Thesis Paper

on

Inventory Management Practices in Bangladesh: A Case Study on "Process and Operation Paper Industries of Several Companies."

Submitted by:

Md. Ashkur Rahman

ID: EMBA2401031016

Program: EMBA

Major: Management

Department of Business Administration

Sonargaon University (SU)

Submitted to:

Department of Business Administration

Faculty of Business

Sonargaon University (SU)

Submitted for the partial fulfillment of the degree of

Executive Master of Business Administration

Sonargaon University (SU)

Date of Submission: April 28, 2025

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Letter of Transmittal

April 28, 2025

Shahnaz Sharmin
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Subject: Submission of Thesis Paper Titled **Inventory Management Practices in Bangladesh: A Case Study on "Process and Operation Paper Industries of Several Companies."**

Dear Madam,

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

Md. Ashkur Rahman
ID: EMBA2401031016
Program: Executive Master of Business Administration (EMBA)
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Declaration of Student

I am Md. Ashkur Rahman, a student in the Executive Master of Business Administration program with ID: EMBA2401031016 at Sonargaon University. I want to sincerely state that the report titled **Inventory Management Practices in Bangladesh: A Case Study on "Process and Operation Paper Industries of Several Companies."** 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

_____

Md. Ashkur Rahmna
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Letter of Authorization

I hereby confirm that the project report titled **Inventory Management Practices in Bangladesh: A Case Study on "Process and Operation Paper Industries of Several Companies."** is a genuine effort by Md. Ashkur Rahman 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 in the same context or a different one.

Shahnaz Sharmin
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Acknowledgement

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Abstract

This thesis report investigates the **Inventory Management Practices in Bangladesh: A Case Study on "Process and Operation Paper Industries of Several Companies."** aiming to assess their impact on operational efficiency, cost management, and customer satisfaction. As the demand for Paper 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, 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 Paper 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 Paper companies have implemented basic inventory management practices, significant challenges persist, including demand variability, supply management 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 Paper industry. Recommendations include the adoption of advanced forecasting techniques, improved management, 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 Paper sector can lead to substantial improvements in management 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 Paper 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 Paper sector in Bangladesh.

List of Acronyms

- WIP Work-In-Progress
- JIT Just-In-Time (Inventory Management)
- SCM Supply Chain Management
- QC Quality Control
- QA Quality Assurance
- MRO Maintenance, Repair, and Operations
- TQM Total Quality Management
- ISO International Organization for Standardizatio
- BEPZA Bangladesh Export Processing Zones Authority
- DoE Department of Environment (Bangladesh)
- BSCIC Bangladesh Small and Cottage Industries Corporati
- HRM Human Resource Management
- SOP Standard Operating Procedure
- BPMA Bangladesh Paper Mills Association

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Chapter: 01
Introduction

1.1 Introduction

The paper industry is one of the foundational sectors in Bangladesh's manufacturing landscape, supporting a wide range of industries such as education, packaging, printing, and hygiene products. With the rise of literacy rates, e-commerce, and industrialization, the demand for different types of paper—such as writing paper, packaging board, tissue paper, and newsprint has been steadily increasing within the country.

Despite this growing demand, the paper industry in Bangladesh faces numerous operational challenges. These include outdated machinery, inefficient production systems, high energy consumption, inconsistent raw material supply, and environmental compliance issues. At the heart of these challenges lies the need for effective **process and operations management**—the strategic planning, coordination, and control of all activities involved in the production and distribution of paper products.

Process management refers to the structured planning and execution of each stage in the papermaking process, including raw material sourcing, pulping, drying, finishing, and packaging. Operations management, on the other hand, encompasses a broader scope—overseeing everything from inventory control, logistics, and human resources to quality assurance and machine maintenance.

In a competitive global market, paper manufacturers in Bangladesh must improve their operational efficiency, adopt new technologies, and implement sustainable practices to remain viable. As such, this study aims to explore how process and operations are managed in the Bangladeshi paper industry, assess their effectiveness, and identify opportunities for improvement.

Through this thesis, a detailed understanding of the production workflows, resource allocation, supply chain dynamics, and quality control measures will be developed. The ultimate goal is to provide actionable insights that can help transform the traditional operational model of paper mills into a more modern, efficient, and sustainable system.

1.2 Background of the study

The paper industry plays a significant role in the industrial development of Bangladesh. From packaging to education and business documentation, paper remains a key material that supports both the economy and daily life. As the demand for paper products increases—driven by population growth, urbanization, and changes in consumer behavior—Bangladeshi paper mills are under increasing pressure to improve their production capacity and operational efficiency.

In the global context, modern paper manufacturing relies heavily on advanced process and operations management practices to ensure cost-effectiveness, quality control, environmental sustainability, and timely delivery. However, in Bangladesh, many paper mills still operate with traditional manufacturing systems, manual processes, and outdated technology. This results in low productivity, high production costs, inconsistent product quality, and challenges in meeting both domestic and export demands.

