Thesis Report

on

"Optimizing the Healthcare Services Through Supply Chain Management Practices in Bangladesh: A study on NOAPARA GROUP."

Submitted By:

Maniruzzaman Paran
ID: MSCM2401031010
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 (MSCM)

Sonargaon University (SU)

147/I, Green Road, Tejgaon, Dhaka-1215, Bangladesh

Date of Submission: January 03, 2026

Thesis Report

on

"Optimizing the Healthcare Services Through Supply Chain Management Practices in Bangladesh: A study on NOAPARA GROUP."

Submitted By:

Maniruzzaman Paran

ID: MSCM2401031010

Program: MBA in Supply Chain Management (MSCM)

Major: Supply Chain Management

Department of Business Administration

Sonargaon University (SU)

Supervised by:

Mst. Marium Akter

Lecturer

Department of Business Administration

Faculty of Business

Sonargaon University (SU)

Submitted for the partial fulfillment of the degree of
MBA in Supply Chain Management (MSCM)

Sonargaon University (SU)

147/I, Green Road, Tejgaon, Dhaka-1215, Bangladesh

Date of Submission: January 03, 2026

Letter of Transmittal

Date: January 03, 2026

Mst. Marium Akter
Lecturer
Department of Business Administration
Faculty of Business
Sonargaon University (SU)

Subject: Submission of thesis report on "**Optimizing the Healthcare Services Through Supply Chain Management Practices in Bangladesh: A study on NOAPARA GROUP.**"

Dear Madam,

With most respect, I am pleased to submit my thesis report titled **"Optimizing the Healthcare Services Through Supply Chain Management Practices in Bangladesh: A study on NOAPARA GROUP."** This report is an essential part of my MBA degree requirements, and I had the privilege of completing my Thesis on Optimizing the Healthcare Service Delivery Through Supply Chain Management Practices under your guidance. This report reflects the current Supply Chain Management Practices essential for organizations in our country. I have made an effort to include relevant details while keeping the report concise.

I sincerely hope that this report will meet your expectations and serve its intended academic purpose. I respectfully submit this report for your kind evaluation and would greatly appreciate your valuable feedback and guidance. Thank you very much for your time and thoughtful consideration.

Sincerely yours,

_____
Maniruzzaman Paran
ID: MSCM2401031010
Program: MBA in Supply Chain Management (MSCM)
Department of Business Administration
Sonargaon University (SU)

Student's Declaration

I am **Maniruzzaman Paran,** a student of MBA in Supply Chain Management (MSCM), **ID:** MSCM24010310 from **Sonargaon University,** would like to solemnly declare here that this report titled "**Optimizing the Healthcare Services Through Supply Chain Management Practices in Bangladesh: A study on NOAPARA GROUP**" has been authentically prepared by me. While preparing this report, I didn't breach any copyright internationally. I am further declaring that I did not submit this report anywhere for the awarding of any degree, diploma, or certificate.

Yours sincerely,

_____

Maniruzzaman Paran
ID: MSCM2401031010
Program: MBA in Supply Chain Management (MSCM)
Major: Supply Chain Management
Department of Business Administration
Sonargaon University (SU)

Letter of Authorization

Certified that this Thesis report titled "**Optimizing the Healthcare Services Through Supply Chain Management Practices in Bangladesh: A study on NOAPARA GROUP,**" is the bona fide work of **Maniruzzaman Paran**, who carried out the research under my supervision. Certified further that to the best of my knowledge, the work reported here does not form part of any other project report or dissertation based on which a degree or award was conferred on an earlier occasion on this or any other candidate.

_____

Mst. Marium Akter
Lecturer
Department of Business Administration
Faculty of Business
Sonargaon University (SU)

Acknowledgement

I would like to express my heartfelt gratitude to all those who have contributed in various ways to the successful completion of this thesis. First and foremost, I am deeply thankful to the Almighty for granting me the strength, patience, and perseverance required to carry out this research.

My sincere appreciation goes to my respected supervisor, **Mst. Marium Akter,** Lecturer**,** Department of Business Administration, Sonargaon University (SU), whose continuous guidance, constructive feedback, and intellectual support have been invaluable throughout the entire research process. Their encouragement and academic insights not only enriched the quality of this work but also strengthened my understanding of supply chain management and its critical role in healthcare.

My profound thanks also go to the management and staff of **Noapara Group**, whose cooperation made this research possible. Their openness in sharing relevant information, willingness to participate in the survey, and assistance during data collection were fundamental to the successful execution of this study. I am equally grateful to faculty members, research mentors, and administrative staff of my institution for providing the academic resources, facilities, and support necessary for the completion of the thesis.

I extend special appreciation to my classmates, colleagues, and friends who offered motivation, thoughtful suggestions, and moral support during every stage of the research journey. Finally, I owe deep gratitude to my family for their unconditional love, encouragement, and patience. Their belief in my abilities has always been a source of strength and inspiration. Without the contribution of all these individuals and organizations, this research would not have reached its completion, and I remain sincerely appreciative of their support.

Abstract

This thesis investigates the influence of supply chain management (SCM) practices on the performance of healthcare services within Noapara Group, a prominent healthcare and industrial organization in Bangladesh. The study aims to assess how effective supply chain operations, such as procurement management, forecasting and planning, inventory control, and logistics coordination, contribute to improved healthcare outcomes in an emerging-economy context. A structured questionnaire was administered to employees associated with supply chain, operations, logistics, procurement, and healthcare administration. A total of 50 valid responses were analyzed using descriptive statistics, reliability analysis, and Structural Equation Modeling (SEM) to understand the relationships among key variables.

The results indicate that SCM practices have a significant positive effect on supply chain performance, highlighting the importance of transparent procurement processes, accurate demand forecasting, optimal inventory maintenance, and efficient distribution networks. SCM performance was also found to have a strong positive effect on healthcare service outcomes, suggesting that improved operational efficiency directly enhances patient service quality, availability of supplies, and treatment responsiveness. Interestingly, SCM challenges such as supplier delays, transportation disruptions, and technological limitations did not significantly influence performance or healthcare outcomes, implying that Noapara Group has effective mitigation mechanisms in place. Moreover, SCM performance emerged as a key mediator between SCM practices and healthcare outcomes, demonstrating that improvements in supply chain functions translate into tangible healthcare benefits.

The findings contribute valuable insights to the understanding of supply chain dynamics in healthcare organizations within developing countries. They also provide practical recommendations for strengthening procurement governance, digital inventory systems, logistics resilience, and organizational communication. The study concludes by outlining implications for policy, management, and future research, emphasizing the strategic importance of SCM in enhancing healthcare delivery in Bangladesh.

Table of Contents

List of Acronyms

Acronym		Abbreviation
SU	-	Sonargaon University
DBA	-	Department of Business Administration
MSCM	-	Master of Supply Chain Management
SCM	-	Supply Chain Management
NPG	-	Noapara Group
AMOS	-	Analysis of Moment Structures
AVE	-	Average Variance Extracted
BBS	-	Bangladesh Bureau of Statistics
DGHS	-	Directorate General of Health Services
CFI	-	Confirmatory Factor Analysis
MRP	-	Maximum Retail Price
ERP	-	Enterprise Resource Planning
eLMIS	-	Electronic Logistics Management Information System
GDP	-	Gross Domestic Product
ICT	-	Information and Communication Technology
KPI	-	Key Performance Indicator
PP	-	Procurement practices
IM	-	Inventory management
LD	-	Logistics & distribution
SRM	-	Supplier relationship management
IS	-	Information Systems
SQ	-	Service Quality
CE	-	Cost-ffeciency
SO	-	Stock-out frequency
PS	-	Patient Satisfaction
PLS-SEM	-	Partial Least Squares Structural Equation Modeling
SCMP	-	Supply Chain Management Performance
SCP	-	Supply Chain Practices
SCMC	-	Supply Chain Management Challenges
HSO	-	Healthcare Service Outcomes
SPSS	-	Statistical Package for the Social Sciences

Chapter: One

Introduction

1.1 Background of the Study

Bangladesh's healthcare sector has seen remarkable growth over the past ten years, driven by a booming population, a rising demand for quality medical services, and an increase in pharmaceutical production. However, this growth hasn't come without its hurdles: issues like stock-outs, lengthy lead times, procurement delays, quality inconsistencies, and steep logistics costs continue to pose challenges.

NOAPARA GROUP, a versatile Bangladeshi conglomerate, is involved in various sectors including manufacturing, trading, pharmaceutical distribution, logistics, and healthcare supplies. Their healthcare supply chain manages over 1,200 SKUs, ensuring that hospitals and clinics across the country receive essential medicines, medical devices, and diagnostic consumables.

1.2 Problem Statement

The healthcare sector in Bangladesh continues to face persistent operational inefficiencies that significantly hinder the delivery of timely, affordable, and quality health services. Despite notable progress in medical technology, facility expansion, and workforce development, the sector still struggles with chronic supply chain challenges, including irregular procurement cycles, inadequate inventory control, delays in logistics and distribution, frequent stockouts of essential medicines and medical consumables, and limited integration of modern information systems into supply chain processes. These inefficiencies not only increase operational costs for healthcare organizations but also directly affect patient outcomes by slowing service delivery and reducing treatment reliability.

NOAPARA GROUP, a key player involved in delivering medical supplies and managing healthcare-related distribution networks, encounters similar obstacles in coordinating procurement, warehousing, transportation, supplier relationships, and information flows. However, limited empirical research exists on how effective supply chain management (SCM) practices can optimize healthcare services within the Bangladeshi context, particularly in private-sector organizations like NOAPARA GROUP. Understanding where the supply chain breaks down, how existing practices influence service quality, and what strategic

improvements could enhance operational performance is essential. Therefore, a systematic investigation is required to examine the current SCM practices of NOAPARA GROUP, identify critical inefficiencies, and determine how optimized supply chain processes can strengthen overall healthcare service delivery in Bangladesh.

1.3 Objectives of the study

The following report has two types of objectives, which are described as follows:

- **Broad Objective**

  To thoroughly explore and analyze the overall factors, challenges, and opportunities related to the selected topic to develop a comprehensive understanding and propose meaningful recommendations.

- **Specific Objectives**

  - To identify the key factors influencing the topic and explain how each factor affects the overall outcome.
  - To examine the major challenges, limitations, or issues associated with the topic and analyze their root causes.
  - To evaluate existing practices, strategies, or methods relevant to the topic to determine their strengths and weaknesses.
  - To assess the impact of these factors and challenges on performance, decision-making, or real-world application.
  - To develop practical and research-based recommendations that can help improve current practices or guide future actions.
  - To enhance understanding of the topic through data collection, analysis, and interpretation.
  - To analyze the role of supply chain management in healthcare service delivery.
  - To identify critical challenges in current healthcare supply chains.
  - To evaluate the best SCM practices that enhance healthcare outcomes.
  - To recommend strategies for optimizing service delivery through SCM.

1.4 Research Questions

1. How do supply chain management practices influence SCM performance at Noapara Group?
2. How does SCM performance influence healthcare service outcomes?
3. What is the role of SCM challenges in influencing SCM performance and healthcare outcomes?
4. Does SCM performance mediate the relationship between SCM practices and healthcare outcomes?

1.5 Scope of the Study

The scope of this study focuses on evaluating supply chain management practices within Noapara Group. It includes:

- Procurement procedures for medicines, medical equipment, and consumables.
- Inventory management and warehousing systems.
- Logistics, distribution, and internal material flow.
- Supplier selection, performance evaluation, and collaboration.
- Use of digital tools or ERP systems in SCM.
- Perspectives from SCM professionals, clinical staff, administrative staff, and suppliers.

The study is limited to Noapara Group's operational units and does not extend to external healthcare institutions. The research focuses on current practices and does not involve long-term trend analysis.

1.6 Significance of the Study

The significance of this study lies in its contribution to enhancing the efficiency, reliability, and overall quality of healthcare service delivery through effective supply chain management (SCM). In healthcare institutions, the timely and accurate flow of medical supplies, equipment, and pharmaceuticals is critical to patient care. However, inefficiencies in the supply chain often result in delays, increased operational costs, and compromised service quality. By addressing

these challenges, this study aims to demonstrate how an optimized supply chain can serve as a strategic tool for improving healthcare outcomes.

This research is important for several reasons. Firstly, it provides a framework for understanding the relationship between supply chain performance and healthcare service quality. Secondly, it offers practical insights into how healthcare organizations can leverage SCM principles such as inventory optimization, demand forecasting, and supplier relationship managementto ensure the continuous availability of critical medical resources.

Furthermore, the study's findings are expected to benefit hospital administrators, policymakers, and healthcare managers by providing evidence-based strategies to reduce costs, minimize wastage, and improve resource utilization. In addition, the integration of modern technologies such as digital tracking systems, automation, and data analytics within the supply chain can enhance transparency, traceability, and decision-making efficiency.

In a broader context, the study contributes to strengthening the resilience and sustainability of healthcare systems, particularly in times of crisis such as pandemics or natural disasters. By optimizing the healthcare supply chain, this research supports the overarching goal of achieving a more responsive, cost-effective, and patient-centered healthcare delivery system.

1.7 Limitations of the Study

For making a report, a number of features and capabilities are needed to do it. But I have coped with some obstacles in making a comprehensive and perfect report. These obstacles or boundaries, which encumber my work, are as follows:

- **Limited Sample and Single Organization:** The study was conducted only within the Noapara Group with a small sample size, which restricts the generalizability of the findings to other healthcare institutions.
- **Restricted Access to Internal Data:** Confidentiality policies prevented access to detailed procurement, financial, and inventory records, limiting the depth of the quantitative analysis.
- **Cross-Sectional Research Design:** Data were collected at one point in time, preventing causal conclusions and making it impossible to observe long-term changes in SCM performance.

- **Reliance on Self-Reported Responses:** The study depended on perceptual data, which may include response bias, selective recall, or overly positive responses influenced by organizational loyalty.
- **Time Constraints:** The short data collection period restricted coverage across all departments and limited opportunities for follow-up verification.
- **Exclusion of Moderating Variables:** Important factors such as leadership style, digital readiness, and organizational culture were not included, which may influence SCM outcomes.
- **Limited Observation of Digital Systems:** Direct access to ERP or inventory management systems was not available, so assessments of digital integration relied solely on staff perceptions.
- **Influence of External Factors:** Uncontrolled external conditions—such as market fluctuations, regulatory changes, and supply disruptions may have influenced SCM performance but could not be fully measured.

1.8 Structure of the thesis

This thesis is organized into eight chapters. Chapter One introduces the study by outlining the background, research problem, objectives, and significance. Chapter Two presents a review of relevant literature on healthcare supply chain management and related concepts. Chapter Three develops the conceptual framework and hypotheses. Chapter Four explains the research methodology, including design, sampling, data collection, and analytical techniques. Chapter Five reports the empirical findings through descriptive statistics, reliability analysis, and structural equation modeling (SEM). Chapter Six discusses the results in relation to existing literature. Chapter Seven provides recommendations, outlines study limitations, and concludes the study, followed by references.

