

**ROLE OF INVENTORY OPTIMIZATION ON E-PROCUREMENT PERFORMANCE  
IN STATE PARASTATALS IN KENYA****Noor Ismail Shalle**

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**ABSTRACT**

Due to global supply chains, inventory interactions often involve many different firms with long production replenishment times and inventory in balances. To coordinate demand requests, transportation and inventory management utilize the benefit of strategic supply chain tools such as information technology to lower and make ordering more efficient. Inventory mismanagement will adversely affect an organization's operations by arresting financial resources that could have been channeled to other profitable sectors and/or activities. Obtaining the optimal constant price jointly with inventory policy is also important to evaluate the benefit of dynamic pricing policies. Limited or no access to timely information regarding both domestic and export markets especially with respect to such matters as supply volumes and quantities has led to supply shortages because players are never aware of how many orders a customer has placed and how much should be ordered from suppliers. Unavailability of inventory has affected customer satisfaction with in the downstream chain hence leading to loss of chain profits among the channel members. This study therefore sought to investigate Inventory Optimization by state parastatals in Kenya. The study adopted descriptive design.

**Key Words:** *inventory, transportation, inventory management, inventory optimization, price*

**Introduction**

Inventory Management is an integral part of business operations in all organizations including the Public Service. The cost of holding inventory includes not only the opportunity cost but also the storage and insurance costs, and the risk of spoilage or obsolescence. Inventory

mismanagement will adversely affect an organization's operations by arresting financial resources that could have been channeled to other profitable sectors and/or activities. Advances in computer technology have given this concept a further impetus, since it is now possible to obtain real-time operating data to fin-tune the entire manufacturing logistics program. While the material management concept has largely found a place in the manufacturing environment, it is not to be supposed that this is the exclusive province of materials management.

This inventory control approach widely used in industry is the periodic review (S, T) control system. Therefore, more case studies focusing on companies that have implemented VMI and studying the benefits they have attained as well as the problems they have faced in practice are needed. When compared with some industrial nations, it was clear that manufacturing companies in Egypt were suffering from a relatively low ITR, and a very low ITR<sup>2</sup>. The difficulty of access to appropriate and predictable levels of finance, at an acceptable cost, has been a consistently binding constraint on investment and growth in poor countries. Information sharing contributes to reduced safety stocks and inventory levels. There are cases where substantial savings can be made using the new policy instead of the traditional echelon or installation stock policy.

In efforts to improve inventory management, many companies have invested millions in enterprise resource planning (ERP) systems, which allow employees to use one software package with a number of integrated modules, rather than multiple, conflicting systems with different operating platforms and data formats. Developments such as e-purchasing may not be of use if employees do not possess the requisite skills in modern technology. Inventory flexibility directly impacts on a supply chain's performance by avoiding out-of-stock situations for products that are suddenly in high demand or by maintaining high inventory levels.

Retail replenishment is a high value activity and as such according to the US commercial department (2004) 1.1 trillion US dollars in inventory support as 3.2 trillion US dollars in annual US retail sales. This inventory is spread out across the value chain, with 400 billion US dollars at retail locations. Firms are now sourcing up to 75% of the value of goods and services globally and uncertainty of demand creates longer safety lead times resulting in high inventory value (Cooper, 2008). Demand conditions are such that it is difficult to meet supply chain expectations as either some supply chain members will be required to expedite shipments (high cost) or hold high levels of inventory (Farris and Hutchison, 2002; Hoff Man, 2009). High levels of stock adversely affect profitability (Bhatnagar and Teo, 2009).

To coordinate demand requests, transportation and inventory management utilize the benefit of strategic supply chain tools such as information technology lower and ordering more efficient (Auramo et al; 2005). This real-time information in regard to inventory levels throughout the supply chain assists in lowering the costs of back orders, lost orders and obsolescence (Yao et al., 2007, Lumsden and Mirzabeiki, 2008). However, inventories at retailers actually have not decreased in time (Chen et al., 2007) Also, Gaur et al. (2005) use firm level data and conclude

