1.INTRODUCTION

1.1 PROJECT OVERVIEW

Inventory management Systems:

Inventory management helps companies identify which and how much stock to order at what time. It tracks inventory from purchase to the sale of goods. The practice identifies and responds to trends to ensure there's always enough stock to fulfil customer orders and proper warning of a shortage

One measurement of good inventory management is inventory turnover. An accounting measurement, inventory turnover reflects how often stock is sold in a period. A business does not want more stock than sales. Poor inventory turnover can lead to deadstock, or unsold stock.

Importance Of Inventory Management Systems:

Inventory management is vital to a company's health because it helps make sure there is rarely too much or too little stock on hand, limiting the risk of stockouts and inaccurate

The primary challenges of inventory management are having too much inventory and not being able to sell it, not having enough inventory to fulfil orders, and not understanding what items you have in inventory and where they're located. Other obstacles include:

Benefits of Inventory Management System:

The two main benefits of inventory management are that it ensures you're able to fulfil incoming or open orders and raises profits. Inventory management also:

- **Saves Money:**

Understanding stock trends means you see how much of and where you have something in stock so you're better able to use the stock you have. This also allows you to keep less stock at each location (store, warehouse), as you're able to pull from anywhere to fulfil orders — all of this decrease's costs tied up in inventory and decreases the amount of stock that goes unsold before it's obsolete.

- **Improves Cash Flow:**

  With proper inventory management, you spend money on inventory that sells, so cash is always moving through the business.

- **Satisfies Customers:**

  One element of developing loyal customers is ensuring they receive the items they want without waiting.

Inventory Management Challenges:

- The primary challenges of inventory management are having too much inventory and not being able to sell it, not having enough inventory to fulfil orders, and not understanding what items you have in inventory and where they're located. **Getting Accurate Stock Details:**

  If you don't have accurate stock details, there's no way to know when to refill stock or which stock moves well.

- **Poor Processes:**

  Outdated or manual processes can make work error-prone and slow down operations.

- **Changing Customer Demand:**

  Customer tastes and needs change constantly. If your system can't track trends, how will you know when their preferences change and why?

- **Using Warehouse Space Well:**

  Staff wastes time if like products are hard to locate. Mastering inventory management can help eliminate this challenge.

Types of Inventory Management Systems:

There are 12 different types of inventories:

Raw materials, work-in-progress (WIP), finished goods, decoupling inventory, safety stock, packing materials, cycle inventory, service inventory, transit, theoretical, excess and maintenance, repair and operations (MRO). Some people do not recognize MRO as a type of inventory.

Inventory Management Process

If you produce on demand, the inventory management process starts when a company receives a customer order and continues until the order ships. Otherwise, the process begins when you forecast your demand and then place POs for the required raw materials or components. Other parts of the process include analysing sales trends and organizing the storage of products in warehouses.

Inventory Management Works

The goal of inventory management is to understand stock levels and stock's location in warehouses. Inventory management software tracks the flow of products from supplier through the production process to the customer. In the warehouse, inventory management tracks stock receipt, picking, packing and shipping.

Inventory Management Techniques and Terms:

Some inventory management techniques use formulas and analysis to plan stock. Others rely on procedures. All methods aim to improve accuracy. The techniques a company uses depend on its needs and stock.

Find out which technique works best for your business by reading the guide to inventory management techniques. Here's a summary of them:

- **ABC Analysis:**

  This method works by identifying the most and least popular types of stock.

- **Batch Tracking:**

  This method groups similar items to track expiration dates and trace defective items.

- **Bulk Shipments:**

  This method considers unpacked materials that suppliers load directly into ships or trucks. It involves buying, storing and shipping inventory in bulk.

- **Consignment:**

  When practicing consignment inventory management, your business won't pay its supplier until a given product is sold. That supplier also retains ownership of the inventory until your company sells it.

- **Cross-Docking:**

  Using this method, you'll unload items directly from a supplier truck to the delivery truck. Warehousing is essentially eliminated.

- **Demand Forecasting:**

  This form of predictive analytics helps predict customer demand.

- **Drop shipping:**

  In the practice of drop shipping, the supplier ships items directly from its warehouse to the customer.

- **Economic Order Quantity (EOQ):**

  This formula shows exactly how much inventory a company should order to reduce holding and other costs.

- **FIFO and LIFO:**

  First in, first out (FIFO) means you move the oldest stock first. Last in, first out (LIFO) considers that prices always rise, so the most recently-purchased inventory is the most expensive and thus sold first.

- **Just-In-Time Inventory (JIT):**

  Companies use this method in an effort to maintain the lowest stock levels possible before a refill.

- **Lean Manufacturing:**

  This methodology focuses on removing waste or any item that does not provide value to the customer from the manufacturing system.

- **Materials Requirements Planning (MRP):**

  This system handles planning, scheduling and inventory control for manufacturing.

- **Minimum Order Quantity:**

  A company that relies on minimum order quantity will order minimum amounts of inventory from wholesalers in each order to keep costs low.

- **Reorder Point Formula:**

  Businesses use this formula to find the minimum amount of stock they should have before reordering, then manage their inventory accordingly.

- **Perpetual Inventory Management:**

  This technique entails recording stock sales and usage in real-time. Read "Definitive Guide to Perpetual Inventory" to learn more about this practice.

- **Safety Stock:**

  An inventory management ethos that prioritizes safety stock will ensure there's always extra stock set aside in case the company can't replenish those items.

- **Six Sigma:**

  This is a data-based method for removing waste from businesses as it relates to inventory.

- **Lean Six Sigma:**

  This method combines lean management and Six Sigma practices to remove waste and raise efficiency.

1.2 PURPOSE:

Businesses that effectively use inventory management are destined to succeed. With the help of inventory management software, companies can automate the process of ordering, storing, and optimizing their goods in a single place. In this article, we will expand on the importance of inventory management, as well as the different inventory management techniques, benefits, and examples managers need to know. Keep reading to learn the key to inventory management that will give you a competitive edge.

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

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

Balancing the risks of overstocks and shortages is an especially challenging process for companies with complex supply chains. A company's inventory is typically a current asset that it plans to sell within a year. It must be measured and counted regularly to be considered a current asset.