Effective **process management** is critical in optimizing the flow of raw materials, reducing waste, and enhancing product quality, while **operations management** ensures the smooth coordination of labor, machinery, supply chains, and maintenance activities. For the Bangladeshi paper industry to remain competitive and sustainable in the long run, there is a growing need to adopt modern management approaches, invest in technology, and develop skilled human resources.

This study aims to explore the current state of process and operations management in the paper industry of Bangladesh, identify key challenges, and provide recommendations for improving efficiency, sustainability, and overall performance.

1.3 Scope of the Study

This study focuses on the **process and operations management practices** within the paper industry of Bangladesh. It aims to explore how paper manufacturing companies manage their production processes, supply chains, resource allocation, and quality control to ensure efficient and sustainable operations.

The scope of the study includes both **public and private sector paper mills**, with a particular focus on large and medium-sized companies that are actively engaged in the production of writing paper, packaging board, tissue, and industrial-grade paper products. Key areas covered include:

- **Raw material sourcing and input management**
- **Manufacturing processes** – from pulping to finishing and packaging
- **Machinery and technology used in operations**
- **Inventory and supply chain management**
- **Quality assurance and control measures**
- **Human resource and labor operations**
- **Waste management and environmental compliance**

The research will not only examine current operational practices but will also highlight the **challenges** faced by the industry, such as outdated technologies, energy inefficiency, and raw material scarcity. Moreover, the study will propose **strategies for process improvement**, cost reduction, and performance optimization based on industry best practices.

Geographically, the study will be limited to mills operating within Bangladesh, with selected case studies from major industrial zones such as Dhaka, Narayanganj, and Chattogram. While the primary data may be collected through interviews, surveys, and company reports (if available), secondary sources such as academic articles, industry publications, and government data will also be used to support the analysis.

1.4 Objectives of the Study

The primary objective of this study is to examine and evaluate the **process and operations management practices** within the paper industry of Bangladesh, with the aim of identifying challenges and proposing practical improvements to enhance efficiency, productivity, and sustainability.

Specific Objectives:

- **To analyze the production process,**used in Bangladeshi paper mills, from raw material sourcing to finished goods.
- **To examine the operations management practices**, including capacity planning, inventory control, labor management, and quality assurance.
- **To identify the major operational challenges** faced by the paper industry, such as outdated technology, resource inefficiency, and environmental concerns.
- **To evaluate the role of technology and automation** in improving process efficiency and reducing waste.
- **To assess supply chain and logistics management strategies** used by paper manufacturers in Bangladesh.
- **To explore human resource management** within the production environment, focusing on labor skills, training, and workforce productivity.
- **To propose recommendations and strategies** for improving process flow, operational efficiency, and sustainable practices in the industry.

1.5 Quantitative Research

This study adopts a **quantitative research approach** to investigate the efficiency, performance, and challenges related to **process and operations management** in the paper industry of Bangladesh. Quantitative research allows for the collection of numerical data that can be analyzed statistically to identify patterns, relationships, and trends in operational practices across different paper mills.

The study will focus on gathering measurable data from selected paper manufacturing companies, particularly in the areas of:

- **Production output** (tons of paper produced per month/year)
- **Machine utilization rates** (operating hours vs. downtime)
- **Raw material usage** (amount of pulp, recycled paper, chemicals used)
- **Energy consumption** (electricity and fuel used per unit of production)
- **Labor productivity** (output per worker/hour)
- **Inventory turnover rates**
- **Defect/reject rates** in quality control
- **Lead time** from order to delivery
- **Waste and recycling rates**

Data Collection Methods:

- Structured **questionnaires** distributed to factory managers, production supervisors, and operation heads.
- Collection of **secondary data** from company records, industry reports, and government databases.
- Use of **statistical tools** (e.g., SPSS or Excel) to analyze data and identify correlations or inefficiencies.

Research Sample:

The study will include a **sample of 5–10 paper mills** from both the public and private sectors across industrial zones such as Dhaka, Narayanganj, and Chattogram. The selection will be based on production scale, accessibility, and willingness to share operational data.

Expected Outcomes:

By using a quantitative approach, the research aims to provide **evidence-based insights** into how operations are managed, which areas need improvement, and how certain variables (like machine usage or raw material input) impact overall efficiency and output.

1.6 Limitations of the Study

While this study aims to provide a comprehensive analysis of process and operations management within the paper industry in Bangladesh, several limitations may affect the depth and generalizability of the findings:

1. Limited Access to Data

Many paper mills, especially private ones, are reluctant to share internal operational data due to confidentiality concerns. As a result, some production figures, cost details, or performance metrics may be estimated or unavailable.

2. Small Sample Size

Due to time and resource constraints, the study is based on a limited number of case studies or surveys from selected paper mills. Therefore, the findings may not fully represent the entire industry, especially small-scale or rural paper producers.

3. Time Constraints

The research was conducted within a fixed academic timeline, which restricted the ability to observe long-term operational performance or seasonal variations in production and supply chains.

