

WHITE PAPER

Optimizing Inventories in Service Part and MRO Supply Chains

Four elements to unlock the value of working capital



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Abstract

Although optimizing inventories in maintenance, repairs, and operations (MRO) and Aftermarket downstream supply chains is a focus area today, it is replete with challenges such as difficulty in finding relevant skillsets and technology cost. This paper attempts to explore the key issues and challenges in these areas and identify solutions.

Optimizing inventory isn't easy

After Service parts and MRO supply chains have high numbers of spares and consumables. And a significant portion of these spares are slow movers and contribute to low inventory turns. Due to their slow movement, simple inventory control methods fail to optimize inventories and lead to low inventory turns and fill rates. A scientific approach is needed to address the issues in these environments, but it requires investment in sophisticated tools, application of statistical methods, and highly skilled resources. These investments coupled with a lack of confidence in getting the desired results often discourage a decision on these investments.



What makes inventory optimization challenging?

a. Too many stock keeping units (SKU)

The number of SKUs in aftersales and MRO supply chains can range from 10,000 to more than 250,000 depending upon the size of the asset base of the organization. In the Aftermarket supply chain, the number can range from 5,000 to over 25,000 depending upon the number of products, size of the dealership network, etc. Each SKU in these supply chains has unique characteristics such as the degree of criticality to business, stock-out cost, consumption / demand pattern, cost, delivery lead time, volatility in demand, demand predictability, impact of equipment lifecycle, OEM support, service contract terms with customer, etc. These parameters along with the high proportion of slow moving SKUs make it difficult to identify the right inventory levels. It impacts fill rates and inventory levels and it has been observed that service part dealers in the Aftermarket supply chain and inventory controllers in the MRO supply chain face difficulties in achieving two turns. In fact, according to a Harvard Business Review article, "Winning in the Aftermarket," 50% of automobile customers with service problems face repair delays because dealers don't have the right parts in inventory.

b. IT total cost of ownership

Scientific methods for inventory optimization apply concepts from operations research, statistics and probability. Operations research matured significantly during the mid-20th century but mostly remained confined to academics till the early nineties with limited usage in the industrial world due to limited computing technology and digitization of business processes. This

changed during the mid- to late-nineties with advancements in technology and digitization of business processes leading to an onslaught of next-generation technology products and usage of operation research and statistical methods. However, the high TCO of IT products made commercial sense for organizations to restrict IT to core supply chain processes and move MRO and aftermarket downstream supply chain to the back seat.

c. Limited availability of right skillsets

Inventory optimization involves application of highly advanced statistical modeling and accurate and timely update of parameters used in modeling. The complex nature of work involved requires highly skilled resources adept in statistical methods with financial acumen. Such skillsets are limited and come at a significantly high cost. Often, these skillsets cannot be utilized fully, especially in Aftermarket downstream supply chain networks, i.e., dealer owned organizations that do not require a dedicated full-time resource for this.



Address the challenges: Focus on four areas

There are four elements that are key to unlock the working capital tied up in service parts and MRO supply chain and increase profitability of dealers in the Aftermarket downstream supply chain:

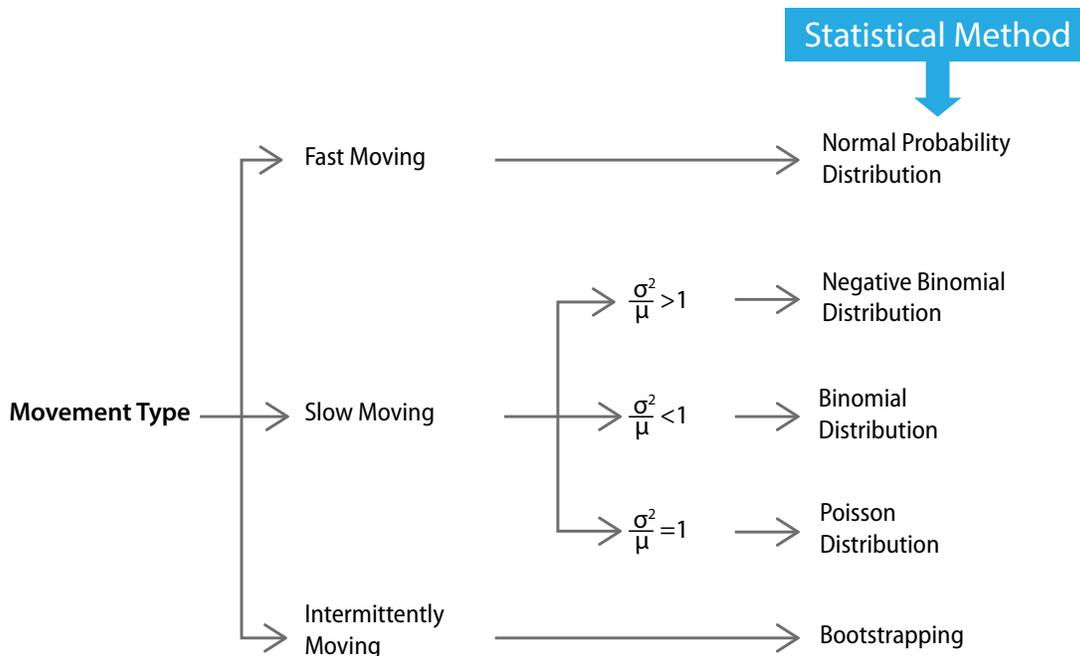


a. Scientific inventory models

Robust scientific models can ease the pain of optimizing inventory levels and managing a large numbers of SKUs, especially in the MRO and Aftermarket supply chain. Here are some examples of scientific inventory models used for optimizing inventory levels.

Inventory parameter	Scientific method to be used
Target service level / fill rate	Newsvendor model, Total cost optimization model, Unit loss function, etc.
Lead times and lead time variations	Probability distributions and Outlier correction algorithms to clean data
Safety stock	Probability distributions based on nature of demand. Outlier correction algorithms to clean raw demand data
Reorder Quantities (ROQ)	EOQ model, Total cost optimization model, etc.
Differentiated inventory optimization strategy	Use of Inventory classification methods—ABC, FSN, VED, etc., to develop right strategies

Based on the type of movement / demand of spare, the following statistical method can be applied:



Statistical models for spares based on movement types



b. Inventory optimization process

Supply chain behavior is constantly changing and in this dynamic environment, it is vital that parameter values and supply chain behaviors are captured and updated regularly.

Therefore, inventory optimization is a continuous process and requires a strong process-oriented approach.

The frequency of process steps and tasks varies and a robust technology platform and skillset are integral to the whole process.



c. Process management with KPO service providers

Growing demand of analytics and limited availability of skillsets have opened the doors to KPO / analytics services providers. Today, KPO / analytics services providers have developed highly innovative and mature shared service delivery models such as pay-per-use wherein payments are based on the number of SKUs-

locations managed without any upfront investment in resourcing requirements. KPO / analytics services providers are also delivering bundled services along with the technology platform.

Fortunately, inventory optimization is not linked to the day-to-day transactions

and hence does not require real-time interaction with the supply chain organization. This makes it ideal for outsourcing quickly with minimal change or impact on the existing supply chain organization.



d. Cloud-based technology

Technology is one of the core pillars for inventory optimization. At the turn of the millennium, options for technology were limited for computing power-hungry inventory optimization processes. However, with cloud-based technology

moving up the maturity curve, computing environment is available at a fraction of the cost. Cloud has enabled software vendors to offer innovative pricing models such as pay-per-use, monthly subscription, dollar value of inventory managed per

location, etc. These innovative pricing models help organizations to avoid upfront investments in technology and reduce the overall TCO of IT.

Case Study

A Fortune 500 oil & gas exploration and production company identifies the right stocking policy for spares and consumables using statistical methods

The company maintained high spares and consumables inventory levels as part of its existing inventory holding policy. Although the policy was reviewed in the late 80s, with the change in IT platform and supply base over a period of time, the company wanted to review the existing enterprise inventory holding policy for spares and consumables worth \$800 million across over 20 locations, more than 40 warehouses and 250,000 SKUs based on scientific methods.

Using highly sophisticated statistical methods and tools, Infosys helped the company to arrive at the target inventory levels at an enterprise level by factoring cost of stock-out, service levels, cost of ordering, inventory carrying costs, criticality levels of spares, and volatility in demand. Further, using statistical methods, Infosys identified inventory reduction opportunity of 24% in consumables and 20% in spares.



Conclusion

Inventory optimization processes, technologies, and skillsets require significant investments. Uncertainty, low confidence in getting the desired results, and the need for upfront investments give rise to status quo and lead to loss of business opportunities and revenue leakages. In such a scenario, it is imperative that organizations get over their inertia and invest, research, and innovate new

tools and methodologies to avoid being swamped by competition. To improve their bottom line, organizations must consider an assessment exercise, proof of concept (POC), and business case validation with a KPO or consulting services provider. Post assessment and POC, organizations can leverage KPOs and SaaS-based products to realize the benefits quickly and at a significantly lower cost.



About the Authors



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Lalit leads supply chain optimization portfolio at S&F practice. He has helped Fortune 500 companies in designing Spare and service parts inventory polices and optimizing inventory levels. Lalit has designed, built and implemented numerous inventory optimization frameworks. He is a mechanical engineer from Indian Institute of Technology (IIT), Roorkee, India, and also a CPIM from APICS.



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