2.LITERATURE SURVEY

1. Inventory and Working Capital Management- An Empirical Analysis

Working capital management is the fictional area of fiancé that covers all the current account of the firm. Working capital management involves the relationship between a firm's short-term assets and its short-term liabilities the goal of Working capital management is to ensure that a firm is able to continue it's an operation and that it has sufficient ability to satisfy both maturing short-term debt and upcoming operational expenses. In general form the View point of the chief financial officer (CFO) management of Working capital is simple and a simple concept of ensuring the ability of the organization to finance the different between the current assets and current liabilities a "Harris 2005". However, a total approach should be followed which cover all the company's activities relating to vendor customer and product (HALL 2002) In reality management of working capital has become one of the most important issues in the organization where many financial executives are trying to identify the basic determinants of working capital and optimal level of working capital (Lamberton 1995). Consequently, companies can minimize risk and improve the overall performance by understanding the role and determinants of working capital. The main objective of the working capital management is to maintain an optimal balance between each of the working capital components. Business success heavily on the ability of financial executives to effectively manage receivables inventory and payables (2005Filbeck and Kyung). Firms can reduce their financial costs and increase the amount of investment lied up in short term assets. Most of the financial manager's time and effort are allocated in optimizing the level current assets and liabilities back toward optimal levels (Lamberton 1995). In general, current assets are considered as one of the important components of total assets of a firm. A firm may be able to reduce the investment of total assets by renting or leasing plant and machinery. whereas the same policy cannot be followed for the components of working capital. the

high level of current assets the risk of liquidity associated with the opportunity cost of funds may have been invested in long-term assets. The impact of working capital policies on profitability is highly important, however a little empirical research has been carried out to examine this relationship. Thus, efficient management of working capital in an important prerequisite for the successful working of a business concern it reduces the chances of business failure generates a feeling of security and confidence in the minds of personnel in the organization its assurance solvency of steady of organization.

2. The relationship of financial and inventory performance of manufacturing firms in Indian context. California Journal of Operations Management.

Inventory Management plays an important role in improving the efficiency and competitiveness of manufacturing firms. This seemingly simple task to determine how much of an item to order or produce, and how much inventory of an item to hold, is at the foundation of all operational decisions. Inventory is one of the elements in the business cycle that absorbs cash. Excessive inventory on one hand can place a heavy burden on the cash resources of a business, on the other, insufficient inventory can result in loss of sales and delays for customers. However, a review of the literature on supply chain performance identifies three inadequacies. First, there is no consensus among the various studies on the Relationship between inventory performance and financial performance. While one array of the literature suggests that there is a positive relation between the two, another suggests that there is no significant relation between the inventory performance and financial performance. Second, most of the existing studies considered total inventory value as a proxy of the inventory performance and neglected its discrete

components (RMI, WIPI, and FGI). Third, the results of these studies lack generalizability in a sense that most of them are conducted in US context. Despite the extensive research carried out in the area of supply chain management (SCM) across the world, SCM practices have not yet been very well-adopted in developing countries like India (Jain et al., 2011).

3. International Journal of Operations and Production Management

IJOPM's mission is to publish leading-edge, innovative research that has the potential to significantly advance the field of Operations and Supply Chain Management, theoretically and practically. Drawing on the experiences of both manufacturing and service industry sectors, in both private and public settings, the journal has become a widely respected resource in a complex and increasingly important field in business management. IJOPM articles can include: Empirical research articles Literature reviews, surveys and critiques of published articles Expert opinion papers – these will always be led by outstanding scholars. Occasional purely conceptual research – this is often a challenge for academics and the quality of content must be on par with other published articles in IJOPM in terms of rigor and potential.

The scope of the Journal covers all aspects of operations and supply chain management: manufacturing and service sectors, profit and non-for-profit organizations, including, but not limited to, the topics listed below.

2.1 Existing problem

Inventory management systems are central to how companies track and control inventories.Having the ability to measure inventory in a timely and accurate manner is critical for havinguninterrupted business operations because inventory is often one of the largest currentassets on a company's balance sheet. Two inventory management systems exist: perpetual system and periodic system. Each system has its pros and cons, and companies may choose based on their own needs for inventory control and available company resources.

The perpetual system uses a permanent inventory account to track inventory purchases anduses. When a company buys inventories during a business cycle, the purchase directlyincreases the balance of the inventory account. Conversely, when a company sells goods from existing inventories, the sale directly decreases the balance of the inventory account. Under the perpetual inventory system, companies are able to maintain a continuous record of changes in inventory and thus, have up-to-date information about their inventory holdings at any point intime.

2.2REFERENCES

[1] Samba Siva Rao K., Singh, Sukhdev. (2006). Inventory control practices in Efforted Management Accountant.

1. Pradeep Singh (2008),” Inventory and Working Capital Management- An Empirical Analysis”, The ICFAI Journal of Accounting and Research.
2. Capcom, Verdon, Hemery, Ari-Pikka & Weiss, Lawrence A. (2009). On the relationship between inventory and financial performance in manufacturing. International Journal of Operations & Production Management.
3. Gaur, Jighyasu & Bhattacharya, Sourabh. (2011). The relationship of financial and inventory performance of manufacturing firms in Indian context. California Journal of Operations Management.
4. Krishnankutty, Raveesh. (2011). Panel data analysis on retail inventory productivity.The Economic Research Guardian.
5. Eneje, B. C., Nweze, A .U. & Udeh, A. (2012). Effect of Efficient Inventory Management on Profitability: Evidence from Selected Brewery Firms in Nigeria. International Journal of Current Research.
6. Nyabwanga, Robert Nyamao & Ojera, Patrick. (2012). Inventory managementpractices and business performance for small scale enterprises in Kenya. KCA Journal of Business Management.
7. Madishetti, Srinivas & Kibona, Deogratias. (2013). Impact of inventory management on the profitability of SMEs in Tanzania. Internation Commerce & Management.
8. Anichebe, N. A. & Agu, O. A. (2013). Effect of Inventory Management on Organizational Effectiveness. Information and Knowledge Management.

9. Panigrahi, Ashok K. (2013). Relationship between inventory management and profitability: An empirical analysis of Indian cement companies. Asia Pacific Journal of Marketing & Management Review.

10. Srinivasa Rao Kasisomayajula(2014) “An Analytical Study on Inventory Managementin Commercial Vehicle Industry in India”, International Journal of Engineering Research.

11. Sanjiv Mittal, R.K. Mittal, Gagandeep Singh, Sunil Gupta (2014).” Inventory Management in Fertiliser Industry of India: An Empirical Analysis” Asia-PacificJournal of Management Research and Innovation.

12. Viplesh Shardeo(2015), “Impact of Inventory Management on the Financial Performance of the firm” IOSR Journal of Business and Management (IOSRJBM).

