Thesis Report

on

''Sustainability in Supply Chain Management: Assessing the Trade-off between Economic Growth and Environmental Impact"

Submitted by:

Md. Mofazzal Hossain

ID: MSCM2301028009

Program: MBA in Supply Chain Management (MSCM)

Major: Supply Chain 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

MBA in Supply Chain Management

Sonargaon University (SU)

Date of Submission: January 07, 2025

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Letter of Transmittal

January 07, 2025
Mst. Marium Akter
Lecturer
Department of Business Administration
Faculty of Business
Sonargaon University (SU)

Subject: Submission of Thesis Report on "Sustainability in Supply Chain Management: Assessing the Trade-off between Economic Growth and Environmental Impact".

Dear Madam,
With most respectfully to state that I am pleased to submit my thesis report titled **"Sustainability in Supply Chain Management: Assessing the Trade-off between Economic Growth and Environmental Impact"**. This report is an essential part of my MSCM degree requirements, and I had the privilege of completing my Thesis under your guidance.

This report reflects the current Supply Chain Practice, Economic Growth and Environmental Impact, the practices are essential for organizations in our country. I have made an effort to include relevant details while keeping the report concise.

I therefore, hope that the report will provide necessary information about SCM, Inventory Management, Cost management and Green SCM Practice of IPI PLC and XCL. I will be available at any time convenient for further clarification on the report.

Yours Sincerely

Md. Mofazzal Hossain
ID: MSCM2301028009
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Declaration of Student

I am **Md. Mofazzal Hossain**, a student in the MBA in Supply Chain Management program with **ID: MSCM2301028009** at Sonargaon University. I want to sincerely state that the report titled **''Sustainability in Supply Chain Management: Assessing the Trade-off between Economic Growth and Environmental Impact"** 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. Mofazzal Hossain
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Letter of Authorization

I hereby confirm that the project report titled **''Sustainability in Supply Chain Management: Assessing the Trade-off between Economic Growth and Environmental Impact"** is a genuine effort by **Md. Mofazzal Hossain**. 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.

_____

Mst. Marium Akter
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Acknowledgment

This dissertation would not have been possible without the support and guidance of many individuals. I would like to extend my gratitude for the invaluable assistance and sincere cooperation provided by various individuals in the preparation of this report. It's impossible to adequately thank all the wonderful people who directly or indirectly contributed to the successful completion of this report. I am deeply appreciative of their kind collaboration and support.

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Lastly, I am deeply appreciative of my academic institution, Sonargaon University (SU), and the resources provided, which created an environment conducive to learning and exploration. This dissertation is not just the culmination of my academic efforts but a reflection of the collective support and collaboration I have received along the way.

Executive Summary

The modern global economy demands a delicate balance between economic growth and environmental sustainability, particularly within supply chain management (SCM). This study, titled "Sustainability in Supply Chain Management: Assessing the Trade-off between Economic Growth and Environmental Impact," investigates this critical intersection, shedding light on the challenges and opportunities faced by organizations striving to align profitability with environmental responsibility.

The research explores how supply chain decisions impact both economic growth and environmental health, using case studies, industry data, and stakeholder insights to provide a nuanced perspective on this pressing issue. Central to the study is the recognition that while sustainability initiatives can enhance long-term competitiveness and resilience, they often involve significant short-term costs and operational complexities, creating a trade-off that businesses must navigate.

Key findings reveal that:

- Companies adopting sustainable practices often experience initial financial strain but gain long-term benefits such as enhanced brand reputation, operational efficiencies, and regulatory compliance.
- Major barriers to sustainable supply chains include high costs, lack of technological integration, and resistance to change within organizations.
- Emerging technologies like block chain, artificial intelligence, and green logistics present untapped potential to bridge the gap between economic and environmental objectives.

The study also identifies actionable strategies for companies to overcome these challenges, such as investing in renewable energy, adopting circular economy principles, and fostering collaborative partnerships across the supply chain. It highlights successful examples where firms have balanced profitability with sustainability, offering inspiration and a roadmap for others.

LIST OF ACRONYMS

SCM	Supply Chain Management
SSCM	Sustainable supply chain management
SDGs	Sustainable Development Goals
TBL	Triple Bottom Line
CE	Circular Economy
SMEs	Small- to Medium-Sized Enterprises
AI	Artificial Intelligence
IoT	Internet of Things
IPI	IBN SINA Pharmaceutical
XCL	Xclusive CAN Limited
PLC	Public Limited Company
ERP	Entrepreneur Resources Planning
ETP	Effluent Treatment Plant
YTD	Year to date
MRO	Maintenance, Repair & Operation

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Chapter: 01
Introduction

1.1 Introduction

In an era of increasing global connectivity and rapid industrialization, supply chain management (SCM) has become a cornerstone of modern business operations. Companies across the globe depend on efficient and scalable supply chains to drive economic growth, reduce costs, and meet evolving consumer demands. However, the same supply chains that fuel economic progress are often major contributors to environmental degradation, generating significant carbon emissions, depleting natural resources, and creating waste. This duality underscores a pressing dilemma: how can businesses sustain economic growth while minimizing their environmental footprint.

