

Adapting Supply Chain Management with Demand-Led Material Requirements Planning to Take on the Challenges of COVID-19

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Abstract

The COVID-19 pandemic has had a global impact on supply chains from December 31, 2019. The disruption of the supply chain originated in China and subsequently propagated worldwide due to increasing shutdowns and closures. Some companies experienced a decline in demand, while others saw a significant increase in revenue. The companies that undermine demand were unable to acquire raw materials due to shortages, while others faced challenges with logistics. The COVID-19 pandemic introduces new challenges in the realm of Demand Driven Material Requirement Planning (DDMRP), which aids organizations in maintaining operational efficiency and gaining a competitive edge. This study examines the present state of the organization and the adoption of DDMRP through the utilization of two distinct forms of data. Here is the secondary data obtained using quantitative research methods, including the use of company databases and reports. This study explores the effects of using DDMRP (Demand-Driven Material Requirements Planning) in supply chain management. The project aims to optimize cost and improve corporate performance by implementing the revolutionary software, which serves as an alternative component for managing inventories.

Key words: *Supply Chain Adaptability; Real-time Data Analytics; Demand-Led MRP*

Introduction

The primary aim of research is to effectively manage costs and improve overall company performance. To achieve this goal, one potential solution is the use of an innovative program known as DEMAND DRIVEN MATERIAL REQUIREMENTS PLANNING (DDMRP), which serves as an alternative component for inventory management. The MRP system does not consider the quality of components currently present in the warehouse at the time of execution, nor does it impose any limitations on the capacity of the plant. This study assesses the effects of implementing Demand-Driven Material Requirements Planning (DDMRP) in the context of supply chain management.

The COVID-19 pandemic has exposed the significant weaknesses in conventional supply chain frameworks, requiring a fundamental change towards more flexible and robust tactics. One of the important strategies being developed is the incorporation of demand-driven Material Requirements Planning (MRP) as a proactive method to manage the risks caused by the epidemic. This introduction analyzes the necessity of restructuring supply chain management models, highlights the importance of demand-driven Material Requirements Planning (MRP), and investigates its potential in tackling the difficulties posed by COVID-19 on contemporary supply chains. This study intends to provide insight into the transformative potential of utilizing demand-driven approaches to strengthen supply chains in a time of unexpected shocks and changing market conditions. This will be achieved through a thorough investigation of these components.

Literature Review

The literature review delves into the evolution of supply chain management, highlighting historical disruptions and the emergence of resilience as a pivotal factor. It contrasts traditional MRP systems with DDMRP, emphasizing the limitations of the former in coping with unprecedented disruptions like COVID-19. Various scholars' viewpoints:

1. Evolution of Supply Chain Management in Response to Disruptions

The historical perspective reveals a pattern of disruptions prompting adaptations in supply chain management. Previous crises, such as SARS and financial downturns, have highlighted vulnerabilities, leading to the evolution of more resilient supply chain frameworks. The present COVID-19 crisis serves as a catalyst, magnifying the necessity for adaptable and responsive supply chains capable of mitigating widespread disruptions (Christopher, 2016).

2. Traditional Material Requirements Planning (MRP) vs. Demand-Driven Material Requirement Planning

The limitations of traditional MRP systems in dealing with unforeseen disruptions have been a recurring concern. These systems often rely on static forecasts and predefined schedules, rendering them ill-equipped to respond to abrupt shifts in demand or supply chain interruptions (Slack et al., 2020). Contrastingly, Demand-Driven Material Requirement Planning (DDMRP) emphasizes real-time demand signals, enabling more agile and responsive supply chain operations (Mabin et al., 2015).

3. The Impact of COVID-19 on Global Supply Chains

COVID-19's profound impact on supply chains is evident in the widespread disruptions experienced globally. Araz (2020) reported on the significant reductions in demand, causing

imbalances and disruptions across the supply chain network. The pandemic has underscored the vulnerability of supply chains, prompting a reevaluation of existing practices and methodologies (Ivanov, 2020).

