A Novel Approach for Supply chain In Distributed Networks Using Multi Echelon

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***Abstract*—In distribution networks ware -houses and distribution center will present at different locations and we have the problem in the covering all the distribution center using single path to minimize the cost and to maintain the optimal quantity at the warehouses we need to follo10w the specific methods in this paper we proposed the multi echelon method which ensure the minimum quantity at the ware houses for simple explanation assumed the production area as one location but in practical a firm can have the multiple production manufacturing areas at the end of this paper we described the system architecture and design which implement this approach and ensure the better performance**

***Keywords*— distribution center, firm, integrity, multi echelon, production area, supply chain, ware house**

I. Introduction

Distribution refers to the steps taken to move and store a product from the supplier to a customer in the supply chain. Distribution is a key entity of the overall profitability of a firm because it directly impacts both the supply chain cost and the customer experience. Good distribution is which achieve a variety of supply chain objectives ranging from low cost to high responsiveness. As a result, companies in the same industry often select very different distribution networks. Supply chain management is aimed at managing complex and dynamic supply and demand networks. A supply chain is defined as a network of facilities that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and distribution of these products to customers. A typical supply chain comprises (i) the production planning and inventory control process, which deals with manufacturing, storage, and their interfaces, and (ii) the distribution and logistics process, which determines how products are retrieved and transported from the warehouse to retailers before being distributed to the customers, the final products from production plants are stored at two distinct stages in the supply chain these places are called “echelons”.

In proposed approach we defined two echelons namely major warehouses and smaller distribution centers. Each warehouse may be supplied material from more than one manufacturing site. A distribution center can be supplied from more than one warehouse at the end of the supply chain, there are the customers. Usually, each customer is assigned to a single distribution center The operation of supply chains is a complex task because of the large-scale physical production and distribution network flows, the uncertainties associated with the external customer and supplier interfaces, and the nonlinear dynamics associated with internal information flows as supply chains become increasingly global additional aspects such as differences in tax regimes, duty drawback and avoidance, and fluctuations in exchange rates also become important

Section 2 of this paper deals with the previous approaches which are defined to manage the supply chain depending on different scenario Section 3 provides the problem statement Section 4 provides the system architecture which is defined based on the proposed approach Section 5 will give the detail design and finally the references with some test cases

II. Related Works

In view of their importance in the modern economy, it is not surprising that supply chains have been on the research agenda of a variety of business and other Academic disciplines for many years. The review presented in this section focuses on model based methodologies that can provide quantitative support to the design and operation of supply chains. The major decisions that need to be made in this context we have already been described in the introduction of this paper.

A. Material requirements planning

Is a production planning and inventory control system used to manage manufacturing processes with three objectives

1) Ensure materials are available for production and products are available for delivery to customers

2) Maintain the lowest possible material and product levels in store

3) Plan manufacturing activities, delivery schedules and purchasing activities

Disadvantage of this method is integrity of the data. If there are any errors in the inventory data, the bill of materials data, or the master production schedule, then the output data will also be incorrect

B. Customer Relationship Management

Is a widely implemented strategy for managing a company's interactions with customers, clients and sales prospects this provides the facilities Quality and efficiency, Decrease in overall costs, Decision support, Enterprise ability, Customer Attentions, Increase profitability Customer Relationship Management (CRM) is widely accepted as an effective approach for collecting, analyzing, and translating valuable customer information into managerial action. However, the potential of CRM has been investigated only in the context of existing products. CRM's potential to aid in future new product development (NPD) has been neglected as mentioned by Holger Ernst and Wayne D. Hoyer [4]

C. Dis advantage in existing systems

Reasons why we are not using this method are very simple Tools and workflows can be complex, especially for large businesses. Previously these tools were generally limited to simple CRM in case of large business models these approaches do not give the good results and dis advantage of the MRP is data in consistence whenever any wrong details are added in the MRP that are reflected though out the next phases like billing etc. in proposed frame work we tried to overcome these failures

In a highly competitive environment a supply chain should be managed in the most efficient way, with the objectives of

1. Minimization of costs, delivery delays, inventories, and investment

2. Maximization of deliveries, profit, and return on investment (ROI), customer service level, and production as mentioned by P. Tsiaris and N. Shah [1].

To solve this problem this paper proposes conceptual framework which can be used at firms this application uses Multi Echelon methodology and the architecture and design of the application is described in later sections

III. Proposed system

This system is designed based on 3-tier architecture at the front end it contain user interface which will be interacting with user for taking input. This architecture model provides the different levels of data access user can not directly modify the database. Fig 3.1 describes the architecture of the system. Front end of this system are designed in VB which will provide different forms to provide the orders. Another front end is web browser which will take requirements and give the requirements to application in form of xml document. TUXEDO is used as middleware. Middleware contain all the business logic and Tuxedo will ensure the distributed transaction management. At the back end we have ORACLE data base we use oracle 9i client for

