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ESTABLISHING A CUSTOMIZED PROCUREMENT AND INVENTORY SYSTEM FROM SCRATCH

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Abstract

This research analyzes Gelberg Signs' development and implementation of a customized procurement and inventory system for the signage industry. The system considers the specific requirements of this high customization industry by addressing workflow optimization, supplier relationship management, and automated reorder point automation for operational efficiency. The system composed of JIT delivery and real-time data tracking resulted in the reduction of stock outs and holding costs and an increase in project timelines and supply chain reliability. It is found that such tailored systems can outperform generic solutions, exhibiting more flexibility, better cost control, and stronger project alignment. The findings of this research provide support for the need for custom procurement strategies in highly specialized markets with dynamic material demands.

Keywords: Customized Procurement, Inventory Management, Signage Industry, Operational Efficiency, Just-in-Time (JIT), Supplier Relationships

I. INTRODUCTION

Proper management of procurements and inventory is vital in improving operational operations for industries that use specialized materials like the signage industry. However, current research highlights the premise that tailored supply chain procurement systems, which include technologies, can enhance supply chain flexibility and inventory management. Big data and IoT together can enable real-time inventory management and demand prediction which eliminates shortages or overstocking [1]. In addition, customized purchasing patterns further improve the efficiency of the relationship between the supplier and the customer, delivery on time and low lead time are both favourable for dynamic markets [2]. Studies have also shown that custom systems are far superior to generic systems, in that they have better procurement workflow that is tailored to the business needs, and better cost control and operational flexibility when compared with standard systems that may not have this aspect [3].

1. Research Problem

The problem with the procurement and inventory management in the signage industry in the USA is that it is very challenging because input material is being demanded in an erratic requirement and there is an extremely critical project timeline [4]. These complexities compounded by variance in supplier lead times and variability in the clients' needs challenged operational efficiency in Gelberg Signs. Due to this, it was impossible to avoid both expensive stockouts and costly overstocking as other industries using the same kind of customised formats have faced it too [4]. The dynamic nature of these requirements could put the traditional procurement systems to the

test, further accentuating the project delays and overall operating costs [5].

The rationale for this study is to tackle such recurrent problems by designing a relevant procurement and inventory system for Gelberg Signs to improve suppliers' integration, minimize overhead costs and ensure the availability of required material. The adoption of such a system has proved effective in other industries, especially through robotic process automation and integrated systems that make it easier to reduce costs and strengthen the chain supply.

2. Research Objectives

- To identify and document the specific procurement and inventory challenges in the signage industry.
- To design and implement a customized procurement system that addresses these needs.
- To evaluate the system's impact on operational efficiency, cost management, and supply chain reliability.

3. Research Scope

This research scope lies in developing, integrating, and assessing a detailed procurement and inventory management system unique to the signage industry with an emphasis on productivity, cost management, and supplier collaboration.

II. LITERATURE REVIEW

The creation of tailor-made systems for procurement of supplies and inventory management has received a lot of support given its effectiveness in improving upon the operation of industries especially those that have strange demand rates. Basic principles of inventory management also emphasise the need to avoid overstock and stock-out circumstances at the same time [6] . Traditional models, such as Economic Order Quantity (EOQ) and Just-in-Time (JIT), provide foundational approaches; however, newer methods like demand-driven material requirements planning (MRP) and data analytics now allow for greater precision and adaptability in managing inventory in dynamic environments [7].

Based on the theoretical frameworks on procurement, it is possible to state that the use of automated and data-operated systems will raise the visibility and quickness of the SCM [8]. These systems using accurate estimation models ensure organizations always have the right stocks they need while eliminating the expenses involved in holding a large inventory. Research suggests that digital procurement benefits companies comprehensively and affects fields such as lead-time and supplier relationships since the signage sector has uncertain orders [9].

Empirical evidence further highlights the effectiveness of customised procurement strategies to improve mechanical production standards [10]. For instance, studies indicate that adopting the real-time data technique and the use of an automated tracking system in inventory management can bring down the amount of overall stock variance, the order lead time and order accuracy. New technologies of custom systems are illustrated to have proved a worthy decrease in general procurement costs together with efficiency in decision-making based on the availability of centralised data and supplier performance analysis [9]. The use of such systems is not only

efficient in managing stocks but also responds to the dynamic conditions within the market so that alarmed organizations can avert unproductive interferences.

