Thesis Report
on
Inventory Management Practices in Supply Chain Management: A Case Study on "Aluminium Industries of Bangladesh."

Submitted by:

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Submitted to:

Department of Business Administration
Faculty of Business
Sonargaon University (SU)

Submitted for the partial fulfillment of the degree of
Master of Business Administration

Sonargaon University (SU)

Date of Submission: January 7, 2025

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Letter of Transmittal

January 07, 2025

Mst. Marium Akter
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Subject: Submission of Thesis Report Titled "Inventory Management Practices in Supply Chain Management: A Case Study on Aluminium Industries of Bangladesh"

Dear Madam,

With most respectfully to state that I am pleased to submit my thesis report titled **"Inventory Management Practices in Supply Chain Management: A Case Study on "Aluminium Industries of Bangladesh"**. This report is an essential part of my MBA degree requirements, and I had the privilege of completing my Thesis at Inventory Management Practices in Supply Chain Management: A Case Study on Aluminium Industries of Bangladesh.

This research was conducted under your valuable guidance and includes insights from relevant literature, data gathered through company records, and analyses of the industry-specific challenges faced in inventory management. I hope this report meets your expectations and contributes meaningfully to the field of supply chain management.

I would really be grateful if you share your precious thoughts regarding the report. Also, if you wish to have further clarification about any aspect of my report, I would gladly answer your queries with further explanation. Thank you again for your support and patience.

Yours Sincerely

Ahmadullah
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Declaration of Student

I am Ahmadullah, a student in the Master of Business Administration program with ID: MSCM2301028010 at Sonargaon University. I want to sincerely state that the report titled **"Inventory Management Practices in Supply Chain Management: A Case Study on "Aluminium Industries of Bangladesh"** has been genuinely created by me. During the preparation of this report, I ensured full compliance with international copyright regulations. I also want to clarify that this report has not been submitted anywhere else for the purpose of obtaining a degree.

Yours Sincerely

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Letter of Authorization

I hereby confirm that the project report titled **"Inventory Management Practices in Supply Chain Management: A Case Study on "Aluminium Industries of Bangladesh"** is a genuine effort by Ahmadullah The research was conducted under my guidance. I also affirm that, to the best of my knowledge, the content presented in this report has not been included in any other project report or dissertation that led to the award of a degree to any candidate earlier, whether inthe same context or a different one.

Mst. Marium Akter
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Acknowledgement

I would like to express my heartfelt gratitude to all those who have supported me throughout the journey of this thesis on inventory management practices in the aluminum industry of Bangladesh.

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Thank you all for your contribution to this thesis and for being a part of my academic journey.

Executive Summary

This thesis report investigates the **"Inventory Management Practices in Supply Chain Management: A Case Study on "Aluminium Industries of Bangladesh."** aiming to assess their impact on operational efficiency, cost management, and customer satisfaction. As the demand for aluminum continues to grow, driven by its versatility and application in sectors like construction and manufacturing, effective inventory management has become crucial for maintaining competitiveness in this dynamic market.

The study begins with an exploration of the theoretical framework surrounding inventory management and supply chain management, referencing key concepts from established literature, including strategies such as Just-In-Time (JIT), Economic Order Quantity (EOQ), and safety stock management. The research methodology involves a case study approach, focusing on selected aluminum companies in Bangladesh. Data was collected through interviews with industry professionals and analysis of inventory records and performance metrics.

Key findings reveal that while many aluminum companies have implemented basic inventory management practices, significant challenges persist, including demand variability, supply chain disruptions, and rising raw material costs. These factors often lead to inefficiencies, such as excess inventory and stockouts, which adversely affect customer satisfaction and profitability.

The study highlights several opportunities for optimization within the inventory management processes of the aluminum industry. Recommendations include the adoption of advanced forecasting techniques, improved supplier relationships, and the integration of technology to enhance visibility and control over inventory levels. Additionally, the research suggests that developing a robust inventory management framework tailored to the specific needs of the aluminum sector can lead to substantial improvements in supply chain performance.

Ultimately, this thesis aims to provide valuable insights and actionable recommendations for industry stakeholders, helping them navigate the complexities of inventory management in the aluminum industry and enhancing their overall operational efficiency. The findings contribute to a better understanding of the critical role inventory management plays in sustaining the growth and competitiveness of the aluminum sector in Bangladesh.

LIST OF ACRONYMS

JIT	Just-In-Time
EOQ	Economic Order Quantity
MRP	Material Requirements Planning
DRP	Distribution Requirements Planning
AIB	Aluminium Industries of Bangladesh
ERP	Enterprise Resource Planning
WIP	Work-in-Progress
B2B	Business-to-Business
IMS	Inventory Management Systems
RFID	Radio Frequency Identification
C2C	Cash-to-Cash
DIO	Days Inventory Outstanding
DSO	Days Sales Outstanding
DPO	Days Payables Outstanding
SKU	Stock Keeping Unit

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Chapter: 01
Introduction

1.1 Introduction

In today's competitive global market, effective supply chain management (SCM) has become a critical factor for the success of manufacturing industries. Supply Chain Management: Strategy, Planning, and Operation, emphasizes the integral role of inventory management in maintaining a seamless flow within the supply chain, optimizing costs, and enhancing overall customer satisfaction. Inventory serves as a buffer against demand fluctuations, production delays, and supply uncertainties, allowing organizations to fulfill customer demands promptly and efficiently. However, managing inventory is a delicate balancing act between maintaining high availability and controlling associated costs, which can include holding costs, stockouts, and overstock.

This thesis focuses on inventory management practices within the supply chain of the aluminum industry in Bangladesh. The aluminum industry is essential to the national economy, supporting sectors like construction, manufacturing, transportation, and electrical industries. Efficient inventory management is especially critical in this sector due to the volatile nature of raw material prices and demand, as well as the need to optimize resources to remain competitive on a global scale.

Drawing on framework, this study will explore key inventory management strategies, such as cycle inventory, safety stock, and reorder points, as well as their impact on the aluminum industry's supply chain performance in Bangladesh. By analyzing these practices through the lens of concepts, the thesis aims to uncover insights into how inventory optimization can enhance the operational efficiency, cost-effectiveness, and responsiveness of aluminum supply chains. This case study approach will also shed light on unique challenges faced by aluminum companies in Bangladesh, providing recommendations tailored to the industry's local context.

