LOGISTICS AND SUPPLY CHAIN MANAGEMENT

A Study on Improving Logistics and Supply Chain Management at PI Industries Limited, Panoli, Gujarat

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Abstract

Logistics and supply chain management are essential functions of manufacturing organisations because they influence the movement of materials, production continuity, operational costs, and customer satisfaction. In the agrochemical and speciality chemicals industry, these functions are particularly important due to the requirements of safe material handling, proper storage, reliable transportation, and timely availability of raw materials. This paper examines logistics and supply chain management at PI Industries Limited, Panoli, Gujarat, and identifies opportunities for improving operational efficiency.

The study adopts a descriptive and exploratory approach based on the information presented in the summer internship project report. It examines procurement, inventory management, warehousing, transportation, documentation, supplier coordination, and technology integration. The analysis highlights the importance of maintaining accurate inventory records, improving coordination between departments, optimising transportation, and strengthening safety procedures. It also discusses the potential contribution of digital inventory systems, demand forecasting, and regular performance evaluation.

The paper concludes that an integrated approach to logistics and supply chain management can support cost control, resource utilisation, production continuity, and reliable customer service. The recommendations are intended as improvement opportunities rather than claims of verified operational deficiencies at the organisation.

Keywords: logistics management; supply chain management; inventory control; transportation; warehousing; PI Industries; operational efficiency

1 Introduction

In the modern business environment, manufacturing organisations depend on effective logistics and supply chain management to coordinate the movement of materials from suppliers to production facilities and ultimately to customers. These activities include procurement, inventory management, warehousing, transportation, distribution, and the exchange of operational information.

An efficient supply chain ensures that the right materials are available in the right quantity, at the right place, and at the required time. It also helps organisations manage costs, avoid unnecessary delays, and use their resources effectively. Consequently, logistics is not merely a transportation function; it is an important part of organisational planning and performance.

PI Industries Limited is an Indian agrisciences and speciality chemicals company established in 1946. Its business activities include agrochemicals, crop protection, speciality chemicals, and custom

synthesis and manufacturing. The company operates manufacturing facilities in Gujarat, including facilities at Panoli, Ankleshwar, and Jambusar.

The present study focuses on the logistics and supply chain management activities associated with PI Industries Limited, Panoli. The nature of its operations makes the coordination of procurement, production, storage, and distribution particularly relevant. Materials must be available for manufacturing, stored appropriately, and moved through the supply chain in accordance with applicable safety and quality requirements.

The study considers how logistics practices can be improved through effective planning, inventory control, supplier coordination, transportation management, and technology. It also examines the relationship between these activities and the organisation's operational and financial performance.

2 Research objectives

The primary objective is to examine logistics and supply chain management practices at PI Industries Limited, Panoli, and identify opportunities for improving operational efficiency.

The secondary objectives are:

1. To understand the importance of procurement and supplier management.
2. To examine inventory control and warehouse management practices.
3. To study transportation, distribution, and material-handling activities.
4. To identify general challenges affecting supply chain efficiency.
5. To understand the role of technology in logistics operations.
6. To recommend measures for reducing avoidable costs and operational delays.

3 Review of concepts and literature

3.1 Logistics management

Logistics management involves planning, implementing, and controlling the movement and storage of goods and related information. Its principal activities include transportation, warehousing, inventory management, material handling, order processing, packaging, and distribution.

In manufacturing organisations, logistics connects procurement with production and connects production with customer delivery. Effective logistics planning supports the availability of materials, reduces unnecessary movement, and improves the utilisation of storage and transportation resources.

3.2 Supply chain management

Supply chain management is broader than logistics management. It involves coordinating suppliers, procurement, manufacturing, warehouses, distributors, and customers. It also includes the management of information and financial flows between these participants.

The effectiveness of a supply chain depends on how well its individual activities are coordinated. For example, procurement decisions affect inventory levels, inventory availability affects production planning, and production schedules influence transportation and dispatch requirements.

