



ISSN:0976-4933
Journal of Progressive Science
Vol.09, No.01 & 02, pp 12-15 (2019)

Comparative Service Levels in the Inventory Management before and during Covid-19 in context of Biosafety Products

J.N. Mishra

Department of Mathematics

Ganpat Sahai P.G. College, Sultanpur (U.P.) India

Email- drjnmishra1967@gmail.com

Abstract

Availability of essential biosafety products in time and reliable manner is serious challenge for supply chains in current situation due to Covid-19 pandemic. Unforeseen change in the demand of biosafety products arose due to protocol of WHO to check the spread of virus. Challenges of supply chain are overcome by improving service level in current scenario, guaranteeing high availability at each link in order to help preserve life. Flexibility of process in supply chain reflected in decision making. Allocation of biosafety products was focused on guaranteeing customer and user satisfaction using flexible strategy of inventory management. Management of Inventories for biosafety products is effected by volatile behaviour which impacts on the containment of the spread of the virus in a global disruption of supply chains. The proposed strategies can be used to companies for products in similar situation of crisis.

Keywords-Covid-19, risk and supply chain

Introduction

As per WHO (2020) Covid-19 was pandemic i.e. an epidemic disease which extends to many countries and attacks almost all individuals in all localities. This pandemic generated interruptions in supply chains i.e. the demand of biosafety products in one hand is increasing and supply of raw materials on other hand is reduced due to lack of supply. To reduce the effect of virus, biosecurity protocol is followed and modification in the consumption of products has generated changes in demand both in type and quantity of products. In current scenario everyone's priority is to save life, making it mandatory for companies to improve their level of customer service, for which they must continuously analyze situation to make their process more flexible and thus adopt quickly to sudden changes caused by the Covid-19 pandemic. Inventory control is

one of the most complex issues in supply chain logistics and management. In this pandemic random fluctuations in demand and lead time were affected. To fulfill requirement of customer and managing supply chain during Covid-19 pandemic it is mandatory the co-ordination and collaboration between process, organizations, markets and the wider economy. To identify stakeholders and model this complex system, the basic tool is value chain analysis, which provides a frame work to identify the criteria to be considered in inventory management for decision making. The current pandemic has made researchers to propose a new definition for supply chain interruptions risk and the extraordinary risk. Now problem is how to make the inventory management process more flexible, considering multiple criteria of the stakeholders with the goal of maintaining and improving service level during the Covid-19 pandemic.

2-Strategies to Mitigate and stabilize a supply chain

Flexible strategy is best to manage the problem in any urgency. Flexibility may be taken as super flexibility as dynamic ability which acts quickly and focused on organized way. Supply chain response strategy may be modified to minimize the variance between demand and supply mitigation strategies are not equally effective and applicable to all products in demand. During the pandemic biosecurity product trading companies faced problem due to variety of products and demand variations. These impacted much on lead time and prices. Inventory management risk mitigation strategies should be focused to (i) determination of chain for material management (ii) repositioning frequently (iii) preservation of level to meet the demand and avoiding excess of stock which leads to expiration and deterioration. Purpose of supply chain is to take decisions for achieving desired level using involvement of stakeholders, classifying products, identifying demand pattern and identification of selection of the inventory control system. Inventory management under an environment of uncertainty and risk challenges the ability to analyze, interpret and search solution in real time that force the chain processes to be adjusted and more flexible. Flexibility in inventory decisions to maintain a high level of customer services is vital to face the risk of epidemic out break as Covid-19.

3-Risk in supply chain

Risk in supply chain may be taken as operational and disruptional. Operational risks are related to problem of quality, quantity and delivery times which can be predictable and controllable. Disruptional risks are associated with catastrophes which are less controllable. These are existence of impact risk for a long time and uncertainty of future impacts and domino effect of the event on other functions or processes. In current pandemic scenario, the importance of the implementation of supply chain risk management (SCRM) has increased. In pandemic period chain system are fearful of

running out of supplies, states of emergency can force all manufacturing industries to reduce or scale short-term production and supply, and ultimately stability the longer time pandemic lasts society will be economically damaged, causing late payments, defaults and an increase in delinquency rates. Now its challenge to maintain supply chain in times of turbulence or VUCA world. VOCA world comprises of volatile, Uncertain, complex and Ambiguous.

Volatile: The environment demands you react quickly to ongoing changes that are unpredictable and out to your control.

Uncertain: The environment requires you to action without certainty.

Complex: The environment is dynamic with many interdependencies.

Ambiguous: The environment is unfamiliar, outside of your expertise.

4-Research criteria

Covid-19 imposed a new world scenario in which biosecurity protocols were established which reflected in policies and impacted the companies demand, more directly the inventory process. A methodology with a mixed approach was adopted developing the research through a before - after study of a company to maintain or improve service levels reducing the risks of inventory failures. Super-flexibility such as the dynamic capacity, adoptive strategies are used in defined time horizon. Decisions are taken using clients, products, forecasting methods, inventory control models and suppliers are considered.

To manage the process service-level-indicator is named as Fill-rate

$$\text{Fill-rate} = \frac{\text{Total No of customer orders shipped}}{\text{Number of customer ord filled}} \times 100 \quad \dots\dots\dots(1)$$

5-Service levels in the inventory management before Covid-19

Company of bio-safety products gains its goal obtaining fill-rate $\geq 95.1\%$ if used inventory management model with five phase structure.

- Phase 1. Integrations of the team work, criteria selection and classification.
- Phase 2. Multicriteria ABC inventory classification.
- Phase 3. Analysis of demand behaviour.
- Phase 4. Demand Forecasting.
- Phase 5. Inventory control systems.

6-Service level in the inventory management during Covid-19

During Covid-19 company faces situation of exponential increasing demand resulting from the real need and compulsive behaviour of customers which leads to bullwhip effect on safety products. Disruption is supply market the threatened the ability

to meet orders with high service levels. During pandemic and market response, the reality was that the inventory and production capacity of the products with the highest demand were not enough to satisfy the orders of customers, Company achieved fill-rate $\geq 95.1\%$ if used inventory management model of three flexible strategies.

Strategy 1. Strengthen the communication between stakeholders. Essential product during pandemic is indexed as

$$\text{Index by item} = \sum_{i=1}^j w_j y_{n_{ij}} \quad \dots\dots\dots (2)$$

where

w_j is the priority vector value for j criteria

$y_{n_{ij}}$ is normalized items value according to the criteria.

Strategy 2. Customer prioritization

Strategy 3. The size to order is decided by customer with a focus on continuous improvement based on these three strategies, adjustments were proposed to the inventory control model used by company to manage the process under new conditions during the Covid-19 period.

Conclusion

A company can train his manpower of service chain by improving service level during any pandemic. Same manpower and inventory before any crisis may be sustainable only using improved service levels for crisis period. Performance level of servers may be increased using some more advanced level of strategy of inventory management before and during any pandemic in future.

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Received on 28.08.2019 and accepted on 18.09.2019