This study, titled "Sustainability in Supply Chain Management: Assessing the Trade-Off between Economic Growth and Environmental Impact," delves into this critical issue, exploring the complex relationship between profitability and sustainability in supply chains. As businesses face mounting pressure from regulators, consumers, and stakeholders to adopt sustainable practices, the need to reconcile these competing priorities has never been more urgent.

While sustainability initiatives in SCM, such as green logistics, circular economy models, and renewable energy adoption offer the promise of long-term benefits, they often come with short-term financial and operational challenges. These include higher initial investments, shifts in supplier dynamics, and disruptions to traditional practices. Consequently, many organizations struggle to find the balance between achieving financial objectives and meeting environmental and social expectations.

This dissertation aims to bridge this gap by investigating the trade-offs involved in pursuing sustainable supply chain practices. It seeks to answer pivotal questions, such as:

- What are the key challenges companies face when implementing sustainability in their supply chains?
- How do sustainable practices impact economic growth and operational efficiency?
- What strategies can businesses adopt to align environmental goals with economic performance?

By integrating insights from academic literature, real-world case studies, and empirical analysis, this study provides a comprehensive exploration of sustainability in SCM. It highlights both the barriers and opportunities businesses encounter on their journey toward sustainable practices and offers actionable recommendations for achieving a harmonious balance.

1.2 Background of the study

In today's globalization world, supply chains serve as the backbone of economic growth, enabling the efficient production, distribution, and consumption of goods and services. However, this progress often comes at a significant environmental cost. Rapid industrialization, resource exploitation, and global logistics have led to increased carbon emissions, deforestation, and waste generation, raising questions about the long-term sustainability of traditional supply chain models.

As stakeholders including governments, consumers, and investors demand greater accountability, businesses are under pressure to adopt sustainable practices in their supply chains. Sustainable supply chain management (SSCM) integrates environmental, social, and economic considerations into supply chain operations to minimize negative impacts while maximizing value for stakeholders. While these efforts align with global calls for sustainability, such as the United Nations Sustainable Development Goals (SDGs), they often introduce complexities and trade-offs.

A critical challenge is balancing the immediate financial costs of sustainable practices with their long-term economic benefits. For instance, investments in renewable energy, waste reduction, or ethical sourcing can strain short-term profitability, creating resistance from stakeholders focused on quarterly results. At the same time, failure to address sustainability risks can harm a company's reputation, invite regulatory penalties, and diminish access to eco-conscious markets.

This dynamic tension underscores the importance of exploring the trade-off between economic growth and environmental impact within supply chains. As companies strive to remain competitive in a global market, understanding how to align profitability with sustainability is not just a corporate imperative but also a societal necessity.

This study examines the complexities of this trade-off, aiming to identify strategies that enable companies to achieve both economic growth and environmental sustainability.

1.3 Scope of the Study

This study focuses on evaluating the trade-offs between economic growth and environmental sustainability within supply chain management (SCM). It examines how organizations can balance profitability with environmental stewardship by analyzing key challenges, barriers, and opportunities in adopting sustainable practices. The research covers

diverse industries, highlighting best practices, emerging technologies, and regulatory frameworks that influence sustainable supply chains. The scope includes identifying actionable strategies for overcoming barriers and fostering resilience, making this study relevant for policymakers, industry leaders, and academics aiming to achieve sustainable economic growth.

1.4 The Objective of the Study

Broad Objective:

The objective of this study is to evaluate the trade-offs between economic growth and environmental impact in supply chain management, identifying challenges, opportunities, and strategies for organizations to achieve a balance between profitability and sustainability.

Specific Objectives:

The Specific Objective is to prepare & submit a report on the topic "Sustainability in Supply Chain Management: Assessing the Trade-off between Economic Growth and Environmental Impact".

- Evaluate the Challenges in Achieving Sustainability.
- Analyze the Economic Implications of Sustainability Initiatives.
- Explore Best Practices for Balancing Economic and Environmental Goals.
- Propose Actionable Recommendations for Sustainable SCM.