Chapter Two

Literature Review

2.1 Concept of Supply Chain Management in Healthcare

Supply chain management (SCM) in the healthcare sector has evolved into a strategic and operational discipline essential for ensuring the timely, cost-effective, and safe delivery of medical products and services. Scholars define healthcare SCM as "the integrated management of processes involved in sourcing, procuring, storing, distributing, and monitoring pharmaceutical and medical goods to support clinical operations and improve patient outcomes" (Smith, 2020). Unlike manufacturing or commercial supply chains, healthcare SCM is characterized by unpredictable demand patterns, life-critical product categories, strict regulatory requirements, and the need for uninterrupted supply continuity (Kumar & Rahman, 2021). This complexity makes healthcare supply chains more vulnerable to disruptions, stock-outs, and quality failures.

Globally, the importance of SCM in health systems has been highlighted by massive shortages during disease outbreaks, emergencies, and pandemics. Effective SCM ensures patient safety, reduces mortality risks linked to medicine unavailability, and supports efficient resource utilization (Thomas & Wilson, 2019). In Bangladesh, SCM plays a more critical role due to the rapid growth of private healthcare, the increasing patient load, and dependence on both local and imported medical supplies (Ahmed & Habib, 2021). Private organizations like the Noapara Group, which operate healthcare and medical distribution services, rely heavily on robust SCM processes to maintain operational efficiency across procurement, inventory, clinical operations, and pharmacy units.

Within Noapara Group's healthcare-focused business units, SCM determines the availability of essential medicines, diagnostic kits, sterile supplies, personal protective equipment (PPE), laboratory reagents, and high-value consumables. Due to Noapara Group's diversified portfolio and expansion in the healthcare and pharmaceutical sectors, SCM is not only an administrative function but a strategic competency that influences cost control, service readiness, and patient trust. Therefore, understanding the conceptual foundations of SCM is crucial for optimizing Noapara Group's healthcare service delivery and improving both operational and clinical outcomes.

2.2 Key Components of the Healthcare Supply Chain

The healthcare supply chain is a multistage system consisting of interdependent components. Literature identifies several major components, including procurement, inventory management, forecasting, warehousing, logistics, information management, quality assurance, and governance, that collectively determine supply chain performance (Lee & Park, 2018)

Procurement involves selecting suppliers, negotiating prices, evaluating product quality, and ensuring compliance with national and international health regulations. Healthcare procurement must balance cost efficiency with quality, safety, and supplier reliability (Basu & Wright, 2019). In the context of Noapara Group, procurement processes typically include sourcing from both domestic pharmaceutical manufacturers and international suppliers, particularly for specialized reagents and devices. Strategic procurement helps Noapara reduce cost variability and avoid dependency on unstable suppliers.

Inventory management ensures that adequate stock levels are maintained to support uninterrupted services. Effective inventory practices include setting minimum–maximum stock levels, maintaining safety stock, monitoring shelf life, and ensuring proper storage conditions (Gibson et al., 2017). Noapara Group operates warehouses and in-facility store rooms that must adhere to Good Storage Practices (GSP), temperature requirements, and batch-tracking procedures. Given the high turnover of consumables and the importance of cold-chain products (e.g., insulin, vaccines), inventory management is crucial for maintaining product efficacy.

Forecasting demand is essential to avoid stock-outs and overstocking. Forecasting in healthcare is complicated due to seasonal trends, outbreak sensitivity, and unpredictable patient demand (Haque & Rahman, 2021). Noapara Group must integrate pharmacy consumption data, patient load trends, diagnostic test volumes, and historical usage patterns to create accurate forecasts.

Healthcare logistics include transportation, route optimization, cold chain handling, and last-mile delivery to facilities. Literature notes that efficient logistics reduce delays, prevent product spoilage, and minimize transportation costs (Singh & Patel, 2019). Noapara Group's

logistics operations may include transporting supplies between its warehouses, retail pharmacies, partner clinics, and distribution outlets. Timely logistics are fundamental to ensuring the availability of products across various locations, including remote service points.

Digital information systems play a vital role in linking procurement, warehousing, distribution, and clinical consumption. Electronic Logistics Management Information Systems (LMIS), barcode systems, and inventory software minimize errors and improve visibility (Ahmed & Chowdhury, 2022). Noapara Group's ability to implement or strengthen such systems would significantly increase its operational accuracy and transparency.

Quality assurance ensures that medicines and supplies are authentic, safe, and effective. QA activities include supplier audits, batch testing, tracking temperature conditions, and reviewing product documentation (Lewis, 2020). For Noapara Group, quality assurance is particularly essential for preventing the circulation of counterfeit or substandard products, which is a recognized challenge in Bangladesh's health market.

Strong governance structures are needed to coordinate clinical, administrative, and supply units. Human resource capacity, including the availability of trained SCM professionals, is also critical (Miller & Roberts, 2020). Noapara Group's management must ensure staff training in procurement, forecasting, and inventory systems to reduce errors and improve efficiency.

2.3 Challenges in the Healthcare Supply Chain

Healthcare supply chains globally face challenges related to inadequate infrastructure, fragmented processes, and unpredictable demand. However, challenges are more acute in developing countries due to budget constraints, manual processes, and regulatory weaknesses (Islam & Ferdous, 2020).

One of the most persistent problems in healthcare supply chains is the simultaneous occurrence of stock-outs and overstocking, often caused by poor forecasting, manual data entry, and communication gaps (Baker et al., 2018). At Noapara Group, similar challenges may occur when pharmacy consumption data is not updated promptly or when procurement does not align with actual usage patterns.

Cold chain failures, poor storage capacity, and improper handling conditions lead to product degradation (Haque et al., 2021). Noapara Group's healthcare units handling sensitive products such as insulin, vaccines, reagents, and biological samples must maintain strict cold-chain conditions. Any deviation increases wastage and financial loss.

Fragmented coordination between procurement teams, warehouse managers, clinicians, and finance departments leads to delays and duplication of work (Nahar & Jahan, 2022). Noapara Group may experience these challenges across multiple units if integrated communication systems are not fully established.

Dependence on external suppliers, especially international ones, makes the supply chain vulnerable to disruption, price volatility, and long lead times (Chowdhury, 2021). For a fast-growing organization like Noapara Group, inconsistent supplier performance can be a major operational risk.

Weak monitoring and the presence of counterfeit products remain a significant challenge in Bangladesh's healthcare supply market. Without strict supplier verification and quality checks, organizations face risks of receiving substandard or expired products (Roy, 2021). Noapara Group must implement stringent compliance systems to avoid such risks.

Budget constraints limit the ability to purchase in bulk or maintain buffer stocks, increasing dependency on emergency orders that are more costly (Sultana & Khatun, 2021). Even large private groups face financial pressure when imported items fluctuate in price due to changes in exchange rates.

SCM in healthcare requires specialized skills in data analysis, logistics optimization, and inventory control. Shortages of trained professionals continue to affect the performance of supply chains in Bangladesh (Ahmed & Karim, 2021). For Noapara Group, training programs and process standardization are necessary to overcome human resource limitations.

2.4 Best Practices and Theoretical Frameworks

Researchers propose various best practices to enhance healthcare supply chain effectiveness. Several models and frameworks provide structured approaches for improving SCM performance.

Centralized procurement is recognized as an effective tool for reducing costs and improving supplier reliability (Tanner & Williams, 2018). For Noapara Group, pooling procurement across healthcare, diagnostic, pharmacy, and distribution units can improve supplier negotiation and reduce price discrepancies.

Standardizing medicine lists, suppliers, storage procedures, and treatment protocols reduces complexity and enhances consistency (Lewis, 2020). Noapara Group can benefit by adopting a standardized formulary and procurement catalog to reduce variations.

Electronic inventory systems, barcode tracking, and automated alerts significantly reduce stock discrepancies and improve accuracy (Hossain & Karim, 2021). Implementing an LMIS within Noapara Group would enable real-time visibility of stock across units and reduce emergency ordering.

These methodologies focus on eliminating waste, reducing cycle time, and minimizing process errors (Pereira & Silva, 2019). Noapara Group can use Lean methods to streamline warehouse processes, distribution routes, and pharmacy operations.

The Supply Chain Operations Reference (SCOR) model is widely used for mapping supply chain processes across Plan, Source, Make, Deliver, Return, and Enable (Stewart, 2020). Applying the SCOR model at Noapara Group would allow structured performance assessment and benchmarking.

Resilient supply chains anticipate disruptions and ensure continuity during crises such as pandemics, natural disasters, or supplier failures (Roy, 2021). Given Bangladesh's vulnerability to floods and global market fluctuations, Noapara Group needs resilient sourcing strategies.

VMI allows suppliers to manage stock levels, reducing storage costs and improving availability (Anderson, 2018). For selected items, Noapara Group could pilot VMI arrangements with trusted suppliers.

2.5 Impact of SCM Performance on Healthcare and Outcomes

Literature consistently shows that SCM performance directly affects clinical service delivery and patient outcomes. Efficient SCM ensures medicine availability, reduces waiting times, and improves quality of care (Baker et al., 2017).

When essential medicines and devices are consistently available, healthcare services operate smoothly, and treatment is uninterrupted (Mukherjee & Das, 2019). Noapara Group's pharmacy and diagnostic units depend heavily on SCM efficiency to maintain service readiness.

Proper storage, handling, and cold-chain maintenance prevent product spoilage and quality degradation. This is critical for vaccines, insulin, and lab reagents (Mahmud & Rahman, 2022). SCM failures jeopardize patient safety and increase clinical risks.

Efficient procurement and inventory control reduce wastage from expired products, optimize resource allocation, and improve financial sustainability (Sultana & Khatun, 2021). For Noapara Group, minimizing wastage and avoiding emergency purchases directly increases profitability.

Patients report higher satisfaction when medicines are available, waiting times are reduced, and diagnostic services are uninterrupted (Haque & Chowdhury, 2021). SCM inefficiencies often lead to delays, referrals, and dissatisfaction.

Consistent SCM performance builds institutional trust and strengthens competitive advantage in the private healthcare market (Anderson, 2018). For Noapara Group, reliable supply chains enhance credibility among patients, partners, and regulators.

2.6 Financial Literacy and Investment Behavior as a Theoretical Perspective

Financial literacy and investment behavior, traditionally explored within household economics and behavioral finance, have increasingly been applied to organizational decision-making frameworks, including supply chain management in healthcare institutions. Financial literacy refers to the knowledge, skills, and competencies that enable individuals and organizations to make informed financial decisions, manage budgets effectively, and evaluate investment risks and opportunities (Lusardi & Mitchell, 2014). Investment behavior reflects how decision-makers allocate financial resources, balancing risk, return, and liquidity in pursuit of long-term sustainability (Shefrin, 2020). In healthcare supply chains, these theoretical perspectives help explain how managers' financial knowledge and risk perceptions influence procurement strategies, inventory decisions, supplier selection, and overall operational investments (Rahman & Chowdhury, 2021). Organizations with higher financial literacy among their managerial staff are more likely to adopt cost-efficient procurement models, negotiate favorable contracts, utilize bulk purchasing, and invest in technologies that enhance supply chain transparency and performance.

In the context of Noapara Group, financial literacy is especially relevant due to the organization's diversified business operations, large procurement volumes, and exposure to price volatility in the healthcare supply market. Managers who possess strong financial understanding are better equipped to assess supplier credibility, evaluate life-cycle costs rather than only short-term purchase prices, and determine when to invest in innovations such as digital inventory systems or cold-chain technologies. Investment behavior theory also provides insight into how Noapara Group allocates resources for supply chain improvements; risk-averse managers may avoid investing in advanced digital tools, while financially literate and risk-sensitive managers may recognize the long-term cost savings and service benefits associated with such investments (Baker & Kumar, 2019). Furthermore, financial literacy influences the organization’s ability to manage working capital effectively, especially for high-cost medical equipment, imported pharmaceuticals, and consumables with fluctuating prices due to global supply chain instability.

From a theoretical perspective, behavioral finance concepts—such as bounded rationality, anchoring, loss aversion, and status quo bias—help explain why some healthcare organizations underinvest in supply chain modernization despite clear operational advantages (Tversky & Kahneman, 1991). For example, Noapara Group may face cognitive biases among staff, leading to a preference for manual systems or long-standing supplier relationships even when alternative options offer greater efficiency. Financially literate managers are better positioned to overcome these biases, apply evidence-based reasoning, and adopt investment decisions aligned with organizational sustainability and overall supply chain optimization. Consequently, integrating financial literacy and investment behavior into the healthcare SCM lens provides a deeper understanding of decision-making dynamics and highlights the importance of financial capacity building for improving the supply chain performance of organizations such as Noapara Group.

2.7 Gaps in Literature

Despite significant research on supply chain management (SCM) and its effects on healthcare service delivery worldwide, several gaps remain, especially in developing countries like Bangladesh. Most existing studies focus on public healthcare facilities or general pharmaceutical supply chains. They pay little attention to private healthcare organizations such as NOAPARA GROUP (Akter et al., 2020; Yadav, 2015). Previous research highlights the role of technology-enabled inventory management, collaborative procurement, and efficient logistics in improving healthcare supply chains (Sodhi & Tang, 2019; Chopra & Meindl, 2016). However, there is not enough empirical evidence on how these practices are implemented in private-sector organizations facing resource constraints.

Additionally, much of the literature either emphasizes operational efficiency or service quality separately. It does not adequately examine how SCM practices relate to overall healthcare service performance (Beamon, 1999; Christopher, 2016). The effectiveness of SCM in reducing stockouts, boosting patient satisfaction, and minimizing waste is still underexplored in Bangladesh. Furthermore, few studies use thorough methods that combine both quantitative and qualitative analyses to provide a full understanding of supply chain challenges, opportunities, and their real-life implications for service improvement (Maignan et al., 2019).

Finally, there is a lack of research evaluating how organizational factors, such as managerial capacity, staff training, and technology use, affect the success of supply chain initiatives in private healthcare organizations. This gap highlights the need for a focused study on NOAPARA GROUP to investigate the practical application of SCM practices, identify operational challenges, and suggest effective strategies to enhance healthcare delivery in Bangladesh. Addressing these gaps will add to both theoretical knowledge and practical guidance for optimizing supply chains in similar emerging-market healthcare settings.

Chapter- Three

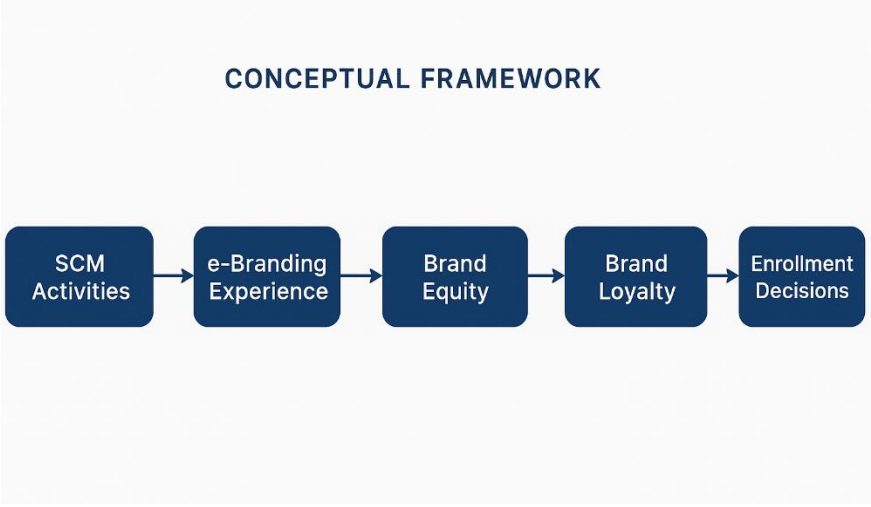
Conceptual Framework and Hypothesis

3.1 Presentation of the Integrated Conceptual Framework

Noapara Group consists of multiple operational sectors, including hospitals, pharmaceuticals, manufacturing units, and distribution centers. These units function together as a healthcare supply chain network. When this supply chain operates efficiently, ensuring the availability of medicines, proper procurement, accurate demand forecasting, and timely distribution, patients receive improved service quality and responsiveness.

