ABSTRACT

Operations research is a discipline to apply advance analytical techniques for good decision making. In operations research, various alternatives are generated and the best possible alternative is chosen amongst them. It is all about good decision making. In practice, in the practical scenario mathematical model of the system or problem is formulated. After that analysis is done using various mathematical techniques. Algorithms and computer programs are now applied for finding the optimal solutions. These models do better job. In real business situations, for instance, planning and scheduling of industrial manufacturing, schedules of railways and airlines, logistics activities, management of inventories, supply chain management etc., these models add value to the operations. The application software does not run accurately without a proper mathematical model which clearly simulates the real situation and provides correct and accurate data.

In these models I have used the methods and scientific techniques to make the applications work correctly. The various applications are chosen for optimal and effective management of the supply chain. It includes various scenarios for future applications and related work in managing business.
The first aim is for obtaining highest level of customer satisfaction in providing customer service and should avoid stock below the optimum level. Because it can lead to late delivery and orders can be backlogged. Eventually the sales can be lost. It can lead to production bottlenecks and finally they get unsatisfied and prejudiced customers. The will decrease the profit margins of the company.

The second important goal of inventory control is to enhance the overall efficiency in manufacturing of products & reduce the cost of production. The cost of purchasing and ordering should be curtailed. The cost of giving quality service to the customers should also be reduced and customer satisfaction should be increased to the highest level possible. But caution should also be exercised to avoid over stocking or piling of excessive inventories. It leads to non functional capital investments in inventories & leads to wastages of resources especially capital resources.

The twin objectives usually have conflicts. It leads to fixed bottlenecks in manufacturing and also have higher inventory cost. The overall effectiveness is also lower. The purchasing and ordering function is not optimal in nature. Therefore inventory control becomes a challenging task for manager. He tries to control stock and various supplies in such a manner to accomplish highest level of consumer satisfaction, customer services. The manager has to strike a balance between overstocking and
under stocking. He has to control the inventory cost. The cost reduction and maximization of profits should be his primary concern. The fundamental goal of the analysis of inventories in production is to specify the time of ordering and the quantity of order. Since it also relates to vendor rating and vendor relationships. These is always a long term healthy relationships with the suppliers. It leads to suppliers relationship management. It is beneficial in the long run.

It is important for the organizations for managing the available resources & use them optimally. The various resources are land, labor, money, machine, equipments etc. Information is also a very useful and effective resource in the current market business scenario. Competing with other companies become easier. If these available resources are managed properly and utilized optimally.

Different perspectives on inventory management also cause the ideal stock levels to be ambiguous. From a sales perspective high service levels are important. The sales department wants to offer their clients the best service. Running out of stock is thus not desirable, and therefore seen from this perspective, high safety stocks seem a perfect solution and not a problem. The management on the other hand needs to satisfy several different objectives: where customer service is being just one of them. Management often wants to reduce costs as much as possible in order to
generate more profit or be more competitive. Maintaining large inventories costs money and consumes working capital that can also be applied for other means.

An operations model having time varying deterioration and linear demand under inflationary environment has been developed. In this model, I have developed an operation model for products having linear demand with time varying deterioration. Generally products do undergo decay or get spoiled with the passage of time. The effect of inflation is also considered and reviewed so that the learning becomes more pragmatic in the economic environment. Backlogging would be allowed completely for the shortages in the system. For gaining knowledge for decision making by the manager, numerical examples are solved and sensitivity analysis is performed.

Inventory model with two warehouses for the decaying products having constant demand has been developed. Shortages are permitted with absolute backlogging. Infinite planning period is there in the model. A numerical example illustrate the system. The sensitivity analysis supports the whole system.

A model for inventory system allowing partial backlogging for products having deterioration which is not instantaneous is developed. The pace of production is reliant on the demand. Weibull distribution is
considered in this model. There are shortages in the system but are partially backlogged. To illustrate the system, mathematical examples are provided. The technique of sensitivity analysis is also approved.

Supply chain model with inflation & time dependent demand is developed. The demand is time varying. There are shortages in the current system but are partially backlogged. The rate of deterioration is constant. The rate of inflation is also there. A numerical example is solved for the system. The sensitivity analysis is also performed.

Inventory control system with quadratic rate of demand and variable holding cost is developed. In this model, the demand for the item is time dependent. The shortages are not allowed in the system. There is instant replenishment in the system. The mathematical examples are solved to demonstrate the system. The method of sensitivity analysis is applied to show adaptability of the current system.