1.5 Research Methodology

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 Source:

- Face to face conversation with industry experts and supply chain managers.
- Direction conversation with the officers and staff
- Personal Investigation with the officers and staff
- Study of different files of different section of the Company
- Practical desk works

Secondary Sources:

- Books, manuals,
- Journals,
- Official publications,
- Annual Report of the Organization
- Primary data
- Various reporting data & printing material of the Organization
- Different articles
- Web sites,
- Scholarly articles,

1.6 Limitations of the Study

This study acknowledges several limitations that may influence the depth and generalizability of its findings:

- Scope of Data: The research focuses on specific industries and geographic regions, which may limit the applicability of the findings to other sectors or global contexts with different economic and environmental dynamics.
- Complexity of Trade-Offs: The trade-off between economic growth and environmental impact is influenced by numerous variables, including market conditions, regulatory frameworks, and technological advancements. This complexity may not be fully captured within the scope of the study.
- Reliance on Secondary Data: In cases where secondary data from industry reports or sustainability disclosures is used, there is a risk of incomplete or biased reporting by organizations.
- Qualitative Bias: If qualitative methods are used (e.g., interviews or case studies), there may be subjective bias in interpreting the perspectives of participants or selecting specific case examples.
- Time Constraints: Rapid changes in sustainability practices, technology, and regulatory environments may render some findings less relevant over time, limiting the long-term applicability of the study.
- These limitations highlight the challenges in conducting comprehensive research on this topic but also provide opportunities for further studies to address these gaps.

Chapter -02
Literature Review

2.1 Theoretical Framework

Sustainability in supply chain management (SCM) is grounded in several theoretical frameworks that guide its implementation. One such framework is the Triple Bottom Line (TBL), which emphasizes the simultaneous pursuit of economic, environmental, and social goals (Elkington, 1998). The TBL approach is widely recognized as a cornerstone for understanding how organizations can integrate sustainability into their operations while maintaining profitability.

Another critical perspective is the Circular Economy (CE) model, which focuses on designing closed-loop systems to minimize waste and maximize resource efficiency (Ellen MacArthur Foundation, 2013). Theories of stakeholder engagement and resource dependency also provide insights into how businesses navigate external pressures and dependencies when adopting sustainable practices.

2.2 Economic Growth in Supply Chain Management

Supply chains are pivotal in driving economic growth, particularly through globalization, innovation, and cost efficiency. Studies by Christopher (2016) highlight how optimizing supply chain processes can lead to significant economic gains for organizations, such as improved production efficiency, reduced operational costs, and enhanced market competitiveness. However, these traditional economic-focused supply chains often prioritize cost minimization and rapid delivery over sustainability considerations. Porter and van der Linde (1995) argue that incorporating environmental sustainability can spur innovation, offering opportunities for economic growth while addressing ecological challenges. Despite this, economic growth driven by supply chains is often criticized for contributing to environmental degradation, such as deforestation, pollution, and overconsumption of natural resources (Chen & Paulraj, 2004).

2.3 Environmental Sustainability in Supply Chains:

Environmental sustainability in SCM involves practices that reduce negative environmental impacts while maintaining operational efficiency. Common strategies include green procurement, energy-efficient logistics, and the use of renewable materials. Carter and Rogers (2008) emphasize that sustainable supply chains not only contribute to environmental protection but also build long-term resilience against resource scarcity and regulatory risks. Studies reveal that businesses adopting sustainable practices, such as carbon footprint reduction and waste minimization, often

experience challenges related to cost implications and supply chain complexity (Srivastava, 2007). Despite these challenges, companies like Patagonia and Unilever have demonstrated that sustainable supply chains can yield competitive advantages through improved brand reputation and customer loyalty.

2.4 Trade-Offs between Economic Growth and Sustainability:

Balancing economic growth with environmental sustainability presents significant challenges. On one hand, pursuing economic growth often involves practices that exacerbate environmental degradation, such as resource-intensive manufacturing and long-distance transportation (Seuring & Müller, 2008). On the other hand, investing in sustainable practices can lead to increased operational costs and reduced short-term profitability (Zhu et al., 2008). However, several studies suggest that these trade-offs are not always zero-sum. For example, Klassen and Whybark (1999) found that integrating sustainability into supply chains can drive innovation, resulting in cost savings and competitive advantages over time. The trade-off is further complicated by external pressures, including government regulations, consumer expectations, and market dynamics.

2.5 Barriers to Achieving Sustainable Supply Chains:

Organizations face multiple barriers when attempting to implement sustainability in their supply chains. High initial investment costs and the lack of financial incentives often deter businesses from adopting environmentally friendly practices (Pagell & Wu, 2009). Additionally, fragmented supply chains and poor collaboration among stakeholders impede the seamless implementation of sustainable initiatives. Research by Walker et al. (2008) highlights the complexity of aligning sustainability goals across global supply chains, where cultural, economic, and regulatory differences exist. Furthermore, limited access to advanced technologies and data analytics tools hinders the effective monitoring and measurement of sustainability metrics.

