

Midocean university

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Research title

*IMPACT OF SUPPLY CHAIN MANAGEMENT
PRACTICES ON OPERATIONAL EFFICIENCY IN AL-
BAHA HEALTH CLUSTER HOSPITALS, SAUDI
ARABIA:AN APPLIED STUDY*

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1.Introduction

Supply chain management (SCM) has become one of the most influential management disciplines in modern organizations, particularly within healthcare systems where uninterrupted availability of medicines, medical devices, and consumable supplies directly affects the quality of healthcare services and patient safety. Hospitals operate in highly dynamic environments characterized by increasing demand, budget constraints, technological advancement, and growing expectations regarding service quality. Consequently, effective supply chain management is no longer limited to purchasing and inventory control but has evolved into a strategic function that contributes significantly to organizational performance.

Healthcare organizations worldwide have recognized that efficient supply chain management reduces operational costs, minimizes waste, shortens procurement lead times, improves inventory availability, and enhances overall operational efficiency. In contrast, poor supply chain practices often result in medicine shortages, excessive inventory, expired products, delayed patient treatment, and unnecessary financial losses.

Saudi Arabia is currently undergoing one of the largest healthcare transformations under Vision 2030. The establishment of Health Clusters and the corporatization of healthcare organizations have increased the importance of operational efficiency and resource optimization. These reforms emphasize integrated healthcare delivery, financial sustainability, digital transformation, and high-quality patient-centered care. Accordingly, improving healthcare supply chains has become a strategic priority for health clusters throughout the Kingdom.

Among these health clusters, Al-Baha Health Cluster represents an appropriate context for examining supply chain management practices. The cluster includes ten general hospitals, specialized centers, and a large network of primary healthcare centers serving the Al-Baha region. Managing pharmaceutical products, medical equipment, laboratory supplies, and consumables across multiple facilities requires efficient coordination, information sharing, inventory management, supplier collaboration, and responsive logistics systems

Operational efficiency has become a key performance indicator for healthcare organizations because it reflects the organization's ability to maximize outputs while minimizing resource consumption. Efficient hospitals can provide timely healthcare services, reduce patient waiting times, minimize operational costs, improve resource utilization, and increase patient satisfaction. Several studies indicate that supply chain management practices significantly contribute to operational efficiency through improved procurement processes, demand forecasting, inventory optimization, supplier relationship management, and information technology integration.

Despite substantial investments in healthcare infrastructure and digital transformation in Saudi Arabia, many healthcare organizations continue to experience operational challenges related to procurement delays, inventory shortages, overstocking, fragmented coordination among departments, and variability in supplier performance. These challenges directly affect hospital performance and may compromise service quality.

Therefore, investigating the relationship between supply chain management practices and operational efficiency within Al-Baha Health Cluster hospitals is both academically valuable and practically important. The findings may assist healthcare leaders and decision-makers in identifying critical supply chain practices that improve operational performance and support the objectives of Saudi Vision 2030.

2.Problem Statement

Healthcare organizations rely heavily on efficient supply chain management to ensure the continuous availability of medicines, medical devices, laboratory supplies, and other essential healthcare resources. Any disruption in procurement, inventory management, supplier coordination, or logistics processes may directly influence operational efficiency, patient safety, service quality, and financial performance.

Despite the significant reforms introduced under Saudi Vision 2030, healthcare organizations continue to face operational challenges related to inventory

shortages, procurement delays, overstocking, fragmented information systems, and increasing operational costs. The transformation toward Health Clusters requires healthcare organizations to optimize shared services, including supply chain management, in order to achieve financial sustainability and operational excellence. Shared services such as supply chain management are a central component of the health cluster model.

The Al-Baha Health Cluster serves more than 303,000 beneficiaries through 10 general hospitals, 94 primary healthcare centers, and 11 specialized centers, making supply chain coordination across multiple facilities a complex operational challenge. Managing pharmaceutical supplies, medical consumables, and equipment efficiently is essential to maintaining uninterrupted healthcare services throughout the cluster.

Although hospitals have adopted various supply chain management practices, limited empirical evidence exists regarding the extent to which these practices influence operational efficiency within Saudi health clusters, particularly in Al-Baha Health Cluster. Most previous studies have focused on manufacturing industries or healthcare organizations outside Saudi Arabia, while relatively few studies have examined supply chain practices within the context of Saudi governmental hospitals undergoing institutional transformation.