Together, these findings establish that customized procurement and inventory systems, particularly those that incorporate automation and data analytics, are essential in specialized fields. They not only drive operational efficiency but also align with broader supply chain resilience strategies, particularly relevant in an era of frequent market fluctuations.

III. METHODOLOGY

This research employs an exploratory, descriptive, and causal qualitative research approach based on the qualitative nature of the data used in developing and assessing the customised procurement and inventory system for the signage industry. Most of the data was obtained from industrial observation, published articles, journals, papers, and case studies specifically from procurement and inventory management in the specialised manufacturing industries [11]. These sources helped to gather information concerning specific tendencies in different industries, purchasing processes of organisations, ways of selecting the appropriate vendors, as well as pitfalls and lessons learned within the sphere of inventory management.

Furthermore, comparison with systems operating in peer industries enables the identification of general issues that may cause discomfort and the ways to approach them optimally, taking into account Gelberg Signs' specific modes of functioning. Measures of relative improvement consisted of process-centred quantitative data concerning lead time, costs, and project timelines to determine the overall effect of the customization system. The analysis of secondary literature sources allowed the definition of the potential interventions to be applied to optimise the signage industry's performance [12].

IV. ANALYSIS & FINDINGS

The following analysis aims to identify Gelberg Signs' procurement and inventory issues within the signage industry and propose the design and development of a new system to solve the identified problems. For the structure of the procurement workflow, the research applies a systematic approach shown in the Supply Chain Operations Reference (SCOR) model and inventory optimization frameworks to manage resources. This system is designed to achieve the main goal of enhancing operation productivity by optimising inventory expenses, dealing with material requirements, and completing projects.

1. Identifying Industry-Specific Needs and Pain Points

Analysis:

It is imperative to understand that the signage industry has unique characteristics that set it apart from other manufacturing industries. Frequency variations, time-sensitive project schedules, and multiple materials with uncertain turnaround times were primary issues. By breaking down these challenges, they were aligned to determine their effects on Gelberg Signs' procurement and inventory functions.

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Findings:
By identifying these needs, the analysis pinpointed three primary requirements: These are (1) flexibility in responding to variations in project requirements, (2) consistent procurement of multiple supplies, and (3) supplier interfaces to ensure time is not wasted. Identifying these areas offered a further understanding of the development of a procurement and inventory system that could address these issues.

Table 1 Industrial Issues Identification

Identified Needs	Impacts
Custom specifications	Require flexible ordering
Tight deadlines	Need for on-time material delivery.
Variable lead times	Demand for strategic sourcing

2. Designing a Tailored Procurement and Inventory Workflow
Analysis:
Using the SCOR model's "Plan, Source, Make, Deliver" structure, a workflow was designed to facilitate seamless movement from request to delivery [13]. Key elements included:

Material Tracking: Organised a tracking method to have an insight into the position of the material at any point in the process while at the same time reducing the time taken between a particular stage and the next.

Automated Reorder Points: Use consumption records to determine the right reorder points at which products should be restocked to ensure the right stock is available when it is needed.

Just-in-Time (JIT) Delivery: Implemented and stabilised JIT processes for the materials consumed most often to decrease holding costs and bring in the material at the right times for production [14].

Findings:
The highlighted workflow helped in the minimization of cases of stock outs as well as prevent the build-up of large stocks. Automated reorder points ensured that the company operated with low inventory levels, whereas JIT delivery positioned these as an ideal focus on managing high-turnover productions.

Table 2 Procurement and Inventory Workflow

Process Component	Impact on Efficiency
Material tracking	Improved visibility and scheduling
Automated reorder	Reduced stock outs and overstocking
JIT delivery	Aligned inventory with demand

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3. Developing Vendor Relationships and Negotiating Terms

Analysis:

Vendor relationship management was prioritized to secure favourable terms and ensure reliable delivery [15]. Key strategies involved:

Negotiating JIT Delivery for high-demand materials to keep inventory costs low.
Creating Customized Order Processes for speciality items to align with project requirements.
Enhancing Communication Channels to facilitate rapid response to urgent orders and minimize delays.