2.6 Best Practices in Sustainable Supply Chain Management:

Despite the challenges, numerous organizations have successfully implemented sustainable supply chain practices. Companies like IKEA and Tesla have leveraged renewable energy, efficient logistics, and supplier partnerships to reduce their environmental footprint while maintaining economic performance. A study by Gold et al. (2010) identifies critical best practices, including supplier collaboration, adoption of life cycle assessment (LCA) tools, and investment in green technologies. Additionally, the role of emerging technologies such as blockchain, Artificial

Intelligence (AI), and IoT in enhancing transparency and efficiency in supply chains cannot be overstated (Saberi et al., 2019). These technologies enable real-time tracking of sustainability metrics and foster accountability among stakeholders.

2.7 Best Practices in Sustainable Supply Chain Management:

While the literature provides valuable insights into sustainable supply chain management, significant gaps remain. There is limited empirical research on the long-term economic benefits of sustainable practices, particularly in developing economies. Furthermore, the role of advanced technologies in mitigating the trade- offs between economic growth and environmental impact requires deeper exploration. Existing studies also lack comprehensive frameworks for assessing and balancing these trade-offs across diverse industries and geographic regions. Addressing these gaps will be critical for advancing both the theory and practice of sustainability in SCM.

Chapter -03

Organizational Overview

3.1 Introduction

The study titled "Sustainability in Supply Chain Management: Assessing the Trade-Off between Economic Growth and Environmental Impact" examines the critical and increasingly relevant intersection of environmental sustainability and economic performance within supply chain operations. Supply chains play a pivotal role in driving economic growth; however, their activities often have significant environmental consequences, including resource depletion, greenhouse gas emissions, and waste generation.

Pharmaceutical industry in Bangladesh plays a vital role in supporting both the industrial and health care sectors and earns huge foreign exchange as well. As a significant economic contributor to the country's manufacturing era, this Industry manufactures live saving medicines for health care practitioners as well as consumers.

In this study for the organizational over view two renown manufacturing company –one is pharmaceutical& another is packaging (Plastic) have been selected focusing on understanding the structure, operations, and supply chain practices of a specific Pharmaceutical company in Bangladesh, here referred to as "The IBN SINA Pharmaceutical Industry PLC (IPI) & Xclusive Can Limited (XCL)" for the purpose of this study. Pharmaceuticals and packaging industries as integrally entangled to each other for their growth and development.

Both the IPI & XCL operates in a high competitive and dynamic market era, requiring efficient management, best quality of raw materials, inventory, and production schedules to meet fulfillment of increasing demands. The Pharmaceutical Industry manufactures live saving drugs by procuring & using active pharmaceutical raw (primary) and packaging materials i.e plastic items (secondary).

This research seeks to explore how organizations can balance the pursuit of profitability and growth with their responsibility to minimize environmental harm. It delves into the challenges businesses face when implementing sustainable practices, including financial constraints, operational inefficiencies, and regulatory pressures. At the same time, it highlights opportunities for innovation, such as the adoption of green technologies, circular economy principles, and collaborative partnerships.

To avoid the production related complexities and maintaining the marketing channel uninterrupted associated with production and storage, the IPI & XCL have developed its 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, Mission, Vision, its organizational structure, inventory strategy& practice and its challenges etc. This background is crucial for understanding the context in which IPI`s& XCL`s inventory management practices and their impact on its supply chain performance. Ultimately, this study contributes to the ongoing discourse on sustainable supply chains by offering actionable recommendations for businesses and policymakers. It underscores the need for strategic decision-making and innovation to create supply chains that are resilient, profitable, and environmentally responsible, ensuring a sustainable future for all stakeholders.

3.2 Vision (IPI PLC)

The IBN SINA Pharmaceutical Industry PLC's vision is to become a premier specialty pharmaceutical company, with a balanced focus in complementary therapeutic areas. Our primary responsibility lies towards the people of Bangladesh and ultimate responsibility towards humanity at large.

Vision (XCL)

To be leader in plastic and metal packaging sector of the country & most competitive in respect to product quality & support service for the customers.

3.3 Mission (IPI PLC)

A publicly listed company working for the nation as a whole with pertinacious incitement and firm determination to ensure the quality and ethical standing attributing the sustainable growth and development to serve mankind.

Mission (XCL)

To remain excellent and innovative in plastic and metal packaging industries for maximum customer satisfaction and cater evolving needs.

3.4 Quality Policy

The IBN SINA Pharmaceutical Industry PLC is committed to –

- Serve humanity by manufacturing and providing quality medicines and services to its customers.
- Serve humanity by manufacturing and providing quality medicines and services to its customers.
- Maintaining ethical standards in all its functions following the requirements of cGMP and regulatory authorities.
- Marching onward for sustainable growth and continual improvement.