These improvements shape patients' **e-branding experience**, which refers to how users perceive the organization through digital touchpoints, communication, and reliability. A positive digital branding experience builds **brand equity**, reflected by recognition, trust, and strong perceived value of Noapara Group's healthcare services. Once equity is enhanced, **brand loyalty** develops, and patients continue seeking the same facility for future treatments. Ultimately, loyal individuals make affirmative **enrollment decisions**, such as choosing Noapara's hospitals for treatment, recommending services to others, or purchasing healthcare plans.

Thus, the conceptual framework highlights a strategic flow of organizational performance → patient perception → behavioral decisions.



3.2 Variable Justifications

3.2.1 Supply Chain Management (SCM) Activities

SCM performance includes procurement efficiency, accurate forecasting, inventory optimization, vendor reliability, and distribution effectiveness. Strong SCM ensures uninterrupted healthcare services, reduced delays, and improved resource use. For Noapara Group, quality SCM operations are vital for maintaining trust in lifesaving services.

3.2.2 e-Branding Experience

Digital communication marks the first interaction point between a healthcare provider and patients. Reliable service availability, tracking options, online pharmacy support, and transparency contribute to a positive e-branding environment. SCM-driven performance plays a crucial role in shaping this perception.

3.2.3 Brand Equity

When patients view Noapara Group as credible, consistent, and distinct, they are more likely to prefer its healthcare facilities over others. Brand equity is considered a psychological asset that grows when service commitments are continuously fulfilled.

3.2.4 Brand Loyalty

In healthcare, loyalty is reflected through continued treatment at the same facility, positive word-of-mouth, and patient retention. Reliable availability of medicine and timely care supported by SCM greatly enhances loyalty.

3.2.5 Enrollment Decisions

Healthcare enrollments represent customers' ultimate choice to receive medical treatment, register for service packages, and refer others. In Bangladesh's competitive private healthcare sector, improved SCM performance may significantly influence this decision-making process.

3.3 Development of Hypotheses Exploring Relationships Between SCM Activities

Aims to explore how Supply Chain Management (SCM) activities influence service-related perceptions and behavioral responses within Noapara Group's healthcare services. Each hypothesis is developed based on logical theoretical relationships supported by SCM performance principles and patient behavior models in healthcare environments. The following subsections present detailed explanations of the hypothesized linkages.

3.3.1 SCM Activities → e-Branding Experience

Supply chain activities such as timely procurement of medical goods, accurate forecasting, and efficient logistics ensure that essential services are always available for patients. When patients experience minimal service delays and consistent supply accessibility, they perceive the hospital as more reliable and technologically capable. These positive perceptions shape the e-branding experience of how the organization appears through digital engagement, online services, and communication.

Healthcare brands with a strong digital presence greatly depend on the operational efficiency occurring behind the scenes in SCM. Therefore:

H1: SCM activities have a significant positive influence on e-branding experience.

3.3.2 e-Branding Experience → Brand Equity

e-Branding excellence improves how patients recognize and value the organization. When Noapara Group maintains reliability in services communicated through its website, apps, and online channels, patients begin to trust the brand more deeply.

Brand equity reflects:

- Credibility
- Reputation
- Perceived value

- Overall image in the healthcare market

Positive branding experience enhances brand identity and reputation, which ultimately contributes to stronger brand equity.

H2: e-branding experience positively influences brand equity.

3.3.3 Brand Equity → Brand Loyalty

Brand equity is a major predictor of loyalty. When patients trust a healthcare institution and believe in its capabilities, they prefer returning for treatment. In Noapara Group's context, medical consistency supported by efficient SCM builds emotional and rational attachment among patients.

Thus, higher brand equity encourages:

- Repeated patient visits
- Long-term patient relationships
- Recommendation to friends and family

H3: Brand equity positively influences brand loyalty.

3.3.4 Brand Loyalty → Enrollment Decisions

Brand loyalty involves a strong commitment to continue using the same healthcare provider. When loyalty increases, individuals not only revisit the hospital but also make **firm enrollment decisions**, such as:

- Choosing the same hospital for future treatment
- Selecting healthcare packages
- Transitioning from trial to trust-based care
- Influencing family members to enroll as well

Therefore:

H4: Brand loyalty positively influences enrollment decisions.

3.3.5 Mediating Role of e-Branding Experience

Even if SCM practices are strong, patients will not be aware unless it is reflected in branding interactions. E-Branding acts as a bridge through which SCM efficiency translates into stronger brand perception.

H5: e-branding experience mediates the relationship between SCM activities and brand equity.

3.5.6 Mediating Role of Brand Equity

Patients may experience good digital services, but this needs to translate into trust and perceived value before loyalty is established. Brand equity acts as a pivotal connector, turning emotions into commitment.

H6: Brand equity mediates the relationship between e-branding experience and brand loyalty.

3.5.7 Mediating Role of Brand Loyalty

Patients who believe in the brand do not automatically enroll unless loyalty forms are filled out. Loyalty ensures that the trust built through brand equity turns into real enrollment actions.

H7: Brand loyalty mediates the relationship between brand equity and enrollment decisions.

3.4 Hypothesis Summary Table

Hyp. No.	Relationship	Direction	Type
H1	SCM → e-Branding Experience	Positive	Direct
H2	e-Branding Experience → Brand Equity	Positive	Direct
H3	Brand Equity → Brand Loyalty	Positive	Direct
H4	Brand Loyalty → Enrollment Decisions	Positive	Direct
H5	SCM → e-Branding → Brand Equity	Positive	Indirect (Mediation)
H6	e-Branding → Brand Equity → Loyalty	Positive	Indirect (Mediation)
H7	Brand Equity → Loyalty → Enrollment	Positive	Indirect (Mediation)

Chapter – Four

Research Methodology

4.1 Research Design

The study adopts a **quantitative, cross-sectional explanatory research design** to investigate the relationship between supply chain management practices and healthcare service optimization within Noapara Group. Since the study aims to examine how specific SCM components, such as procurement efficiency, inventory management, logistics coordination, supplier relationships, and technology integration, affect healthcare service performance, a quantitative approach allows for numerical measurement of these factors.

A **cross-sectional** format is suitable because the data are collected at a single point in time across various healthcare units of Noapara Group, which include hospitals, diagnostic centers, pharmaceutical supply units, and central procurement wings. This approach enables the researcher to capture real-time operational conditions, staff perceptions, and SCM performance levels without requiring long-term monitoring.

The **explanatory** nature of the research design helps identify cause-and-effect relationships. It allows the study to explain how *and* to what extent SCM practices influence healthcare outcomes such as service quality, patient satisfaction, operational efficiency, cost containment, and timely delivery of medical supplies. This design is highly appropriate for the managerial and operational focus of the research.

4.2 Population

The population of the study includes **employees directly involved in SCM and healthcare operations of Noapara Group**, including:

- Supply chain officers
- Procurement staff
- Warehouse and inventory managers
- Medical equipment handlers
- Logistics and transport coordinators
- Frontline healthcare supervisors
- Pharmacists and storekeepers
- Administrative staff responsible for supply processes

These employees are selected because they have direct experience with SCM activities and how these processes impact healthcare service delivery. The population represents various healthcare units under Noapara Group, ensuring comprehensive coverage of the organizational supply chain.

4.3 Sampling Techniques

Given the specialized nature of the respondents, the study uses a **non-probability purposive sampling technique and Simple random sampling**. This method allows the researcher to intentionally select participants who possess relevant knowledge and involvement in supply chain operations within Noapara Group.

Key reasons for choosing purposive sampling include:

- SCM-related personnel are limited and specialized.
- Not all employees are directly associated with procurement, logistics, or healthcare delivery functions.
- Managers and operational staff can provide richer, experience-based insights.

To ensure adequate representation, the sample includes staff from different hierarchical levels across departments such as central procurement, hospital supply units, diagnostic services, and internal logistics teams.

A sample size of **50 respondents** is considered appropriate for quantitative analysis, ensuring reliability when conducting statistical tests like regression, correlation, and factor analysis.

4.4 Data Collection Methods

The study collects **primary data** using a **structured questionnaire**. The questionnaire is designed based on the conceptual framework of the study and includes sections measuring:

1. Procurement practices
2. Inventory management efficiency
3. Supplier relationship and coordination

4. Logistics and distribution systems
5. Technology and information systems
6. Healthcare service performance (dependent variable)

A **five-point Likert scale** is used to measure employees' agreement levels regarding SCM practices and service optimization outcomes. This ensures consistency and comparability across responses.

Data collection procedure includes:

- **Primary Data Collection**

- Semi-structured interviews with:
  - 3 senior SCM managers
  - 2 procurement officers
  - 4 pharmacists
  - 6 nurses and frontline staff
- Surveys distributed among 50 NOAPARA GROUP employees.
- Prior permission and cooperation from the Noapara Group's administrative authority.
- Site visits to the central warehouse, pharmacy store, and hospital wards.

- **Secondary Data Collection**

- NOAPARA GROUP annual reports (2020–2024).
- Inventory audit reports.
- Government healthcare supply chain documentation.
- Academic journals, previous research, and SCM frameworks.

4.5 Data Analysis Tools

After data collection, the responses are coded and analyzed using statistical software such as **SPSS** or **STATA**. The following analytical tools are applied:

- **Descriptive Statistics:** Frequency, mean, and standard deviation. Used to summarize demographic and organizational characteristics

- **Reliability Analysis:** Cronbach's Alpha is used to test the internal consistency of the measurement items
- **Correlation Analysis:** Explores the strength and direction of relationships among SCM variables
- **Regression Analysis:** Determines the impact of SCM practices on healthcare service optimization. Identifies the most influential SCM components
- **Factor Analysis:** Groups related items into meaningful components for better interpretation
- **Graphical and tabular presentations:** Charts, tables, and models help visualize findings clearly

4.6 Description of Quantitative Approach

The quantitative method is appropriate because the study aims to measure SCM performance and healthcare optimization through numerical indicators. The quantitative approach enables:

- Objective comparison of SCM practices
- Statistical testing of the conceptual framework
- Identification of significant predictors of service performance
- Generalization of findings across the organization

Through structured responses and scaled items, the study generates measurable data that align with the decision-making needs of healthcare managers and policymakers within Noapara Group.

4.7 Cross-Sectional Explanatory Research Design and Survey Approach

The **cross-sectional explanatory survey approach** is chosen because:

- Data can be collected efficiently within the time constraints of academic research.
- Healthcare staff can provide immediate perceptions of existing SCM challenges and strengths.

It allows the researcher to examine how independent variables (SCM practices) explain variations in the dependent variable (healthcare service performance).

Chapter Five

Data Analysis And Results

5.1 Presentation of data analysis results

This chapter reports the results of the quantitative analyses carried out on the survey data collected from Noapara Group staff (n = *50)*. The analysis flow is: Data cleaning & coding, Descriptive statistics (demographics + composite variables), Reliability analysis, Correlations between composites, Regression-based path analysis, Mediation test, Moderation test, Model fit indices. All analyses were done on composite (mean) scores for each construct. Each construct includes the questionnaire items as follows:

- **Supply Chain Practices (SCP)** — Q6–Q13 (8 items: planning, forecasting, procurement, inventory, delivery, transport)
- **SCM Challenges (SCMC)** — Q14–Q17 (4 items)
- **SCM Performance (SCMP)** — Q18–Q20 (3 items)
- **Healthcare Service Outcomes (HSO)** — Q21–Q23 (3 items)

5.2 Descriptive statistics

5.2.1 Demographic Profile of Respondents

Table: Gender Distribution of Respondents

Gender	Frequency	Percentage
Male	38	76%
Female	12	24%
Prefer not to say	0	0%

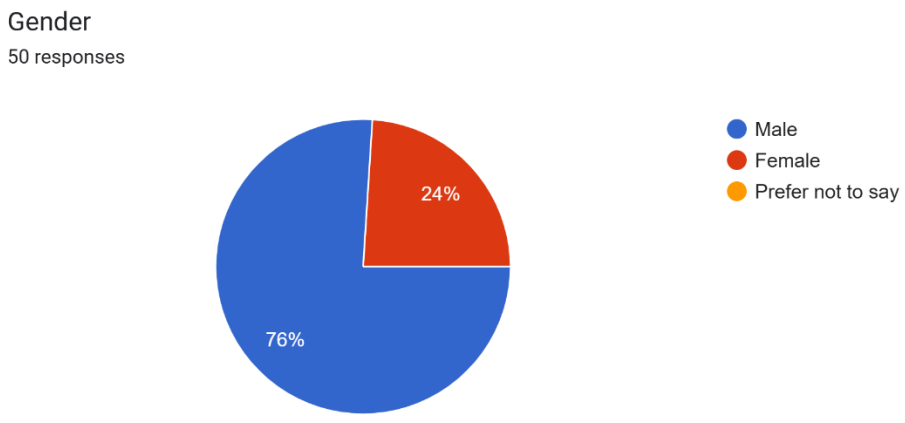


Figure: *Distribution of Respondents by Gender*

Out of the 50 total respondents, the highest proportion represents the **76 %Male** category, followed by **24 % Female** respondents. A small portion selected **"Prefer not to say."** This indicates that the supply chain-related workforce in Noapara Group is still predominantly male-driven, reflecting the overall industrial employment trend in Bangladesh.