Accordingly, this study seeks to investigate the impact of supply chain management practices on operational efficiency in Al-Baha Health Cluster hospitals by examining key dimensions including supplier relationship management, inventory management, information sharing, strategic procurement, and logistics integration.

3. Significance of the Study

This study is expected to contribute to both academic knowledge and healthcare practice.

3.1 Academic Significance

The study enriches the literature on supply chain management within healthcare organizations by examining its relationship with operational efficiency in the context of Saudi governmental hospitals. It also contributes to the limited body of research focusing on Health Clusters established under Saudi Vision 2030.

Furthermore, the study extends the application of Supply Chain Management Theory and the Resource-Based View (RBV) in healthcare organizations operating within developing economies.

3.2 Practical Significance

The findings of this study are expected to benefit:

- * Executives of Al-Baha Health Cluster.
- * Hospital administrators.
- * Pharmacy directors.
- * Supply chain managers.
- * Procurement departments.
- * Healthcare policymakers.

The study may assist decision-makers in identifying the most influential supply chain management practices that improve hospital performance while reducing operational costs and enhancing service quality.

4. Research Objectives

General Objective

To investigate the impact of supply chain management practices on operational efficiency in Al-Baha Health Cluster hospitals.

Specific Objectives

1. To examine the level of supply chain management practices implemented in Al-Baha Health Cluster hospitals.
2. To evaluate the level of operational efficiency in Al-Baha Health Cluster hospitals.
3. To determine the effect of supplier relationship management on operational efficiency.
4. To investigate the impact of inventory management on operational efficiency.
5. To examine the effect of information sharing on operational efficiency.
6. To investigate the impact of strategic procurement on operational efficiency.
7. To provide recommendations for improving operational efficiency through effective supply chain management practices.

5. Research Question

Main Research Question

What is the impact of supply chain management practices on operational efficiency in Al-Baha Health Cluster hospitals?

Sub-Questions

1. What is the current level of supply chain management practices in Al-Baha Health Cluster hospitals?
2. What is the level of operational efficiency in Al-Baha Health Cluster hospitals?
3. Does supplier relationship management significantly affect operational efficiency?
4. Does inventory management significantly affect operational efficiency?
5. Does information sharing significantly affect operational efficiency?
6. Does strategic procurement significantly affect operational efficiency?
7. Which supply chain management practice has the strongest influence on operational efficiency?

6. Research Hypotheses

Main Hypothesis

H1: Supply chain management practices have a statistically significant positive impact on operational efficiency in Al-Baha Health Cluster hospitals.

Sub-Hypotheses

- * H1a: Supplier relationship management positively influences operational efficiency.
- * H1b: Inventory management positively influences operational efficiency.
- * H1c: Information sharing positively influences operational efficiency.
- * H1d: Strategic procurement positively influences operational efficiency.
- * H1e: Logistics integration positively influences operational efficiency.

7 Previous Studies

Study 1: Mittal and Mantri (2023)

Mittal and Mantri (2023) conducted a systematic literature review to examine the role of Supply Chain Management (SCM) in healthcare organizations. The study analyzed previous research published between 2010 and 2022 to identify the

major SCM practices that influence healthcare performance. The findings indicated that supplier relationship management, inventory optimization, logistics integration, and information sharing significantly improve operational efficiency, reduce procurement costs, and enhance service quality. The authors concluded that healthcare organizations should adopt integrated supply chain strategies supported by digital technologies to improve organizational performance.

Study 2: Longaray et al. (2023)

Longaray et al. (2023) investigated performance measurement systems used in hospital supply chains through a systematic review of international literature. The study identified operational efficiency, procurement performance, inventory turnover, financial performance, and patient service quality as the most frequently used performance indicators.

The authors emphasized that healthcare organizations require comprehensive performance measurement systems capable of integrating supply chain activities across different departments. They also recommended conducting empirical studies within governmental healthcare institutions to validate existing theoretical models.

Study 3: Azadeh et al. (2023)

Azadeh et al. (2023) examined the optimization of hospital medical supply chains using integrated operational planning models. Their study demonstrated that effective coordination among procurement, warehousing, transportation, and inventory management significantly reduces operational costs while improving service responsiveness.