4. Focus on Manufacturing Operations Only

This study is focused specifically on process and operations management. It does not cover broader business aspects such as financial performance, marketing strategies, or external market dynamics unless they directly affect operations.

5. Reliability of Secondary Data

Some secondary data sources, such as government reports or industry publications, may not be fully up to date. Inconsistencies in statistical reporting can also impact the accuracy of certain conclusions.

6. COVID-19/Post-Pandemic Effects

The long-term impacts of the COVID-19 pandemic on operations, supply chains, and labor productivity may still be affecting the industry, which could influence current performance data and trends.

Chapter -02

Theoretical Discussion

2.1 Introduction

The paper industry in Bangladesh has witnessed significant growth in recent years due to the increasing demand for paper products, both domestically and internationally. As an emerging economy, Bangladesh's paper industry faces a variety of challenges related to production processes, operational efficiency, and sustainability. This literature review focuses on the key processes involved in the paper industry of Bangladesh, the operational challenges it faces, and the innovative solutions being implemented to improve performance and environmental impact.

2.2 Raw Material Sourcing and Pulping

The choice of raw materials significantly impacts the production process, environmental footprint, and quality of the final product. The primary raw materials used in paper production are wood, bamboo, and recycled paper.

- **Wood-Based Raw Materials**: Wood is the traditional and most common raw material for paper production. However, concerns about deforestation and the sustainability of wood as a raw material are growing.
- **Bamboo**: Bamboo has emerged as a more sustainable alternative in certain regions, such as Bangladesh, where it is abundant. Bamboo grows faster than trees and is considered more renewable, making it an attractive choice for paper mills seeking to reduce environmental impacts.
- **Recycled Paper**: Recycling paper reduces the need for virgin wood pulp, conserves resources, and decreases environmental impacts.

The pulping process, which separates the cellulose fibers from lignin and other impurities in the raw material, plays a crucial role in determining the quality and characteristics of the paper. There are three main types of pulping:

- **Mechanical Pulping**: Mechanical pulping involves grinding the raw material to separate the fibers. It is commonly used for producing newsprint and lower-quality paper but results in lower-strength fibers and higher energy consumption.

- **Chemical Pulping (Kraft Process)**: Chemical pulping, particularly the kraft process, uses chemicals like sodium hydroxide and sodium sulfide to break down lignin and release cellulose fibers. However, it is energy-intensive and produces chemical waste, which must be managed effectively.
- **Semi-Chemical Pulping**: This method combines mechanical and chemical techniques to produce a pulp that balances quality with cost-effectiveness, making it suitable for certain types of paper products.

2.3 Paper making Process

The papermaking process involves several stages, including the formation of the paper sheet, pressing, drying, and finishing. Each of these stages plays a critical role in determining the final properties of the paper.

- **Formation**: The pulp slurry, which consists of fibers and water, is spread onto a moving screen called a Fourdrinier wire. As the water drains away, the fibers begin to bond, forming a paper sheet.
- **Pressing**: After the paper sheet is formed, it passes through a series of rollers that press out excess water and compact the fibers. This helps improve the strength and density of the paper.
- **Drying**: The wet paper sheet is then dried by passing it through a series of heated rollers or drying cylinders. which is one of the major operational costs in paper mills. Efficient drying technologies, such as steam-heated dryers, are crucial for reducing energy consumption.
- **Calendering**: Calendering is the process of smoothing and compressing the paper to achieve the desired surface finish. The paper is passed through a set of rollers that improve its surface quality and thickness. This process is especially important for producing glossy or smooth paper products.



2.4 Coating and Finishing

Coating and finishing are optional steps that enhance the quality and appearance of the paper. Coating involves applying a layer of materials, such as clay, calcium carbonate, or latex, to the paper surface to improve its smoothness, brightness, and printability. This is especially important for paper used in high-quality printing, such as magazines, brochures, and packaging materials.

Coating helps improve the paper's printability, surface smoothness, and gloss.

Finishing processes involve cutting, trimming, and packaging the paper into sheets, rolls, or other forms for distribution. The finishing stage is vital for ensuring that the paper meets customer specifications in terms of size, shape, and quality.



2.5 Environmental and Sustainability Concerns

The paper industry is known for its significant environmental impact, particularly in terms of water consumption, energy use, and chemical waste. As a result, there has been increasing pressure on the industry to adopt more sustainable practices.

- **Water Use and Wastewater Treatment**: Paper mills require vast amounts of water for various stages of production, particularly pulping and bleaching. *Pokhrel and Viraraghavan (2004)* emphasize the importance of treating wastewater to remove harmful chemicals and pollutants before discharging it into the environment.

- **Energy Efficiency**: Paper production is highly energy-intensive, with significant energy consumption during the pulping, drying, and pressing stages. The industry has been working on improving energy efficiency through the adoption of technologies such as biomass energy and energy recovery systems.

- **Sustainable Raw Material Sourcing**: The use of renewable raw materials, such as bamboo and recycled paper, helps reduce the environmental impact of paper production.