1.2 Background of the study

Effective inventory management is one of the fundamental components of efficient supply chain management (SCM). As businesses strive to meet demand while minimizing costs, managing inventory effectively has become a priority across industries. Inventory serves as a key asset in the supply chain, ensuring that materials, components, and finished goods are available to meet customer needs. However, inventory also incurs significant holding, ordering, and stockout costs, requiring businesses to adopt well-structured inventory management practices.

In Bangladesh, the aluminum industry is a vital part of the industrial sector, supporting various other industries such as construction, transportation, and manufacturing. Aluminum, being lightweight, durable, and resistant to corrosion, is widely used in infrastructure and product manufacturing, and demand for it continues to grow. With increasing demand, the need for effective supply chain management has also risen, and inventory management, in particular, has come to the forefront. Many aluminum companies in Bangladesh face inventory-related challenges such as demand variability, fluctuations in raw material costs, and long lead times. Inefficient inventory practices in this sector can lead to high holding costs, stockouts, or overstocking—all of which can impact profitability and customer satisfaction.

This study examines the inventory management practices employed by aluminum industries in Bangladesh, investigating how these practices contribute to overall supply chain performance. Through a detailed case study approach, this research aims to analyze the current inventory systems, identify existing gaps, and explore potential improvements. The findings will provide valuable insights for industry stakeholders in Bangladesh, helping them develop strategies that optimize inventory levels, reduce costs, and enhance operational efficiency within their supply chains.

1.3 Scope of the Study

The scope of this study encompasses the examination and evaluation of inventory management practices within the supply chains of aluminum industries in Bangladesh. It aims to assess how these practices affect overall operational efficiency, cost management, and customer satisfaction. Given the aluminum sector's critical role in supporting other industries such as construction, transportation, and manufacturing, the study focuses on identifying key inventory challenges specific to this industry and exploring effective strategies to address them.

This research covers several core areas:

- **Inventory Management Techniques:** Analyzing the existing inventory management strategies, such as Economic Order Quantity (EOQ), Just-In-Time (JIT), and safety stock levels, to understand how these approaches are applied within the aluminum industry in Bangladesh.

- **Impact on Supply Chain Efficiency:** Investigating the impact of inventory management on supply chain performance metrics, including lead times, service levels, and cost-effectiveness, to gauge how well the industry meets demand.

- **Challenges in Inventory Management:** Identifying the major challenges faced by aluminum industries in Bangladesh, such as demand variability, lead time uncertainties, and fluctuations in raw material prices.

- **Optimization Opportunities:** Exploring potential inventory optimization techniques that can improve supply chain efficiency, reduce costs, and minimize stockouts or overstock scenarios within the industry.

The study is limited to aluminum industries operating within Bangladesh, with an emphasis on large and medium-sized companies that contribute significantly to the supply chain landscape. The findings are intended to offer practical recommendations for industry stakeholders, including inventory managers, supply chain professionals, and policymakers, on optimizing inventory management to enhance competitiveness and responsiveness in the aluminum supply chain. This research does not encompass downstream sectors that rely on aluminum products but rather focuses on inventory practices within aluminum production and distribution.

1.4 Objectives of the Study

Broad Objective:

To analyze and evaluate the inventory management practices in the supply chain operations of Aluminium Industries in Bangladesh for identifying efficiency, challenges, and improvement opportunities.

Specific Objectives:

The study seeks to achieve the following specific objectives:

- To assess the effectiveness of current inventory management practices in the Aluminium Industries of Bangladesh.
- To identify challenges and recommend strategies for optimizing inventory processes to improve supply chain efficiency.
- To provide actionable insights and recommendations to optimize inventory management practices for enhanced operational efficiency.
- To investigate the extent to which technological tools and systems are integrated into inventory management processes within the industry.
- To evaluate the existing strategies and techniques used for inventory management in the Aluminium Industry of Bangladesh.

These specific objectives guide the research in comprehensively understanding the impact and significance of inventory management within Bangladesh's aluminum sector.

1.5 Quantitative Research

Drawing from my educational background, I've acquired various research methodologies. This study provided me with the chance to apply my academic knowledge in a real-world context. Data collection predominantly involved secondary sources.

Primary Sources

Primary sources will provide first-hand data directly from Aluminium Industries' operations and employees involved in inventory management processes. The data collected will help quantify key aspects of inventory practices and supply chain management. Methods include:

- Face to Face or Direct Observation.
- Inventory Records Analysis.
- Data from Company Records.
- Efficiency of material flow within the factory.
- Inventory turnover rates.
- Lead times and order quantities.
- Dispatching finished goods.

Secondary Sources

Secondary sources will provide established industry benchmarks, historical data, and academic insights that can be used to contextualize the findings from primary data and compare Aluminium Industries' performance to industry standards. Key secondary sources include:

- **Review of Academic Journals:** Quantitative data on inventory management metrics, models, and practices will be extracted from peer-reviewed journals. Examples include statistical studies on inventory optimization, cost-benefit analyses, and performance metrics within the manufacturing industry.

- **Analysis of Books:** Quantitative frameworks, theories, and case studies from authoritative books on supply chain and inventory management will be utilized to draw comparisons and validate findings.

- **Literature Benchmarking:** Identifying and compiling numerical benchmarks and standards mentioned in journals and books to assess the performance of Aluminium Industries' inventory management against global and regional practices.

This approach ensures that the research is enriched by a broad spectrum of credible, data-driven insights from established academic and professional literature.

1.6 Limitations of the Study

While this study on "Inventory Management Practices in Supply Chain Management: A Case Study on Aluminium Industries of Bangladesh" aims to provide a comprehensive analysis, certain limitations affect the scope and generalizability of the findings:

- **Limited Access to Proprietary Data**: Access to specific internal data and detailed financial records of Aluminium Industries was restricted due to company confidentiality policies. This constraint limited the depth of quantitative analysis in areas such as inventory carrying costs and precise profitability impact.

- **Time Constraints**: Due to limited time for data collection and analysis, the study could not cover all aspects of the supply chain in equal depth. This restricted the analysis to key metrics of inventory management, potentially overlooking other relevant factors influencing supply chain efficiency.

