores, and preparing and the meta verse**. Michaels, the arts and crafts chain, used to have employees teach art classes at some of the company stores.

According to Easy Post, '**Companies can reap a 25% increase in productivity, a 20% gain in space usage, and a 30% improvement in stock use efficiency if they use integrated order processing for their inventory system**. Advanced mobile applications allow companies to manage their inventory and supply chains effectively
The scope of an inventory system can cover many needs, including **valuing the inventory, measuring the change in inventory and planning for future inventory levels**. The value of the inventory at the end of each period provides a basis for financial reporting on the balance sheet.Shoppers will return to stores in 2022 with expectations that **retailers will offer tools that connect digital and physical shopping experiences, like curbside click and collect or QR code payment options**.

12. APPENDIX

source code :

https://github.com/IBM-EPBL/IBM-Project-49355-1660818149/blob/main/Final%20Deliverables/Final%20code.ipynb

GITHUB LINK :

https://github.com/IBM-EPBL/IBM-Project-49355-1660818149

DEMO LINK :

https://www.mediafire.com/file/lkit0s2w9hi4liq/PNT2022TMID49119.mp4/file