that inventory turnover has a downward sloping trend between 1987-2000 for US retailers. With such a stockpile inventory, it should be expected that stock outs at the retail level should be very low, but research suggests that it is not the case. Global studies have shown that stock-outs occurs at 8.3% of all retail sales worldwide (Grven et al., 2002). Research studying 71,000 customers worldwide concluded that customers lose patience with stock outs. Only 15% of the customers will delay the purchase to another time until the customers will delay the purchase to another time until the item is back in stock. On the other side, supply management (which includes supplier selection, contracting, and quality and inventory control) is the responsibility of operations managers. Due to global supply chains, inventory interactions often involve many different firms with long production replenishment times and inventory in balances (Bhatnagar and Teo, 2009). Obtaining the optimal constant price jointly with inventory policy is also important to evaluate the benefit of dynamic pricing policies.

### **Statement of Problem**

Limited or no access to timely information regarding both domestic and export markets especially with respect to such matters as supply volumes and quantities has led to supply shortages because players are never aware of how many orders a customer has placed and how much should be ordered from suppliers (Gupta, 1984). Petroni (2007) showed that leading manufacturers in Kenya, such as Coca-Cola, East African Breweries, Keroche Breweries, Bata Ltd, British American Tobacco (BAT), Royal Foam and Vita Foam are faced with problems of wrong forecasting due to unavailability of enough customer demand information. This has caused erratic deliveries in these firms, late deliveries and inflexibility hence affecting customer satisfaction with in their downstream chain (UNACTAD, 2006). Customers are concerned with the availability of the product and the ability of the firms to meet their needs timely (Aghazadesh, 2003). They make repeat purchases based on the service provided by the chain partner. Unavailability of inventory has affected customer satisfaction with in the downstream chain hence leading to loss of chain profits among the channel members (Aghazadesh, 2003). This study therefore sought to investigate Inventory Optimization by state parastatals in Kenya

### **Literature Review**

Balakrishnan et al. (1996) examine the effect of JIT adoption (which, supposedly, decreases inventory) on firms' profitability and find that, on average, there is no statistically significant association between ROA and JIT adoption. However, cross-sectionally, JIT-adopting firms with a diffuse customer base have a superior ROA relative both to adopting firms with a high degree of customer satisfaction and to their matched control firms. Gaur et al. (2002) investigate a relationship between operational and financial performance in retailing and find that different retailers follow different operational strategies (low or high inventory turns) in achieving financial targets. Hendricks and Singhal (2005) show that supply chain disruptions can be quite costly for a company: firms on average experience a 107% drop in their operating income and a 2.32% drop in ROA, and the negative impact of disruptions is long-lasting. Singhal (2005)

analyzes the long-run stock price effects of excess inventories. He finds that the stock market partially anticipates excess inventory situations, and the negative effect of excess inventory is significant: mean abnormal returns due to excess inventory are -37.22% in the sample.

Rajagopalan and Malhotra (2001) study trends in inventory levels at US firms over time to test the widely held belief that inventory management has improved due to the introduction of JIT practices and IT system implementations. Using a large sample of firms from the US Census Bureau including both private and public companies, they find that material and work-in process inventories decreased in the majority of the two-digit SIC industries from 1961 to 1994. Furthermore, in some segments there were greater improvements in the post-1980 period when JIT practices were adopted.

Gilmore (2007) stated that working capital tied up in inventory can't be used for more productive purposes that could generate higher returns or growth for the company. Secondly, inventory is a component of the company's overall capital investment. Those firms that can generate a given level of profit with a lower level of investment in inventory will generate higher cash flows and better return on invested capital – key metrics Wall Street types use to value companies and determine stock prices. Thirdly, higher levels of inventory tend to lead to more problems with write-offs of slow, excess and obsolete inventories (SLOBs), which can hammer a company's profit line, especially in today's environment of rapid product lifecycles. (Ramakrishma, 2005).

In America, inventory contribute to almost sixty percent 60% of the annual turnover in the manufacturing firms (Anderson, 1987). This shows clearly that a lot of concern should be given to inventory management to avoid unnecessary costs. Actually any function of the firm which accounts for well over half of its receipts certainly deserves a great deal of managerial attention.