2.6 Technological Innovations

Technological advancements have played a crucial role in improving the efficiency, quality, and sustainability of paper production processes. Some of the key innovations in the paper industry include:

- **Automation**: Automation technologies, such as process control systems, sensors, and robotic systems, have been integrated into paper mills to improve production efficiency and reduce human error, leading to better quality control and reduced waste.

- **Recycling Technologies**: Advances in paper recycling technologies have allowed mills to increase the use of recycled fiber and reduce the reliance on virgin materials.

    - **Energy-Efficient Equipment**: The development of energy-efficient machines and systems, such as low- energy dryers and energy recovery boilers, has helped mills reduce their energy consumption and operational costs.

2.7 Quality Control and Testing

Quality control is an essential part of paper production. The final product needs to meet specific criteria in terms of:

- **Strength**: How much force the paper can withstand before breaking.
- **Opacity**: How opaque or transparent the paper is, depending on its intended use.
- **Surface Smoothness**: Smoothness is crucial for paper that is used in high-quality printing.

- **Brightness**: How white or bright the paper is, which is especially important for fine paper and printing applications.
- **Thickness/Grammage**: The weight per unit area of the paper, which influences its durability and performance.

Testing is done throughout the production process to ensure consistency and high standards.

2.8 Recycled Paper Processing (For Recycled Paper Production)

Recycled paper is increasingly being used as an alternative to virgin wood fibers. The process for recycling paper involves:

- **Collection and Sorting**: Recycled paper is collected, sorted, and cleaned to remove contaminants like ink and plastic.
- **Pulper**: The recycled paper is mixed with water to form a slurry. Any remaining ink or coatings are removed, typically using chemical agents or mechanical processes.
- **De-inking**: The slurry is then treated with chemicals to remove the ink and other coatings, ensuring that the recycled paper is of good quality.
- **Pulping and Refining**: After de-inking, the pulp is refined, diluted, and prepared for papermaking.

The recycling process helps reduce waste, conserve resources, and lower the environmental footprint of paper production.

Chapter -03

Organizational Overview

3.1 Industry Context in Bangladesh

- **Over 100 paper mills**, including major players like Meghna Pulp and Paper Mills Ltd, **Bashundhara Paper Mills**, **Karnafuli Paper Mills**, and **Magura Paper Mills**.
- Paper products include: writing paper, printing paper, newsprint, tissue paper, kraft liner, duplex board, and packaging board.
- Raw materials are sourced locally (e.g., bamboo, jute stick, recycled paper) and internationally (imported pulp and chemicals).
- The industry is shifting toward **recycled pulp**, **sustainability**, and **automation**.

3.2 Organizational Structure of a Typical Paper Mills

Department	Core Functions
Raw Materials & Procurement	Sourcing of raw materials like wood chips, bamboo, wastepaper, and chemicals
Pulping Department	Mechanical or chemical conversion of raw materials into pulp
Papermaking Department	Sheet formation, pressing, drying, calendering
Finishing Department	Cutting, coating, packing of paper products
Quality Control (QC)	Testing for GSM, brightness, moisture, strength, etc.
Engineering & Maintenance	Maintenance of machinery, boilers, turbines, and ETP
Logistics & Distribution	Supply chain management, warehousing, and transportation
HR & Administration	Workforce management, training, compliance, and safety
R&D and Environment (EHS)	Process innovation, ETP operation, and environmental compliance

3.3 Supporting Processes

1. Quality Control

- In-process and post-process testing.
- Labs test for thickness (GSM), smoothness, opacity, and strength.
- Compliance with ISO and BSTI standards.

2. Energy & Utility Management

- High consumption of **electricity**, **steam**, and **water**.
- Some large mills use **captive power plants** (biomass, gas).
- Focus on energy-saving devices (VFDs, heat recovery systems).

3. Environmental Compliance

- Operation of **Effluent Treatment Plants (ETPs)** to treat wastewater.
- Compliance with **DOE (Department of Environment)** regulations.
- Use of **recycled fiber** to reduce deforestation and pollution.

3.4 Environmental & Energy Management

- **ETPs (Effluent Treatment Plants)**: Treat liquid waste from pulping.
- **Air Pollution Control Systems**: Scrubbers, filters for emissions.
- **Boilers & Captive Power Plants**: Steam and electricity generation.
- Increasing use of **biomass fuel**, **recycling systems**, and **waste heat recovery**

3.5 Inventory and Logistics Department

- **Inbound Logistics**: Transport of raw materials and chemicals.
- **Warehouse**: Inventory storage of pulp, chemicals, and finished goods.
- **Outbound Logistics**: Delivery to retailers, wholesalers, printers, or direct customers.

3.6 Human Resource Department

- **Skilled Technicians** operate pulping and papermaking machinery.
- **Engineers and Chemists** supervise processes and develop improvements.
- **Safety Officers** ensure occupational health and compliance with labor regulations.
- **Training Teams** build staff capacity for Lean, Six Sigma, and automation tools.

