

## MATERIALS REQUIREMENT PLANNING AND ORGANIZATIONAL PERFORMANCE: ANY CONNECTION?

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### Abstract

Effective inventory management is crucial to maintaining competitiveness and achieve organizational success. This paper evaluated the concept of material requirement planning (MRP) and assessed its import to and organizational performance metrics (inventory turnover, order fulfillment, cost savings, service level). Extensive literature review was done to sound the views of scholars on the meaning and nature of MRP, as well as its contribution to organizational performance. Based on the literature review, we observe that MRP has significant influence on organizational performance. This is because the studies assessed, all report that MRP informs higher stock turnover rates, increased profitability, enhanced service levels, customer satisfaction, among other outcomes. Thus, the study concluded that MRP is a viable inventory management practice that leads to improved organizational performance; and study recommends that firms, especially those in retailing, that are desirous of boosting their performance should invest in technology-based MRP system.

**Keyword:** Customer satisfaction, inventory turnover, material requirement planning, order fulfillment, organizational performance

### Introduction

In today's competitive retail landscape, corporate-chain-stores face significant challenges in managing their inventory effectively. Inventory management is a critical aspect of corporate-chain-stores operations, as it directly impacts organizational performance. The ability to efficiently manage inventory, minimize stockouts and reduce waste is crucial satisfying customers, profitability and competitiveness of corporate-chain-stores.

Port Harcourt, a major city in Nigeria, is home to numerous corporate-chain-stores that cater to the growing demand for fast-moving consumer goods. However, these corporate-chain-stores face unique challenges, including infrastructure constraints, limited access to technology, and intense competition. Effective inventory management practices like material requirement planning (MRP) is essential for these corporate-chain-stores to navigate these challenges and achieve organizational success.

MRP is a key aspect of inventory management that focuses on planning, scheduling, and controlling materials needed for production. It ensure that the right quantity of materials are available at the right time to meet production demands. It involves systematic calculation of material needs based on production schedules, inventory levels, and lead times.

MRP improve efficiency by reducing excess inventory, minimizing stockouts, and optimizing production processes, thus enhancing overall operational performance. MRP significantly relates to supply chain performance (Kamalu et al., 2023). Whilst efficient inventory management is necessary, a translation of the operational systems from traditional to advanced systems laced in technology cannot be overemphasized. Small and Medium-Sized Enterprises (SMEs) operational performance is impacted by knowledge of advanced technologies like Internet of Things (IoT) , big data, and machine learning, aiding in inventory cost reduction (Panigrahi et al., 2024).

Kumar et al. (2023) highlights the role of sustainable supply chain management (SSCM) in enhancing organizational efficiency, reducing environmental impact, and improving overall sustainability. Yang (2023) presents an inventory model that optimizes the replenishment cycle and order quantity for items that deteriorate over time, particularly under conditions of fluctuating demand. The study finds that the proposed model helps minimize total inventory costs, including holding, ordering, and deterioration costs, by determining the optimal order quantity and timing. Lee (2021) finds that SSCM practices and digital integration significantly enhance firm performance. Ateke and Nwiele (2017) posit that organizational adaptability in response to dictates of the business environment and fulfilling the changing preferences of consumers has been the stock-in-trade for progressive business praxis.

This study explore the interplay between MRP and organizational performance. It examines how MRP impact organizational performance metrics such as stock turnover, profitability, customer satisfaction, and supply chain efficiency. By exploring this relationship, this study aims to provide valuable insights for corporate-chain-store operators and stakeholders. Fig. 1 illustrates our conceptualization of MRP can impact measures of organizational performance.

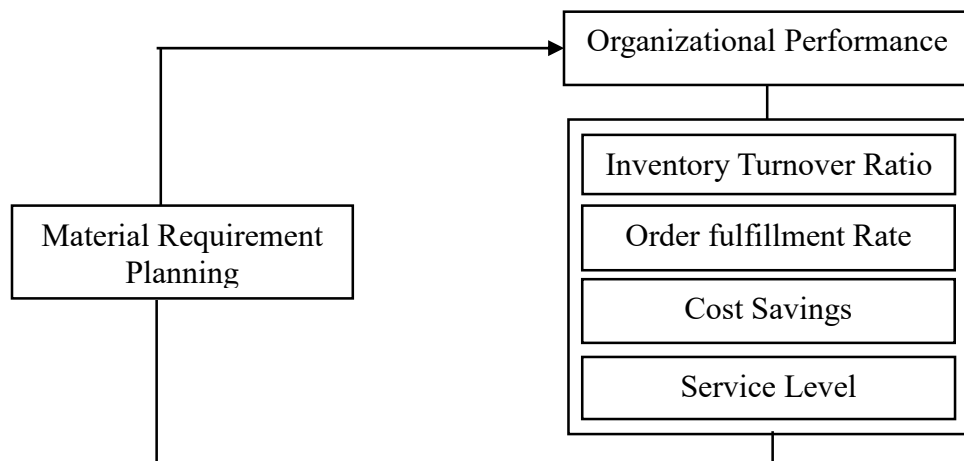


Fig. 1 Conceptual Framework of Material Requirement Planning and Organizational performance.