The researchers concluded that healthcare organizations implementing integrated supply chain systems experience higher operational efficiency and better utilization of healthcare resources.

Study 4: Alshammari et al. (2024)

Alshammari et al. (2024) investigated the impact of digital transformation on healthcare supply chain performance within Saudi hospitals. Using a quantitative research design, the study found that digital inventory systems, electronic procurement platforms, and integrated information systems significantly improved inventory accuracy, procurement speed, and operational efficiency.

The study recommended expanding digital supply chain initiatives across Saudi governmental hospitals to support the objectives of Saudi Vision 2030.

Study 5: Al-Qahtani et al. (2025)

Al-Qahtani et al. (2025) evaluated the implementation of the Saudi pharmaceutical track-and-trace system (RSD) across healthcare institutions. The findings indicated that electronic tracking systems improved medicine availability, reduced stock shortages, minimized counterfeit medicines, and enhanced inventory visibility.

The researchers concluded that digital supply chain technologies contribute directly to improving operational efficiency and healthcare quality.

Study 6: Ibrahim and Hassan (2022)

Ibrahim and Hassan (2022) explored the relationship between inventory management and hospital operational performance in public healthcare institutions. The study revealed that effective inventory planning significantly reduced stock-outs, minimized expired medicines, and enhanced healthcare service continuity.

The authors concluded that inventory management remains one of the strongest determinants of operational efficiency within hospitals.

Study 7: Kumar et al. (2021)

Kumar et al. (2021) investigated supplier relationship management in healthcare organizations across several developing countries. The results demonstrated that long-term supplier collaboration improved procurement reliability, reduced lead times, enhanced purchasing flexibility, and strengthened organizational performance.

The study emphasized that strategic supplier partnerships should replace traditional transactional purchasing approaches.

Summary of Previous Studies

The reviewed literature consistently demonstrates that Supply Chain Management practices positively influence healthcare organizational performance. The most frequently examined SCM practices include:

- * Supplier Relationship Management
- * Inventory Management
- * Information Sharing
- * Strategic Procurement
- * Logistics Integration

Similarly, operational efficiency has commonly been measured through indicators such as:

- * Cost reduction
- * Lead time reduction
- * Inventory turnover
- * Resource utilization
- * Service quality
- * Patient satisfaction
- * Organizational productivity

Most previous studies reported statistically significant positive relationships between SCM practices and operational efficiency.

8 Research Gap

Although numerous studies have investigated Supply Chain Management in healthcare organizations, several important research gaps remain.

First, the majority of previous studies were conducted in manufacturing industries or healthcare systems outside Saudi Arabia. Consequently, their findings may not fully reflect the operational characteristics of Saudi governmental hospitals.

Second, limited empirical studies have examined healthcare supply chain management within Saudi Health Clusters established under Saudi Vision 2030.

Third, existing studies have primarily focused on individual SCM dimensions such as inventory management or procurement rather than examining multiple SCM practices simultaneously within a comprehensive research model.

Fourth, very few studies have investigated the relationship between Supply Chain Management practices and operational efficiency within Al-Baha Health Cluster hospitals despite the strategic importance of the cluster in Saudi Arabia's healthcare transformation.

Finally, previous studies have paid limited attention to evaluating SCM practices from the perspectives of healthcare administrators, pharmacy managers, procurement officers, and supply chain professionals simultaneously.

Therefore, this study seeks to address these gaps by investigating the impact of multiple Supply Chain Management practices—including supplier relationship management, inventory management, information sharing, strategic procurement, and logistics integration—on operational efficiency within Al-Baha Health Cluster hospitals.

9 Theoretical Foundation of the Study

A theoretical foundation provides the conceptual basis for explaining the relationship between independent and dependent variables. It enables researchers to interpret empirical findings using established management theories and supports the development of research hypotheses.

This study is primarily grounded in the Resource-Based View (RBV) theory, while also drawing on Supply Chain Management Theory and Dynamic Capabilities Theory. These theories collectively explain how effective supply chain practices can enhance operational efficiency in healthcare organizations.

9.1 Resource-Based View (RBV)

The Resource-Based View (RBV), introduced by Barney (1991), argues that organizations achieve superior performance when they possess valuable resources and capabilities that are difficult for competitors to imitate.