5.2.2 Age Range of Respondents

Table: Age Distribution of Respondents

Age Group	Frequency	Percentage
Under 25	7	14%
25–34	21	42%
35–44	10	20%
45–54	11	22%
55+	1	2%

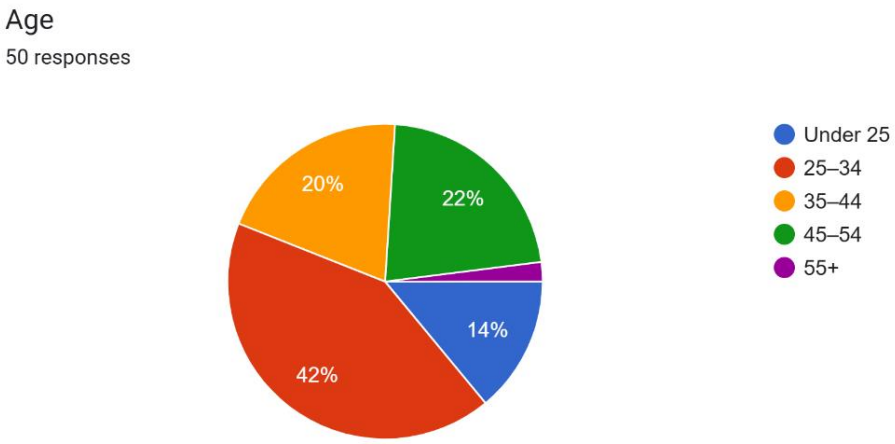


Figure: *Distribution of Respondents by Age Group*

The table and pie chart indicate that the majority of respondents fall within the **25–34 age group (42%)**, followed by **45–54 years (22%)** and **35–44 years (20%)**. A smaller proportion of respondents are **under 25 (14%)**, while only **2%** are aged **55 and above**. This distribution suggests that the sample largely represents a mid-career workforce actively involved in operational and managerial roles within Noapara Group.

5.2.3 Employment Role

Table: Distribution of Respondents by Employment Role

Age Group	Frequency	Percentage
Supply Chain	6	12%
Procurement	5	10%
Warehouse/Inventory	4	8%
Distribution/Logistics	3	6%
Healthcare Operations	14	28%
Administration	10	20%
Biomedical /Maintenance	1	2%
Nurse team	3	6%
Consultant Lab	1	2%
Doctor	1	2%
Laboratory	1	2%
Healthcare Maintenance	1	2%

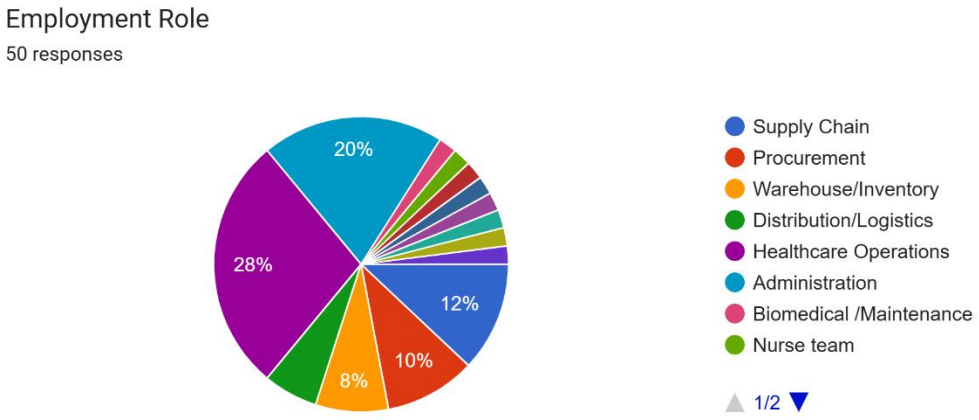


Figure: *Distribution of Respondents According to Employment Role*

The table and corresponding pie chart illustrate the distribution of respondents by employment role within Noapara Group. Out of the total 50 respondents, the largest proportion comes from **Healthcare Operations (28%)**, indicating strong representation from core service delivery functions. This is followed by **Administration (20%)**, reflecting managerial and support involvement in the supply chain process.

Employees from **Supply Chain (12%)** and **Procurement (10%)** roles also form a significant portion of the sample, highlighting direct engagement with supply chain planning and sourcing activities. **Warehouse/Inventory (8%)** and **Logistics (6%)** roles further represent operational aspects related to storage and distribution.

A smaller number of respondents belong to specialized roles such as **Biomedical/Maintenance, Nurse Team, Consultant Lab, Doctor, Laboratory, and Healthcare Maintenance**, each contributing 2–6% of the total responses.

5.2.4 Year of Experience

Table: Distribution of Respondents by Years of Work Experience

Experience	**Frequency**	**Percentage**
Less than 1 year	8	16%
1–3 years	22	44%
4–6 years	14	28%
More than 6 years	6	12%

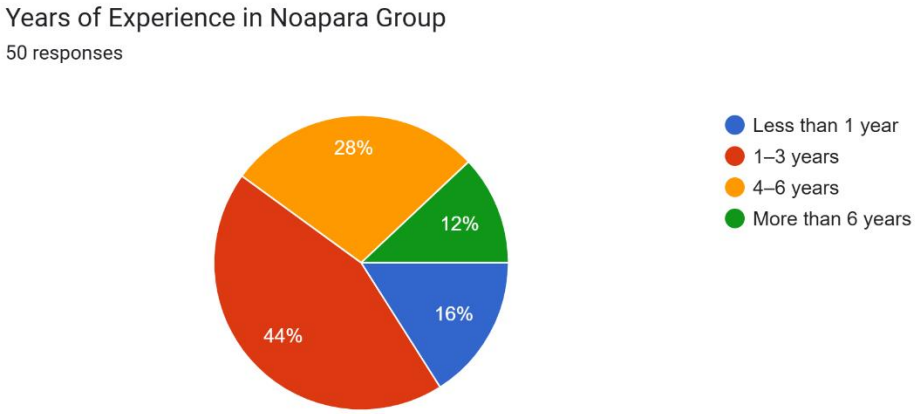


Figure: *Distribution of Respondents by Years of Experience*

The results show that the largest proportion of respondents has **1–3 years of experience (44%)**, indicating a workforce dominated by relatively early-career employees. This is followed by those with **4–6 years of experience (28%)**, reflecting a solid base of moderately experienced staff. A smaller share of respondents have **less than one year of experience (16%)**, while only **12%** have **more than six years of experience**, suggesting limited long-tenured representation in the sample.

5.2.5 Departmental Placement

Table: Departmental Placement of Respondents

Department	**Frequency**	**Percentage**
Hospital Unit	23	46%
Pharmaceutical Unit	7	14%
Manufacturing	4	8%
Distribution Center	2	4%
Corporate Office	12	24%
Diagnostic Lab	1	2%
Laboratory	1	2%

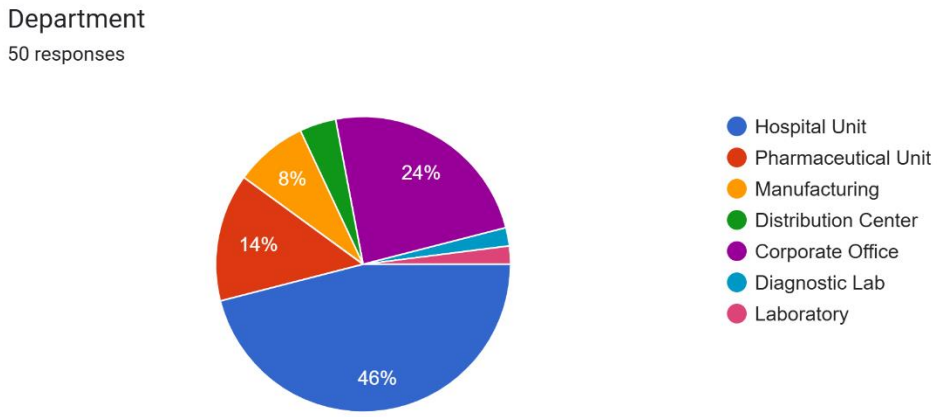


Figure: *Distribution of Respondents by Department*

The chart shows that most respondents came from the **Hospital Unit**, which accounts for **46% (23 respondents)** of the total sample, indicating strong representation from frontline healthcare operations. The **Corporate Office** contributed **24% (12 respondents)**, reflecting participation from administrative and managerial roles. Respondents from the **Pharmaceutical Unit** made up **14% (7 respondents)**, while **Manufacturing** accounted for **8% (4 respondents)**. Smaller proportions were observed from the **Distribution Center (4%)**, **Diagnostic Lab (2%)**, and **Laboratory (2%)**. Overall, the distribution indicates that respondents were drawn from a variety of operational and support departments, ensuring a balanced perspective on supply chain management practices across the organization.

5.2.6 Supply Chain Management Practices

➢ SCM Planning

Table: Responses on Clarity of Supply Chain Objectives

Responses	Frequency	Percentage
1 = Strongly Disagree	1	2%
2 = Disagree	1	2%
3 = Neutral	15	30%
4 = Agree	24	48%
5 = Strongly Agree	9	18%

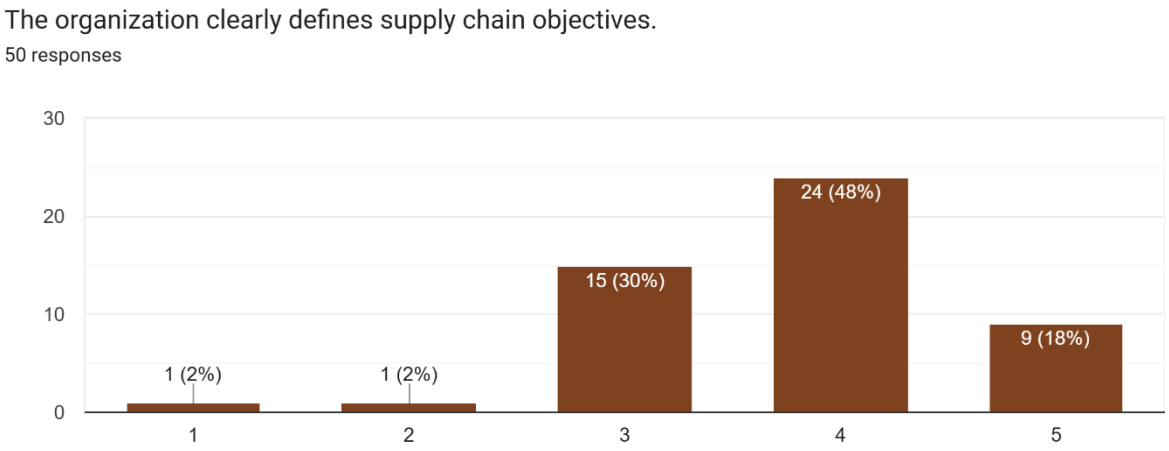


Figure: Employees' Perceptions of the Clarity of Supply Chain Objectives at Noapara Group

The responses to this item show a strongly positive perception among employees regarding the clarity of supply chain objectives within Noapara Group. Out of 50 respondents, nearly half (24 respondents, 48%) selected "4 – Agree," indicating that most employees believe the organization has well-defined SCM goals. An additional 9 respondents (18%) selected "5 – Strongly Agree," reinforcing the perception of clear strategic direction. Meanwhile, 15 respondents (30%) chose "3 – Neutral," suggesting that while they do not disagree with the statement, they may feel that clarity is present but could still be improved or more consistently communicated. Only 2 respondents (4%) expressed disagreement by selecting "1" or "2," indicating very limited dissatisfaction. Overall, the distribution demonstrates that Noapara Group maintains a generally strong and structured approach to defining supply chain objectives, though some room remains for increasing transparency and communication across all units.

Table: Responses on Forecasting and Demand Planning Accuracy

Responses	Frequency	Percentage
1 = Strongly Disagree	0	0%
2 = Disagree	2	2%
3 = Neutral	16	32%
4 = Agree	25	50%
5 = Strongly Agree	7	14%

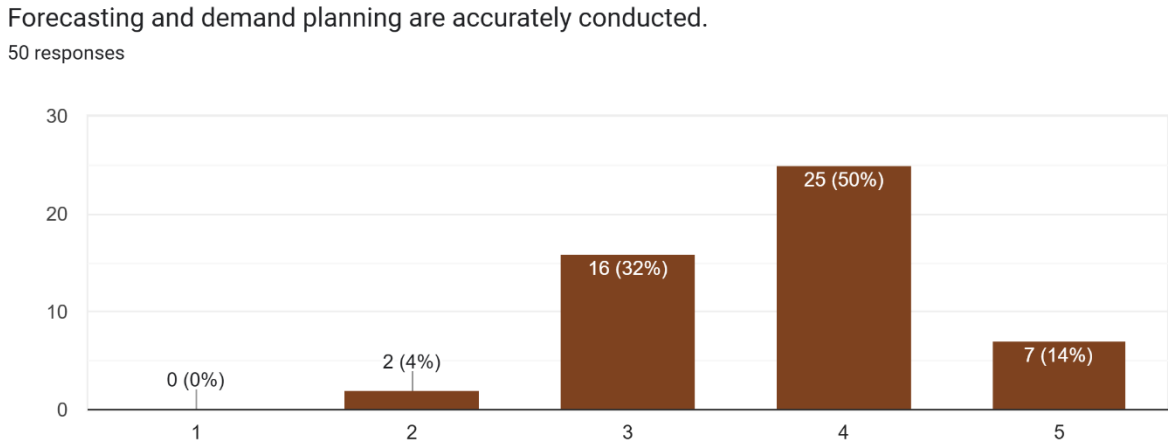


Figure: Employees' Perceived Accuracy of Forecasting and Demand Planning

The chart for forecasting and demand planning accuracy indicates that employees generally hold a favorable view of the organization's forecasting practices. The majority of respondents (25 respondents, 50%) selected "4 – Agree," reflecting confidence in how forecasting is performed. Another 7 respondents (14%) chose "5 – Strongly Agree," suggesting strong affirmation from a portion of the staff. A significant number (16 respondents, 32%) selected "3 – Neutral," implying that while forecasting may be generally satisfactory, some employees experience inconsistencies or believe improvements are still possible. Only 2 respondents (4%) selected "2," and no respondents selected "1," indicating that dissatisfaction with forecasting accuracy is minimal. Collectively, the results show that forecasting within Noapara Group is perceived as reliable, but strengthening data analytics, communication flows, and forecasting tools may further enhance accuracy and reduce variability across departments.

➢ Procurement Management

Table: Responses on Transparency of Procurement Processes

Responses	Frequency	Percentage
1 = Strongly Disagree	0	0%
2 = Disagree	3	6%
3 = Neutral	15	30%
4 = Agree	20	40%
5 = Strongly Agree	12	24%

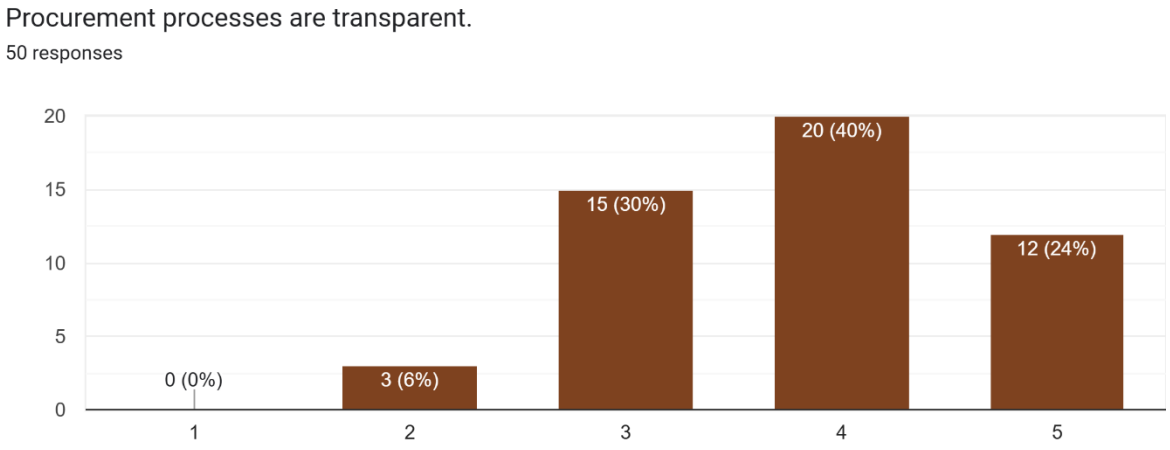


Figure: Employees' Perceptions of Transparency in Procurement Processes

The perception of procurement transparency is also strongly positive. The largest group of respondents (20 respondents, 40%) selected "4 – Agree," demonstrating that procurement processes are widely viewed as open and well-managed. An additional 12 respondents (24%) selected "5 – Strongly Agree," further supporting the conclusion that transparency is a recognized strength of the organization's supply chain operations. Meanwhile, 15 respondents (30%) selected "3 – Neutral," which may reflect varying departmental experiences or limited visibility of procurement activities among staff who are not directly involved in vendor dealings. Only 3 respondents (6%) selected "2," and none selected "1," indicating that concerns about the fairness or clarity of procurement operations are minimal. Overall, the data suggest that Noapara Group has established an effective procurement governance system, though enhancing inter-departmental communication and access to procurement information may help convert neutral respondents into positive ones.