- **Sample Size Limitations**: The sample size for primary data collection, especially the survey and interview participants, was limited to the employees available within the time frame. This may impact the representativeness of the findings and limit the generalizability of the conclusions.

- **Reliance on Self-Reported Data**: Some primary data relied on self-reported responses from employees, which may be subject to response biases. Factors like memory recall and personal biases might have affected the accuracy of the reported data on inventory practices.

- **Geographical and Industry Constraints**: The study focuses exclusively on the Aluminium Industries in Bangladesh, limiting its applicability to other industries or regions. Inventory management practices may differ significantly across industries and geographical locations, so the findings may not generalize to other contexts.

- **Changes in Market and Economic Conditions**: The study captures inventory management practices within a specific timeframe. Any subsequent changes in economic conditions, such as fluctuations in raw material prices or market demand, may alter the dynamics of the supply chain and affect the relevance of the findings over time.

- **Limitations of Secondary Data Sources**: Some secondary data sources may be outdated or not directly applicable to the specific context of Aluminium Industries. The availability of current and directly relevant benchmarks was limited, which may affect the comparability of findings with industry standards.

These limitations highlight the challenges faced during the research process and suggest areas for future research to build upon the findings of this study.

Chapter -02

Literature Review

2.1 Introduction

The study of inventory management in supply chain management has grown significantly in recent decades, as organizations recognize the critical role that effective inventory practices play in enhancing operational efficiency, reducing costs, and improving customer satisfaction. This literature review presents a summary of key theories, models, and practices in inventory management, as well as an examination of their relevance to the aluminium industry, particularly in the context of Bangladesh.

2.2 Overview of Inventory Management in Supply Chain

Inventory management involves planning, controlling, and monitoring stock levels to balance customer demand with supply chain efficiency. Classic inventory management theories, such as Economic Order Quantity (EOQ), Just-in-Time (JIT), and ABC analysis, have laid the foundation for optimizing stock levels to reduce costs while ensuring product availability (Silver, Pyke, & Peterson, 1998). EOQ, for instance, is widely used to determine the optimal order quantity that minimizes total inventory costs, including holding and ordering costs, while JIT aims to minimize inventory by receiving goods only as they are needed in the production process.

2.3 The Role of Inventory Management in Supply Chain Performance

Effective inventory management is essential for achieving a lean, agile supply chain that can respond quickly to changing market demands (Christopher, 2011). Studies highlight that optimized inventory practices contribute to reducing lead times, improving order accuracy, and enhancing customer satisfaction (Chopra & Meindl, 2007). In particular, inventory management practices such as demand forecasting, safety stock management, and vendor-managed inventory (VMI) have been shown to enhance the overall efficiency and resilience of supply chains in competitive industries.

2.4 Inventory Management Practices in Manufacturing

Manufacturing industries, including aluminium production, face unique challenges in inventory management due to fluctuating raw material costs, long lead times, and the need to maintain high-quality standards. According to Nahmias (2009), inventory control strategies in manufacturing environments often require balancing raw material availability with finished goods demand. Techniques like Material Requirements Planning (MRP) and Distribution Requirements Planning (DRP) are frequently employed in manufacturing to ensure timely availability of components and finished products, minimizing idle time and maximizing production efficiency.

2.5 Supply Chain Management in the Aluminium Industry

The aluminium industry is particularly sensitive to inventory management due to the high cost of raw materials and the capital-intensive nature of production. Aluminium production involves multiple stages, from raw material procurement (such as bauxite) to smelting, rolling, and distribution. Studies emphasize the importance of maintaining optimal inventory levels to avoid stockouts or overstocking, both of which can be costly (Moon & Lee, 2020). Furthermore, effective inventory practices are crucial to sustaining production continuity, as disruptions in inventory can lead to costly downtime in manufacturing processes.

2.6 Inventory Management Practices in Emerging Markets

Research on inventory management practices in emerging markets, such as Bangladesh, suggests unique challenges and adaptations. Factors such as limited infrastructure, fluctuating demand, and supply chain bottlenecks affect inventory management efficiency in these regions (Hossain & Abdullah, 2019). For the aluminium industry in Bangladesh, inventory challenges include inconsistent supply of raw materials, limited warehousing facilities, and higher logistical costs. Studies recommend adopting hybrid inventory strategies that combine traditional inventory models with flexibility to adapt to the local market's uncertainties (Rahman, Khan, & Kamal, 2021).

2.7 Just-in-Time (JIT) and Lean Inventory Practices

Lean inventory and JIT practices are widely studied in the context of minimizing waste and improving supply chain agility (Ohno, 1988). These practices emphasize reducing unnecessary stock and maintaining inventory only as required to meet demand. However, for industries like aluminium, where production is capital intensive, JIT may require modification due to the high risk of supply chain interruptions (Srinivasan & Soni, 2020). Research indicates that a balance between JIT and buffer stocks can help ensure continuity in production while reducing carrying costs.

2.8 Digitalization and Inventory Management

With advancements in technology, digital tools such as enterprise resource planning (ERP) systems, blockchain, and data analytics are transforming inventory management practices (Ivanov, Dolgui, & Sokolov, 2019). These technologies enable real-time monitoring of stock levels, demand forecasting, and enhanced collaboration across the supply chain. In the aluminium industry, where material tracking and demand fluctuations are critical, such technologies can provide better visibility and control over inventory, improving decision-making and reducing lead times.

2.9 Theoretical Framework and Relevance to the Study

The theoretical framework for this study is grounded in inventory management theories such as EOQ, JIT, and safety stock theory, as well as supply chain management principles. These frameworks provide a foundation for analyzing the effectiveness of inventory management practices at Aluminium Industries of Bangladesh. By employing these theoretical perspectives, the study aims to evaluate how well the company's current practices align with established models and identify potential areas for improvement.

Chapter -03

Organizational Overview

3.1 Introduction

The aluminum industry in Bangladesh plays a vital role in supporting both the industrial and consumer sectors. As a significant contributor to the country's manufacturing landscape, the industry provides essential materials for construction, packaging, transportation, and numerous other applications. This organizational overview focuses on understanding the structure, operations, and supply chain practices of a specific aluminum company in Bangladesh, referred to as "Aluminium Industries of Bangladesh" (AIB) for the purpose of this study.