3.3 Inventory and warehouse management

Inventory management aims to maintain appropriate stock levels while avoiding excess inventory and shortages. Techniques such as ABC analysis, First In, First Out (FIFO), Economic Order Quantity (EOQ), and safety stock management can support inventory control.

Warehouse management involves receiving, identifying, storing, and handling materials. Systematic storage arrangements, accurate records, and appropriate material-handling procedures can improve space utilisation and reduce the possibility of damage or unnecessary movement.

3.4 Transportation and technology

Transportation management involves selecting suitable routes, arranging vehicles, scheduling deliveries, and controlling freight expenses. Effective transportation planning can improve delivery reliability and reduce avoidable expenditure.

Technology can support these activities through enterprise resource planning (ERP) systems, warehouse management systems (WMS), barcode scanning, GPS tracking, and

4 Research methodology

The study follows a descriptive and exploratory research design. The descriptive approach provides an understanding of logistics and supply chain activities, while the exploratory approach identifies potential areas for improvement.

The research is based on the information presented in the uploaded summer internship project report concerning PI Industries Limited, Panoli. The report describes the internship's learning areas, research objectives, conceptual framework, and general supply chain improvement opportunities.

The research is qualitative and descriptive in nature. It considers procurement, inventory management, warehousing, transportation, documentation, and departmental coordination as interconnected components of supply chain performance.

The analysis is based on the information available in the report and does not claim to establish measured operational outcomes. No numerical survey results, cost savings, employee response percentages, or performance improvements are introduced where such evidence is not provided.

The study has certain limitations. The internship was conducted over a limited period, and access to confidential company information may be restricted. The study also focuses on one manufacturing location, so its conclusions should not automatically be applied to every facility or business operation of the company.

5 Analysis and discussion

5.1 Procurement and supplier coordination

Procurement ensures the availability of raw materials, equipment, and other resources required for manufacturing. Effective procurement planning depends on coordination between purchasing, production, inventory, and suppliers.

If material requirements are not communicated in time, production schedules may be affected. Conversely, purchasing more materials than required can increase storage costs and tie up financial resources.

For PI Industries, regular communication with suppliers and coordination between procurement and production are relevant improvement areas. Supplier performance can be reviewed using factors such as delivery reliability, material quality, and responsiveness. Such evaluation can help the organisation make informed procurement decisions.

5.2 Inventory management

Inventory management is important because both excess stock and insufficient stock can affect business performance. Excess inventory increases storage and carrying costs, while shortages can interrupt manufacturing activities.

Maintaining updated inventory records, conducting regular stock verification, and monitoring material movement can support better inventory control. Demand forecasting can also help estimate future material requirements and align purchasing with production plans.

The report identifies inventory accuracy and the timely availability of materials as important areas for study. These are general supply chain considerations and should not be interpreted as confirmed inventory failures at PI Industries.

5.3 Warehouse management and material handling

Warehouses support the safe storage and movement of raw materials and finished goods. Their efficiency depends on systematic storage arrangements, proper identification, accurate records, and suitable handling procedures.

In the chemical manufacturing sector, warehouse management also involves particular attention to storage conditions, packaging, and safety requirements.

Improved warehouse space utilisation can reduce unnecessary material movement and make storage operations more systematic. Clear identification and regular inventory checks can support accurate records and easier material retrieval.

5.4 Transportation and distribution

Transportation connects suppliers, manufacturing facilities, warehouses, and customers. Its performance depends on vehicle availability, route planning, delivery schedules, and the coordination of dispatch activities.

Transportation expenses may include freight charges, fuel, loading and unloading, vehicle maintenance, and handling costs. Reviewing transportation routes and delivery schedules can help identify opportunities to reduce unnecessary expenditure.

Distribution planning is also connected to customer service. Timely and reliable delivery supports product availability and helps maintain customer confidence.

5.5 Documentation and departmental coordination

Accurate documentation supports transparency and coordination across logistics activities. Common documents include purchase orders, goods receipt notes, delivery challans, invoices, stock registers, and material requisition notes.