According to Ramakrishma (2005), on an average, half the sales income in an organization is spent on inventory. Suppose a firm is spending 50% of its volume on material and the profits are say 10% of sales volume. A 2% reduction in inventory cost will boost the profits to 11% of sales or the profits will be increased by 10%. To achieve the increase in profit through sales efforts, a 10% increase in sales volumes will be necessary. In other words, organizations earn or loose large sums depending on how effective are their Inventory Management. (Ramakrishma, 2005). Leenders et al (1989) Confirmed that, there was an increase in the use of material management concept compared with the study done in 1988.

According to the article by the Support for Improvement in Governance & Management (SIGMA) 2011, Public procurement contracts represent a major share of any country's GDP and public expenditure budget. According to data published by the European Commission in its recent Evaluation Report, public procurement in the EU accounted for EUR 2100 billion in 2009, or 19% of GDP. (SIGMA) 2011. These levels of expenditure alone provide sound reasons for analyzing the performance of public procurement operations at all levels. The overriding objective of a state's public procurement system is to deliver efficiency and "value for money" in

the use of public funds, whilst adhering to EU requirements and to national laws and policies. (SIGMA2011). Performance measurement is about seeking to answer the fundamental question of whether the procurement system and operations ultimately deliver in accordance with the main objectives set. Three different levels of performance measurement within a public procurement system are broadly identifiable there are close links between the three levels in terms of performance interdependency. However, the needs, objectives and methodologies for measuring performance can differ. (SIGMA, 2011)

According to the Supply chain digest (Gilmore 2007), the data analysis on inventory show continued upward pressure on inventory levels, with average inventories across all industry sectors up by 2.1% in 2006. The largest driver of this increase is generally thought to be the rise in off shoring. As a greater percentage of a company's total sales comes from offshore sources, its inventory levels are likely to rise, as higher inventories are used to buffer the impact of the longer supply chains and increased inventory risk.

Inventory plays a big part in the manufacturing firms as it account for about 56% of the annual turnover. (Ondiek, 2006). Kenyan organizations are faced with a lot competition in the current markets. This has led to the need for coming up with better method of managing and measuring how resources are utilized by various jobs or products, and therefore be able to eliminate any wastage in the value chain. The new cost management methods require having the right persons doing the right job. (Ondiek, 2006). In this case, the major concern is how inventory functions are organized and actually who is responsible over these functions in the Kenyan manufacturing firms. (With the tremendous improvements in information technology and communication, inventory management is seen to improve in Kenya. The increasing emphasis on the competitiveness has led to a new emphasis on the competitive advantage through effective utilization of organization resources. It is essential to address fundamental competitive advantage through cost reduction. Issues like competitive buying, buying wisely, effective and reliable sources of supply, to keep inventory investment and inventory costs at a practical minimum, are the current business.(Ondiek, 2006).

The conclusion drawn from the research is that majorities of the Kenyan firms are not practicing professionals in inventory management and that inventory management was more suited for large firms. Lack of enough people with know-how in inventory management locally has actually contributed to lack of recognition of the same. As compared to America and Japan, most Kenyan, firms have a long way to go in- terms of effective and efficient inventory management. (Ondiek, 2012)

Otieno, (2011) explains that companies which are able to manage their long term business relationship by crafting mutually beneficial supply chains normally have high global volume, regular and standardized (predictable) demand, supply requirements and low switching costs. This reinforces long term business relationship and brand building. The primary objective of

supply chain management is to fulfill customer demands through the most efficient use of resources, including distribution capacity, inventory, labour and by companies carefully selecting among all the options (rapid response, capacity adjustments, least cost approach and a combination of all these), a supply chain can be tailored to 'fit' the physical and market needs of the specific products it moves and prevent supply disruptions. Companies can easily choose the location of their facilities but they cannot choose the location of their customers (Otieno, 2012).

### **Inventory Cost Management Practices**

Material Requirements Planning (MRP) is a practice that attempts to reign in materials needs. It is a technique that is based around the concept of dependent demand. The concept of dependent demand states that the demand for one item is dependent on the demand for another item. These items are complimentary and one may require the other in order to function. A prime example of dependent demand would be auto tires and automobiles. If the demand for automobiles falls, the need for auto tires will decrease, leading to decreased demand for auto tires. When the demand is dependent, it is then possible to forecast the demand for the product and the quantities of materials needed to produce the final product. All components and subassembly requirements can be determined once dependency is established (Gitman, 2003).