3. IDEATION&PROPOSED SOLUTION

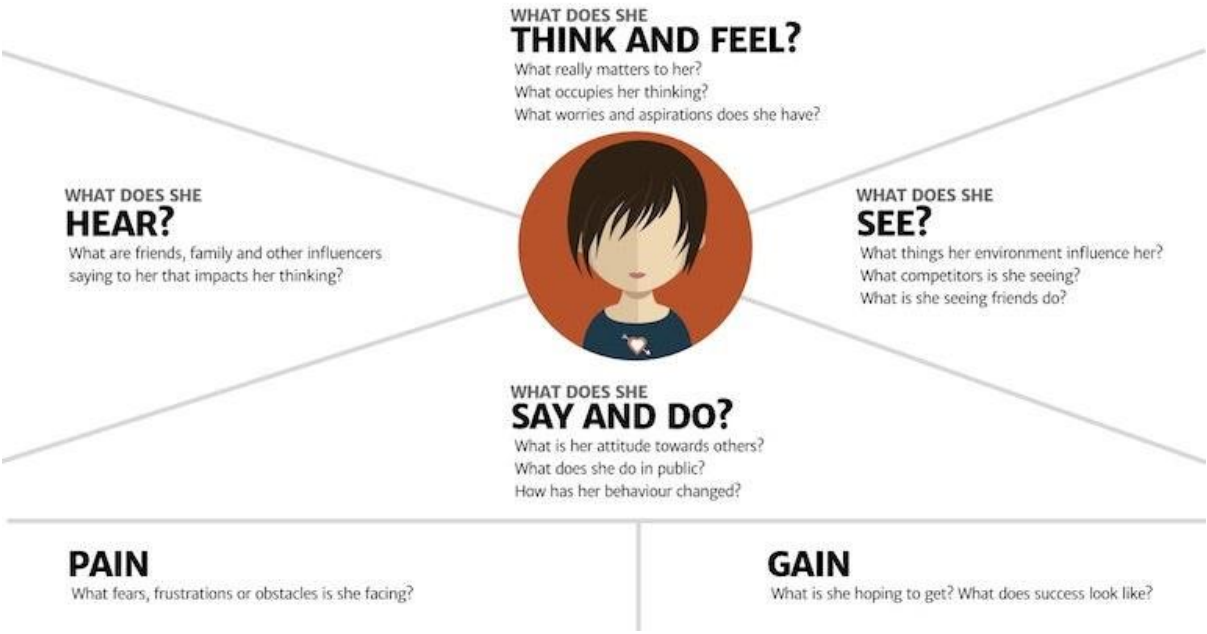
3.1 Empathy Map Canvas

At their core, customer empathy maps are a methodology that product managers, designers, and engineers use to enhance their understanding of their customers’ needs. They provide an easy way to visualize different facets of a user’s mindset while using a product.

Customer empathy maps were originally developed by Dave Gray, a leader in the product strategy space. Typically, they are made up of 4 quadrants that cover what a user says, thinks, does, and feels, with a chosen user persona in the centre:

Empathy is the human ability to identify and understand another person's situation, including the emotions that they are experiencing. As the name suggests, an empathy map is a tool that can help you build empathy with your end users by helping you to understand, visualize, and then to articulate what a product team knows about its users. It helps the team find answers to the "Why?" questions (such as, "Why do users do what they do?").The tool was initially created by Dave Gray, the author of Game storming: A Playbook For Innovators, Rulebreakers, And Changemakers, who also created something called an empathy map canvas.

The canvas is divided into several sections, and the user (the person who will use your product; the one you want to understand and empathize with) is located at the center of the canvas.Each area explores the user's mindset, as well as what happens in their environment while interacting with your product. Here are some essential areas of an empathy map



Ideation and brainstorming

Brainstorming sets the stage for the rest of the ideation process, so it's something you should approach with deliberate strategy. A typical brainstorming session involves one or more people directing their thoughts towards a particular problem or issue. Initial steps include defining the problem and pitching alternative perspectives or strategies that may circumvent the problem itself. Sometimes the best solution is to take an entirely different approach. Group ideas are organized, analysed and tested when appropriate throughout the process to guide future decisions. Everyone has good ideas and bad ideas, but some bad ideas are definitely worse than others. It's important to understand the ideation process so you can keep bad ideas from influencing the final outcome.

1. Brainstorming is a core business practice

Brainstorming should be part of daily life in business, but that doesn't mean it should happen all the time. Business leaders and their teams need to know when to engage in brainstorming and innovation and when it's time to focus on the next stage.

2. Every process starts with concept

Every product, service or process began with a concept. Understanding how these concepts are developed and communicated is an invaluable skill in business management. Leaders who master ideation have almost no limits on what they can accomplish.

3. Companies live by their ideas

The way that a company develops and expresses ideas essentially becomes their brand personality. It becomes the tangible nature of the company to its employees and the general public. Ideas define people and organizations alike, so it’s worth putting in the effort to get good ones.

1. Problem Statement: The retailers need a systematic software procedure to keep track of their inventory data because they only keep it in the logbook and not properly organized so that they are able to record the inventory data quickly and safely.

2. Idea / Solution description: We are proposing a solution that focuses on tracking the inventory of the retailers and comparing them with the threshold value which was set by the user and preparing an analysis that results in the overall analysis of the sales.

3. Novelty / Uniqueness: The project will be able to provide real time statistics about revenue, stocking and real-time tracking of shipped goods similar to amazon.

4. Social Impact / Customer Satisfaction: The retailers need a way to maintain a systematic software procedure to keep track of their inventory data because they only keep it in the logbook and not properly organized so that they are able to record the inventory data quickly and safely. This will greatly aid the retailer on their vision for improving their business by providing future statistics and analysis of day-to-day sales.

5. Business Model (Revenue Model): Providing the app as a service with having certain features as subscribe and available to premium users who will be a

charged over a specific period of time depending upon the plan they choose to use.

6. Scalability of the Solution: The project will be having the Python Flask for the development of the backend, which makes it easy to run on any web browsers and it will affect the collection of data from the user side and the sending of prediction analysis from the IBM Watson. The server IBM Cloud will be used for making it work without any slow loading or delay of the prediction of the website