Errors or delays in documentation can create difficulties in tracking materials and coordinating activities. Digital documentation and tracking systems may help reduce manual errors and improve information availability.

Coordination between procurement, production, warehouse, finance, and logistics is equally important. A shared understanding of material requirements and delivery schedules can support smoother operations.

5.6 Technology and safety

Technology can improve logistics visibility and decision-making. ERP systems can connect information across departments, while barcode scanning and warehouse management software can support inventory accuracy. GPS tracking can assist transportation monitoring.

The adoption of technology should be supported by suitable employee training, reliable data, and consistent procedures.

Safety is another important consideration for PI Industries because of its operations in agrochemicals and speciality chemicals. Appropriate storage, handling, packaging, and transportation procedures are necessary to support employee safety and reduce operational risks.

6 Major findings

The study highlights the following findings:

- Procurement planning: Timely availability of raw materials is essential for maintaining production continuity.
- Inventory control: Updated records and regular stock monitoring can help prevent excess inventory and material shortages.
- Warehouse efficiency: Systematic storage and safe material handling can improve space utilisation and material movement.
- Transportation management: Route planning and delivery scheduling are important for controlling logistics expenses.
- Supplier coordination: Regular communication and supplier evaluation can support reliable procurement.
- Technology integration: ERP systems, barcode scanning, GPS tracking, and warehouse software can improve visibility and information accuracy.
- Documentation: Accurate purchase, receipt, inventory, and dispatch records support transparency and coordination.
- Interdepartmental coordination: Communication between procurement, production, warehouse, finance, and logistics is essential for smooth operations.
- Safety: Appropriate chemical storage and transportation procedures are important for safe and responsible operations.

These findings identify important supply chain management considerations. They do not represent a quantified assessment of PI Industries' current performance.

7 Recommendations

Based on the analysis, the following measures are recommended as potential improvement opportunities.

7.1 Strengthen inventory control

Maintain updated inventory records and conduct regular stock verification. Where appropriate, use ABC analysis to prioritise inventory monitoring and apply demand forecasting to plan material requirements.

7.2 Improve procurement and supplier coordination

Strengthen communication between procurement and production departments. Review supplier performance regularly and coordinate material delivery schedules with production requirements.

7.3 Optimise transportation planning

Review transportation routes, vehicle utilisation, and delivery schedules. Monitor freight and related expenses to identify opportunities for reducing unnecessary costs.

7.4 Improve warehouse utilisation

Review warehouse layout and storage arrangements to support efficient material identification, safe handling, and better use of available space.

7.5 Introduce appropriate digital systems

Evaluate the use of digital inventory records, barcode scanning, warehouse management software, and transportation tracking. Implementation should be based on operational requirements and supported by employee training.

7.6 Strengthen documentation and safety

Maintain accurate logistics documentation and establish regular checks for record completeness. Continue to emphasise safe storage, handling, packaging, and transportation of chemical materials.

7.7 Monitor supply chain performance

Conduct periodic reviews of inventory accuracy, supplier reliability, delivery schedules, warehouse utilisation, and logistics expenses. Performance monitoring can help identify areas requiring further investigation and improvement.

8 Conclusion

Logistics and supply chain management play an important role in the efficiency and performance of manufacturing organisations. Procurement, inventory management, warehousing, transportation, and distribution are interconnected activities that influence material availability, production continuity, operational costs, and customer service.

The study of PI Industries Limited, Panoli, highlights the relevance of effective planning, accurate documentation, supplier coordination, and safe material handling in the agrochemical and speciality chemicals industry. It also identifies technology integration, demand forecasting, and regular performance evaluation as useful areas for improvement.

The recommendations presented in this paper are intended to support further examination and continuous improvement. Their practical value should be assessed using company-specific operational information and appropriate performance measures.

An integrated approach to logistics and supply chain management can help manufacturing organisations improve resource utilisation, manage costs, and maintain reliable operations. For PI Industries, continued attention to coordination, inventory accuracy, transportation planning, and safety can support the broader objective of efficient and responsible business performance.

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