Smart Cart

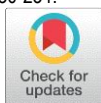**Naren S[1], Ajay R[2], Harikrishna S[3], Thanajjayan P[4]**

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Abstract: *This project is on a web-based application "Smart Cart" which ensures quality control in businesses that handle transactions revolving around consumer goods. Without proper inventory control, a large retail store may run out of stock on an important item. This system will alert the retailer when it is time to reorder. Smart Cart automates the process of managing inventory at a general store. It manages the sales, supplies and inventory of the general store. It keeps track of all the customers, the purchases made during a given period and the inventory of the items. This application is basically managed by the administrator. The administrator can login through the system. He also can view the details of the customers. A database is maintained which has the inventory of all the items. The system also keeps track of supplier details and sales. It stores all purchase order details and invoice details in respective tables in the database. This web-based application also has a POS system. The main function of a POS system is to process sales transactions quickly and accurately. When a customer makes a purchase, the system records the transaction, deducts the amount from the inventory, and calculates the total cost including taxes and discounts.*

Key Word: *Inventory management, data storage architecture, product recommendations, invoice generation.*

I.INTRODUCTION

Inventory Management has always been a problem not only in multinational companies but also at local shops. Proper management of the records about various products has always been a tedious task. Inventory Management is very essential to a corporation. Also, the Inventory Management models are separated using variables that represent reality, for instance, volume and size of the stored charge. The information about sales is usually displayed in a tabular format rather than the pictorial form which would help us understand better the direction In which the company is moving forward. Many small-scale industries use a spreadsheet to save their database which is usually vulnerableto loss and corruption. Inventory Management is essentialas per business perspective because it provides more diverse production systems. This can be done by increasing or reducing inventories and generating of production and financial gains. Effective Inventory Management includes forecasting the economic quantity of stock, determining replenishment information, location tracking, and controlling inventory levels. RFID and barcode system help to achieve this feature.

Simultaneously managing massive goods, abundance of warehouses shows up and thus these problems are put for the on the agenda.Various approaches have been proposed to satisfy the customers' demands. Generally, large inventory hasmany actors such as supplier, distributor, retailer connected in topology and Inventory Managers cannot afford to lose money due to anyone non-availability in chain. There are frequent demand uncertainties and different techniques are used to mitigate this delay.Moreover, the industries need technology to improve productivity which helps them to gain maximum output.Also, the records need to be entered manually without any errors which are tedious as well as time-consuming mechanism. The indigent control of inventory leads to the organization's capital which is then tiered in the resources. On the other hand, it is observed that good Inventory Management can increase an organization's productivity leading to higher profit ability. Moreover, the accounting of inventory can b every complicated. The traditional means of inventory accounting can reduce the accuracy of the system. Recently systems are developed that can automatically take care of the accounting work, data processing, and also produce insights about it. Inventory system oversees the layers of inventory which in turn determines the layers that should be maintained when inventory should be restocked. Cloud services are available to store and analyze data for the ones who cannot afford their physical server. And these are factors that help in the development and success of these industries using digitized system with advanced features.

The proposed system aims to develop a system that deals with the day-to-day requirements of any production organization, identifies hot stocks, most profitable stocks and fast- flowing goods based on data analysis and give in sights to the organization. The system also predicts future sales as well as recommends the brand/product. The system also aims to make the UI intuitive and easy for the user and at the same time not overwhelm with lots of information. The system also allows viewing the data from different devices. It will also generate an invoice for the user. The digitized system instead of the paper-based(manual) work will help to reduce the workload of the user, increase efficiency and accuracy of the record of sales and reduce time consumption that leads to increase in productivity. Directs ale report of the products will be generated without any time delay. A better understanding of sales will be given to the user by visualization through graphs and charts.