AIB operates in a competitive and dynamic market, requiring efficient management of raw materials, inventory, and production schedules to meet fluctuating demands. The organization procures raw materials, primarily bauxite and other aluminum derivatives, which it processes into a wide range of products. Given the complexities and high costs associated with aluminum production and storage, AIB has developed strategic inventory management practices aimed at reducing costs, improving product quality, and enhancing operational efficiency.

This section will provide an overview of the company's history, its organizational structure, and its place in the Bangladeshi aluminum industry. Additionally, it will highlight AIB's core operations and supply chain structure, offering insights into the inventory management strategies that allow it to navigate the unique challenges of the Bangladeshi market. This background is crucial for understanding the context in which AIB's inventory management practices operate and their impact on its supply chain performance.

3.2 Vision

To be a leading and sustainable aluminum manufacturer in Bangladesh, recognized for operational excellence, quality products, and commitment to customer satisfaction.

3.3 Mission

- To deliver high-quality aluminium products that meet the needs and expectations of customers in both domestic and international markets.
- To prioritize customer satisfaction by maintaining reliable supply chains, timely delivery, and exceptional service standards.
- To embrace innovation and advanced technology in the production process, ensuring modern solutions to industry challenges.
- To operate responsibly by minimizing environmental impact through sustainable manufacturing practices and resource efficiency.

3.4 Core Operations

AIB's core operations span from procuring raw materials, such as bauxite and aluminum derivatives, to the manufacturing and distribution of a wide range of aluminum products. The company has implemented streamlined production processes to manage and control its inventory levels, which is critical in maintaining an efficient supply chain and meeting customer demands promptly. AIB's manufacturing facilities are equipped with modern technology that allows for flexibility in production, enabling the company to respond swiftly to market changes and customer requirements.

3.5 Supply Chain and Inventory Management

Inventory management is central to AIB's supply chain strategy, given the high costs associated with aluminum storage and the volatility in raw material prices. AIB has adopted practices such as Just-in-Time (JIT) inventory and Economic Order Quantity (EOQ) to balance inventory levels and reduce carrying costs. The company also leverages data analytics to forecast demand more accurately, minimizing stockouts and overstock scenarios. AIB's focus on efficient inventory management not only lowers operational costs but also strengthens its supply chain resilience, which is essential in maintaining a competitive edge in the aluminum industry.

3.6 Commitment to Sustainability

AIB is committed to environmentally responsible practices throughout its supply chain. This includes recycling aluminum scrap, reducing waste, and minimizing energy consumption in production. By adopting sustainable practices, AIB not only reduces its environmental impact but also aligns with global standards, enhancing its reputation within both local and international markets.

3.7 Custom Aluminum Manufacturing

AIB specializes in the custom production of aluminum products tailored to meet specific client requirements. This includes a variety of profiles, shapes, and sizes suitable for different applications, such as construction, automotive, and packaging. The company works closely with clients to design and manufacture products that meet precise specifications, ensuring optimal functionality and performance.

3.8 Logistics and Distribution Services

AIB manages a streamlined logistics and distribution network to facilitate the timely delivery of products to customers. With strategically located warehouses and distribution centers, AIB ensures efficient inventory management, reducing lead times and improving service levels. The company coordinates closely with logistics partners to optimize transportation routes and minimize costs.

3.9 Board of Directors



Ebrahim Dawood Mamoon
Chairman at Kai-Altech Group



Al Amin Murshed
Managing Director at Kai Bangladesh Aluminium Limited

Message from Chairman

As a leading conglomerate in Bangladesh, our journey has been defined by a commitment to innovation, quality, and excellence across a diverse range of industries. From aluminium and stainless steel, paper, ceramics, and metals, our group has consistently pushed the boundaries to deliver world-class products and services. Our success is rooted in the trust of our customers, the dedication of our employees, and the visionary leadership that has guided us over the years. We believe in building a sustainable future, where business growth goes hand in hand with social responsibility and environmental stewardship. As we look ahead, we remain focused on expanding our horizons, embracing new challenges, and continuing to lead with integrity and purpose. I invite you to explore our website and learn more about our businesses, our values, and our unwavering commitment to excellence. Thank you for your continued trust and support.

Our Brands

KAI ALUMINIUM · ALTECH ALUMINIUM এ্যালটেক এ্যালুমিনিয়াম · METALTECH INDUSTRIES · GardaShield · EVERBEST Ladder · PAPERTECH Industries Limited · STEELTECH IT'S ALL ABOUT STAINLESS STYLE · SINOBANGLA LANDSCAPE · Kyros Footwear · BTL · M&M ENGINEERING · Blitz Weddings & Events · KAI TRADE

3.10 AIB Services

- **Company Name:** Aluminium Industries of Bangladesh (AIB), also known as AIB Services.
- **Industry:** Aluminum production and manufacturing.
- **Established:** Year of establishment is not specified, but the company has been a long-standing player in Bangladesh's aluminum industry.
- **Core Products:**
  - Aluminum profiles.
  - Aluminum sheets and coils.
  - Specialized aluminum products for construction, transportation, electrical, and packaging sectors.
- **Operations:**
  - Production and processing of aluminum products.
  - Distribution and supply chain management across Bangladesh.
  - Vertical integration from raw material procurement to final product delivery.
- **Infrastructure:**
  - Multiple manufacturing plants equipped with modern technology and machinery.
  - Extensive warehousing and distribution centers supporting effective inventory management.
- **Supply Chain Approach:**
  - Emphasis on sustainable and efficient inventory management.
  - Streamlined processes to reduce costs and optimize resources.
  - Focus on minimizing lead times to ensure timely product delivery.
- **Competitive Edge:**
  - Strong focus on quality and customer satisfaction.
  - Innovation in production and operational practices.
  - Commitment to environmental responsibility and corporate social responsibility.