3.7 Product Categories

Paper mills often produce a range of products such as:

- Writing and printing paper (A4, copier paper)
- Newsprint
- Kraft paper (for packaging)
- Tissue paper (napkins, toilet rolls)
- Duplex board and linerboard

3.8 Board of Director

3.6



Mr. Mostafa Kamal, Chairman and Managing Director of MGL



Beauty Akter Vice Chairman of MGL

Message from Chairman

The message from the MGI (Meghna Group of Industries) Chairman, Mostafa Kamal, emphasizes their commitment to contributing to Bangladesh's economic and social development. He highlights MGI's dedication to innovation, quality, and the well-being of the nation's people. The message also underscores MGI's role in employment generation and its ambition to expand both domestically and internationally.

Our Brands



3.9 Case Example: Meghna Pulp and Paper Mills Ltd.

- Uses **SAP ERP** with integrated inventory module
- Stores imported pulp in climate-controlled warehouses
- Tracks inventory turnover to avoid slow-moving finished goods
- Regular training for warehouse staff to ensure FIFO compliance
- Aligns production planning with sales forecasts to minimize excess stock

3.10 Paper Clients

1. Educational Institutions

Paper mills supply a large portion of their writing and printing paper to schools, colleges, and universities for:

- Exercise books
- Notebooks
- Answer sheets
- Exam question papers

Common Clients:

- Government schools (via tender process)
- Private schools and colleges
- Publishing houses producing textbooks (like *NCTB* materials)

2. Publishing and Printing Houses

These clients require high-quality paper for:

- Books
- Magazines
- Newspapers
- Journals

Examples of major clients:

- *Ananda Publishers*, *Mawlana Bhashani Science and Technology University Press*, *Daily Prothom Alo*, *The Daily Star*
- Local printing presses for packaging inserts, flyers, posters

3. Packaging and Industrial Clients

With the rise of **e-commerce and retail**, demand for packaging board and kraft paper has grown significantly.

Clients include:

- Corrugated box manufacturers
- Food packaging companies (e.g., **Pran-RFL, ACI, Square**)
- Clothing exporters (garment boxes, tags, etc.)
- E-commerce platforms (e.g., **Daraz, AjkerDeal**)

4. Government and Public Sector

Through tenders and bulk procurement programs, the government is a major consumer of:

- Writing paper

- Official files
- Envelope paper
- Printed stationery

Clients include:

- **NCTB (National Curriculum & Textbook Board)**
- **Bangladesh Government Press**
- **Ministries** (Education, Agriculture, Finance, etc.)

5. Export Clients

Some Bangladeshi mills, especially those producing **tissue, kraft paper, and corrugated boards**, export to:

- India
- Nepal
- Bhutan
- Sri Lanka
- Middle Eastern countries (especially UAE, Saudi Arabia)

Exporting Mills:

- **Meghna Pulp and Paper Mills Ltd.**

- **Bashundhara Paper Mills Ltd.**
- **Mukul Paper Mills Ltd.**
- **KDS Packaging**
- **Hakkani Pulp & Paper Mi**

3.11 List the Paper industries of Bangladesh

1. Meghna Pulp and Paper Mills Ltd.

- **Type**: State-owned
- **Location**: Meghna ghat, Narayanganj , Dhaka Division
- **Established**: 2018

- **Overview**: A leading manufacturer of writing, printing, and tissue papers, serving both domestic and international markets .

2. Karnaphuli Paper Mills Ltd.

- **Type**: State-owned
- **Location**: Chandraghona, Chittagong Division
- **Established**: 1953
- **Overview**: The largest paper production facility in Bangladesh, operating as a subsidiary of the Bangladesh Chemical Industries Corporation . younusgroup.com+1Wikipedia+1Wikipedia+1Wikipedia+1

3. Bashundhara Paper Mills Ltd.

- **Type**: Private sector
- **Location**: Dhaka
- **Overview**: A leading manufacturer of writing, printing, and tissue papers, serving both domestic and international markets .

4. Magura Paper Mills Ltd.

- **Type**: Private sector
- **Location**: Narayanganj

- **Overview**: Specializes in producing kraft liner and fluting medium, essential for manufacturing corrugated cartons .maguragroup.com.bd

5. BCL Paper Mills Ltd.

- **Type**: Private sector
- **Location**: Thengamara, Bogura
- **Overview**: A 100% recycled paper mill producing media, quality, and white papers, with an operational Effluent Treatment Plant (ETP) . maguragroup.com.bd+4bpp-bd.com+4maguragroup.com.bd+4bclgroupbd.com

6. Younus Paper Mills Ltd.

- **Type**: Private sector
- **Location**: Rupgonj & Narayangonj
- **Overview**: Manufactures various types of paper including writing, newsprint, and coated paper, with an annual production capacity of 36,200 MT . Wikipedia+6younusgroup.com+6younusgroup.com+6younusgroup.com