II. SYSTEM OVERVIEW

A. System Flow of Smart Cart Inventory Management System
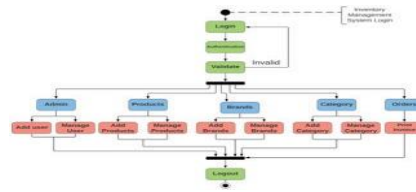

Fig.1. System Flow Diagram of Smart Cart Inventory Management System

The Fig. 1 shows the flow of the steps performed by the user in order to interact with the Smart Cart inventory management system. In this aspect, the diagram depicts the validation of the user performed by a controller system and the various options available to the user to add and manage the storage of the data at the data store. The validated user uses an input device to enter the commands to manage the articles, where in manage encompasses several aspects such as editing the stock levels, performing the inflow and outflow from a secured locked enclosure of products.

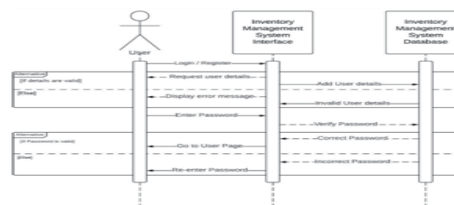### B. Architecture of Smart Cart

Fig.2.User Validation of Smart Cart System

Fig. 2 depicts how the validated user performs the tasks of managing the inventory through the portal and interacts with the controller that is connected to the data store through the internet or a distributed channel. The steps that user performs are shown in a sequence of initially adding the brands and then the addition of various attributes stored into the inventory.

Fig.3.User Methods of Smart Cart System

In Fig.3, the interface acts as a central mechanism connecting the user via a portal or an application to the database that helps in validating the user to perform various analys is techniques on the data store and predict the inventory levels that helps in better management of the inventory. The interface performs a series of steps to validate the user.

III.METHODOLOGY

The system focuses on providing a solution towards effective management of inventory and extracting useful information from the data being generated through the transactions of the goods. The method used by the system to provide these results is as follows:

A. Data Storage Architecture

The inventory is maintained in hierarchical order with the categories being the root of the tree. The category is followed by the different brands having products in this category. Each brand has several products in its umbrellaand they are stored as nodes to each brand. This approachhelpsforeasystorage,searches,andextractionoftheinformation related to a product. It also reduces the search time for a product to a great extent as compared to searching in a list which makes the system more efficient. All the other information such as the price of the product, weight, barcode, selling price, date of purchase is stored in the leaf node. The analyzes of the data are also much easier with the above-mentioned approach. The items similar to each other lie under the same category.

Fig. 4 shows the hierarchy of the data storage of the system. Each level shows different parameters to be stored and their corresponding child parameters. The sales and purchase data of each product is stored in tables in a chronological order thus facilitating in the study of the data on a temporal basis. This data is analyzed by a machine learning model to identify the trend in the data. The model not only identifies the trend in entires ales and purchases but also segments the data to individual products and helps to better understand the trend in the product level as well. This system makes it easy for the user to

identify the sales in each category or brand as well as a product. This forecasting method helps to estimate the future sales and thus notifies the user to increase or decrease the levels of inventory associated with each product as the demand fluctuates. This method is useful for the stock replenishment process to take place in an effective manner.

Fig.4. Data storage at Smart Cart

B. Market Basket Analysis

In the next step, the sales data is analyzed by the algorithms such as Market Basket Analysis to find the correlation between the sales of items belonging to a different category. Market Basket Analysis is used to find which of the items are being purchased together by the customer to find the associative index of one item to another. There are few default pairs and other pairs are formed by the order history of users. The pair of items are given scores according to the sales of products and pair with the highest score is considered to be the ideal basket items. This data is of significant importance to the warehouse manager as the items should be placed in close proximity to one another for timely dispatch as they are being ordered at the same time. This step also ensures to provide an efficient way to store the inventory.