3.11 AIB Clients

- **Construction Companies:** Major clients in the construction sector requiring aluminum profiles, sheets, and customized structural components for buildings, infrastructure, and architectural applications.
- **Transportation Sector:** Automotive and transport manufacturing companies that use AIB's aluminum products for lightweighting and durability in vehicles, railway carriages, and transport equipment.
- **Electrical and Electronics Manufacturers:** Producers of electrical and electronic components who rely on aluminum for its conductivity and corrosion resistance, particularly in wiring, circuit boards, and enclosures.
- **Packaging Industry**: Clients in the food and beverage, pharmaceutical, and consumer goods sectors who require aluminum for lightweight and protective packaging materials, such as cans and foil.
- **Household Appliance Manufacturers**: Companies producing appliances and household goods that use aluminum parts for their lightweight and heat-resistant properties.
- **Retail Distributors**: Distributors and retailers that supply AIB's aluminum products to smaller businesses, hardware stores, and end consumers across Bangladesh.
- **Government and Public Sector Projects**: Government agencies and contractors involved in large-scale infrastructure projects, such as bridges, airports, and public buildings, where AIB's aluminum products meet regulatory and durability standards.
- **Export Market Partners**: International clients and importers who source aluminum products from AIB for various applications in their local markets.
- **Renewable Energy Sector**: Companies involved in renewable energy solutions, such as solar panel and wind turbine manufacturers, who require aluminum for its lightweight and corrosion-resistant properties in structural components.
- **Custom Clients for Specialty Projects**: Clients with specialized needs in custom aluminum fabrication for unique projects, such as custom machinery, specialized architectural designs, and industrial equipment.

3.12 List the Aluminium industries of Bangladesh

Bangladesh has a number of prominent aluminium manufacturing companies, catering to construction, automotive, and consumer industries. Here are some major aluminium industries:

- **KAI Bangladesh Aluminium Ltd** – Established in 1997 and certified with ISO 9001:2008, KAI is a leader in aluminium extrusion products, including windows, doors, and curtain walls. Located in Baridhara, Dhaka.
- **Chung Hua Aluminium Industry Ltd** – Known for aluminium extrusions, Chung Hua supplies products like aluminium profiles and frames. It is based in the Uttara area of Dhaka.
- **Dhaka Thai Ltd. (ALCO Thai Aluminium)** – Founded in 1997, it produces a range of products including aluminum doors, windows, furniture parts, and industrial components.
- **Bangladesh Thai Aluminium Ltd** – This company, located on Kemal Ataturk Avenue, Banani, Dhaka, produces aluminium products for construction and industrial applications.
- **Nikki Thai Aluminium Industries Ltd.** – Produces aluminum profiles and accessories, focusing on architectural uses.
- **Fu-Wang Aluminium Industries Ltd** – Located in Banani, Dhaka, Fu-Wang is another reputable aluminium manufacturing company focusing on extrusion and related services
- **Altech Aluminium Industries Ltd** – Also in Baridhara, Dhaka, Altech Aluminium produces a variety of extrusion profiles and is a sister company of KAI Aluminium.
- **Aramit Thai Aluminium Ltd.** – A supplier of aluminum products for the construction sector.
- **PHP Aluminium** – Part of the PHP Group, this company is involved in the production of various aluminum profiles and sheets.

These companies represent just a segment of the aluminium industry in Bangladesh, which includes over a hundred additional small- and large-scale companies across Dhaka and Chittagong. Many focus on producing aluminium-based construction materials such as frames, partitions, and fittings.

Chapter -04

Analysis of Inventory Management Practices in Supply Chain Management

4.1 Introduction

Inventory management is a critical component of supply chain management, ensuring that a company maintains an optimal level of stock to meet customer demands while minimizing costs. Efficient inventory management can drive significant cost savings, enhance operational efficiency, and improve customer satisfaction. This analysis focuses on inventory management practices within the supply chain of Aluminium Industries of Bangladesh, a prominent player in the manufacturing and supply of aluminium products.

4.2 Objectives of the Analysis

The main objectives of this analysis are to:

- Assess the current inventory management practices used by Aluminium Industries of Bangladesh.
- Identify the challenges and inefficiencies in the inventory management process.
- Evaluate the impact of inventory practices on the overall supply chain performance.
- Recommend strategies to improve inventory management and enhance supply chain efficiency.

4.3 Inventory Control Techniques

Inventory control techniques help AIB balance the costs of holding inventory against the risk of stockouts. The key methods include:

- **Economic Order Quantity (EOQ):** AIB uses EOQ to calculate the optimal order size, balancing ordering costs with holding costs to minimize total inventory costs. This method is particularly effective in reducing excess inventory while maintaining enough stock to meet demand.
- **ABC Analysis:** This technique categorizes inventory into three classes: A (high value), B (moderate value), and C (low value). By prioritizing high-value items (A items), the company allocates resources and management attention to inventory with the greatest financial impact.
- **Just-In-Time (JIT):** To minimize inventory holding costs, AIB employs a JIT approach, which focuses on keeping stock levels low and ordering materials only when necessary for production. This approach requires a reliable supply chain and precise planning to ensure timely availability of materials.

4.4 Inventory Forecasting and Planning

Effective demand forecasting and inventory planning are essential for AIB to avoid both shortages and excess stock. The company uses various methods, including:

- **Historical Sales Data:** Past sales data are analyzed to forecast future demand patterns, allowing AIB to adjust stock levels based on anticipated demand.
- **Market Analysis and Trend Monitoring:** By analyzing market trends and shifts in customer demand, the company can make more accurate predictions, adapt to changing customer preferences, and respond to seasonal or cyclical demand fluctuations.

4.5 Safety Stock Management

To mitigate the risks of stockouts due to demand variability or supply disruptions, AIB maintains safety stock levels, especially for critical items. Safety stock levels are calculated based on demand fluctuations and lead time uncertainty, allowing for a buffer to manage unexpected events and maintain production continuity.

4.6 Technology Integration in Inventory Management

Technology integration plays a significant role in AIB's inventory management practices. The company uses **Enterprise Resource Planning (ERP)** systems for real-time inventory tracking, which allows for greater transparency across the supply chain. ERP systems support AIB by providing accurate, up-to-date information on stock levels, reorder points, and order statuses, enabling proactive management of inventory.

4.7 Challenges in Inventory Management

AIB faces several challenges that impact its ability to maintain optimal inventory levels:

- **Demand Unpredictability:** The aluminium industry is subject to fluctuations in customer demand, making it difficult to accurately forecast and manage inventory levels.
- **Lead Time Variability:** Uncertainties in supplier lead times often require AIB to maintain higher safety stock, which increases holding costs.
- **Inventory Obsolescence:** The risk of obsolescence is a challenge for AIB, as changes in technology or customer demand can render certain items outdated, leading to excess stock and potential losses.