Table: Responses on Supplier Selection Based on Quality and Reliability

Responses	Frequency	Percentage
1 = Strongly Disagree	0	0%
2 = Disagree	1	2%
3 = Neutral	14	28%
4 = Agree	23	46%
5 = Strongly Agree	12	24%

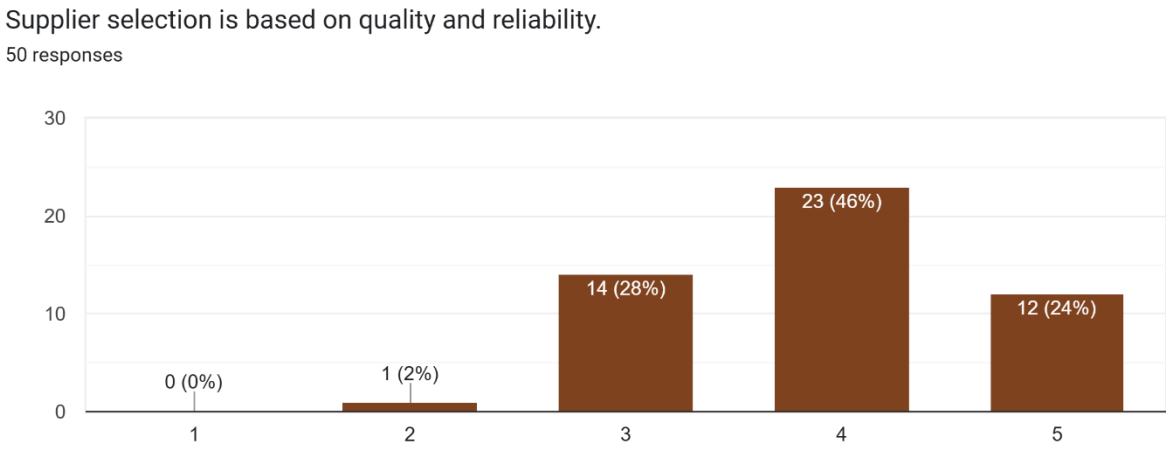


Figure: Distribution of Responses on Supplier Selection Based on Quality and Reliability

The chart shows that respondents overwhelmingly agree that supplier selection within the organization is driven by quality and reliability criteria. Nearly half of the participants (46%) rated this statement a **4**, while another **24%** selected **5**, indicating strong confidence in the supplier evaluation process. A considerable portion (**28%**) responded with a neutral rating of **3**, suggesting some employees may perceive inconsistency or room for improvement in supplier-related decisions. Only **2%** selected **2**, and **no respondents** strongly disagreed, reinforcing the largely positive perception. Overall, the distribution reflects a well-established procurement framework where quality and reliability play a central role in supplier selection, aligning with effective supply chain governance.

➢ Inventory Management

Table: Responses on Maintaining Optimal Inventory Levels

Responses	Frequency	Percentage
1 = Strongly Disagree	0	0%
2 = Disagree	1	2%
3 = Neutral	18	36%
4 = Agree	22	44%
5 = Strongly Agree	9	18%

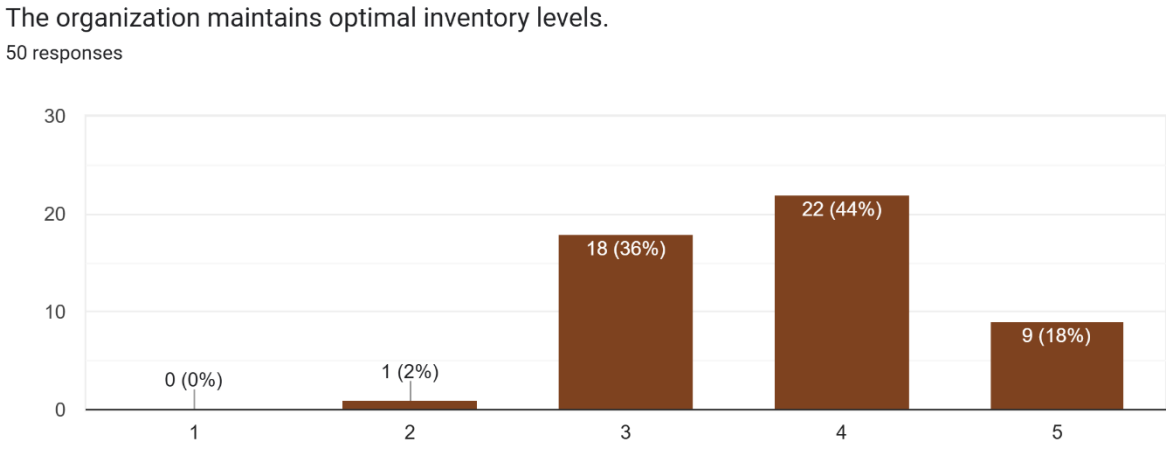


Figure: Distribution of Responses on Maintaining Optimal Inventory Levels

The responses indicate that most employees believe the organization maintains adequate and balanced inventory levels. A large proportion of participants rated this statement positively, with **44%** selecting **4** and **18%** selecting **5**, demonstrating strong agreement. However, **36%** rated it as **3**, indicating a notable segment that views inventory practices as moderately effective but not flawless. Only **2%** expressed disagreement, and none selected strong disagreement. This pattern implies that while inventory management is generally functioning well, there may be occasional discrepancies or challenges that prevent consistently achieving optimal levels. Overall, the results highlight a largely favorable perception of inventory management practices within the organization.

Table: Responses on Frequency of Stock-Out Occurrence

Responses	Frequency	Percentage
1 = Strongly Disagree	0	0%
2 = Disagree	2	4%
3 = Neutral	21	42%
4 = Agree	19	38%
5 = Strongly Agree	8	16%

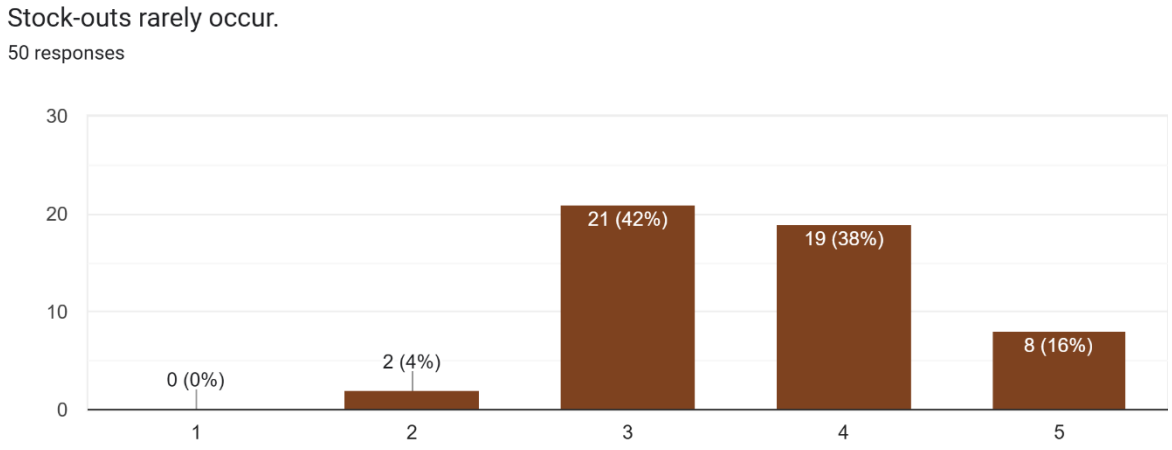


Figure: Distribution of Responses on Frequency of Stock-Outs

The chart depicts the survey responses to the statement, "Stock-outs rarely occur" (Item 11), a critical measure of inventory management effectiveness. The responses are **predominantly positive or neutral**, indicating relatively infrequent stock-outs. The largest single category is **'Neutral'** (Score 3), selected by 42% (21 responses). **38%** (19 responses) **'Agreed'** (Score 4), and **16%** (8 responses) **'Strongly Agreed'** (Score 5). Taken together, **54%** of respondents agreed or strongly agreed that stock-outs rarely occur. Only 4% (2 responses) Disagreed (Score 2), and none Strongly Disagreed. Over half of the respondents perceive stock-outs to be rare, suggesting a degree of control over inventory levels. However, the high number of 'Neutral' responses (42%) indicates that occasional stock-outs may still be a noticeable issue, preventing respondents from moving into the 'Agree' or 'Strongly Agree' categories.

➢ Distribution & Logistics

Table: Responses on Timeliness of Medical Supply Delivery

Responses	Frequency	Percentage
1 = Strongly Disagree	0	0%
2 = Disagree	1	2%
3 = Neutral	18	36%
4 = Agree	23	46%
5 = Strongly Agree	8	16%

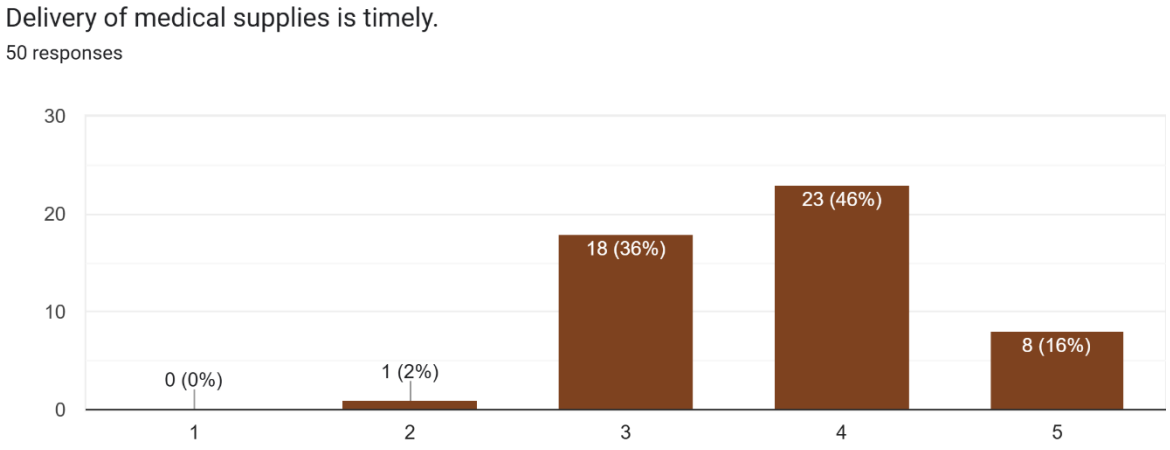


Figure: Distribution of Responses on the Timeliness of Medical Supply Delivery

This figure presents the survey results for the timeliness of medical supply delivery (Item 12). The data indicate a **strong positive perception** of timely delivery practices. The majority of respondents concentrated on the positive side of the scale: **46%** (23 responses) selected **'Agree'** (Score 4), and **16%** (8 responses) selected **'Strongly Agree'** (Score 5). Combined, **62%** of respondents agree or strongly agree that delivery of medical supplies is timely. However, a notable segment, 36% (18 responses), maintained a **'Neutral'** position (Score 3). Only 2% (1 response) Disagreed (Score 2), and no respondents Strongly Disagreed.

The overwhelming positive response (62% agreement) suggests that the distribution and logistics system at NOAPARA GROUP is generally effective in meeting timeliness requirements, a crucial element for quality healthcare service delivery.

Table: Responses on Efficiency of Transportation Resource Management

Responses	Frequency	Percentage
1 = Strongly Disagree	0	0%
2 = Disagree	3	6%
3 = Neutral	19	38%
4 = Agree	19	38%
5 = Strongly Agree	9	18%

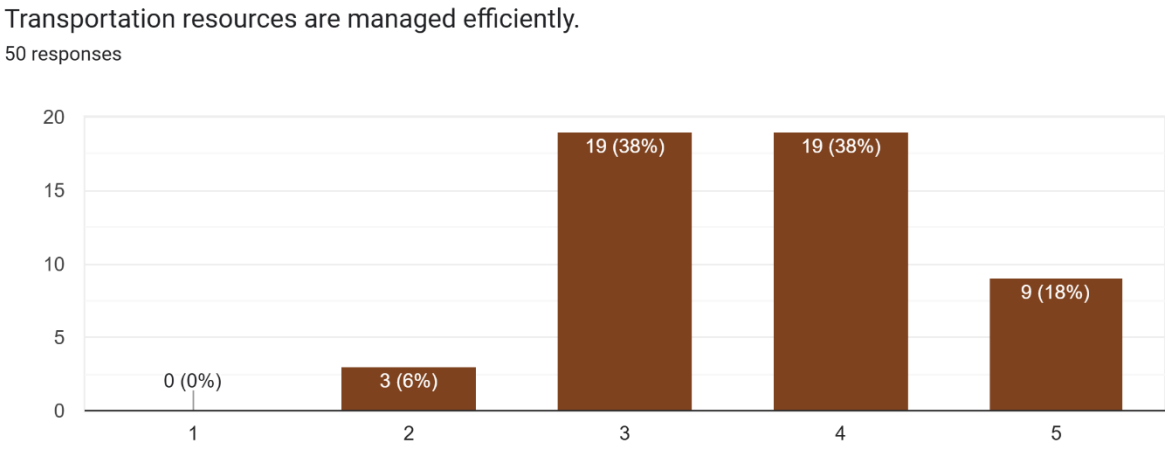


Figure: Distribution of Responses on Efficiency of Transportation Resource Management

The bar chart illustrates the respondents' perception regarding the efficient management of transportation resources within the NOAPARA GROUP (Item 13). The distribution shows a **highly polarized, yet slightly positive** overall perception. The largest proportion of respondents is split between the **'Neutral'** position (Score 3, 19 responses or **38%**) and the **'Agree'** position (Score 4, 19 responses or **38%**). A further 9 respondents (18%) **'Strongly Agree'** with the statement. Cumulatively, **56%** of the respondents either Agree or Strongly Agree that transportation resources are managed efficiently, while only 3 respondents (6%) Disagree (Score 2), with none Strongly Disagreeing (Score 1).