C. Regression Modelling

The daily sales data is aggregated and analyzed to find out the trend in the sales of certain products and to also forecast the overall sales of the company based on prior performance. The regression model is built such that it takes data of monthly performance and generates a trend line and along with it also refers to the sales growth in the previous year's same month and also considers those parameters for better accurate predictions. These predictions are important for the user to manage the cash flows of the organization and to also manage the levels of inventory in the warehouse.

The model takes the parameters of sales of individual products and also the brands of each product and generates are port having data regarding the forecast of brands and products. This data can be used to estimate the future growth of a particular brand along with the products which are associated with those brands.

The model thus takes the temporal data as an input parameter and forms trend line for individual products aswell as brands and predicts the growth of each component separately as opposed to the approach where just monthly sales are predicted. This makes the model very accurate and efficient for sales and inventory management because of its approach to predict the sales of every separate entity.

The above steps help to automate and increase the efficiency of the entire process of inventory management however in the last step, the system needs to ensure that the data is secure in case of power failures as well. To include this safety feature the system proposes to print the invoice of the sales and purchase of the products so that the data can be accessed in case of serious failures as well.

The system thus encompasses the entire process of inventory management and identifies the weak points and also with the help of advanced computing algorithms, solves all the issues and provides a nall-round solution.

IV.RESULT AND DISCUSSION

A. Customer Data & Sales of Smart Cart inventory management system

Fig.5.Customer Data & Sales of Inventory Management System

Fig.5 shows customer data and sales in pie chart and bargraph. The customer data depicts the amount of sales by the him and the sales data depicts the total sales of each product.

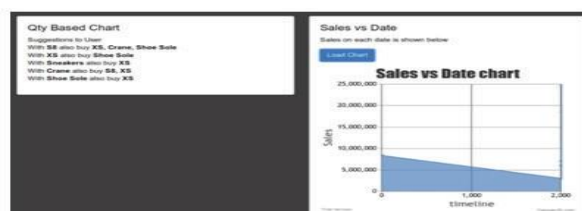### B. Recommendation of products to Inventory Manager

Fig. 6.Recommendation & Time of sales of products of Smart Cart inventory management system

Fig. 6 gives recommendations to the Inventory Manager based on their previous orders. The Sales VS Date Chart displays the total sales made over the course of time indicating the direction in which the company is heading.

C. Adding new product to Inventory

Fig.7.Adding new product to Smart Cart inventory management system

Fig. 7 shows how new products can be added into theinventory. The administrator can input parameters such as Product Name, Category and Brand of the product in order toadd the item in the inventory.

D. Placing a new order by Administrator

Fig.8. Placing a new order by Administrator of Smart Cart inventory management system

Fig.8 shows the inventory manager can makene worder by providing information such as the name of the supplier, product name and quantity of the product. The total price of the product will be displayed by considering GST and also discount (if any). The supplier can choose any payment method of his/her choice.

E. Invoice generated by Smart Cart inventory management system

Fig.9.Invoice generated by Smart Cart inventory management system

After the Inventory Manager makes the order, an invoice is generated that gives detailed description of the order as shown In the Fig.9.

The manual labour was significantly decreased and automation was done to an extent where the time consumption for each process reduced by a significant amount. The verification and analysis process for the inventory improved that resulted in making better decisions leading to higher profit ability and efficiency.

F. Adding and updating customers to Inventory

G. Adding and updating suppliers to Inventory

V.CONCLUSION

The proposed system has thus aimed to solve several issues faced by the warehouse organizers and inventory managers with the help of several algorithms such as Market Basket Analysis. There are many other advancements to predict the trend of the consumption which will include more attributes for analysis, thus including the number of attribute scan increase the accuracy of the overall system and bring In more accurate results for correlation and trend analysis.

The system also studies how the needs of the inventory managers have changed from just storing the data to analyze the data for a better understanding of the flow of the markets. This radical shift from storage-oriented approach to processing the information stored has also been addressed. The system thus discusses an approach which solves the present needs of the inventory managers and helps them to manage the overall process efficiently.

VI.ACKNOWLEDGMENT

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