4.8 Impact of Inventory Management on Supply Chain Performance

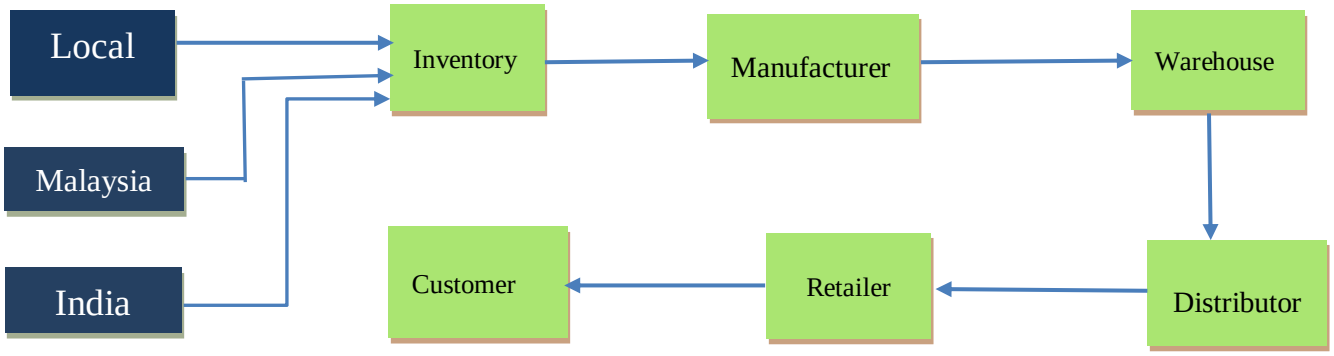
Effective inventory management practices have proven beneficial to AIB's supply chain in several ways:

- **Cost Reduction:** By optimizing inventory levels and using EOQ and JIT, AIB has successfully minimized costs associated with warehousing, handling, and stockouts.
- **Enhanced Customer Satisfaction:** With efficient inventory planning and timely order fulfillment, the company can consistently meet customer demands, fostering loyalty and enhancing reputation.
- **Operational Efficiency:** Automated inventory tracking reduces manual errors, streamlines stock management, and allows for more efficient allocation of resources, contributing to smoother operational flow.

4.9 Supply Chain Management in Kai Aluminium

A supply chain is a sequence of all functions, facilities and activities that involves producing and delivering a product or service to the final consumer. The sequence starts from raw materials and ends with the final customer. As mentioned in the inventory section, some vital raw materials needed for production are aluminium ingot, silicon, magnesium, talcum powder, etc. Not only are these materials collected from local market, but **Kai Bangladesh aluminium ltd** also brings them from Malaysia and India. It is important to note that **Kai** maintains a B2B business model although some side deals might happen from time to time.

KAI Aluminium's Supply Chain: -



4.10 Sourcing

The sourcing process in the aluminum industry plays a pivotal role in ensuring a consistent supply of raw materials, components, and services required for production. Efficient sourcing strategies contribute to maintaining quality, minimizing costs, and enhancing the overall efficiency of the supply chain. The aluminum industries in Bangladesh, such as **Kai Bangladesh Aluminium Ltd**, adopt structured and systematic sourcing practices tailored to meet the unique demands of this sector.

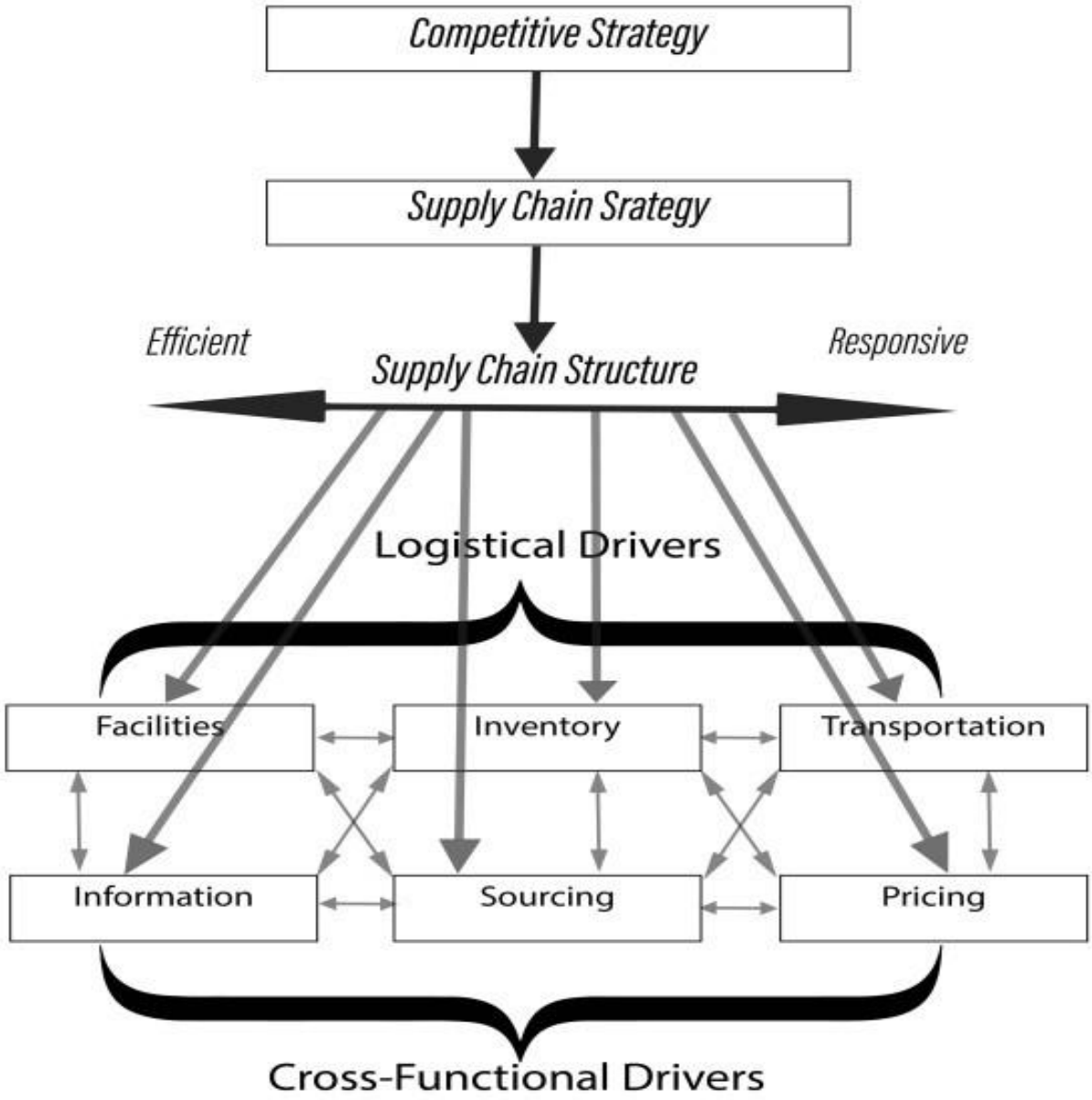
Aluminium ingot, silicon, magnesium, talcum powder, etc. Not only are these materials sourcing from local market, but **Kai Bangladesh Aluminium Ltd** also brings them from Malaysia and India.