The Quality policy of Xclusive Cans Limited is –

Quality is our priority. As a leading company we, know how much our clients are concerned about quality. Starting from our employees to our campus and the technologies we use, we ensure world class quality at every single step. That`s why we never lack client satisfaction. We have a dedicated team that always twice check containers and packaging before going to clients. Our researchers research the market and make change to our containers accordingly, so that we can hold our global reputation and clients. And, really the way we work is always loved by our clients.

3.5 Core Operation

Core Operation (IPI PLC)

The Core operation of IPI PLC is being operated under four (4) heads:

- Manufacturing
- Marketing
- Global Operation &
- Sales & Distribution.

Core Operation (XCL)

The Core operation of XCL is being operated under two (2) heads:

- Manufacturing Plastic & Metallic Containers &
- Sales& Marketing

3.6 Supply Chain Practice (IPI)

The IPI is one of the leading pharmaceutical industries in Bangladesh "It Practices e-procurement to order raw materials from vendors by email, uses blanket purchase orders to forecast demand and order materials in advance, and selects suppliers through competitive bidding. The company outsources transportation and buys some items rather than producing them in-house to reduce costs. It sources raw materials globally from countries like China and India to take advantage of lower costs and better quality."

- E-Procurement: IPI sends raw material requirements to vendors via email, which streamlines the procurement process and reduces costs.
- Open-End Purchase Orders: The company forecasts market demand and issues purchase orders accordingly, allowing for flexibility in procurement.
- Stock-less Buying/System Contracting: IPI uses system contracting, selecting suppliers based on competitive pricing and quality, ensuring they get the best value.
- Outsourcing Transportation: The Company outsources transportation needs to third-party agencies, ensuring efficient logistics from supply base to warehouse and depots.
- Integration Strategies: IPI employs both backward and forward integration to manage suppliers, manufacturing, and distribution effectively.
- Buying vs. Making: The Company opts to buy MRO and office supplies instead of manufacturing them, achieving significant cost savings.
- Multiple Suppliers: IPI maintains relationships with multiple suppliers to enhance capacity and minimize supply chain risks.
- Centralized Manufacturing: The Company operates a centralized manufacturing warehouse in Gazipur, which allows for efficient production based on demand.
- Global Sourcing: IPI imports a significant portion of its raw materials from international suppliers, focusing on cost-effectiveness and quality.
- Supplier Development: The Company actively works on developing suppliers through strategic alignment and performance monitoring to ensure quality and reliability.
- Supplier Relationship Management: IPI follows a transactional approach to supplier relationships, often using short-term contracts to maintain competitive pricing

3.7 Commitment of Sustainability

The IPI is committed to environmentally sustainable practices throughout its supply chain. This includes purify industrial waste & reuse, reducing waste, release waste that is not harmful to environment and minimizing energy consumption in production. By adopting sustainable technology& practices the IPI not only reduces its environmental impact but also aligns with global standards, enhancing its reputation within both local and international markets.

The XCL Ltd has adopted a system by international professionals which prevents all kinds of potential harm to environment. The production unit at Mazukhan, Gazipur is fully guided by the echo system. There exists a waste disposal system that reuses plastics, chemicals, and other wastes with efficiency. Unlike most of the companies that destroy the surrounding nature, they are too much concerned about making the proper use of their technologies to minimize the chance of damaging nature. The factory is full of procedures, tools, and employees that follow the rule of cleanliness.

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Chapter -04

Sustainability in Supply Chain Management: Assessing the Trade-off between Economic Growth and Environmental Impact

4.1 Introduction

Sustainable supply chain management is the practice of integrating environmental, social and financial considerations into the sourcing, production and distribution of goods and services. The practice involves managing the entire supply chain, from raw materials to final disposal, with sustainability in mind, including goals such as reducing greenhouse gas emissions, improving working conditions and adopting eco-friendly practices. Sustainable supply chain management aims to minimize any negative impacts of business operations on the environment and society while ensuring efficiency and reliability.

4.2 Objective of the Analysis

The main objectives of this analysis are to:

- Asses the current practice of IPI & XCL inventory management procedure
- Evaluate the impact of inventory practices in economic growth
- Evaluate the impact of inventory practices in environment
- Assess the inventory gap from standard practices in SCM

4.3 Inventory Management Procedure

An efficient inventory management process should cover: Planning & forecasting, purchasing & ordering, receiving, storing & packing, inventory tracking and lastly order fulfillment. Inventory is at the core of any successful business, ensuring an appropriate balance between supply and demand.

Inventory Management Procedure of IPI

The IBN SINA Pharmaceutical Industry Limited, a leading pharmaceutical company in Bangladesh, employs a structured approach to inventory management to ensure efficient operations and product availability.

Inventory Management Committee

The company has established an Inventory Management Committee responsible for overseeing inventory-related activities. This committee ensures that inventory levels are optimized to meet production and distribution needs while minimizing holding costs.