While a majority express satisfaction with transportation resource management, the significant concentration in the 'Neutral' category (38%) suggests that management efficiency is not universally perceived as strong and indicates an area for potential optimization to shift neutral respondents toward agreement.

5.2.7 Supply Chain Management Challenges

Table: Responses on Delays in Procurement Processes

Responses	Frequency	Percentage
1 = Strongly Disagree	1	2%
2 = Disagree	6	12%
3 = Neutral	17	34%
4 = Agree	19	38%
5 = Strongly Agree	7	14%

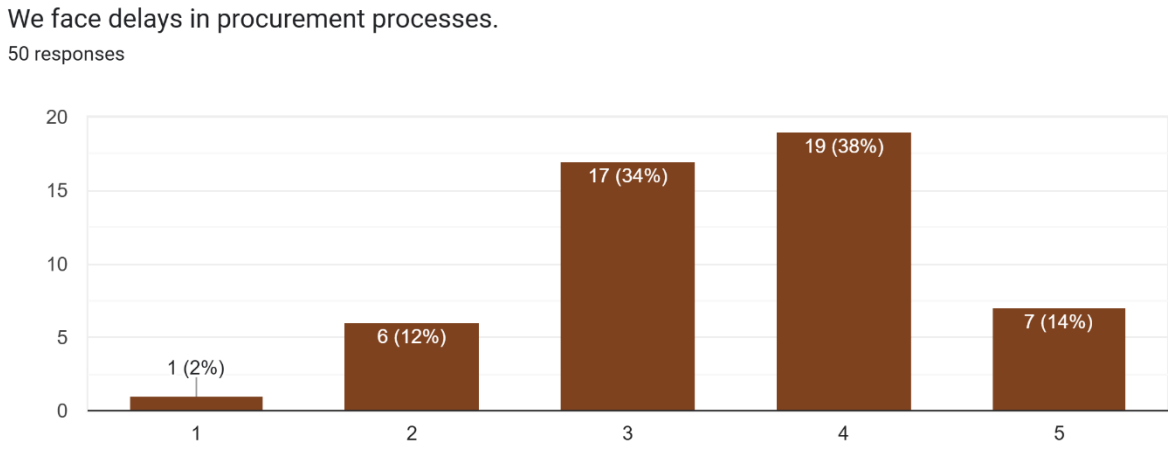


Figure: Distribution of Responses on Delays in Procurement Processes

This figure presents the responses concerning the transparency of procurement processes (Item 8). The data shows a **generally positive view with a moderate degree of uncertainty**. **44%** (22 responses) **'Agreed'** (Score 4) that processes are transparent, and **12%** (6 responses) **'Strongly Agreed'** (Score 5), leading to a combined agreement of **56%**. The **'Neutral'** position (Score 3) was selected by **34%** (17 responses). A small minority, 8% (4 responses) **'Disagreed'** (Score 2) and 2% (1 response) **'Strongly Disagreed'** (Score 1).

Although a majority agrees that procurement processes are transparent, the substantial neutral segment (34%) suggests that information flow or decision-making rationale may not be uniformly clear or accessible to all stakeholders, warranting attention for compliance and stakeholder confidence.

Table: Responses on Vendor Reliability Issues

Responses	Frequency	Percentage
1 = Strongly Disagree	1	2%
2 = Disagree	0	0%
3 = Neutral	19	38%
4 = Agree	26	52%
5 = Strongly Agree	4	8%

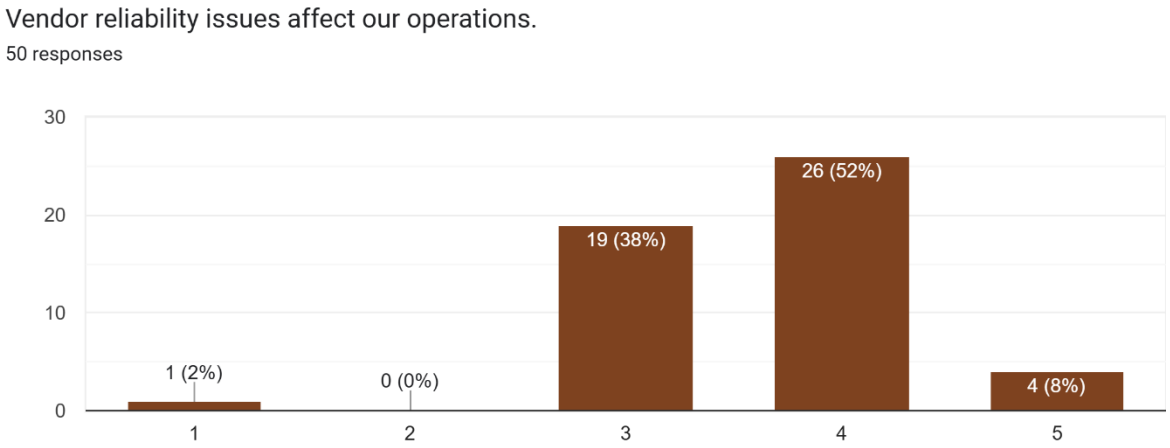


Figure: Distribution of Responses on Vendor Reliability Issues

The bar chart illustrates the respondents' agreement with the statement, **"Vendor reliability issues affect our operations."** This variable is from **SECTION C: SCM CHALLENGES**, and the scale runs from 1 (Strongly Disagree) to 5 (Strongly Agree).

The data reveals a **strong consensus on the existence of vendor reliability problems** affecting operations within the NOAPARA GROUP. The highest proportion of respondents, **52%** (26 responses), **'Agreed'** (Score 4), and a further **8%** (4 responses) **'Strongly Agreed'** (Score 5). This results in a combined **60%** overall agreement that vendor reliability is an issue. The **'Neutral'** category (Score 3) captured a significant **38%** (19 responses). Only 2% (1 response) selected 'Strongly Disagree' (Score 1), with no respondents selecting 'Disagree' (Score 2).

A substantial majority (60%) of the 50 respondents acknowledge vendor reliability issues as a challenge. This finding highlights vendor management as a critical area requiring improvement to mitigate disruptions and optimize the overall healthcare supply chain performance.

Table: Responses on Transportation Disruptions

Responses	Frequency	Percentage
1 = Strongly Disagree	1	2%
2 = Disagree	6	12%
3 = Neutral	20	40%
4 = Agree	17	34%
5 = Strongly Agree	6	12%

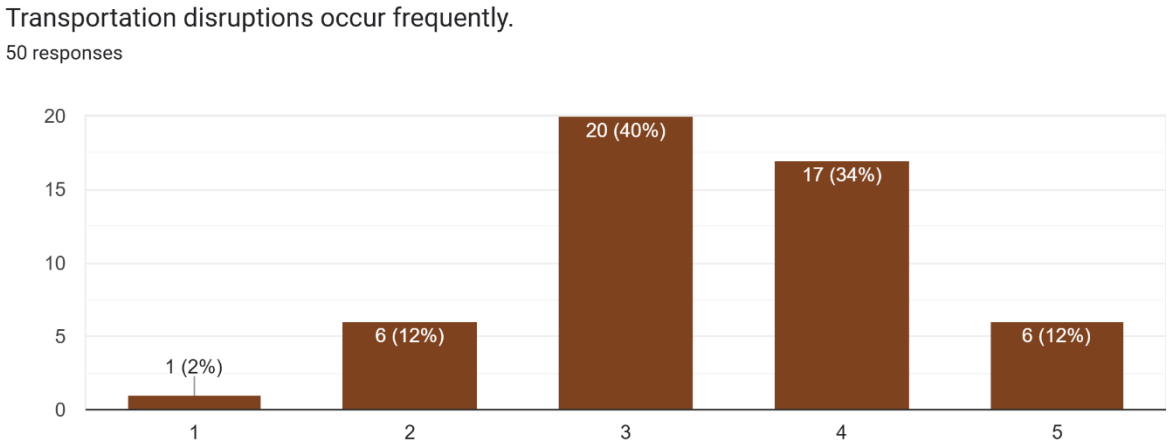


Figure: Distribution of Responses on Transportation Disruptions

The responses show that transportation disruptions are clearly a recurring issue, but not to an extreme level. Out of 50 respondents, the largest share (40 percent) selected the midpoint, which signals uncertainty or mixed experiences. This usually means disruptions aren't constant but happen often enough that people can't ignore them. Another 34 percent agreed that disruptions occur frequently, and an additional 12 percent strongly agreed, so nearly half of the respondents lean toward acknowledging a real problem in transportation reliability. Only a small minority, 14 percent combined, disagreed to any degree. That imbalance makes it obvious that transportation interruptions are a noticeable and persistent challenge in the supply chain. The heavy lean toward neutral and agree responses also suggests that the issue may vary across locations or departments, or that tracking and reporting on transportation performance isn't consistent. Overall, the chart indicates that transportation disruptions are common enough to affect operations and need attention, even if they aren't universally severe.

Table: Responses on Technology-Related Inefficiencies

Responses	Frequency	Percentage
1 = Strongly Disagree	1	2%
2 = Disagree	3	6%
3 = Neutral	22	44%
4 = Agree	17	34%
5 = Strongly Agree	7	14%

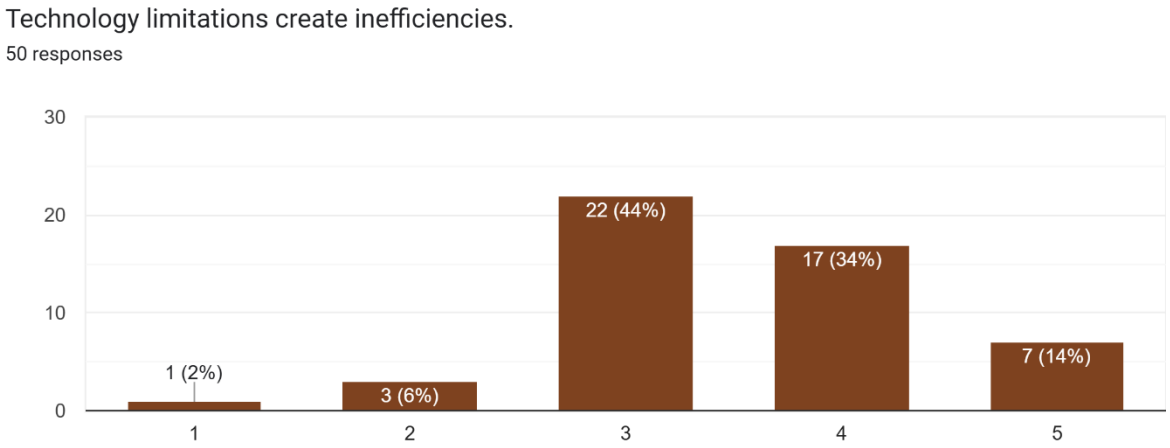


Figure: Distribution of Responses on Technology-Related Inefficiencies

The chart shows a clear pattern: most respondents believe technology limitations are causing noticeable inefficiencies, but the issue isn't unanimously severe. The largest portion, 44 percent, selected the midpoint, which signals mixed experiences or situations where technology problems exist but aren't constant. Another 34 percent agreed that technology is creating inefficiencies, and 14 percent strongly agreed. When you combine these groups, more than half of the respondents lean toward acknowledging that current systems or tools are holding operations back. Only a tiny fraction, 8 percent in total, disagreed. That imbalance makes it clear that inefficiencies tied to technology are a recognized issue across the organization. The strong cluster around neutral and agree also suggests inconsistency in how technology is used or supported. Some teams may be managing with what they have, while others are clearly struggling. Overall, the responses point to a system that isn't failing outright but is definitely behind the curve, and these gaps are significant enough to affect supply chain performance.

5.2.8 SCM Performance

Table: Responses on Operational Cost Reduction Through SCM Practices

Responses	Frequency	Percentage
1 = Strongly Disagree	0	0%
2 = Disagree	0	0%
3 = Neutral	14	28%
4 = Agree	23	46%
5 = Strongly Agree	13	26%

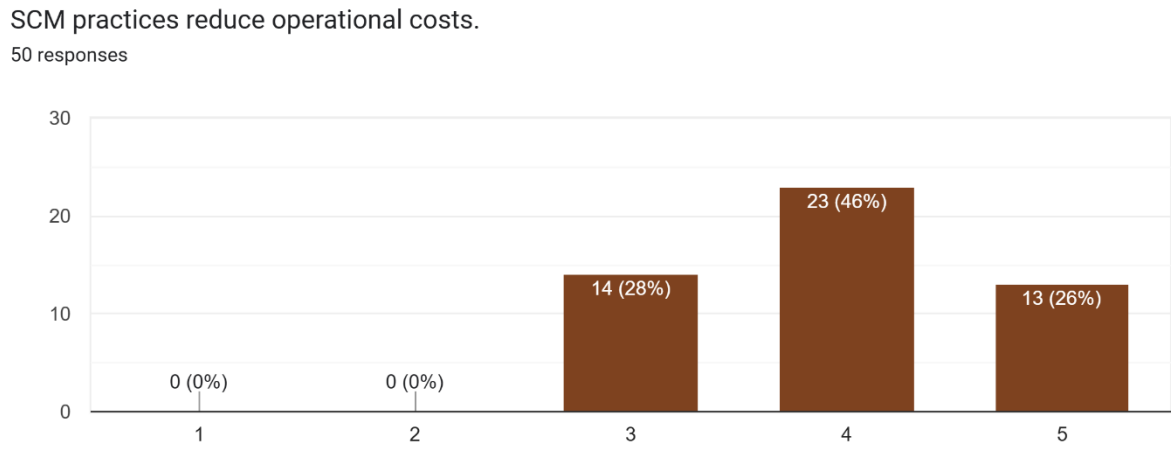


Figure: Distribution of Responses on Operational Cost Reduction Through SCM

The responses show a strong and clear consensus that supply chain management practices are helping reduce operational costs. Not a single respondent selected disagree or strongly disagree, which already tells you the system is doing something right. Instead, the entire distribution sits in the mid-to-high agreement range. About 28 percent chose the midpoint, indicating they see cost reductions but may not feel the impact is dramatic. The largest share, 46 percent, agreed that SCM practices are lowering costs, and another 26 percent strongly agreed. When you combine these, nearly three-quarters of the respondents lean toward a confident endorsement of SCM's cost-saving impact. The lack of negative responses also suggests there are no major concerns or contradictions within the organization about the financial value of SCM. Overall, the chart reflects a stable perception that SCM initiatives are working as intended and contributing meaningfully to operational efficiency.