4.11 Procurement

KAI Aluminium understands that in order to reap profits, they must minimize costs. Their main cost arises from the purchase of parts, materials and other inventories. Factors that can have a significant impact on quality of goods and service and operations and timing deliveries are closely monitored. Therefore, they developed practices like tracking goods, managing returns with suppliers and customers, order fulfillments, etc. so that acquiring goods does not halt the flow of production.

4.12 Inventory for Supply Chain Structuring Drivers

The supply chain strategy determines how the supply chain should perform with respect to efficiency and responsiveness. The supply chain must then use the three logistical and three Cross functional drivers to reach the performance level the supply chain strategy dictates and maximize the supply chain profits. Although this framework is generally viewed from the top down, in stances a study of the six drivers may indicate the need to change the supply chain strategy and, potentially, even the competitive strategy.



4.13 Types of Inventories in Supply Chain Management

Inventory plays a crucial role in ensuring the smooth operation of supply chain management, particularly in the aluminium industry. It can be categorized into various types based on function, purpose, and management strategies. Below are the primary types of inventories:

➢ Raw Materials Inventory

Raw materials are the basic inputs required for production. In the aluminium industry, these include bauxite, alumina, or other raw materials essential for manufacturing aluminium products.

Purpose:
Ensures that production processes are not disrupted due to shortages.

Challenges:
Volatility in raw material prices and supply chain disruptions can impact raw material availability.

➢ Work-in-Progress (WIP) Inventory

WIP inventory includes partially finished products that are in various stages of the production process.

Purpose:
To maintain continuous production flow, ensuring that different manufacturing stages are synchronized.

Challenges:
Managing WIP inventory requires balancing production speed and efficiency to avoid bottlenecks or excess accumulation.

➢ Finished Goods Inventory

These are fully manufactured products ready for sale or distribution, such as aluminium sheets, rods, or extrusions.

Purpose:
To meet customer demand promptly and ensure timely delivery.

Challenges:
Overstocking can lead to increased holding costs, while understocking risks losing sales opportunities.

➢ Maintenance, Repair, and Operations (MRO) Inventory

MRO inventory includes supplies, spare parts, and tools necessary to maintain production equipment and facilities.

Purpose:
Ensures that machinery operates smoothly with minimal downtime due to repairs or maintenance.

Challenges:
Balancing the cost of holding spare parts with the risk of production delays due to equipment failure.

➢ Safety Stock Inventory

Safety stock is extra inventory held to protect against uncertainties in demand and supply.

Purpose:

Acts as a buffer to mitigate risks of stockouts caused by demand fluctuations or supply chain disruptions.

Challenges:

Maintaining optimal safety stock levels without incurring excessive holding costs.

➢ Cycle Stock Inventory

Cycle stock refers to the inventory regularly used and replenished through routine production and procurement cycles.

Purpose:

Supports normal business operations based on predictable demand patterns.

Challenges:

Efficient replenishment planning is critical to prevent excess inventory buildup.

➢ Pipeline Inventory

Pipeline inventory consists of goods in transit between different stages of the supply chain, such as raw materials enroute to the factory or finished goods on their way to distributors.

Purpose:

Ensures a continuous flow of materials and products throughout the supply chain.

Challenges:

Managing lead times and ensuring accurate tracking of inventory in transit are essential.

➢ Dead Stock

Dead stock includes obsolete or unsellable inventory that no longer has demand.

Purpose:

Though not intentional, understanding dead stock helps manage and minimize waste.

Challenges:

High holding costs and space utilization, requiring strategies for liquidation or recycling.

4.14 Inventory-Related Metrics

Inventory-related decisions affect the cost of goods sold, the C2C cycle, the assets held by the supply chain, and its responsiveness to customers. A manager should track the following inventory-related metrics that influence supply chain performance:

- **C2C cycle time (**DIO+DSO−DPO) is a high-level metric that includes inventories, accounts payable, and receivables.

- **Average inventory** measures the average amount of inventory carried. Average inventory should be measured in units, days of demand, and financial value.

- **Inventory turns** measure the number of times inventory turns over in a year. It is the ratio of average inventory to either the cost of goods sold or sales.

- **Products with more than a specified number of days of inventory** identifies the products for which the firm is carrying a high level of inventory. This metric can be used to identify products that are in oversupply or to identify reasons that justify the high inventory, such as price discounts or a product being a very slow mover.

- **Average replenishment batch size** measures the average amount in each replenishment order. The batch size should be measured by SKU in terms of both units and days of demand. It can be estimated by averaging over time the difference between the maximum and the minimum inventory (measured in each replenishment cycle) on hand.

- **Average safety inventory** measures the average amount of inventory on hand when a replenishment order arrives. Average safety inventory should be measured by SKU in both units and days of demand. It can be estimated by averaging over time the minimum inventory on hand in each replenishment cycle.

- **Seasonal inventory** measures the amount by which the inflow of product exceeds its sales (beyond cycle and safety inventory). Seasonal inventory is built up solely to deal with anticipated spikes in demand.