7. Alif Pulp & Paper Mills Ltd.

- **Type**: Private sector
- **Location**: Gazipur
- **Overview**: Plans to operate a 50 Ton/day writing and printing paper mill, along with a 30 Ton/day tissue paper mill, with a focus on export-quality products . maguragroup.com.bdThe Financial Express+2younusgroup.com+2alifgroup.net+2alifgroup.net

8. North Bengal Paper Mills Ltd.

- **Type**: State-owned
- **Location**: Pabna District

- **Established**: 1975
- **Overview**: Initially a government-owned entity, it was closed in 2002 due to financial losses; efforts have been made to reopen or privatize the mill .bpp-bd.com+4younusgroup.com+4Wikipedia+4Wikipedia+1hakkanigroup.net+1

9. Khulna Hard Board Mills Ltd.

- **Type**: State-owned
- **Location**: Khulna
- **Established**: 1965

Overview: Produces hardboard using Sundari wood from the Sundarbans mangrove forest, operating und

10. Tanveer Paper Mills Ltd.

- **Type**: State-owned
- **Location**: Meghna ghat, Narayanganj , Dhaka Division
- **Established**: 2009

- **Overview**: A leading manufacturer of, Liner Paper Grade 01 & Liner Paper Grade 02 is available serving both domestic and international markets .

Chapter -04

Inventory Management Practices in Paper Industry

4.1 Introduction

The paper industry manages large volumes of raw materials like wood pulp, chemicals, and recycled paper, alongside bulky finished goods such as paper rolls, sheets, and packaging. Effective inventory management is vital for operational efficiency, cost control, and meeting market demands.

4.2 Types of Inventory in the Paper Industry

Inventory Type	Description
Raw Materials	Pulp (virgin or recycled), chemicals, starch, dyes, and water
Work-in-Progress	Semi-finished paper at various stages (pressed, semi-dried, uncut rolls)
Finished Goods	A4 sheets, tissue rolls, kraft paper, paperboard
Maintenance & Spares (MRO)	Machine parts, lubricants, belts, bearings
Packaging Materials	Shrink wraps, labels, cartons for finished goods

4.3 Inventory Planning

Inventory planning in the paper industry ensures that both raw materials and finished goods are managed efficiently, with minimal waste or disruption to production.

A. Demand Forecasting

- **Historical data analysis** and **seasonal trends** are essential to predict the demand for finished products, especially for high-demand seasons (e.g., back-to-school for paper products).
- **Collaborative forecasting** with customers helps paper manufacturers adjust production schedules accordingly.

B. Production Planning

- **Materials requirement planning (MRP)** is used to ensure that raw materials like pulp and chemicals are ordered in advance to match the production schedule.
- Paper mills use **Just-In-Time (JIT)** inventory systems for efficient material usage, reducing storage costs.

C. Safety Stock Management

- Safety stock levels for critical raw materials (such as **pulp**) and finished goods help mitigate disruptions in the supply chain.
- **Buffer stocks** are maintained to cover lead time fluctuations and unforeseen demand spikes.

D. Lead Time Considerations

- Paper mills must account for long **lead times** on imported raw materials, such as **imported pulp** or specialty chemicals.
- Internal **supply chain mapping** and collaboration with logistics partners help optimize lead time and reduce the risk of stockouts.

4.4 Inventory Classification

ABC Analysis is one of the most widely used methods for inventory classification. It divides inventory into three categories: A, B, and C, based on their **value**, **usage**, and **importance** to the production process.

1. **Category A: High-Value, Critical Items**

    - **Characteristics**: These are the most valuable or critical items, often representing a small portion of the total inventory but a large percentage of the total value.
    - **Examples in the Paper Industry**: Imported **pulp**, specialty chemicals, key machinery components.

- **Management**: These items require **tight control**, **frequent reviews**, and **just-in-time** (JIT) purchasing to avoid stockouts.

2. **Category B: Moderate-Value, Important Items**

    - **Characteristics**: Items in this category are of moderate value and have a significant impact on production but do not contribute as much to the overall cost structure.
    - **Examples in the Paper Industry**: **Packaging materials**, **local raw materials** (like starch), and **semi-finished products**.
    - **Management**: These items are managed with periodic stock checks and replenished at regular intervals.

3. **Category C: Low-Value, Non-Essential Items**

    - **Characteristics**: These items account for a large portion of the total inventory but a small percentage of the total value.
    - **Examples in the Paper Industry**: **MRO supplies**, **safety gear**, and **tools**.
    - **Management**: These items are **bulk purchased** and monitored less frequently. They are also more prone to overstocking.

4.1 Challenges in Inventory Management

- Supply Chain Disruptions
- **Demand Fluctuations and Seasonal Variability**
- **Inventory Overstocking and Storage Costs**
- **Quality Control and Damage**
- **Inaccurate Demand Forecasting**
- **Inadequate Technology and Data Management**
- Long Lead Times for Imported Raw Materials

- Labor and Inventory Handling Issues
- Regulatory Compliance and Environmental Concerns

4.6 Quality Management

Practices:

- QC labs in medium to large mills testing GSM, brightness, tear resistance, etc.
- Use of ISO 9001 and 14001 standards in export-oriented mills.
- Regular sampling during production.