According to RBV, organizational resources become a source of sustainable competitive advantage when they are:

- * Valuable
- * Rare
- * Inimitable
- * Non-substitutable (VRIN)

Within healthcare organizations, these strategic resources include:

- * Skilled healthcare professionals
- * Advanced information systems

- * Integrated procurement systems
- * Effective inventory management
- * Strong supplier relationships
- * Organizational knowledge

From the RBV perspective, Supply Chain Management practices represent organizational capabilities rather than merely operational activities. Hospitals that effectively manage suppliers, inventory, logistics, and information are more likely to achieve higher operational efficiency than organizations lacking these capabilities. Recent reviews continue to support applying RBV in healthcare and supply chain research.

9.2 Supply Chain Management Theory

Supply Chain Management Theory emphasizes that organizations achieve superior performance by integrating procurement, suppliers, logistics, inventory management, and information systems into one coordinated process.

The theory assumes that organizational performance depends on coordination among all members of the supply chain rather than optimizing individual functions independently.

In healthcare organizations, effective SCM includes:

- * Strategic Procurement
- * Supplier Relationship Management
- * Inventory Management
- * Logistics Coordination
- * Information Sharing

Hospitals implementing integrated SCM systems generally experience:

- * Lower procurement costs
- * Better inventory control
- * Faster response times
- * Higher medicine availability
- * Improved operational efficiency

The theory therefore supports the assumption that improving SCM practices positively influences operational performance.

9.3 Dynamic Capabilities Theory

Dynamic Capabilities Theory explains how organizations continuously adapt their internal resources to respond to changing environments.

Healthcare organizations operate in highly dynamic environments characterized by:

- * Rapid technological changes
- * Increasing patient demand
- * Supply disruptions
- * Regulatory reforms
- * Healthcare transformation

According to this theory, organizations improve performance by continuously developing capabilities that enable them to sense opportunities, seize them, and reconfigure organizational resources.

For Al-Baha Health Cluster hospitals, Dynamic Capabilities explain how digital transformation, integrated logistics systems, electronic procurement platforms, and collaborative supplier relationships contribute to operational efficiency.

9.4 Theoretical Framework of the Study

Based on the above theories, this study proposes that Supply Chain Management Practices constitute strategic organizational capabilities that positively influence Operational Efficiency.

Independent Variable

Supply Chain Management Practices

- * Supplier Relationship Management
- * Inventory Management
- * Information Sharing
- * Strategic Procurement
- * Logistics Integration

Operational Efficiency

Measured through:

- * Cost Reduction
- * Service Quality
- * Resource Utilization
- * Procurement Cycle Time
- * Inventory Availability
- * Process Efficiency

The proposed framework assumes that improvements in SCM practices lead to measurable improvements in hospital operational efficiency.

9.5 Conceptual Framework

Independent Variable (IV): Supply Chain Management Practices

- * Supplier Relationship Management
- * Inventory Management
- * Information Sharing
- * Strategic Procurement
- * Logistics Integration

Dependent Variable (DV): Operational Efficiency

- * Cost Reduction
- * Resource Utilization
- * Service Quality
- * Inventory Availability
- * Operational Productivity

10. RESEARCH METHODOLOGY

This chapter presents the research methodology adopted to investigate the impact of Supply Chain Management (SCM) practices on operational efficiency in Al-Baha Health Cluster hospitals. It describes the research philosophy, research design, research approach, study population, sampling procedures, data collection instruments, validity and reliability procedures, statistical analysis methods, and ethical considerations.

A quantitative cross-sectional survey design was selected because it enables the researcher to examine relationships between SCM practices and operational efficiency using standardized data collected from employees working in hospitals. This approach is widely used in healthcare management research because it facilitates statistical testing of hypotheses and supports evidence-based decision-making.

10.1 Research Philosophy

This study adopts the Positivist Research Philosophy.

Positivism assumes that reality can be objectively measured through empirical observations and statistical analysis. Since this study seeks to examine the relationship between measurable variables (SCM practices and operational efficiency), the positivist philosophy is considered the most appropriate.

The positivist paradigm allows the researcher to test hypotheses objectively using quantitative data collected from healthcare professionals.

10.2 Research Approach

The study adopts the Deductive Research Approach.

The deductive approach begins with existing theories and empirical literature before developing hypotheses that are statistically tested using collected data.