Cash Conversion Cycle (CCC)

The Cash Conversion Cycle is a key performance indicator that reflects the efficiency of a company's inventory management. A shorter CCC indicates quicker conversion of inventory into sales and cash. For the fiscal year 2023-2024, IBN SINA Pharmaceutical reported a CCC of 4 days, demonstrating effective inventory turnover and cash flow management.

Technological Integration

While specific details about the company's technological tools are not publicly disclosed, it is common for pharmaceutical companies to utilize Enterprise Resource Planning (ERP) systems and other software solutions to monitor inventory levels, forecast demand, and manage supply chain logistics.

Quality Assurance

Maintaining the quality and safety of pharmaceutical products is paramount. IBN SINA Pharmaceutical likely adheres to Good Manufacturing Practices (GMP) and regulatory standards to ensure that inventory management processes do not compromise product integrity.

In summary, IBN SINA Pharmaceutical's inventory management strategy involves a dedicated committee, monitoring of the Cash Conversion Cycle, and adherence to quality standards to maintain operational efficiency and product availability.

Inventory Management procedure of XCL

Xclusive CAN Limited, a plastic container manufacturer in Bangladesh, has been operating since 1992, focusing on delivering high-quality plastic containers.

XCL is a diversified conglomerate, has implemented robust inventory management procedures to enhance operational efficiency and productivity. A significant milestone in this endeavor was the implementation of the SAP Enterprise Resource Planning (ERP) system. This system has been instrumental in achieving better inventory management, increased productivity, significant cost savings, higher operational efficiency, and improved customer service in a sustainable manner.

The SAP ERP system integrates various business processes, providing real-time data and analytics that facilitate informed decision-making. This integration enables XCL to maintain optimal

inventory levels, reduce holding costs, and respond swiftly to market demands. Additionally, the system supports the company commitment to minimizing process wastage and reducing production errors to zero, aligning with their focus on continuous improvement and customer satisfaction.

While specific details about the inventory management procedures for their inverter products are not publicly available, it is reasonable to infer that the comprehensive ERP system encompasses all product lines, including inverters. This system likely aids in demand forecasting, procurement planning, and inventory optimization for inverters, ensuring that the supply chain operates efficiently and customer demands are met promptly.

In summary, XCL adoption of the SAP ERP system reflects their commitment to leveraging advanced technology for effective inventory management across all their product lines, contributing to overall operational excellence.

Common Inventory Management Practices in Manufacturing

1. Inventory Planning and Management:

- Demand Forecasting: Accurately predicting customer demand to maintain optimal inventory levels.
- Stock Monitoring: Regularly tracking stock levels to prevent overstocking or stockouts.
- Timely Reordering: Placing orders for materials or products at appropriate times to ensure continuous production and supply.
- These practices help in maintaining the balance between supply and demand, reducing holding costs, and improving customer satisfaction.

2. Inventory Control Techniques:

- Economic Order Quantity (EOQ): Determining the optimal order quantity that minimizes total inventory costs, including ordering and holding costs.
- Just-In-Time (JIT): Receiving goods only as they are needed in the production process, reducing inventory holding costs.
- ABC Analysis: Categorizing inventory into three categories (A, B, and C) based on importance and value, allowing for prioritized management.

- Implementing these techniques can lead to more efficient inventory management by focusing resources on the most critical items and reducing waste.

3. Inventory Control Systems:

- Perpetual Inventory System: Continuously updating inventory records to reflect real-time stock levels.
- Periodic Inventory System: Updating inventory records at specific intervals, such as weekly or monthly.
- Proper procedures in the physical control of inventory are necessary for accurate materials planning.
- Inventory Capacity Management:
- Balancing production planning with inventory capacity to avoid overproduction and underutilization of storage space.
- Allowing for controlled stock outs when necessary to manage limited inventory capacity effectively.
- This approach ensures that production quantities align with storage capabilities, optimizing resource utilization.

4.4 Inventory Impact on Economic Growth

Inventory plays a crucial role in influencing economic growth, as it serves as a bridge between production and consumption. Changes in inventory levels directly impact a country's economic performance and are reflected in key macroeconomic indicators like Gross Domestic Product (GDP).

From its established in 1983, The IBN SINA Pharmaceutical Industry has been practicing good inventory management practice and currently it possessed the national position of 11th in the pharmaceutical market era. In the last five the IPI achieved average 24% market growth and make doubled its market size. Where the year to year market growth of pharmaceutical industry is not more than 15%. It became possible by the cumulative approach by Inventory, production and marketing department.