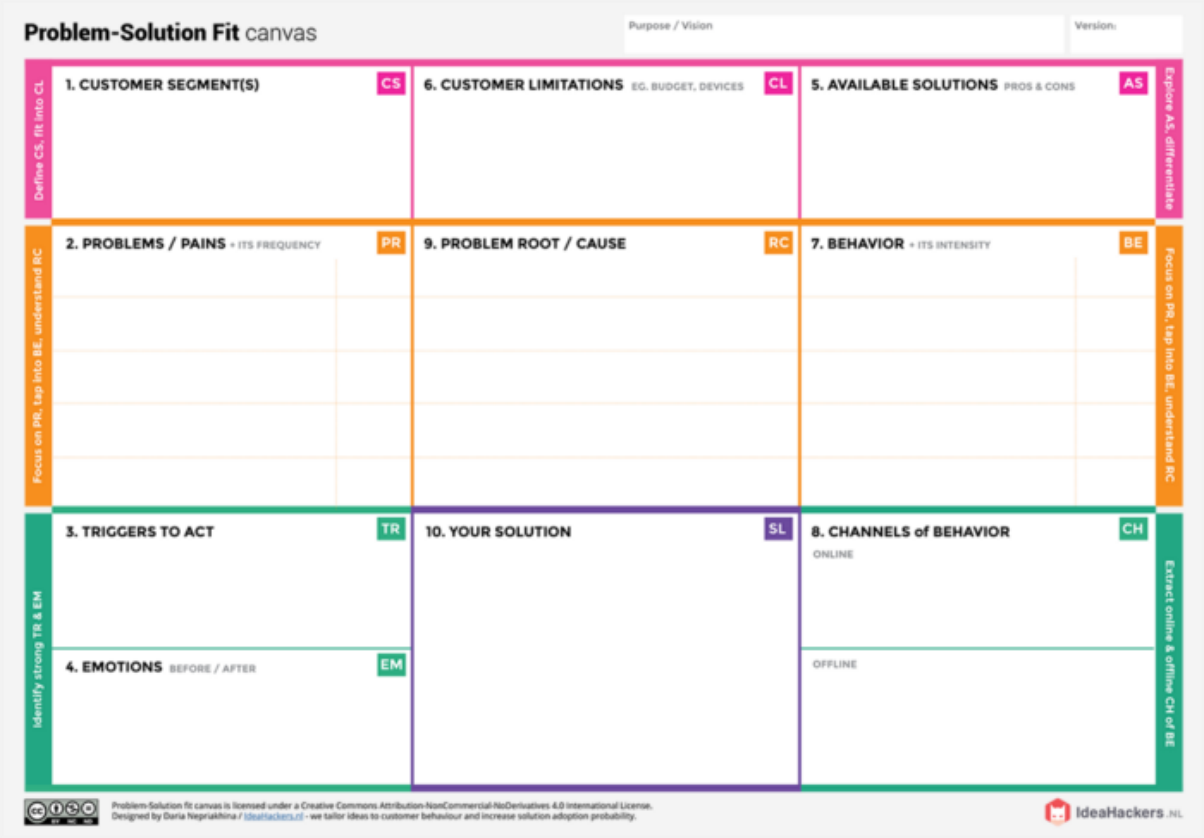
3.4 Problem Solution Fit

Translate problems into solutions that will be adopted.

The Problem-Solution Fit canvas is based on the principles of Lean Start-up, LUM (Lazy User Model) and User Experience design. It helps entrepreneurs, marketers and corporate innovators identify behavioural patterns and recognize what would work and why. It is a template to help identify solutions with higher chances of solution adoption, reduce time spent on testing and get a better overview of the current situation.

My goal was to create a tool that translates a problem into a solution, taking into account customer behaviour and the context around it. None of the existing canvases or frameworks were giving me an overview and insight into the real customer situation during his/her decision-making process. With this template

you will be able to take important information into consideration at an earlier stage and look at problem solving in depth. It increases your chances of finding problem-solution and product-market fit.



It helps you to:

- Solve complex problems in a way that fits the state of your customers.
- Succeed faster and increase your solution adoption by tapping into existing mediums and channels of behaviour.
- Sharpen your communication and marketing strategy with the right triggers and messaging.
- Increase touch-points with your company by finding the right problem-behaviour fit and building trust by solving frequent annoyances, or urgent or costly problems.

- **Understand the existing situation in order to improve it for your target group.**

The structure.

1. **Customer State fit:** to make sure you understand your target group, their limitations and their currently available solutions, against which you are going to compete.

2. **Problem-Behaviour fit:** to help you filter out the noise and identify the most urgent and frequent problems, understand the real reasons behind them and see which behaviour supports it. Is this behaviour weak or infrequent — is it a problem worth solving?

3. **Communication-Channel fit:** to help you sharpen your communication with strong triggers, emotional messaging and reaching customers via the right channels.

4. **Solution guess**: translate all the validated data you have gathered into a solution that fits the customer state and his/her limitations, solves a real problem and taps into the common behaviour of your target group.

4. REQIUREMENT ANALYSIS

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Designing/Developing the site to be having a learning curve. Having simple and easy to navigate website for users. Attractive looking web-page. Making the site to be responsive for desktops and mobile users.
NFR-2	**Security**	The security should be strong as to the attackers wont be penetrating to the authorized users account or data. Log in system is used to prove authentication and authorization. Security can be increased by using OTP. Cookies based security system for authentication and improved visiting experience on the site for clients.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through Username and Password
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Sign In	Sign in to the application by Gmail, Username and Password.
FR-4	Dashboard	Can view the product details.
FR-5	Ordering	Order required products by putting them in a cart first.
FR-6	Restocking	Ordering more products when the stock is low.

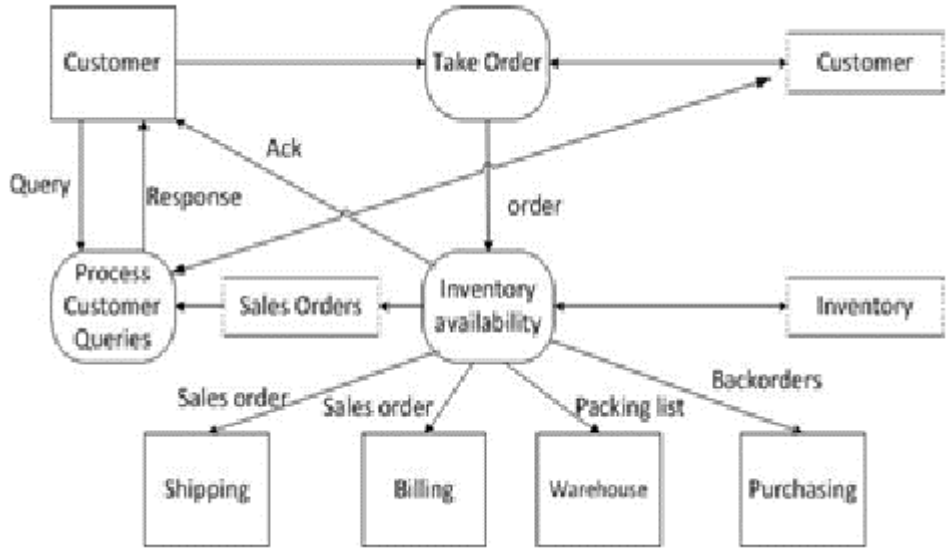
Non-Functional Requirements:

NFR-3	Reliability	Should be having the capacity to handle sufficient numbers of users and not be lagging or experiencing any discomfort when browsing when the web-page is busy. Should have minimum errors when executing the programs. Should be available even at the times of calamity
NFR-4	**Performance**	The convenience of this is it reduces the time period of searching in aisle, searching for desired product, etc. It reduces costs, saves time, restocking period and predicts the best selling products. This makes the business more productive and profitable by having an organized management
NFR-5	**Availability**	This uses IBM DB2 to ensure high availability of database servers and performances