### Theoretical Foundation of the Study

This work would devolve around the resource based-view, which suggest that organizations can gain competitive advantage by leveraging their unique resources and capabilities, including. RBV argues that firms can achieve superior performance by effectively managing their resources. Analyzing MRP and organizational performance through the lens of RBV involves understanding how unique resources and capabilities of firms, particularly those related to MRP, contribute to their competitive advantage and overall performance.

The overview of the RBV which posits that the key to achieving and sustaining a competitive advantage lies in the organization's ability to utilize its unique resources and capabilities suggests that not all resources are equally valuable; only those that are valuable, rare, inimitable, and non-substitutable (VRIN) provide a lasting competitive advantage.

In the context of this study, MRP can be seen as critical resource that significantly impacts organizational performance. A well-implemented MRP technique can create significant value by improving efficiency and enhancing customer satisfaction. By optimizing stock levels, firms can minimize holding costs and reduce the likelihood of stockouts or overstocking, which directly improves profitability.

RBV was adopted as a baseline theory for this study because it offers a framework for analyzing how MRP can contribute to organizational performance. By identifying and leveraging unique, valuable, and inimitable resources, firms achieve sustained competitive advantage, which manifests in improved operational efficiency, customer satisfaction and financial performance.

### **Concept of Material Requirement Planning (MRP)**

MRP is a set of policies, procedures, and technologies used to manage inventory levels, track inventory movements, and optimize inventory storage and retrieval (Bhattacharya et al., 2018). Its primary goal is to ensure that the right products are in the right place, at the right time, and in the right quantity (Ojeka et al., 2020). A typical MRP system has inventory tracking components used to monitor and record inventory levels, movements, and locations (Kumar et al., 2018).

MRP is a production planning and inventory control system that helps manage manufacturing processes. It calculates the materials needed for production, ensuring that the right quantities are available at the right time. It monitors inventory movement, rate of consumption, regularity of flow of materials, hence, it classifies materials based on movements and consumption (Chen et al., 2017). Gupta et al. (2015) broke down the MRP process into three steps: managing on-hand inventory, identifying additional requirements, planning and scheduling their production or procurement.

MRP system also has inventory valuation component that assigns values to inventory for accounting and financial purposes, it can be used for the ABC/Pareto and the WXY consumption classification (Kim et al., 2019). Manufacturers and distributors can be connected using the MRP System to streamline inventory flow (Hsu et al., 2016). Reporting and Analytics is an important tool of MRP system that provides insight into inventory performance, trends and areas for improvement (Eze et al., 2020). Other key components of MRP include bill of materials, inventory records, production schedule and lead time (Gupta et al., 2015).

MRP processes are designed to handle issues relating to required materials, quantity required and timing of requirement, and distributes resources accordingly. In other words, MRP allocates inventory precisely where it is needed. Though traditionally handled manually, modern MRP is computer-based and offered either as dedicated software or integrated modules of larger production management suites like manufacturing ERPs. In either case, a MRP system usually includes both inventory management and production planning and scheduling functionalities. In recent times, companies have favoured computer-based MRP systems because of their potentials to improve inventory accuracy and reduce costs (Bhattacharya et al., 2018; Kumar et al., 2018).

### **Concept of Organizational Performance**

Organizational performance refers to the ability of an organization to achieve its goals and fulfil its mission. It describes the health of a firm as an outcome of management processes measured against stated corporate goals or compared to the performance of competing firms; or a company's capacity to achieve set goals by efficiently utilizing scarce resources (Ateke & Kalu, 2016).

Organizational performance is assessed from different perspectives, including financial performance, productivity, customer satisfaction, employee engagement, innovation, output quality. In the context of inventory management, organizational performance includes such metrics as, order fulfillment rates, inventory turnover, supply chain efficiency, sales growth, service level and product availability. These aspects of organizational performance are easily quantified and can be improved. Firms identify areas for improvement and implement strategies to enhance their overall performance and competitiveness.