Challenges:

- Inconsistent quality in recycled raw materials.
- Manual inspection in smaller units delays corrective action.

4.7 Procurement and Lead Time Management

Despite the strategies mentioned, paper mills face several challenges in procurement and lead time management:

- **Supply Chain Disruptions**: External factors such as natural disasters, pandemics (e.g., COVID-19), and geopolitical tensions can disrupt the supply chain, leading to significant delays in material procurement and delivery.
- **Global Dependency for Raw Materials**: As Bangladesh and many countries rely on **imported pulp**, **currency fluctuations**, and changes in **international trade policies** can significantly impact procurement lead times.
- **Port Congestion and Customs Delays**: Paper mills face delays at customs and ports, especially for imported raw materials like **pulp** and **chemicals**. **Customs clearance procedures** and **port congestion** can extend lead times and impact production schedules.
- **Demand Variability**: Seasonal fluctuations and changing customer preferences can complicate procurement and lead time management. Accurate demand forecasting is crucial but difficult to achieve in an unpredictable market.

4.8 Sourcing

- **Identify Requirements**

Define what products or services are needed (quantity, specs, delivery time).

- **Market Research**

Study supplier market, industry trends, and risks.

- **Supplier Identification & Prequalification**

Shortlist suppliers based on capabilities, experience, certifications.

- **Request for Proposal/Quotation (RFP/RFQ)**

Collect bids from selected suppliers.

- **Evaluation & Negotiation**

Compare bids on price, delivery, quality, service, and compliance.

- **Supplier Selection**

Choose the best-fit supplier based on defined criteria.

- **Contracting**

Set terms and sign agreements (price, lead times, penalties, SLAs).

- **Performance Monitoring**

Track supplier performance using KPIs and regular reviews.

4.9 Solutions to Warehousing and Storage

To address these issues, paper mills in Bangladesh and elsewhere are adopting various strategies to optimize warehousing and storage.

A. Improved Warehouse Design and Layout

- **Optimal Storage Systems**: Using **racking systems** (e.g., **pallet racking** or **shelving units**) and **stacking techniques** that maximize available space helps reduce congestion and improve accessibility. For example, **high-bay racking systems** can allow for taller storage, making more efficient use of vertical space.
- **Automated Warehousing**: Adoption of **automated material handling systems** like **conveyor belts**, **robotic pickers**, and **automated guided vehicles (AGVs)** helps in reducing the labor-intensive aspects of warehousing and increases handling speed and accuracy.

B. Environmental Control and Monitoring

- **Climate Control**: Installing **dehumidifiers** and **temperature-controlled storage areas** can help maintain optimal conditions for storing paper. In high-humidity areas like Bangladesh, investing in these technologies can reduce the risk of damage from excessive moisture and improve the overall quality of paper products.
- **Regular Monitoring**: Installing **humidity and temperature sensors** to monitor and control environmental conditions in the warehouse ensures that the paper products remain in good condition.

C. Inventory Management Software

- **ERP Systems**: Advanced **Enterprise Resource Planning (ERP)** systems and **Warehouse Management Systems (WMS)** can track inventory levels in real time, helping paper mills manage their stock more effectively and avoid overstocking or understocking.
- **Barcoding and RFID**: Using **barcode scanners** and **RFID technology** can automate the tracking of paper products in the warehouse, making it easier to locate, track, and manage stock. This reduces the risk of misplaced or lost inventory.

D. Proper Training and Safety Measures

- **Employee Training**: Warehousing staff should be regularly trained in the proper handling of paper products, including **lifting techniques**, **stacking protocols**, and **safety precautions** to reduce the risk of damage and injuries.
- **Safety Protocols**: Paper mills should implement strict safety guidelines for workers to prevent accidents when handling heavy machinery or paper products. This includes the use of **personal protective equipment (PPE)** like gloves, helmets, and safety shoes.

E. Sustainable Packaging Solutions

- **Eco-friendly Packaging**: Using **recyclable**, **biodegradable**, or **sustainable packaging materials** helps reduce the environmental impact of storage. Additionally, optimizing the use of packaging materials can help reduce costs and waste.

4.10 Labor and Inventory Handling

Labor and inventory handling are integral to the efficiency of the paper industry in Bangladesh. The industry faces significant challenges, including **labor shortages**, **health and safety risks**, **inventory mismanagement**, and **space constraints**. However, by investing in **training**, **technology**, **automation**, and **advanced inventory management systems**, paper mills in Bangladesh can improve productivity, reduce costs, and optimize their supply chains.

As demand for paper products continues to grow, addressing labor and inventory handling challenges will be essential for the industry's long-term success. By adopting modern practices and improving workforce skills, the paper industry can become more efficient, competitive, and resilient to external challenges.