- **Fill rate** (order/case) measures the fraction of orders/demand that were met on time from inventory. Fill rate should be averaged not over time but over a specified number of units of demand (say, every thousand or million).

- **Fraction of time out of stock** measures the fraction of time that a particular SKU had zero inventory. This fraction can be used to estimate the lost sales during the stockout period

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- **Obsolete inventory** measures the fraction of inventory older than a specified obsolescence date.

4.15 Warehouse Management in Supply Chain Management

A warehouse plays a critical role in the supply chain by serving as a hub for storing, managing, and distributing inventory. In the aluminium industry, warehouses ensure the smooth flow of raw materials, work-in-progress (WIP), and finished goods to meet production and customer demand. Effective warehouse management directly influences inventory control, operational efficiency, and customer satisfaction.

Functions of Warehouses

Storage of Inventory

- Raw Materials Storage: Ensures that essential inputs like bauxite or alumina are readily available for production.
- Finished Goods Storage: Houses completed aluminium products until they are shipped to customers or distributors.
- Buffer Stock: Maintains safety stock to mitigate supply chain disruptions or demand fluctuations.

Inventory Control and Tracking

- Warehouses are equipped with inventory management systems (IMS) to track stock levels, locations, and movements.
- Barcoding, RFID, and automated tracking systems ensure accuracy and real-time monitoring.

Order Fulfillment

- Facilitates picking, packing, and shipping of orders efficiently to ensure timely delivery to customers.
- Supports customized order processing for different clients, enhancing flexibility.

Quality Control and Inspection

- Regular checks are conducted to ensure raw materials meet production standards and finished goods are defect-free.
- Proper handling and storage conditions are maintained to preserve product quality.

Value-Added Services

- Warehouses may offer additional services like product customization, assembly, packaging, or labelling before dispatch.

Chapter – 05

Findings & Analysis

5.1 Findings and Analysis

The study on inventory management practices in the supply chain of Aluminium Industries of Bangladesh has provided valuable insights into the strengths, challenges, and opportunities for improvement. The findings and their analysis are outlined below:

Reliance on Manual Inventory Management.

- Frequent errors in data entry.
- Delays in processing updates.
- Limited ability to analyze inventory trends efficiently**.**

Limited Use of Technology.

- Dependence on **basic tools**, such as Excel, for inventory tracking.
- Lack of **real-time data integration** across departments.
- Missed opportunities to leverage **ERP systems** or other modern software to streamline operations and enable data-driven decisions.

Lack of Accurate Demand Forecasting.

- **Overstocking** during periods of low demand.
- **Stockouts** during unexpected demand spikes.
- A lack of flexibility to respond to **dynamic market conditions**.

High Inventory Holding Costs.

- Increased **storage costs** due to excess inventory.
- Higher **opportunity costs** associated with idle capital tied up in stock.
- Inefficient use of **resources**, driving up overall operational expenses.

Inconsistent Supply Chain Coordination.

- **Delayed communication** between suppliers and the organization.
- Inadequate **synchronization** of production schedules with inventory needs.
- **Missed delivery timelines**, affecting overall supply chain efficiency.

Vendor Dependence.

- Poses risks to **supply chain stability** during vendor disruptions.
- Limits **bargaining power**, potentially leading to higher procurement costs.
- Creates **bottlenecks** in the supply chain when vendors face capacity constraints.

Overstocking Practices.

- **Excess capital investment** in inventory.
- Increased risks of **inventory obsolescence** or deterioration.
- **Inefficiencies** in storage and resource utilization.

Poor Warehouse Space Utilization.

- **Wasted storage space** due to inefficient stacking and layout designs.
- Increased **time and labor costs** for locating and retrieving items.
- Reduced capacity to accommodate incoming stock, especially during peak periods.

Chapter – 06

Recommendations & Conclusion

6.1 Recommendations

Based on the findings and analysis, the following recommendations are proposed to improve inventory management practices in Aluminium Industries of Bangladesh:

Integration of Inventory Management Technology

- Implement advanced inventory management software, such as ERP (Enterprise Resource Planning) systems, to automate inventory tracking, stock replenishment, and reporting.
- Leverage technologies like barcoding or RFID (Radio Frequency Identification) for real-time inventory monitoring.

Adopt Demand Forecasting Techniques

- Introduce data-driven forecasting tools that utilize historical data, market trends, and predictive analytics to align inventory levels with market demand.
- Regularly review and adjust forecasts to account for seasonal fluctuations and market changes.

Implement Lean Inventory Practices

- Adopt Just-In-Time (JIT) inventory practices to reduce overstocking and holding costs.
- Optimize safety stock levels based on demand variability and supplier lead times.

Enhance Supply Chain Coordination

- Strengthen communication and collaboration with suppliers and distributors through regular meetings and shared digital platforms.
- Develop long-term agreements with multiple vendors to mitigate risks and ensure a stable supply chain.

Improve Warehouse Efficiency

- Redesign warehouse layouts to maximize space utilization and streamline material handling.
- Introduce warehouse management systems (WMS) to optimize storage, retrieval, and dispatch processes.

Develop Performance Metrics

- Establish key performance indicators (KPIs) such as inventory turnover, stock accuracy, and order fulfillment rates.
- Conduct regular performance reviews to identify bottlenecks and areas for improvement.

Conduct Employee Training

- Provide comprehensive training to employees on modern inventory management tools, forecasting techniques, and supply chain best practices.
- Encourage a culture of continuous learning and adaptation to technological advancements.

Focus on Sustainable Practices

- Minimize waste and implement eco-friendly practices by monitoring and managing obsolete or surplus inventory.
- Explore sustainable packaging and storage solutions.

6.2 Conclusion

Effective inventory management is critical for the operational efficiency and profitability of Aluminium Industries of Bangladesh. The current practices, while functional, face significant challenges such as overstocking, high holding costs, and reliance on manual processes. By adopting modern technologies, enhancing demand forecasting, and optimizing supply chain collaboration, the company can achieve:

- Reduced operational costs,
- Improved customer satisfaction,
- Enhanced market competitiveness.

The transition to advanced inventory practices will require strategic planning, investment in technology, and commitment to continuous improvement. By addressing these areas, Aluminium Industries of Bangladesh can not only resolve its current inefficiencies but also position itself as a leader in supply chain management within the industry.

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