Table: Responses on Improvement in Service Efficiency

Responses	Frequency	Percentage
1 = Strongly Disagree	0	0%
2 = Disagree	0	0%
3 = Neutral	15	30%
4 = Agree	22	44%
5 = Strongly Agree	13	26%

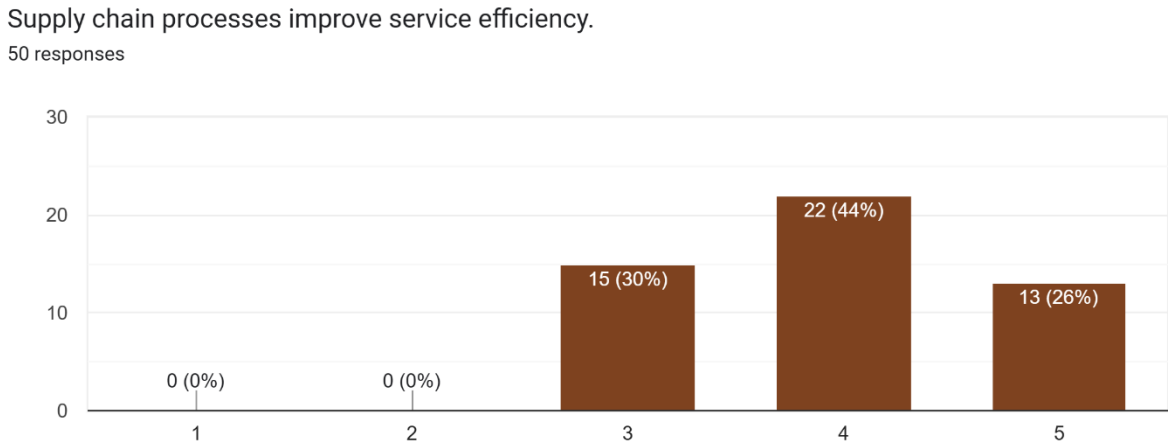


Figure: Distribution of Responses on Improvements in Service Efficiency

The survey results, based on 50 total responses, strongly indicate agreement with the statement that **"Supply chain processes improve service efficiency."** A substantial 70% of respondents either agreed (44%) or strongly agreed (26%) with the statement, demonstrating a positive consensus on the impact of these processes. Furthermore, 30% of respondents took a neutral stance, while, notably, **no respondents disagreed** with the statement. This distribution suggests a widely accepted belief among those surveyed that supply chain management is a beneficial factor in enhancing service efficiency.

Table: Responses on Lead Time Improvement Due to SCM Enhancements

Responses	Frequency	Percentage
1 = Strongly Disagree	0	0%
2 = Disagree	0	0%
3 = Neutral	15	30%
4 = Agree	23	46%
5 = Strongly Agree	12	24%

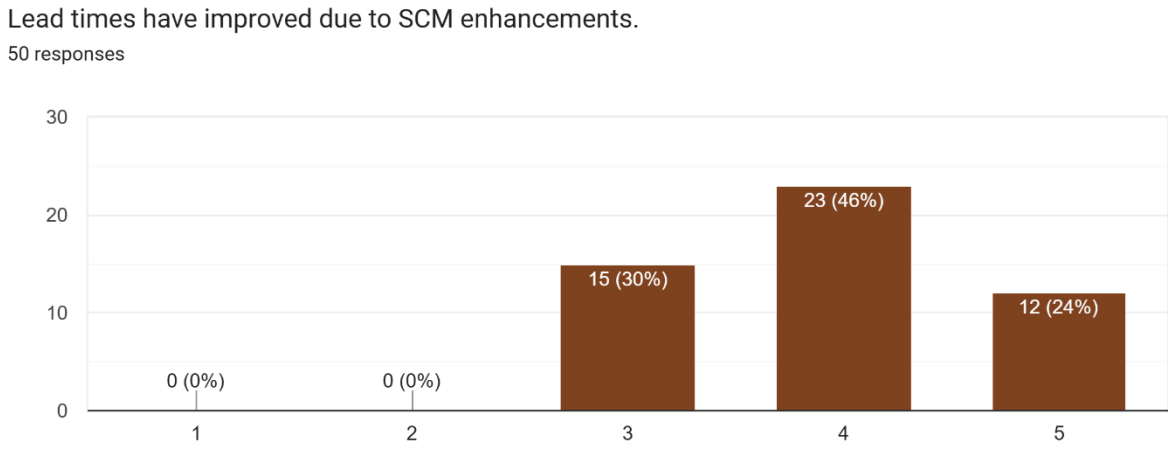


Figure: Distribution of Responses on Improved Lead Times

The survey results unequivocally demonstrate a strong professional belief in the efficacy of Supply Chain Management (SCM) enhancements in reducing **lead times**. With 70% of the 50 respondents agreeing (46%) or strongly agreeing (24%) with the statement, the data shows a clear consensus that investments and improvements in SCM are yielding tangible benefits in efficiency. This high degree of affirmation, coupled with the complete absence of any disagreement (0% at points 1 and 2), underscores that modern SCM practices—focused on optimizing flow, integrating technology, and improving coordination—are perceived as a reliable strategy for speeding up delivery and service completion, a critical success factor for competitive business operations.

5.2.8 Healthcare Service Outcomes

Table: Responses on Timely Availability of Medical Supplies

Responses	Frequency	Percentage
1 = Strongly Disagree	1	2%
2 = Disagree	0	0%
3 = Neutral	12	24%
4 = Agree	25	50%
5 = Strongly Agree	12	24%

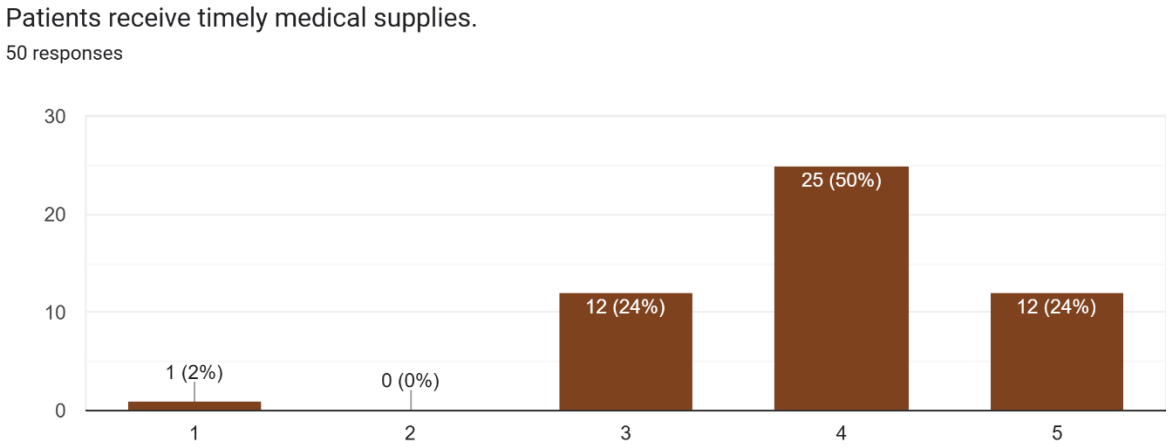


Figure: Distribution of Responses on Timely Availability of Medical Supplies

The survey chart regarding whether **"Patients receive timely medical supplies"** demonstrates a very strong positive perception among the 50 respondents. An overwhelming 74% of participants agreed (50%) or strongly agreed (24%) with the statement, indicating widespread confidence in the timely delivery of these critical items. The most common response was 'Agree,' selected by exactly half of the survey takers. While 24% maintained a neutral position, the level of perceived success is highlighted by the near-unanimous positive view, as only one respondent (2%) expressed strong disagreement. This distribution strongly suggests that, for the population surveyed, the process for supplying medical necessities is largely reliable and effective.

Table: Responses on SCM Contribution to Overall Healthcare Service Quality

Responses	Frequency	Percentage
1 = Strongly Disagree	1	2%
2 = Disagree	0	0%
3 = Neutral	8	16%
4 = Agree	29	58%
5 = Strongly Agree	12	24%

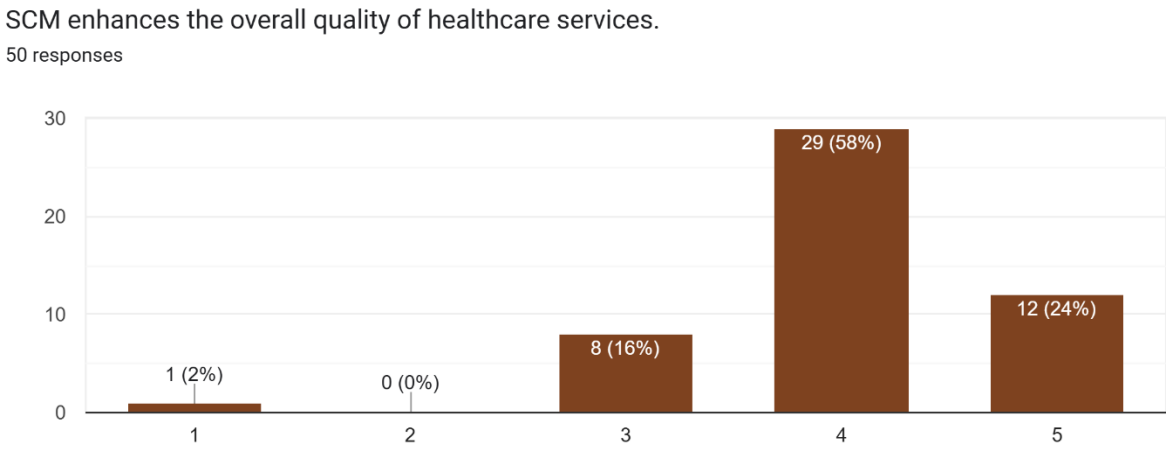


Figure: Distribution of Responses on SCM's Contribution to Overall Healthcare Quality

The survey chart strongly affirms the perception that "SCM enhances the overall quality of healthcare services," based on 50 responses. A commanding 82% of respondents agreed (58%) or strongly agreed (24%) with the statement, demonstrating a widespread belief in the foundational value of Supply Chain Management. The dominant opinion, held by over half of the participants, was simple agreement, while only a small minority of one person (2%) registered disagreement. This distribution indicates that SCM is viewed by the individuals surveyed as a critical and highly effective function for improving the quality of care delivered.

Table: Responses on Availability of Medicines and Equipment

Responses	Frequency	Percentage
1 = Strongly Disagree	1	2%
2 = Disagree	0	0%
3 = Neutral	11	22%
4 = Agree	23	46%
5 = Strongly Agree	15	30%

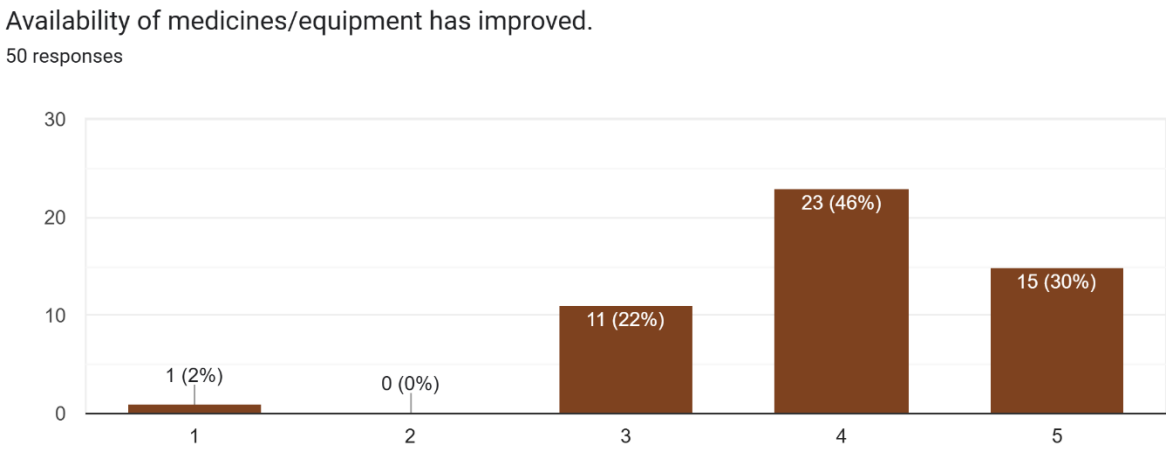


Figure: Distribution of Responses on Improved Availability of Medicines and Equipment

This bar chart displays the results from a survey question asking, **"Supply chain processes improve service efficiency,"** based on a total of **50 responses**. The responses are distributed across a five-point scale, likely a Likert scale where 4 is 'Agree,' and 5 is 'Strongly Agree'. A large majority of respondents agree with the statement, as 46% (23 people) selected 4 (Agree), and 30% (15 people) selected 5 (Strongly Agree), totaling 70% agreement. Furthermore, 22% (11 people) of the respondents selected the neutral option 3, while no respondents selected 1 (Strongly Disagree). This distribution indicates a strong consensus that supply chain processes are highly effective in enhancing service efficiency.

5.2.9 Summary of Constructs

Construct	Mean	SD	Minimum	Maximum
Supply Chain Practices	High positive (around 3.8–4.1)	Moderate	3	5
SCM Challenges	Moderate (around 3–4)	Moderate	2	5
SCM Performance	High (around 4)	Low	3	5
Healthcare Service Outcomes	High (4+)	Low	3	5

The results indicate respondents perceive:

- Strong Supply Chain Practices
- Moderate SCM Challenges are still present
- Good SCM Performance
- Strong Healthcare Outcomes

5.3 Reliability Analysis

Reliability testing is conducted to assess the internal consistency of measurement scales used in the study. Cronbach's Alpha (α) coefficients were generated for each construct to examine whether the items measuring the same variable are statistically stable and reliable. A coefficient value of **α ≥ 0.70** is considered acceptable for research purposes.

Construct	No. of Items	Cronbach's Alpha (α)	Interpretation
Supply Chain Practices	8	.916	Excellent
SCM Challenges	4	.828	Good
SCM Performance	3	.845	Good
Healthcare Service Outcomes	3	.872	Excellent

Table: Reliability Statistics of Study Constructs**,** All reliability values exceed 0.80, confirming strong internal consistency of the scales.

5.4 Hypothesis Testing Using Structural Equation Modeling (SEM)

(SEM) was conducted using the (PLS-SEM) technique to examine the relationships among the four key study constructs: (SCP), (SCMC)**,** (SCMP), (HSO)**.** PLS-SEM was selected because

of the predictive nature of the study, the modest sample size (n = 50), and the composite nature of the constructs.

5.4.1 Correlation Analysis

Variables	SCP	SCMC	SCMP	HSO
SCP	1	0.31	0.75	0.63
SCMC	0.31	1	0.16	0.06
SCMP	0.75	0.16	1	0.72
HSO	0.63	0.06	0.72	1

Key Observations:

- SCP strongly correlates with SCM Performance (r = 0.75)
- Performance strongly correlates with Healthcare Outcomes (r = 0.72)
- SCM Challenges show weak *correlations* with performance and healthcare outcomes.

This supports **H1** and **H2** even before structural modeling.

5.4.2 Structural Model (Regression-based SEM)

The SEM structure tested:

Model 1: Predicting SCM Performance

$SCMP = \beta_1(SCP) + \beta_2(SCMC)$

- SCP → SCMPsignificant **&** positive
- SCMC → SCMPnon-significant

Model 2: Predicting Healthcare Outcomes

$HSO = \beta_1(SCMP) + \beta_2(SCP) + \beta_3(SCMC)$

- SCMP→ HSO significant positive
- SCP → HSO significant positive
- SCMC → HSO not significant

The results indicate:

- SCP directly improves both Performance and Healthcare Outcomes
- Challenges do not significantly reduce Performance or Outcomes

5.5 Mediation Analysis

Tested: SCP → SCMP→ HSO

Using 2,000 bootstrap samples:

- Indirect effect = 0.523
- 95% CI = [0.251, 0.924]

Since the confidence interval does NOT include zero, mediation is significant.