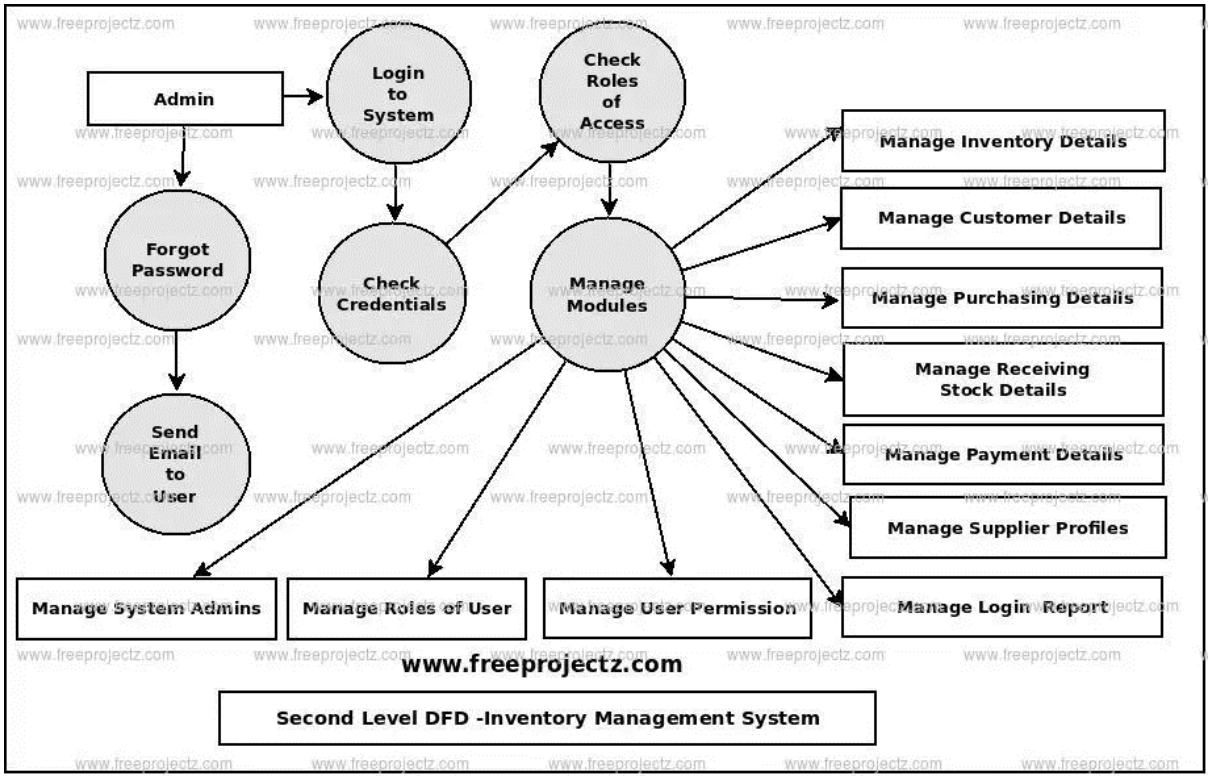
NFR-6	**Scalability**	As DB2 is highly scalable, the coding can be produced and developed efficiently and new features can be introduced easily. Reusing the code can be done to add any new features. IBM Container in Docker registry is used which highly scalable