According to Baker, (2004), inventory creates costs for each company, but it is needed in order to achieve proper service levels, changes in demand, false forecasts, and unreliable lead times. Inventory is everything that is tied up in the supply chain, not just at warehouses or distribution centers. However, supplies may be piled up in order to save time and money on economies of scale or to lower transportation costs. All decisions concerning inventory must therefore be given great attention, as the capital tied up in inventory expenditures may prove beneficial elsewhere in the company. Meeting all of these objectives requires great skill and it is therefore not strange that organizations spend so much time on questions concerning inventory management.

Proper inventory management is the key to satisfying customers while simultaneously holding down costs so that company finances can be put to good use. If inventory is not managed correctly excessive products may have to be written off, leading to higher product costs as well as lower profit margins.

More and more companies are attempting to undercut their rivals by providing excellent aftermarket service, which in turn leads to higher costs for the company; with the upside being greater customer loyalty and longer term profits due to extended customer relations. A well established and well functioning after-sales supply chain creates just this. "Services such as rapid onsite restoration, returns processing, spare parts fulfillment and equipment refurbishment" all fall under the ideas needed in successful after-market sales. However, if companies want to excel in this area, operation evaluation must be done to ensure that optimal levels of support are being achieved, "while at the same time gaining the benefits of business growth, customer loyalty and premium pricing."

Allegrì (1990) notes that Material management is a concept that is congruent with the modern view manufacturing because it organizes, coordinates, and integrates the functions of procurement with the logistics of manufacturing operations. Advances in computer technology have given this concept a further impetus, since it is now possible to obtain real-time operating data to fin-tune the entire manufacturing logistics program.

The plant department that are most generally involved in materials management operations are purchasing, traffic, production control, materials handling, material scheduling, and inventory management; however, the implications of the concept go far beyond these departments in the manufacturing entity. For example, there is additional involvement with manufacturing and plant engineering, maintenance, engineering design, finance and accounting.

While the material management concept has largely found a place in the manufacturing environment, it is not to be supposed that this is the exclusive province of materials management. Quite the contrary, since the materials management concept can be applied profitably to service industries such as truck lines, railroads, and hospitals with equal efficiency Cheatham (1989).

Many of today's businesses have inefficient supply networks or too much inventory locked up at warehouse sites throughout the distribution system. The importance of inventory turns and effective distribution systems are being analyzed to a greater extent by upper level management. Some of the negative aspects that can be seen in inventory handling, which harmfully affect profit margins are "poor visibility into inventory, long cycle times, inconsistent customer service, inventory obsolescence and the significant costs of brick-and mortar investments."

Additionally, in order to hold expected customer service levels, inventory must be maintained at ever large numbers over an increasingly larger distribution network which spans the entire world. Products and parts lists are growing, making the process of controlling the inventory even more difficult. All of this at a time when financial departments are trying to cut costs in order to make business more profitable.

Cheatham (1989) noted that there has been considerable interest in recent years among practitioners and researchers regarding how to make the dream of an integrated supply chain a reality. The idea of the entire supply chain acting in a coordinated, synchronous fashion to achieve higher levels of customer service for end customers at a lower total supply chain cost is inherently attractive. The desired outcomes not only enhance customer loyalty and margins, but also ensure the very survival of the firm and its supply chain partners in increasingly competitive markets. However, rendering the levels of cooperation and coordination necessary among multiple parties to garner these benefits has proven anything but simple.

### **Study Findings on Inventory Optimization**

Findings indicated that most of the respondents (63%) felt that high levels of inventory/stock adversely affect profitability of the corporation while the remaining 37% felt that high levels of inventory/stock do not adversely affect profitability of the corporation

The study also sought to establish the extent to which respondents agreed with various statements about Inventory Optimization in their organizations. Data findings revealed that 73% of them felt that inventory optimization was affected by dynamic pricing policy, 69% felt that top level management contributes to policies on ordering and replenishment of inventory in their organizations, and 56% felt that proper inventory policies affect state corporation performance.