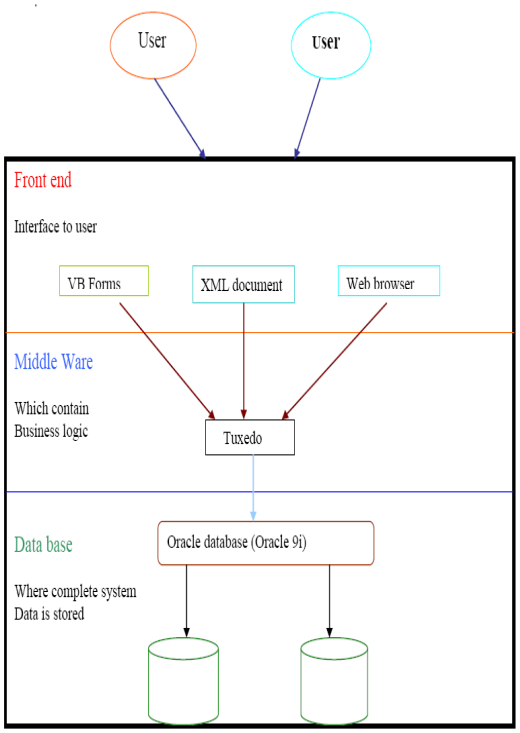

Fig 1 the architecture of the system

Interacting with the database. Our proposed echelon method is been implemented in middle ware where we define the complete business logic and the maintenance rules which are responsible for the optimal stock maintain at the warehouses

A. Interfaces Description

Interface between front end and middleware was written in VB which helps to perform operations on orders given by automated scheduling using this interface we can modify the order, we can delete order, we can modify the delivery date, we can modify the commitment but any modification done should obey the business rules Interface between middleware and oracle is written in pro*c which provide the connection to database and it allows us to perform operations on the database every order is stored in different table in database pro*c allows us to write queries in combination with c to perform the operations on database to maintain the consistency

B. Sub systems

This application contain mainly 4 sub-systems they are

- Back log Management
- Automated Scheduling
- Manual Scheduling
- Swap
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1) *Back log Management:* This module will responsible for maintaining the back log whenever any request comes we cannot directly ships the order to the customer sometimes product may exists or may not . In second case we need some extra time to manufacture the product. ST will maintain the log of its products we cannot ship the entire log to one order we need some logical way of maintaining the log this logical way of maintaining is done by the back log management

2) Automated Scheduling: This module is responsible for scheduling the orders given by the different users this application will read order quantity, shipping to, date of conform etc. this application contain predefined business logic which will give the commitment to the user if all the constraints are meet. In this application we propose the conform date given by user and if there are any modification in the order those will be populated

3) Manual Scheduling: This module will provide options like re defining the order which was processed by automated schedule for the users using this application we can merge the two different orders and we can divide the order or we can change the commitment date or we can the shipment date but whatever operation done in this application are required to meet their predefined constraints

4) Swap: This will allow the user to swap the order. Only divisional users are allowed to access swap they can pre pone or post pone the plan based on that window will show the respected planes which are scheduled t that date and he can swap them. While proponing the orders it also check the current status of the order and if the order is eligible then only he or her can pre pone the order.

The draw backs in the existing systems are solved in this frame work by defining the restriction levels in the middle ware data inconsistency problem has been solved by allowing the authorized people to call the services of tuxedo this security check is done at the two level one is at the front end level and another one is done at tuxedo using the user details present in the databases

Product details are maintained by their hierarchy which is defined prior to addition of the products this hierarchy is business dependent we maintain the different tables for different level of hierarchy and we maintain the relation from higher level to lower levels using the foreign keys

IV. Results Analysis

We compared the proposed frame work design with the existing frame works based on their execution times and working behaviors depending on the number of products they are dealing with. In Real-time firm's they contain the large number of the product types in addition to this we should also maintain the details of obsolete products Graphs present below will display the results of the

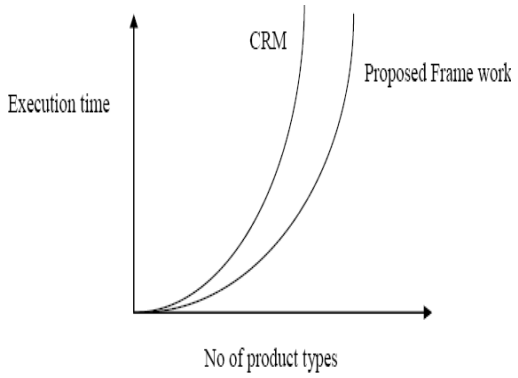

Fig 2 graph of integrity

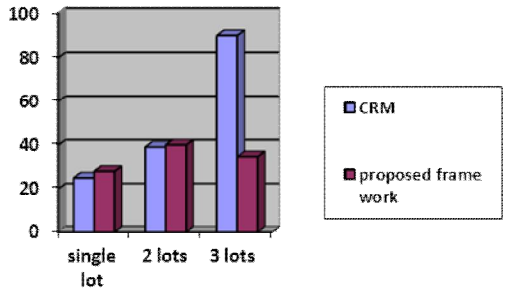

Fig 3 Execution time graph

We had taken the windows environment for executing these frame works and we executed the both frame work designs on the same machines one after another. The minimum system requirement for the both systems is same when the type of products are more CRM will give the poor results and proposed frame work will handle the different types of products easily and give the optimal results

V. Future work

Future work of this framework is integrating with production line management systems currently production line and warehouse management are maintained by two complete different systems. If we integrate these two systems we can reduce the overhead of maintenance. Integrating these two individual systems will be

When we combine the production line [(5)] with the distribution line in present scenario these two lines are maintained at different levels in different environments. Product line frame works are responsible for maintaining the details like how the product is manufactured and what are the different stages in manufacturing and what are the products used in production

VI. Conclusion

This frame work ensure the providing the optimal path and maintaining the optimal stock at the warehouses. We implemented the multi echelon method to maintain the optimal level of products at the different ware houses we maintained the product family hierarchy for maintaining the data integrity we defined the optimal path for distribution by treating the problem as the optimal shortest path problem and we maintain the interfaces with other systems to get the product details, stock availability in the warehouses

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