5.PROJECT DESIGN

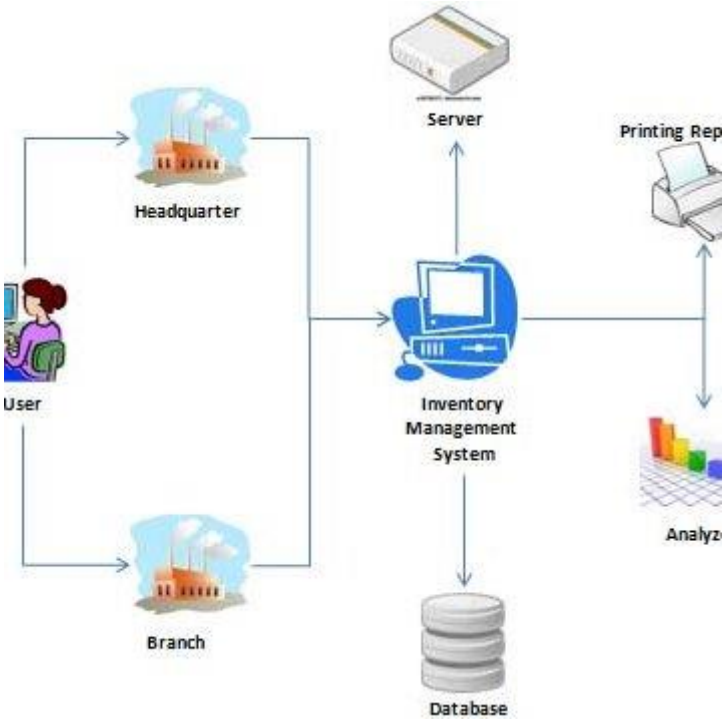
5.1.1 DATA FLOW DIAGRAMS



5.1.2 CUSTOMER RESPONSE OF INVENTORY MANAGEMENT



5.2SOLUTION AND TECHNICAL ARCHITECTURE



5.2Architecture of web page inventory management system

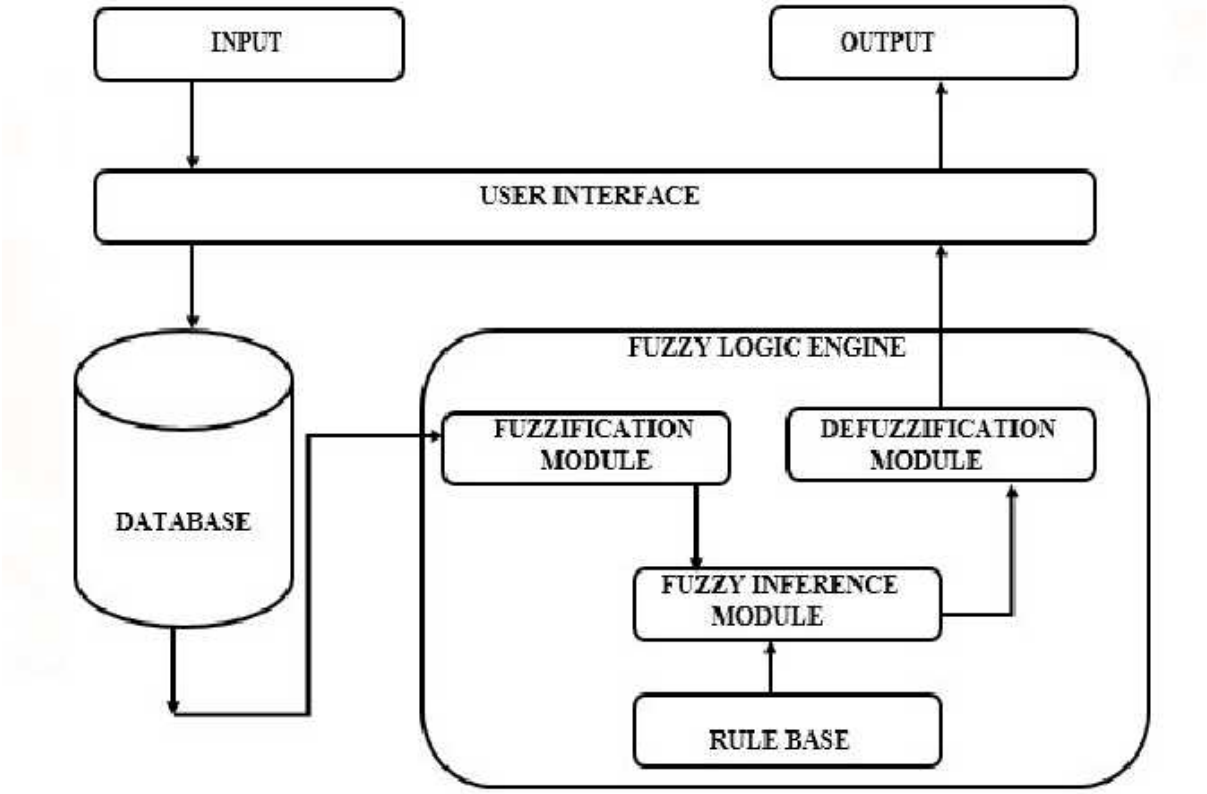
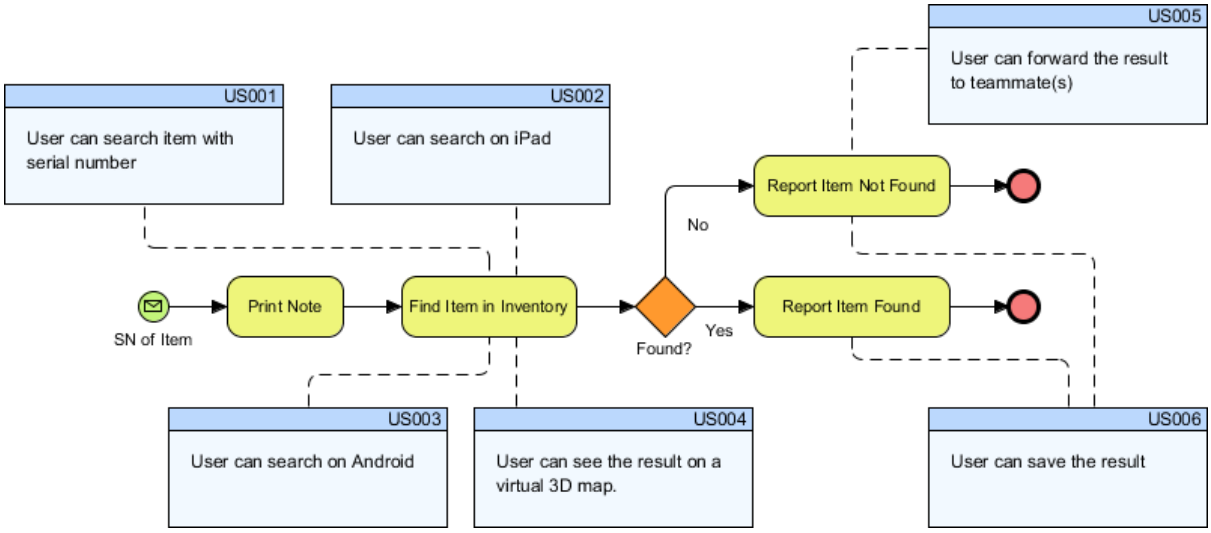
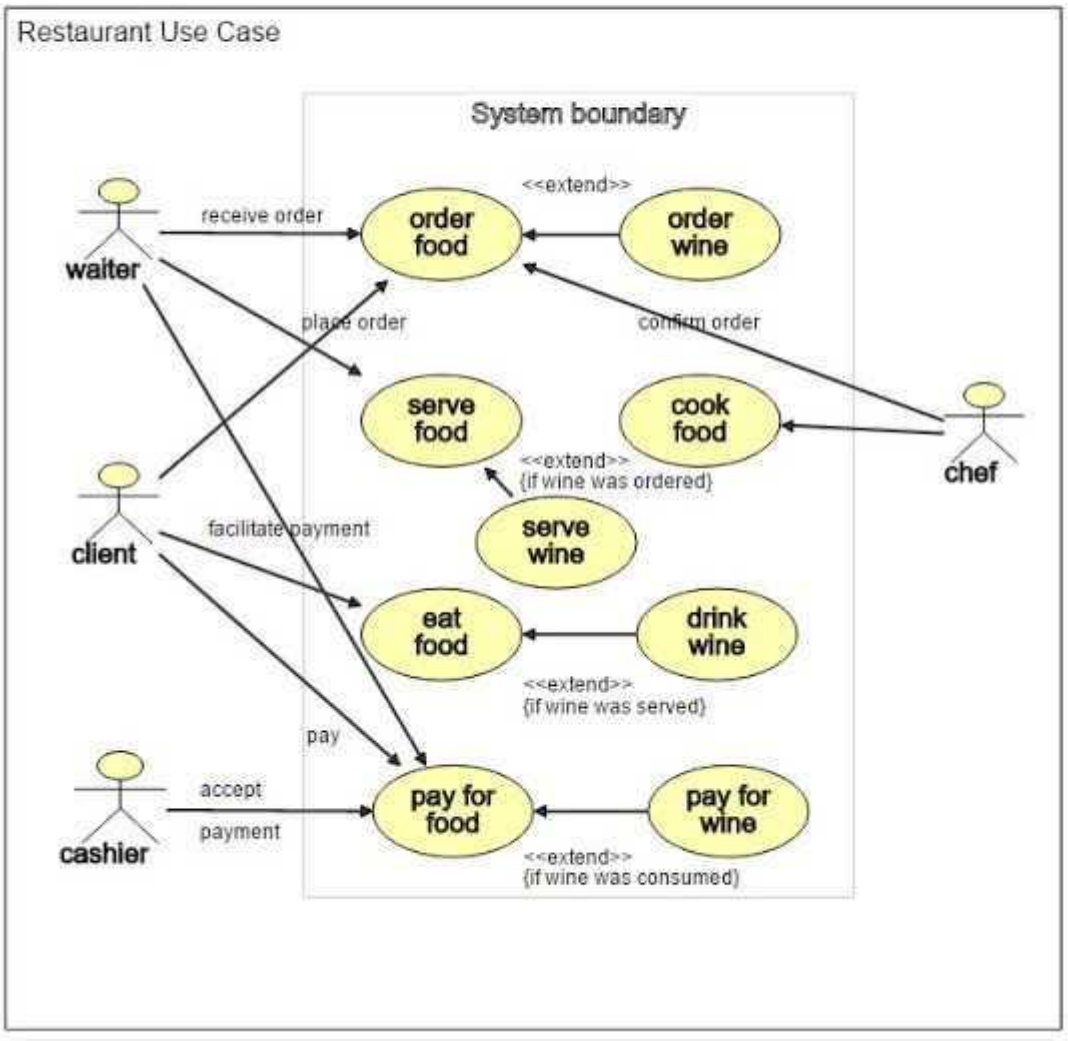