Chapter – 05

Findings & Analysis

5.1 Findings and Analysis

1. High Dependency on Raw Materials

The paper industry is heavily reliant on raw materials such as wood pulp, recycled paper, and chemicals. Any fluctuation in supply or price significantly affects inventory planning and cost structures. Companies with strong supplier networks and diversified sourcing strategies tend to maintain better inventory stability.

Key Insight: Firms using long-term contracts and sustainable sourcing (e.g., FSC-certified pulp) manage costs and supply chain disruptions more effectively.

2. Imbalance Between Inventory and Demand

Many paper mills struggle with aligning production volumes to real-time market demand due to forecasting limitations. This results in either overproduction (leading to high storage costs) or stockouts (affecting delivery timelines).

Key Insight: Adoption of demand forecasting tools and ERP integration leads to improved responsiveness and reduced inventory holding.

3. Technology Adoption is Uneven

Larger firms have adopted ERP, WMS, RFID, and automation, improving their visibility and control over inventory. In contrast, smaller players still rely on manual or semi-digital systems, causing inefficiencies in stock tracking, waste management, and lead time control.

Key Insight: Digital transformation is a key differentiator in inventory efficiency.

4. Warehousing and Storage Remain a Bottleneck

Due to the bulky nature of paper products and sensitivity to environmental conditions (e.g., humidity, temperature), storage optimization remains a major challenge. Improper storage can lead to product degradation, shrinkage, or waste.

Key Insight: Climate-controlled facilities and proper FIFO/LIFO systems can significantly reduce losses.

5. Lead Time and Supplier Variability

Lead times for sourcing raw materials, especially from international suppliers, are often long and inconsistent. This adds a layer of complexity to inventory planning, particularly when demand is volatile.

Key Insight: Companies using safety stock buffers and local suppliers demonstrate more agility.

6. Labor and Handling Issues

Manual inventory handling leads to higher error rates and inefficiencies in many traditional mills. Automated material handling systems and employee training programs are limited in implementation, especially in developing regions.

Key Insight: Investment in workforce training and automation reduces damage, improves productivity, and enhances inventory accuracy.

7. Environmental and Regulatory Pressures

Governments and global consumers are pressuring the industry for eco-friendly practices. Inventory decisions now increasingly consider sustainable sourcing, recyclable inventory, and waste reduction, impacting material choices and stock levels.

Key Insight: Environmentally conscious inventory policies offer both compliance and reputational benefits.

Summary of Key Findings:

Area	Strengths	Challenges
Raw Materials	Sustainable sourcing, long-term contracts	Price volatility, long lead times
Technology	ERP/WMS in large firms	Manual systems in SMEs
Warehousing	High-density storage in modern setups	Climate sensitivity, space constraints
Labor	Skilled workforce in large firms	Handling inefficiencies in traditional mills
Forecasting	ERP-based demand planning	Limited forecasting in smaller firms

Chapter – 06

Recommendations & Conclusion

6.1 Recommendations

1. Modernize Technology and Equipment

- Upgrade outdated machinery to **enhance production efficiency** and reduce waste.
- Introduce **automation and digital controls** (e.g., ERP, IoT monitoring) for better process control and real-time data tracking.

2. Promote Sustainable and Eco-Friendly Practices

- Adopt **recycled pulp** and **sustainable forestry practices**.
- Use **environmentally friendly chemicals** and implement **wastewater treatment systems**.
- Comply with **local and global environmental regulations** (e.g., ISO 14001).

3. Diversify Product Offerings

- Shift focus from low-demand items (like traditional writing paper) to **high-demand sectors**:
    - **Tissue paper** (household, sanitary)
    - **Packaging paper** (corrugated boxes, kraft)
    - **Eco-friendly paper bags** and **biodegradable items**

4. Strengthen Supply Chain and Inventory Management

- Develop **local raw material sources** to reduce dependency on imports.
- Implement **just-in-time (JIT)** inventory practices and **digital inventory tracking** to optimize stock levels and reduce waste.

5. Enhance Export Capabilities

- Identify and target new export markets (Africa, Middle East, Southeast Asia).
- Improve product **quality certifications** to meet international standards.
- Partner with trade associations and government for **logistics and export incentives**.

6. Develop Human Resources

- Conduct regular **training and skill development** programs for operators and managers.
- Introduce **lean manufacturing practices** to build a quality- and efficiency-focused workforce.

7. Government & Policy Support

- Request policy reforms like:
    - **Reduced import duties** on raw materials
    - **Easier access to financing**
    - **Incentives for green technologies**
- Collaborate with government to improve **infrastructure and transport logistics**.

6.2 Conclusion

The paper industry is undergoing significant changes globally, and Bangladesh is at a critical juncture to capitalize on emerging trends. While digitalization has reduced the demand for traditional writing and printing paper, there is substantial growth potential in **tissue**, **packaging**, and **eco-friendly paper products**.

To stay competitive and sustainable, the industry must **embrace modern technology**, **diversify product lines**, and **commit to environmental responsibility**. With proper **government support**, **industry collaboration**, and **strategic investments**, Bangladesh's paper industry can evolve into a strong player in both local and international markets.

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