Coherent System To Assimilate Close-Loop Inventory of Perishable Stock Using Analytics

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Abstract- Efficiency of Supply chain in retail industry experiencing multiple challenges in terms of replenishment due to poor prediction analysis and improper trending. Improving accuracy to the prediction, the relative loss and cost associated to business can be minimized which in turn will positively impact on the financials. Based on sensor data and its feedback mechanism using integrated systems with probability analysis, the re-order time and its quantity is automated to greater extent in current market trend.

This paper is to develop coherent system for Perishable goods which are exception as the challenges still remain same with earlier discussed approach due to uncertainty with multi-vendor design. With the help of data mining assisted with historical data and big data predictive analysis, the existing issues on the prediction will be addressed using dynamic bench marking models which not only minimizes the error in prediction but also improve the overall efficiency to be cost effective solution.

Keywords- Supply chain, Data mining, Big data predictive analysis, opinion mining.

I. INTRODUCTION

Replenishment in supply chain is biggest challenge in order to manage the product vs profit ratio to have positive impact the business. This paper deals about the model which is very specific to the perishable goods order/re-order quantity based on the trend analysis using Big-data and also with the market analysis. Hence the main question will be on how far the prediction percentage is possible?

Several factors are influencing the time and quantity decision for any range of business model for retail industry, starting from small shop to big retailers like Big Bazaar, Walmart, and Ahold etc. Key factors are Vendor contract, quality, Bench marking and prediction of sales.

Detailed analysis on each of these areas are discussed in the paper and conclusive model is proposed by which we can automatically predict and order the quantity required for the level of business based on the input from multiple sources

and it is ongoing and dynamic for the perishable goods to the vendors. Automation can be incorporated based on the feasibility but the analysis and prediction are the key functions of this research.

II. RELATED WORKS

Main objective of the replenishment is to fill the goods in stores before it is becoming empty in the shelves. The prime objective is to reduce the waste occurred due to improper replenishment and also to ensure the order/reorder time for the goods should happen just in time so that the inventory cost is reduced. This still holds good for the generic goods. But for perishable goods, we have to be more caution about the expiry date, quantity along with demand forecast. 250 varieties of fruits and vegetables are available in the market, along with this there are dairy products, meat and poultry, seafood, cooked foods. Key function is that each of these products has to be maintained in certain temperature which involves power and efficiency in logistics to deliver quality products. This is one additional risk considering perishable goods for supply chain replenishment.

For the automatic prediction of the order quantity, various factors has to be considered along with the standard supply chain management[1] with the help of below modules:

- Data collection Phase
- Retailer
- Global Trending (GT) analysis
- Analysing Phase
- Supply chain
    1. Order/re-order process
    2. Vendor
    3. Logistics
    4. Processing methods & functions
   5. Contract between Retailers and Vendors

Consumer and Market trends are the initial feeder for the supply chain to start functioning and the goods required for them is being forecasted accurately is the intention of this model. In this model, the items bought by every customer with the quantity is recorded against time. This will be stored in the

master database and the historical trends are being pulled using Big-Data forecasting methods. Being this model is generic, it can be applied for both perishable and non-perishable goods too. The Big data outcome from individual data marts are fine-tuned to provide input for the analysing phase where the conditions are being designed using standard algorithms to predict the reports for the ordering process.

Big-Data analysis will also include the Market feedback collected from multiple sources of survey. Global trending data is another input for the analysis process where it will be forecasting based on peak and non-peak period for certain goods which are having affinity with the festive days and normal days. During such days, we have to stock the goods in surplus to avoid no stock situation.

Analysis phase will consider the data from Big-data analysis and Global trending for individual items to forecast the demand for supply based on the historical records along with peak and non-peak season trends. Individual data marts for monthly wise are also used to compare with previous months data marts for the difference and to identify the growth/decline of the sales.

III. SYSTEM FRAMEWORK
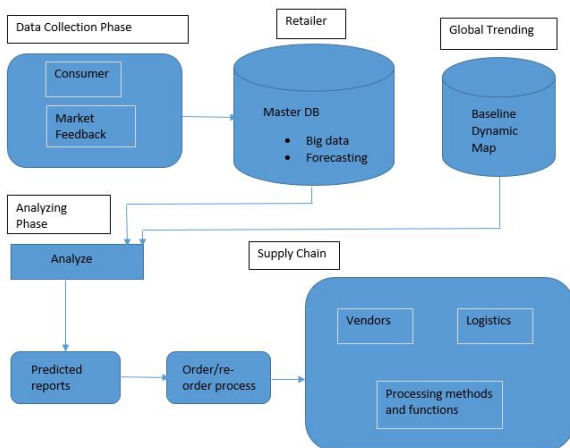
Once the analysis is completed, then it will be forwarded to the prediction which is mainly forecasting the demand against the vendors. In multi-vendor environment, the products are categorized against the vendors based on the contractual agreement which explains about the time, quality, and Order/reorder considerations. These variables will change from vendor to vendor and decision can be made based on the historical record of the vendor rating. Considering larger scale of business, redundancy and backup arrangements will also be planned for the vendors. Main crucial part of perishable goods

is that if either the goods are not sold or spoiled for some reason, then the return policy with the vendor has to be clearly defined in the contractual agreement. This model is mainly used to predict the demand for the perishable goods with Big-Data analytics from the existing database.
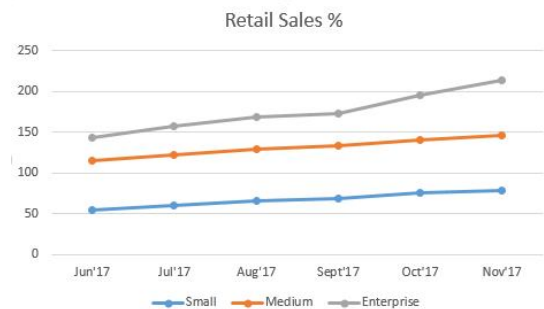
IV. RESULTS

Inventory cost will be reduced to almost nil.

With help of proper order/reorder, sales can be increased with respect to profit.

Business can be expanded as the model is rigid and scalability is flawless for new set of goods

Contribute to greater extend towards waste management as perishable goods are key factor in retail supply chain.

Decision tree logic will be used for the Vendor selection based on their track historical record. The graph depicts the growth of sales percentage for small, medium and enterprise business using this model with sample data.

V. CONCLUSIONS

In this paper, we study the model for the perishable goods prediction and forecast for the retail business and how it can be used to achieve the inventory cost and also to improve the sales percentage. This method will not only help the retailer but also help vendor to assess the situations and plan for the upcoming periods as the forecast trending will help them to proactively work on arranging the goods just in-time to avoid the issues. Lot of standard supply chain practices are taking in to consideration [1] [10] which are used for single vendor based management system to avoid the inventory loss and inaccuracies. In this with additional factors like expiry date, quantity, quality especially for the perishable goods are considered as wastage is considered as higher level of leakage for the cost involved in the supply chain management for retail business. The model can be further extended to the other areas of business as the core methodology remains same.

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