Fig. 2 Intelligent System Architecture

5.3 USER STORIES





6.PROJCET PLANING & SCHEDULING

6.1 Sprint Planning &Estimation

Sprint planning is an event in the framework where the team determines the product backlog items, they will work on during that sprint and discusses their initial plan for completing those. Teams may find it helpful to establish a sprint

goal and use that as the basis by which they determine which product backlog items they work on during that sprint.

Who is involved in Sprint Planning Sprint planning typically involves the entire team. A identifies the candidate product backlog items and their relative priorities, as well as proposes a sprint goal. The members determine how many of the product backlog items they forecast they will be able to complete and determine how they will deliver those product backlog items.

A coach typically facilitates sprint planning in order to ensure that the discussion is effective and that there is agreement to the sprint goal and that the appropriate product backlog items are included in the sprint backlog. A good location for sprint planning is the so that you have access to all the information about your product backlog and you can reference and update any information radiators you may use.

If your team is distributed, sprint planning represents a good opportunity to gather everyone together so that your planning discussions can be more effective and to reinforce the person-to-person connections of the team. Sprint planning occurs on the first day of a new sprint.

The event should occur after the sprint review and from the previous sprint so that any output from those discussions can be considered when planning for the new sprint.

It does not have to occur immediately after those other two events. You'll find it's best to place a higher priority on scheduling sprint planning when the entire team is available. You may find that it's best to have a standing consistent time for sprint planning so that your team can keep that time slot clear from other engagements.

Sprint Planning Structured

Sprint planning is typically split into two parts:

Part 1 – Scope

The team selects which items from a prioritized list of ready product backlog items (usually expressed as user stories) they forecast they will be able to complete during the sprint.

Here's a sample agenda for the first part of sprint planning:

- What is the goal for this sprint Use this as a decision filter to determine which product backlog items to include in the sprint.
- What product backlog items are ready and contribute toward the sprint goal
- Who is available for this sprint Identify any vacations, holidays, other activities that will impact everyone's availability during the sprint.
- What is the team's capacity based on everyone's availability
- What items will the team include on the sprint backlog based on the sprint goal and the team's capacity.
- How confident does the team feel that they'll be able to meet the sprint goal.

Part 2 – Plan

The team discusses in more detail how they will deliver the selected product backlog items. This may (but does not have to) include identifying tasks for the product backlog items, whether there are any dependencies between the items, that each team member works on.

ESTIMATION

Estimation any of numerous procedures used to calculate the value of some property of a population from observations of a sample drawn from the population. A for example, is the single number most likely to express the value of the property. An interval estimate defines a range within which the value of the property can be expected (with a specified degree of confidence) to fall. The 18th-century English theologian and mathematician was instrumental in the development of to revision of estimates on the basis of further information. In the experimenter evaluates the precision of the estimate during the process, which is terminated as soon as the desired degree of precision has been achieved.

7.SOLUTION

```
from flask import Flask, render_template, request, redirect, session
import sqlite3 as sql

app = Flask(__name__)
app.secret_key = 'HIII'


@app.route('/')
def home():
  return render_template('retail.html')


@app.route('/about')
def about():
  return render_template('about.html')
```

```
@app.route('/signin')
def signin():
  return render_template('signin.html')

@app.route('/signup')
def signup():
  return render_template('signup.html')

'''@app.route('/list')
def list():
  return render_template('list.html')'''



@app.route('/data',methods = ['POST', 'GET'])
def data():
  if request.method == 'POST':
    try:
      username = request.form['username']
      email = request.form['email']
      password = request.form['password']


      with sql.connect("student_database.db") as con:
        cur = con.cursor()
        cur.execute("INSERT INTO students (username,email,password)
VALUES (?,?,?)",(username,email,password) )
        con.commit()
        msg = "Record successfully added!"
    except:
```

```
            con.rollback()
            msg = "error in insert operation"

        finally:
            return render_template("list.html",msg = msg)
            con.close()

@app.route('/list')
def list():
   con = sql.connect("student_database.db")
   con.row_factory = sql.Row

   cur = con.cursor()
   cur.execute("select * from students")

   students = cur.fetchall()
   return render_template("list.html", students = students)

if __name__ == '__main__':
   app.run(debug = True)


'''@app.route('/siginpage')
def signinpage():
   return render_template('signinpage.html')'''
```

8.TESTING

DEMO VIDEO LINK

https://drive.google.com/file/d/1SPLxcvlqIgcReuhkVpFDIcowtnzww0Nf/view?usp=drivesdk

9.1Performance Metrics

Inventory Metrics: Sales KPIs

You can use sales metrics to better compete in the marketplace and help your sales team to win deals and collaborate. Set up these KPIs to mesh with organizational goals, and use them to optimize the sales teams' performance.

Inventory Turnover Rate

Also known as inventory turnover ratio or inventory turn, inventory turnover rate is the number of times a company sells and replaces its stock in a period, usually one year. You can use the inventory rate to determine if a business has too much inventory compared to how much of its stock is selling. Inventory rate measures how well a company makes sales from its inventory. Use this formula to calculate inventory turnover rate:

Days on Hand

Days on hand (DOH), also known as the average days to sell inventory (DSI) or average age of inventory, is the rate of inventory turns by day. This daily interval is the most common timeframe after an annual range

Weeks on Hand

Weeks on hand demonstrates the average amount of time inventory sells per week: a high weeks on hand measure shows inefficient movement, while a low weeks on hand rate shows efficient inventory movement.

Use this formula:

Weeks on hand = (average inventory for period / cost of sales for period) x 52

Stock to Sales Ratio

Stock to sales ratio is the measure of the inventory amount in storage versus the number of sales. This broad calculation can be used to adjust the stock to maintain high margins.

Use this formula:

Stock to sales ratio = $ inventory value / $ sales value

Sell-through Rate

Sell-through rate is a comparison of the inventory amount sold and the amount of inventory received from a manufacturer. This helps demonstrate the efficiency of a supply chain.