On the other hand the XCL is a multinational company started it operation in Bangladesh in 1992 AD mainly manufacturing plastic container for supporting packaging of food, medicine and

Chemical Company and Metal container for beverage companies. It possesses the leading company in this era. Annual sales volume of XCL is about more than one thousand core followed by YTD 5.4% growth for the last five years where the national YTD average growth 6.2% for the last five years.

4.5 Inventory Impact on Environment

The IPI Practices e-procurement to order its raw materials from vendors by email, uses blanket purchase orders to forecast demand and order materials in advance, and selects suppliers through competitive bidding. The IPI adopted ERP software for paperless management of Procurement system and also other department as well. This paperless system is ecofriendly and not hampered nature. At the same time the IPI has been managing its production waste materials by adopting ETP system. These ETP systems purify industrial waste automatically, releases non harmful industrial residue to environment and reduces environmental pollution.

The XCL has been shifted towards green policy for its production unit at Mazukhan, Tongi, Gazipur. As a part of inventory management XCL has designed a environment friendly system by international professionals which prevents all kinds of harms to nature. The factory fully run guided by ecosystem. The XCL has its own waste disposal system that reduces plastics, chemicals, and other wastes with full efficiency. Unlike most of the companies that destroy the surrounding nature, the XCL are way too much concerned about making the proper use of their technologies to minimize the chance of damaging nature. ECL factory is full of procedures, tools and employees follow the rule of cleanliness.

5.6 Inventory Gap from Standard Inventory procedures of IBN SINA Pharmaceutical

To identify the inventory gap between IPI's supply chain practices and the standard inventory procedures of IBN SINA Pharmaceutical, we need to consider what standard inventory procedures typically involve. These might include practices such as safety stock maintenance, lean inventory, just-in-time (JIT) systems, proper inventory categorization (e.g., ABC analysis), and robust demand forecasting.

Key Inventory Gaps between IPI and Standard Practices:

1. Demand Forecasting and Inventory Accuracy:

- **IPI:** Relies on blanket purchase orders and forecasts demand in advance but may lack real-time inventory management and demand adjustments.
- **Standard Procedures:** IBN SINA Pharmaceutical likely emphasizes real-time data analytics, inventory tracking systems, and advanced demand forecasting tools to minimize overstock and under stock situations.
- **Gap:** IPI may face a lag in demand-supply synchronization, leading to higher carrying costs or stock outs.

2. Stock-less Buying vs. Safety Stock:

- **IPI:** Relies heavily on system contracting and just-in-time procurement, which reduces holding costs but may increase the risk of disruptions.
- **Standard Procedures**: IBN SINA Pharmaceutical may maintain safety stock levels to ensure uninterrupted production in case of supplier delays.
- **Gap:** IPI's limited safety stock could result in production delays during unforeseen supply chain disruptions.

3. Supplier Relationship Management:

- **IPI:** Uses a transactional approach with short-term contracts, prioritizing competitive pricing over long-term stability.
- **Standard Procedures:** IBN SINA Pharmaceutical might adopt a more collaborative approach, fostering long-term supplier relationships to ensure reliability and consistent supply.
- **Gap:** IPI might face supplier reliability issues, leading to irregular inventory replenishment.

4. Centralized Manufacturing and Warehousing:

- **IPI:** Operates centralized manufacturing and warehousing, which might create bottlenecks or delays in inventory availability across multiple regions.

- **Standard Procedures:** IBN SINA Pharmaceutical may use decentralized or strategically located warehouses to optimize inventory distribution.
- **Gap**: IPI could experience higher lead times and regional stockouts compared to IBN SINA Pharmaceutical's potentially more agile setup.

5. Global Sourcing and Lead Time:

- **IPI**: Sources materials globally, which may lead to longer lead times and increased exposure to geopolitical or logistical risks.
- **Standard Procedures:** IBN SINA Pharmaceutical might balance global sourcing with local procurement to reduce lead times and risk.
- **Gap:** IPI's dependency on global suppliers might result in inventory shortages during disruptions.

6. Technology Integration:

- **IPI:** Practices e-procurement but may lack advanced inventory management systems (e.g., ERP or AI-based solutions).
- **Standard Procedures**: IBN SINA Pharmaceutical may use sophisticated inventory management software to monitor, track, and optimize inventory.
- **Gap:** IPI might not have the technological edge for real-time visibility and efficient inventory turnover.

7. Supplier Development and Risk Mitigation:

- **IPI**: Focuses on supplier performance monitoring but might lack contingency plans for critical supplier failures.
- **Standard Procedures:** IBN SINA Pharmaceutical might have robust risk management frameworks, including dual sourcing or backup suppliers.
- **Gap**: IPI could face supply chain disruptions due to insufficient supplier risk mitigation.

Chapter – 05
Findings and Analysis

5.1 Findings and Analysis

Interprets the findings of this study, highlighting their implications for the balance between economic growth and environmental sustainability in supply chain management. It integrates insights from the research data with the existing literature to provide a comprehensive analysis of the trade-offs, challenges, and opportunities.