The study also found out that majority of the interviewees (67%) opined that real time information regarding inventory levels assists in lowering cost and back orders, while the remaining 33% felt it did not assist at all.

The study found out that inventory optimization influences procurement performance in state corporations in Kenya. According to the findings sixty five decimal seven per centum (65.7%) correspondence on procurement performance can be explained by a unit change inventory demand. State corporations are non sourcing up to 75% of the value of goods and services globally and uncertainty of demand creates safety lead times. To coordinate demand requests, transportation and inventory management utilize the benefit of strategic supply chain tools such as information technology, lower and ordering more efficient hence influences procurement performance by covering the cost of back orders, lost orders and obsolescence, affect the revenue stream, optimal replenishment policy. The question of how much inventory a firm should keep has been studied but there is dichotomy in the views given that inventory is both an asset and a liability.

Too much inventory consumes physical space, creates a financial burden and increases the possibility of damage, spoilage and loss. Further, excessive inventory frequently compensates for sloppy and inefficient management, poor forecasting haphazard scheduling and inadequate attention to process and procedures.

Contrary to the findings of the aforementioned studies with the use of a small sample size though 46 firms, reported that the accounting performance of JIT adopters declines slightly compared to a matched sample of a non adopters.

### **Conclusions and Recommendations**

The findings emphasize that continuous inventory replenishment policy takes a regular order. The time of a replenishment decision is called an order point and the arrival of an order is regeneration point. The objective of any firm is to maximize the long-run average profit with decision variables (Q,R,P). However, the inventory level is always non-negative when unmet

demands is lost. Therefore, consistent with Hadley and Whitin (2003) the expected holding cost is adjusted by adding the expected lost sales to the average inventory level to include the increased holding cost. To coordinate demand requests, transportation and inventory management utilize the benefits of strategic supply chain tools such as information technology to assist in keeping inventory lower and ordering more efficient (Auramo et al, 2005). This real-time information in regard to inventory levels throughout the supply chain assist in lowering the costs of back orders, lost orders, and obsolescence (Yao et al, 2007, Lumsden and Mir Zabeiki, 2008).

The finding also emphasized that the advent of electronic procurement have been viewed as a key stone of supply chain collaboration. A collaborative supply chain has been described as two or more organisations working together to jointly plan and implement supply chain operations more successfully than working independently (Simatupang and Sridharan, 2002, Arshinder and Deshamkh 2008, Simatupang and Sridharan 2002) proposed that integrative policies of information sharing, joint decision making and incentive alignment would be present in collaborative supply chain. Supply chain collaboration is a concept that is affected by many factors, with electronic procurement being one of them. Despite the critical role of electronic in supply chain, research pertaining to digitally enabled supply chain integration has been limited and piecemeal (Rai et al, 2006).

Moreover, it has been repeatedly reported that electronic procurement is an important enabler for information sharing, however, its impact on complex collaborative practices including joint decision making and incentive alignment has not been established yet. In addition, very little is known about how electronic procurement enabled collaboration effects performance (Sanders, 2007).

Collaboration has received increased attention in both the operations and supply chain literature (Matopoulos et al, 2007, Nyaga et al, 2010). On the other hand, and its and compliance examine the performance of public organizations. In order to ensure citizen receive value further taxes (Jacobs, 1998, Guthrie and Parker 1999, Morin, 2003). However, these audits are complex by nature (Funnell, 1998; Dittenhofer, 2001) and there are as yet to generally accepted auditing standards (Bowerman et al, 2003). In fact, there exists no general agreement on a distinct definition of performance audit (Pollitt, 2003; English, 2007). An audit orientation towards goals is emphasized INTOSAI (2004).

However, it has been found difficult to audit the outcome of public activities (Gendron et al, 2001; Broadbent and Laughlin, 2003), as goals have a tendency to be ambiguous and sometimes contradictory. Moreover, the relationship between cause and effect is normally complicated making it difficult to isolate the outcome of a specific organization's activity (Broad bent and Laughlin, 2003; Sanger, 2008). As public activities are carried out in ways that make the outcome difficult to measure with quantitative methods, it can be complicated to carry out a

traditional effectiveness audit. Thus, the sixth audit type, goal-related audit has a role within extended VFM audit. This audit type may examine whether goals.

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