It is thus apparent that organizational performance is a concept with multiple indicators, and can be used in differing contexts between profit and non-profit oriented organisations (Ateke & Kalu, 2016). In the current study however, organizational performance is viewed from the profit oriented perspective, and is measured using inventory turnover ratio, order fulfillment, cost savings and service level.

Inventory turnover ratio measures how efficiently, a firm turns over its inventory within a given period. A higher turnover ratio indicates more efficient inventory management, suggesting that the supermarket is selling products quickly and not overstocking. Effective MRP will lead to a higher inventory turnover ratio as it ensures that stock levels are aligned with actual demand.

Order fulfillment rate represents the percentage of customer orders that are fulfilled on time and in full. High fulfillment rates are crucial for customer satisfaction and retention. Proper use of MRP should improve order fulfillment rates by ensuring that the right products are always available when needed.

Cost savings means the reduction in costs associated with inventory management, such as carrying costs, stockouts, and wastage. Effective MRP can lead to significant cost savings by optimizing inventory levels. MRP implementation will result in cost savings by reducing unnecessary inventory and minimizing stockouts or excess inventory.

Service level is a measure of a firm's ability to meet customer demand without stockouts. A higher service level indicates better customer service and satisfaction. MRP helps maintain high service levels by ensuring that inventory is always aligned with customer demand, reducing the chances of stockouts.

### **Material Requirements Planning Organizational Performance**

The contributions of MRP to organizational performance has been a major pain-point for business practitioners and researchers alike. Thus, significant attention has attended studies on MRP and organizational performance in recent years. Most of these studies are consistent in their report on the influence of MRP on organizational performance.

Akinola et al. (2024) reported that inventory management positively influences corporate profitability of consumer goods firms in Nigeria; Adebola and Adesola (2019) found that effective inventory management is crucial to increased profitability of manufacturing firms. These studies highlights the importance of inventory management to achieving organizational performance.

Similarly, Adeyeye et al. (2016) found that inventory control has significant impact on performance of manufacturing firms. This suggests that effective inventory management is essential to achieving organizational success; and that companies that implement MRP can improve inventory turnover ratio, and operate more efficiently (Chopra & Meindl, 2001).

Caramanis and Anagnostopoulos (2007) found a significant increase in inventory turnover ratio after MRP implementation. This is because MRP improved order fulfillment rates by ensuring timely and accurate inventory replenishment (Wisner & Tan, 2000). Relatedly, Ho and Chang (2001) found that MRP implementation led to significant increase in order fulfillment rates; and results in in cost savings through reduced inventory holding costs, lower stockouts, and minimized waste (Vollmann et al., 2005).

In addition, MRP implementation has been linked to significant cost savings and improved service levels, by ensuring product availability and reducing stockouts (Chang & Lin, 2011; Cakravastia & Takahashi, 2004; Chopra & Meindl, 2001). Further, MRP has been shown to impact organizational performance by influencing 15% to 30% improvement in inventory turnover ratio (Ogbu, 2015; Caramanis & Anagnostopoulos, 2007; Chopra & Meindl, 2001); 25%; 10% to 20% improvement in

order fulfillment rates (Kumar & Singh, 2017; Ho & Chang, 2001; Wisner & Tan, 2000); 10% to 25% reduction in inventory holding costs (Madenko, 2016; Chang & Lin, 2011; Vollmann et al., 2005); 5% to 15% improvement in service levels (Ochieng, 2017; Cakravastia & Takahashi, 2004; Chopra & Meindl, 2001).

The forgoing reports of scholars attests to the idea MRP impact inventory turnover ratio, order fulfillment rates, cost savings, and service level. This means that MRP can significantly impact organizational performance. Adoption of MRP improve efficiency and enhance sustainability. Literature suggests that MRP system lead to improvements in organizational performance, including increase in inventory turnover ratio; increase in order fulfillment rates; reduction in inventory holding costs; and improvement in service levels.

### Conclusion and Recommendations

MRP is vital to achieving organizational performance. This study focused on exploring the link between MRP and organization performance, measured as inventory turnover ratio, order fulfillment rates, cost saving and service level. Literature review was the methodology adopted. The works scholars and the reports they present were analysed and synthesized to determine the role of MRP in organizational performance.

The observation was that MRP improves organizational performance. Effective MRP implementation lead to improved financial performance, customer satisfaction, operational efficiency, and employee productivity. The study concludes that by leveraging MRP, firms can enhance inventory turnover ratio, increase order fulfillment rates, achieve reduction in inventory holding costs and create improvement in service levels; and therefore, improve their overall performance.

Thus, the study recommends that firms, especially those in retailing, that are desirous of boosting their performance should invest in technology-based MRP system. This will enable them optimize their material management processes and provide better customer service.

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