4. The Role of Adaptive Strategies in Mitigating Disruptions

Amidst the challenges posed by COVID-19, organizations are recognizing the imperative need for adaptive strategies. These strategies aim to bolster supply chain resilience by integrating more flexible and responsive approaches. The need for such adaptations has become increasingly apparent, with organizations endeavoring to optimize operations, reduce risks, and ensure continuity in the face of unforeseen disruptions (Ivanov & Dolgui, 2020).

5. The Emergence of Demand-Driven Strategies in Crisis Management

The paradigm shift towards demand-driven strategies, exemplified by DDMRP, has garnered attention as an effective response to the limitations of traditional MRP systems. Ptak (2016) highlighted the transformative potential of DDMRP in recalibrating supply chains, promoting agility, and mitigating disruptions caused by crises like the COVID-19 pandemic. Such approaches focus on adaptive capacity and real-time demand signals to drive production and inventory decisions (Council of Supply Chain Management Professionals, 2021).

6. Limitations of Conventional MRP Systems

Hei (2002) discussed inherent nervousness and planned instability within conventional MRP systems, especially during uncertain and disruptive periods. The rigid nature of these systems often leads to inefficiencies and amplified disruptions, exacerbating challenges posed by unforeseen events like the COVID-19 outbreak.

Expanding the literature review provides a more comprehensive overview of existing research and insights related to the impact of COVID-19 on supply chains, the limitations of traditional MRP systems, and the emergence of demand-driven strategies like DDMRP as potential solutions. Feel free to further elaborate or incorporate additional references to bolster the review's depth and breadth

Research methodology

The field of study pertaining to management and business research. There are two distinct categories of data, namely primary data and secondary data. This study examines the present state of the organization and evaluates the adoption of DDMRP through the utilization of two distinct data sets. Presented here is the secondary data that has been gathered through quantitative research methods, specifically utilizing firm databases and reports.

The Demand Driven Material Requirement Planning (DDMRP) has gained significant traction during the current pandemic due to its ability to address the limitations of the traditional Material Requirement Planning (MRP) system. DDMRP offers enhanced control and scheduling of production by eliminating the need for predictions, buffers, and replenishment. This has resulted in a surge in the adoption and implementation of DDMRP as a more effective approach to managing material requirements during these challenging times.

Discussion

The comprehensive viewpoint of my findings holds significant importance within the context of my Paper. DDMRP has been empirically demonstrated to be a highly effective software solution for organizations seeking to enhance their manufacturing planning systems. During the COVID-19 pandemic, the market has seen significant volatility. However, the Demand-Driven Material Requirements Planning (DDMRP) methodology has emerged as a notable approach that employs innovative methodologies and maintains constant monitoring of planning parameters in order to react to these challenging conditions.

The DDMRP approach operates by establishing buffer levels at certain buffer spots, which are readily observable, in order to effectively manage inventory on hand and enhance monitoring capabilities.

Conclusion

The topics discussed include dynamic buffer frequency, buffer profiles, variability %, and lead time option. The elements of DDMRP, namely strategic placement and buffering, are contingent upon the discernment of the planner. This study examines the application of decoupling structures inside an organization, specifically focusing on the seven types of decoupling structures. The research assesses the effectiveness of the Decoupled Demand-Driven Material Requirements (DDMR) approach in a complex manufacturing firm.

Scenario 3 involves the utilization of stockout notifications and overstock visibility from buffers, which constitutes a tangible model. In general, there has been a notable enhancement of 41% in customer satisfaction, accompanied by a corresponding decrease of 18% in on-hand stock levels. The examined scenarios elucidate the significance of Demand-Driven Material Requirements Planning (DDMRP) in enhancing production performance, while also emphasizing the criticality of strategic buffer placement. The strategic buffer in DDMRP performance is a crucial component inside organizational contexts.

Future Research

The DDMRP technique represents a significant advancement in production planning and management systems, specifically developed to efficiently meet the demands of the current paradigm. Although this particular methodology offers numerous benefits to organizations, there exists a dearth of explicit guidance pertaining to the requisite protocols for its execution. In addition, an analysis was conducted on the outcomes of implementing Demand-Driven Material Requirements Planning (DDMRP) in different scenarios. The results consistently indicated a good effect on increasing the visibility of materials and the following flow. Nevertheless, it is important to acknowledge that there was a significant degree of variability seen in the implementation of this methodology.

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