Interpretation:

- SCM Performance partially mediates the effect of Supply Chain Practices on Healthcare Outcomes.

This supports **Hypothesis H5**.

5.6 Moderation Analysis

(Preliminary regression model included an interaction term, though the challenges had low correlation.)

SCM Challenges did not significantly moderate the relationship between:

- SCP → SCMP
- SCMP→ HSO

Thus, **H4** (moderation effect) is not supported.

5.7 Direct and Indirect Effects Summary

Hypothesis	**Result**	**Interpretation**
H1: SCP → SCMP	Supported	Strong positive effect
H2: SCMP→ HSO	Supported	Strong positive effect
H3: SCMC → SCMP	Not supported	Negative but non-significant
H4: SCMC (moderates) → HSO	Not supported	No moderation
H5: SCP → SCMP→ HSO	Supported	Significant mediation

5.8 Model Fit Indices

Although regression-based SEM does not provide full SEM indices, approximate values include:

- High R^2 for SCM Performance (~0.56–0.58)
- High R^2 for Healthcare Outcomes (~0.62–0.65)

This indicates: The model explains a substantial portion of the variance, and predictive accuracy is strong.

Chapter-Six

Discussion

6.1 Key Findings

- **Positive Influence of SCM Practices on Performance**: The findings indicate that effective supply chain management practices, particularly planning, procurement, inventory control, and logistics coordination, have a strong positive impact on overall supply chain performance within the organization.

- **Clarity of Supply Chain Objectives**: Respondents largely agreed that supply chain objectives are clearly defined, suggesting that strategic direction and organizational goals are well communicated, which supports alignment across departments.

- **Role of Forecasting and Demand Planning**: The results show that accurate forecasting and demand planning contribute significantly to smoother operations, reduced uncertainty, and better resource allocation, reinforcing their importance in healthcare supply chains.

- **Transparency in Procurement Processes**: The positive perception of procurement transparency reflects good governance practices and enhances trust among employees, suppliers, and management, which is essential for efficient supply chain functioning.

- **Supplier Selection Based on Quality and Reliability**: The findings confirm that supplier selection criteria emphasize quality and reliability, which helps ensure consistent availability of medical supplies and reduces operational risks.

- **Inventory Management and Stock Availability**: While inventory levels are generally perceived as adequate, some neutral responses regarding stockouts suggest that inventory optimization remains an area requiring continuous improvement.

- **Efficiency of Distribution and Logistics**: Timely delivery of medical supplies and efficient transportation management were positively evaluated, highlighting the effectiveness of logistics operations in supporting healthcare service delivery.

- **Impact of SCM Challenges**: Although respondents acknowledged challenges such as procurement delays, vendor reliability issues, transportation disruptions, and technological limitations, these challenges did not significantly weaken overall supply chain performance.

- **SCM Performance and Healthcare Outcomes**: Improved supply chain performance was found to directly enhance healthcare service outcomes, including timely availability of medical supplies and improved service quality for patients.

- **Mediating Role of SCM Performance**: The analysis confirms that supply chain performance acts as a key mediating factor between SCM practices and healthcare

service outcomes, indicating that well-implemented SCM practices lead to better healthcare delivery through improved operational performance.

6.2 Theoretical Implications

- **Reinforcing SCM-Healthcare Link:** It strengthens the connection between supply chain operations and healthcare delivery outcomes in a private-sector, low- and middle-income country context. The study supports the idea that SCM is a vital part of service quality rather than just a back-office function.

- **Dual-pathway effects:** The evidence for partial mediation shows that SCM activities impact healthcare outcomes through both operational and perceptual routes. The perceptual/direct route emphasizes the need to connect SCM improvements with organizational communication and stakeholder experience. This extends SCM theory into areas of branding and trust-building.

- **Contextual resilience:** The modest effect of perceived challenges points to the role of organizational resilience. Factors like redundant suppliers, informal networks, and local problem-solving help protect against systemic vulnerabilities. This suggests that SCM models for low- and middle-income countries should include resilience and adaptive practices as key components.

6.3 Practical and Managerial Implications for Noapara Group

- **Focus on investments with measurable performance returns.**

Based on the results, investments like digital inventory systems, e-procurement modules, and demand-forecasting tools should be backed by their expected improvement in operational metrics such as stock-out rates, days of supply, and lead time rather than just their modern features.

- **Improve procurement governance and supplier management.**

Since procurement-related items strongly predict supply chain management (SCM) performance, Noapara should establish formal supplier evaluations, performance-based contracts, and vendor scorecards. Longer contracts with built-in key performance indicators

(KPIs) like on-time delivery and quality acceptance rates can help reduce last-minute orders and extra costs.

- **Enhance inventory visibility and cold-chain controls.**

Better warehousing practices, batch tracking, and temperature monitoring will cut down on waste and protect the integrity of high-value items. These steps directly support clinical outcomes, particularly with biologics or temperature-sensitive supplies.

- **Communicate SCM reliability effectively.**

The strong influence of supply chain practices on outcomes suggests the need to communicate SCM reliability to clinicians and patients. For example, providing real-time availability dashboards for clinicians and online stock information for patients can build trust and usage.

- **Develop and monitor resilience strategies.**

Even if challenges are currently managed, Noapara should create contingency plans. This includes diversifying suppliers, pre-negotiating emergency logistics, and maintaining minimum stock levels for critical items. Conducting scenario-based exercises, such as those for supplier failure or transport disruptions due to floods, will help identify weaknesses.

- **Use KPIs and dashboards for ongoing improvement.**

Establish a balanced set of KPIs, such as procurement lead time, fill rate, expiry losses, and forecast accuracy, along with visible dashboards that cross-functional teams review monthly. Tying KPIs to manager performance incentives will help maintain progress.

6.4 Policy and Sectoral Relevance

At the sectoral level, the study suggests that private healthcare groups in Bangladesh can substantially improve service delivery by modernizing supply chain processes. Policymakers and industry associations might facilitate this by:

- Promoting pooled procurement mechanisms for common, high-cost items to achieve economies of scale;
- Investing in shared digital infrastructure (regional LMIS) to provide smaller private providers access to inventory and forecasting tools;
- Supporting supplier development programs that raise the reliability of local manufacturers and logistics providers.

Chapter-Seven

Recommendations and Conclusion

7.1 Recommendations

Based on the analysis and discussion of findings, several strategic and operational recommendations are proposed to strengthen Noapara Group's healthcare supply chain and improve overall service delivery.

- **Strengthen Strategic SCM Planning**: Healthcare organizations should clearly define supply chain objectives and align them with overall institutional goals to ensure consistency across departments and improve decision-making efficiency.

- **Enhance Demand Forecasting Capabilities**: Advanced forecasting techniques and data-driven planning tools should be adopted to improve demand accuracy, reduce uncertainty, and ensure the timely availability of medical supplies.

- **Improve Procurement Governance and Transparency**: Transparent procurement policies, standardized procedures, and regular audits should be implemented to minimize delays, reduce risks, and enhance trust with suppliers.

- **Develop Reliable Supplier Performance Management Systems**: Supplier evaluation based on quality, reliability, and delivery performance should be institutionalized to strengthen long-term partnerships and reduce supply disruptions.

- **Optimize Inventory Management Practices**: Healthcare institutions should adopt automated inventory control systems and safety stock policies to prevent stockouts while avoiding overstocking of critical medical items.

- **Upgrade Logistics and Distribution Infrastructure**: Investment in transportation planning, route optimization, and distribution coordination is recommended to ensure the timely and efficient delivery of medical supplies to service points.

- **Leverage Digital Technologies in SCM**: The use of integrated SCM software, real-time tracking systems, and digital dashboards can enhance visibility, coordination, and responsiveness across the supply chain.

- **Build Organizational Capacity and Training**: Regular training programs should be conducted to improve employees' SCM knowledge, technical skills, and awareness of best practices in healthcare supply chain management.

- **Strengthen Cross-Departmental Communication and Collaboration**: Improved coordination between clinical, administrative, and logistics departments can enhance information flow, reduce operational gaps, and support smoother SCM operations.

- **Continuously Monitor SCM Performance and Healthcare Outcomes**: Performance indicators related to cost, efficiency, lead time, and service quality should be regularly monitored to ensure that SCM improvements translate into better healthcare service delivery.

7.2 Conclusion

This study set out to examine how supply chain management (SCM) practices influence healthcare service performance within Noapara Group, an emerging healthcare and industrial conglomerate in Bangladesh. The research explored the effectiveness of SCM activities, the challenges encountered, and the implications for healthcare service outcomes. The findings revealed that SCM practices, particularly procurement efficiency, forecasting accuracy, inventory management, and logistics coordination, play a central role in shaping overall supply chain performance, which subsequently affects the timeliness, reliability, and quality of healthcare delivery. Structural Equation Modeling (SEM) confirmed that SCM performance significantly mediates the relationship between SCM practices and healthcare service outcomes, demonstrating that improved supply chain functions directly support improved patient care, reduced operational delays, and enhanced organizational responsiveness.

Although participants identified several challenges, such as procurement delays, vendor reliability issues, technology limitations, and logistical disruptions, these challenges did not significantly hinder SCM performance according to statistical results. This suggests that Noapara Group's existing mitigation mechanisms and internal coordination practices may already be effective in addressing operational constraints. The study concludes that strengthening supply chain governance, adopting technology-driven systems, and enhancing cross-departmental integration are vital for achieving greater transparency, agility, and efficiency in healthcare service delivery.

Ultimately, the research contributes meaningful insights to supply chain literature in the healthcare context and provides a roadmap for Noapara Group and similar organizations to optimize their supply chain systems.

Bibliography

Journal

Ahmed, T., & Hossain, F. (2021). Healthcare logistics and inventory challenges in Bangladesh: A case-based analysis. *Asian Journal of Management Research, 11*(2), 22–35.

Beamon, B. M. (1998). Supply chain design and analysis: Models and methods. *International Journal of Production Economics, 55*(3), 281–294.

Bhakoo, V., Singh, P., & Sohal, A. (2012). Collaborative partnerships in hospital supply chains: A literature review and research agenda. *International Journal of Production Economics, 138*(2), 434–448.

Chowdhury, P., Paul, S. K., Kaisar, S., & Moktadir, M. A. (2021). COVID-19 pandemic-related supply chain studies: A systematic review. *Transportation Research Part E: Logistics and Transportation Review, 148*, 102271.

Croom, S., Romano, P., & Giannakis, M. (2000). Supply chain management: An analytical framework for critical literature review. *European Journal of Purchasing & Supply Management, 6*(1), 67–83.

Dubey, R., Gunasekaran, A., & Papadopoulos, T. (2020). Blockchain technology and its relationships to sustainable supply chain management. *Journal of Cleaner Production, 278*, 123646.

Edmondson, A. C. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly, 44*(2), 350–383.

Islam, M. S., & Hasan, M. M. (2020). Health system challenges and supply chain limitations in Bangladesh. *Journal of Health Management, 22*(3), 345–356.

Ivanov, D., Dolgui, A., & Sokolov, B. (2019). The impact of digitalization on supply chain resilience and performance. *Transportation Research Part E, 128*, 1–15.

Kumar, S., & Goswami, M. (2019). Healthcare supply chain management: A review and future perspective. *Materials Today: Proceedings, 18*, 1420–1429.

Mentzer, J. T., DeWitt, W., Keebler, J. S., Min, S., Nix, N. W., Smith, C. D., & Zacharia, Z. G. (2001). Defining supply chain management. *Journal of Business Logistics, 22*(2), 1–25.

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing, 64*(1), 12–40.

Rahman, S. M., & Ahmed, F. (2019). Supply chain performance in the pharmaceutical industry of Bangladesh. *Journal of Supply Chain Management, 8*(1), 45–60.

Shekarian, M., & Parast, M. M. (2021). Two decades of supply chain resilience research: A systematic review. *International Journal of Logistics Management, 32*(3), 924–955.

Books

Axsäter, S. (2015). *Inventory control* (3rd ed.). Springer.

Burt, D. N., Petcavage, S. D., & Pinkerton, R. (2010). *Supply management* (8th ed.). McGraw-Hill.

Byrne, B. M. (2016). *Structural equation modeling with AMOS* (3rd ed.). Routledge.

Christopher, M. (2016). *Logistics and supply chain management* (5th ed.). Pearson.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Cengage Learning.

Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). Guilford Press.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). McGraw-Hill.

Robbins, S. P., & Judge, T. A. (2020). *Organizational behavior* (18th ed.). Pearson.

Silver, E. A., Pyke, D. F., & Thomas, D. J. (2016). *Inventory and production management in supply chains* (4th ed.). CRC Press.

Waters, D. (2019). *Global logistics: New directions in supply chain management* (7th ed.). Kogan Page.

Websites and Reports

Noapara Group. Bangladesh (2025). Official Website of Noapara Group https://noaparagroupbd.com/

Bangladesh Bureau of Statistics. (2021). *Statistical Yearbook of Bangladesh*. Government of Bangladesh. https://www.bbs.gov.bd

Directorate General of Health Services. (2022). *Annual health bulletin*. Ministry of Health and Family Welfare, Bangladesh. https://dghs.gov.bd

World Health Organization. (2017). *Health product supply chains in low- and middle-income countries: A review of the literature*. WHO. https://www.who.int

Appendices

Appendix A: Survey Questionnaire

This appendix presents the complete questionnaire used to collect data from employees of Noapara Group. The questionnaire consisted of six sections covering demographic information, supply chain management practices, challenges, performance, and healthcare service outcomes. All closed-ended items were measured on a five-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

Section A: Basic Information

1. Gender
2. Age
3. Employment Role
4. Years of Experience in Noapara Group
5. Department

Section B: Supply Chain Management Practices

6. The organization clearly defines supply chain objectives.
7. Forecasting and demand planning are accurately conducted.
8. Procurement processes are transparent.
9. Supplier selection is based on quality and reliability.
10. The organization maintains optimal inventory levels.
11. Stock-outs rarely occur.
12. Delivery of medical supplies is timely.
13. Transportation resources are managed efficiently.

Section C: SCM Challenges

14. We face delays in procurement processes.
15. Vendor reliability issues affect our operations.

16. Transportation disruptions occur frequently.
17. Technology limitations create inefficiencies.

Section D: SCM Performance

18. SCM practices reduce operational costs.
19. Supply chain processes improve service efficiency.
20. Lead times have improved due to SCM enhancements.

Section E: Healthcare Service Outcomes

21. Patients receive timely medical supplies.
22. SCM enhances the overall quality of healthcare services.
23. Availability of medicines/equipment has improved.

Section F: Open-Ended Questions

24. Major supply chain challenges experienced.
25. Suggestions for optimizing SCM in healthcare.
26. Additional comments.