Here is the formula to calculate sell-through rate:

Sell-through rate = (# units sold / # units received) x 100

Backorder Rate

Backorder rate is a measurement of the number of orders a company cannot fulfill when a customer places an order. It shows how well a company stocks in-demand products.

Calculate the backorder rate with this formula:

Backorder Rate = (# delayed orders due to backorders / total # orders placed) x 100

Accuracy of Forecast Demand

Accuracy of forecast demand, also known as the demand forecast accuracy, is a percent of how close the actual on-hand quantity is to the forecast. It checks on what a company forecasted, ordered and sold in the prior period.

Use this formula to calculate the accuracy of forecast demand:

Accuracy of Forecast Demand = [(actual – forecast) / actual] x 100

Rate of Return

Rate of return (ROR), also called the return on investment (ROI), is a percentage that shows the profit on an investment over a period. This percentage is a proportion of the original investment and usually expressed for a year.

Calculate the rate of return with this formula:

Rate of return (ROR) = [(final value – initial value) / initial value] x 100

Product Sales

Product sales, also known as sales revenue, is the income from customer purchases minus any returns or canceled sales. This metric is normally reported for a standard period, such as a month or year.

Use this formula to calculate product sales:

Product sales = gross sales revenue – sales returns – discounts – allowances

Revenue per Unit

Revenue per unit is how much one unit of product is worth. This metric is particularly helpful for subscription-based businesses.

Calculate revenue per unit with this formula:

Revenue per unit = total revenue for period / average units sold for period

Cost per Unit

Cost per unit is how much a single unit of product costs a company to produce or buy. It is best used in companies that manufacture or sell large amounts of the same product.

Use this formula to calculate cost per unit:

Cost per unit = (fixed costs + variable costs)/ # units produced

Gross Margin by Product

Gross margin by product is the amount of money a company keeps per dollar of sales. This metric removes any costs from producing the item.

Calculate gross margin with this formula:

Gross margin = [(net sales – cost of goods sold) / net sales] x 100

Gross Margin Return on Investment

Gross margin return on investment (GMROI) shows how much a company made compared to how much it invested in stock purchases. This metric measures how efficiently a company buys and sells its products.

Use this formula to calculate gross margin return on investment:

Gross margin return on investment = gross margin / average inventory cost

In This Metrics

Inventory Metrics: Receiving KPIs

Receiving KPIs, also known as warehouse KPIs, may overlap with operational KPIs, especially in regard to storage. Receiving KPIs are specific to the process of bringing in, receiving and immediately dealing with inventory.

Time to Receive

Time to receive is the rate at which staff bring in and prepare to sell new stock. This KPI measures the efficiency of a company's stock receiving process.

Use this formula to calculate time to receive:

Time to receive = time for stock validation + time to add stock to records + time to prep stock for storage

Put Away Time

Put away time is the amount of time it takes for a company to stow inventory. Chronologically, the actions that determine put away time follow those that determine time to receive. With increased efficiencies in this metric, lead time decreases.

Calculate put away time with this formula:

Put away time = total time to stow received stock

Supplier Quality Index

Supplier quality index (SQI) aggregates and weighs a vendor's performance in important areas such as material quality, corrective actions, prompt reply, delivery quality, quality systems and commercial posture. This is the broadest metric companies can assign to their vendors.

Most companies prefer to report monthly weighted scores, then calculate SQI for an annual average. This is one example of a formula to calculate weighted supplier quality index:

Supplier quality index = (material quality x 45%) + (corrective action x 10%) + (prompt reply x 10%) + (delivery quality x 20%) + (quality systems x 5%) + (commercial posture x 10%)

10. ADVANTAGES & DISADVANTAGES

10.1 ADVANTAGES:

1. Improves Accuracy

Real-time inventory tracking helps you improve inventory management and ensures that you have optimal stock available to fulfill orders. However, for most retail businesses, the inventory accuracy is merely 63%. With accurate inventory tracking, you can eliminate over-stocking, and in turn, reduce the cost and manual efforts required in holding it.

2. Reduces costs

Improving inventory management efficiency avoids chances of errors, and fewer errors eventually require fewer resources spent on fixing errors. Moreover, organized inventory management avoids overstocking and reduces the money spent on holding costs. The inventory management system notifies to timely replenish stock and avoid stock-outs.

In short, smart inventory management eliminates the need for large working capital, improves cash flow, and provides you with the required finances to fund payroll, product development, or any other business activity.

3. Saves Time

You can automate your inventory management process to save time in inventory forecasting and optimize the pick-pack process by leveraging robotics and AI. As you automate these tasks, you provide employees with ample time to work on more important tasks and devise strategies for business growth.

4.Improves Business Planning

Using an in-house inventory management strategy can help you get the business insights required to scale your business or improve operations further.

Implementing features like barcode scanning and using a central data warehouse enables you to easily transfer data and monitor the happenings of your business.

5. Improves Customer Service

To sustain in today's competitive eCommerce space, it is vital to provide your customers with a good shopping experience. Happy customers not only increase the chances of repeat purchases but can help you drive more conversions with good reviews and word-of-mouth publicity. With effective inventory management, you can quickly fulfill accurate and complete customer orders.

Now to make the most out of the above-mentioned advantages of inventory management, modern businesses need to invest in an Inventory Management System (IMS).

10.2 DISADVANTAGES:

1. Loss of items

The first disadvantage is the vulnerability to loss of items. This system does have a function to ensure quick and easy inventory recording. However, the absence of physical checks in this system has the potential for the loss of goods and can result in company losses.

2. Scanning errors

One of the important things that must be in a perpetual inventory system is that each item must have a barcode. The presence of a barcode or tag on each item is used to make it easier for you to scan all items. Suppose an error occurs in the scanning system or fails to be detected. In that case, the company will not record the item in the system.

3. Improper inventory tracking

The main problem in the inventory system is improper inventory tracking. If this happens, tracking the company's goods and inventory in the warehouse or store will hamper your business operations. Therefore, you can use effective and efficient backups to support recording in the perpetual inventory system.

4. Hacking

One of the things you need to be aware of when it comes to systems is hacking. Irresponsible hacking will threaten the security of all company data and information. This also applies to the perpetual inventory system in your company. Therefore, you should make sure to protect company data securely. The existence of hacking can result in the leakage of company data. If this happens, your company will be considered to have no credibility and the system is not optimal.

5. Theft

The last weakness is that it is vulnerable to theft. A perpetual inventory system does not guarantee that the stock of goods in your company will remain safe from theft. The possibility of theft by irresponsible people is still very large. Therefore, companies must implement strict procedures to prevent theft, which can harm the company. If items are lost due to theft, this will impact your records in the perpetual inventory system.

11. 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. As you have read above, there are different techniques that businesses can utilize to simplify and optimize stock management processes and control systems.