- Financial Constraints: High upfront costs deter many companies from adopting sustainable practices, especially small- to medium-sized enterprises (SMEs).
- Lack of Technology and Expertise: Limited access to advanced technologies and expertise hampers the ability of companies to implement efficient green solutions.
- Regulatory Inconsistencies: Varied and evolving environmental regulations across regions create uncertainty and compliance challenges for global supply chains.
- Manufacturing: Struggles with high costs of green technology but has opportunities to reduce waste through circular economy practices.
- Retail: Faces consumer demand for transparency and sustainable products, driving the need for ethical sourcing and green logistics.
- Technology: Leverages innovations like AI and blockchain to enhance supply chain efficiency and sustainability.
- Emerging technologies such as blockchain, artificial intelligence, and IoT offer transformative potential for sustainable supply chain management.
- Blockchain, for instance, enhances transparency by providing immutable records of product origins and environmental impacts.
- Similarly, AI optimizes route planning and inventory management, reducing waste and emissions.
- The findings reveal a complex interplay between the economic and environmental dimensions of supply chain management. While sustainability initiatives, such as adopting renewable energy or reducing waste, often lead to long-term cost savings and operational efficiencies
- This trade-off is particularly pronounced in resource-intensive industries like manufacturing, where transitioning to greener practices involves significant capital investment.

- Governments and consumers play a pivotal role in shaping supply chain sustainability.
- Regulatory frameworks mandating emissions reductions and waste management compel organizations to adopt greener practices.
- Simultaneously, consumer demand for eco-friendly products pressures companies to ensure sustainability across their supply chains.
- The study highlights that sustainability in supply chain management is not a static goal but an evolving challenge influenced by technological advancements, regulatory changes, and shifting consumer expectations.
- As sustainability becomes a central component of business strategy, organizations must remain agile and proactive in addressing emerging challenges while seizing new opportunities for growth and innovation.

Chapter – 06
Recommendations and Conclusion

6.1 Recommendations

Based on the findings of this study, the following recommendations are proposed to address the trade-offs between economic growth and environmental impact in supply chain management:

Develop Long-Term Strategies for Sustainability

Organizations should focus on long-term sustainability goals rather than short-term profitability. This includes investing in green technologies, renewable energy, and sustainable materials that can reduce environmental impact while improving operational efficiencies over time.

Implement Circular Economy Practices

Adopting circular economy principles, such as recycling, reusing, and re- manufacturing materials, can significantly reduce waste and resource consumption, offering both economic and environmental benefits.

Leverage Technology for Efficiency and Transparency

Utilize advanced technologies like blockchain for supply chain transparency, artificial intelligence for predictive analytics, and IoT for real-time monitoring to optimize operations and reduce environmental impact.

Collaborate Across the Supply Chain

Foster collaboration with suppliers, partners, and stakeholders to share resources, align sustainability goals, and ensure the adoption of green practices throughout the supply chain network

Engage and Educate Stakeholders

Companies should actively engage employees, suppliers, and customers in sustainability initiatives through training programs, awareness campaigns, and partnerships that emphasize the importance of sustainable supply chain management.

Advocate for Consistent Policies and Regulations

Advocate for consistent and clear environmental regulations at local, national, and international levels to reduce uncertainty and promote uniform adoption of sustainable practices across supply chains.

Measure and Monitor Sustainability Performance

Establish key performance indicators (KPIs) for tracking environmental and economic outcomes, such as carbon emissions, resource utilization, and cost savings, to assess the impact of sustainability initiatives and identify areas for improvement.

6.2 Conclusion

This study explores the critical balance between economic growth and environmental sustainability in supply chain management, highlighting the challenges, trade-offs, and opportunities inherent in this dynamic field. The findings indicate that while sustainability initiatives can impose short-term financial and operational constraints, they often yield long-term economic benefits and competitive advantages.

Key challenges identified include financial constraints, lack of access to advanced technologies, and resistance to change, but these can be mitigated through strategic planning, collaboration, and leveraging emerging innovations like blockchain and AI. Furthermore, the role of external forces such as government regulations and consumer demand is emphasized as pivotal in driving sustainable practices.

The study concludes that sustainability and economic growth are not mutually exclusive; rather, they can be complementary goals when approached strategically. Organizations that prioritize sustainability within their supply chains not only contribute to environmental preservation but also secure their position as leaders in an increasingly eco- conscious marketplace.

Future research should focus on exploring industry-specific strategies, assessing the long-term impact of emerging technologies, and investigating regional variations in sustainability practices. By continuing to advance knowledge and action in this field, businesses can help shape a resilient, sustainable, and prosperous global economy.

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