These measures ensured that Gelberg Signs could count on consistent material availability, reducing risk in project timelines and contributing to cost savings.

Findings:

This helped with vendor management, therefore, Gelberg Signs could make contracts with vendors that ensured the materials were provided as per provision and the cost too. The communication also led to a better time to discover problems earlier than anyway when some materials could not be delivered on time.

Table 3 Vendor & Delivery Terms

Vendor Management Action	Outcome
Negotiated JIT delivery	Lowered inventory costs
Customized order processes	Enabled flexibility for project requirements
Improved communication with vendors	Reduced delays due to rapid response

4. Implementation and Cross-Departmental Training

Analysis:

Cross-department engagement is necessary to have effective system implementation. The training was designed to indoctrinate each team with new procedures and help them understand how the system helped their role the greater operational efficiency. Training programs included:

Role-Based Instruction: Tailored sessions for each department to highlight relevant parts of the system.

Hands-On Training and Feedback Loops: Allowed for real-time feedback and adjustments to ensure user-friendliness and effectiveness.

Findings:

The hands-on implementation approach generated a strong buy-in throughout Gelberg Signs because employees could clearly understand the benefits of the new system by seeing how it would change their daily workflows. This buy-in was necessary to make the system successful to help new procedures stick, and to ease the transition.

Table 4 Implementational Approaches

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Implementation Approach	Impact on System Adoption
Role-based training	Increased relevance and understanding
Hands-on feedback and adjustments	Enhanced user-friendliness and acceptance

5. Monitoring and Continuous Improvement

Analysis:

Continuous monitoring was set up in a feedback loop which emphasised inventory levels, vendor performance and material lead times. Key performance indicators (KPIs) were tracked using data analytics tools for continuous optimization. Changes made based on feedback included:
Adjustment of Reorder Points: Updated based on usage trends to optimize inventory turnover.

Evaluation of Vendor Performance: Regularly reviewed to maintain reliability and cost-effectiveness.

Findings:

The key aspect of this continuous improvement process was that the system adapted over time as business needs changed. Further holding cost reduction and improved project timelines resulted from further refinement to reorder points and continuing vendor evaluation.

Table 5 Monitoring Process

Continuous Improvement Action	Effect on Operational Efficiency
Adjusted reorder points	Optimized inventory turnover
Regular vendor performance review	Ensured reliability and reduced procurement risks

Outcomes and Key Findings

The customized procurement and inventory system provided significant operational efficiencies for Gelberg Signs. Key outcomes included:

- Inventory Cost Savings: Lower inventories led to savings on overhead because the resources can be used for other operational requirements.
- Increased Timeliness: More efficient process mapping and better management of relationships with vendors also helped ensure that project deadlines were met more consistently.
- Improved Operational Control: The system allowed better tracking of materials, reducing project disruptions caused by material shortages or overstocking.
- Enhanced Flexibility and Responsiveness: The integrated system of automated reorder points and JIT practices allowed Gelberg Signs to be expedited and not acquire inventory overruns in the face of alterations to projects.

V. CONCLUSION

It has successfully addressed the core objectives of designing a customized procurement and inventory system for the signage industry and Gelberg Signs in particular. Through delineating industry-specific challenges, the study helped establish the need for flexibility and better supplier coordination in a high customization environment. The strategy emphasized key elements in the

developed system, such as reorder points based on automation, and JIT delivery, and established strong vendor relations which helped to eliminate stock out, minimize inventory holding cost and ensured more reliability of suppliers.

Applying the SCOR model and inventory optimization, Gelberg Signs enjoyed a responsive and efficient procurement system that satisfied the signs projects' demands. The findings, indicated enhanced organisational performance with a decline in instances of project delay, more compliance with project schedule, and a decrease in costs. This supported the study that developing a tailored method of procurement is more effective the organising procurement in selected industries indicating the relevance of flexibility and scalability of the operation to the high-velocity growth of the industry.

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