This approach is appropriate because:

- * SCM theories already explain organizational performance.
- * Previous studies suggest positive relationships between SCM practices and operational efficiency.
- * The study seeks to verify these relationships within Al-Baha Health Cluster hospitals.

10.3 Research Design

A quantitative descriptive-correlational research design will be employed.

The descriptive component will describe current SCM practices implemented within hospitals.

The correlational component will examine relationships between SCM practices and operational efficiency.

The explanatory component will determine the magnitude of the impact of each SCM practice on operational efficiency using regression analysis.

10.4 Study Area

The study will be conducted within Al-Baha Health Cluster, Kingdom of Saudi Arabia.

The cluster includes:

- * General hospitals
- * Specialized hospitals
- * Primary Healthcare Centers
- * Shared services supporting healthcare delivery

The cluster was established as part of the Health Sector Transformation Program under Saudi Vision 2030 and is responsible for coordinating healthcare services across the Al-Baha region.

11. Study Population

The target population consists of employees directly involved in supply chain and operational activities within Al-Baha Health Cluster hospitals.

Participants will include:

- * Hospital Directors
- * Deputy Directors
- * Supply Chain Managers
- * Procurement Officers
- * Pharmacy Directors
- * Pharmacy Supervisors
- * Warehouse Managers
- * Medical Supply Coordinators
- * Inventory Officers
- * Operations Managers

These participants are expected to possess sufficient knowledge regarding supply chain practices and operational performance.

11.1 Sampling Technique

The study will employ stratified random sampling.

The population will be divided into strata according to job category to ensure adequate representation from different administrative departments.

This technique minimizes sampling bias and improves representativeness.

11.2. Sample Size

The required sample size will be determined using the Krejcie and Morgan (1970) sample size table.

Assuming the study population is approximately 400–500 employees involved in supply chain and operational activities across Al-Baha Health Cluster hospitals, the recommended sample size is expected to range between 196 and 217 respondents.

To compensate for incomplete responses, approximately 230 questionnaires will be distributed.

12. Research Instrument

Data will be collected using a structured self-administered questionnaire.

The questionnaire will consist of two sections.

Section A

Demographic Information

- * Gender
- * Age
- * Education
- * Years of Experience
- * Job Position
- * Hospital

Section B

Research Variables

Supply Chain Management Practices

- * Supplier Relationship Management
- * Inventory Management
- * Information Sharing
- * Strategic Procurement
- * Logistics Integration

Operational Efficiency

- * Cost Reduction

- * Resource Utilization
- * Service Quality
- * Process Efficiency
- * Inventory Availability

All items will be measured using a Five-Point Likert Scale:

1 = Strongly Disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly Agree

12.1 Validity and Reliability

12.1.1 Validity of the Research Instrument

Validity refers to the extent to which a research instrument accurately measures the constructs it is intended to measure (Creswell C Creswell, 2023). In this study, several procedures will be undertaken to ensure the validity of the questionnaire.

First, content validity will be established through an extensive review of the literature on Supply Chain Management (SCM) and Operational Efficiency. The questionnaire items will be adapted from previously validated instruments used in peer-reviewed studies to ensure that they adequately represent the dimensions of the study variables.

Second, the questionnaire will be reviewed by a panel of experts in business administration, healthcare management, supply chain management, and research methodology. Their comments and recommendations regarding the clarity, relevance, and comprehensiveness of the questionnaire items will be incorporated before the final version is distributed.

Finally, a pilot study will be conducted involving approximately 20–30 respondents from hospitals that are not included in the final study sample. The pilot study will assess the clarity of the questionnaire, identify any ambiguous items, and estimate the time required to complete the survey. Feedback obtained from the pilot study will be used to improve the final questionnaire.

12.1.2 Reliability of the Research Instrument

Reliability refers to the consistency and stability of the research instrument in measuring the study variables. Internal consistency reliability will be assessed using Cronbach's Alpha coefficient, which is one of the most widely accepted measures of reliability in social science research.

According to Hair et al. (2022), a Cronbach's Alpha value of 0.70 or above indicates acceptable reliability, while values above 0.80 indicate good reliability. Each construct of the questionnaire—including Supplier Relationship Management, Inventory Management, Information Sharing, Strategic Procurement, Logistics Integration, and Operational Efficiency—will be tested separately to ensure internal consistency.

12.1.3 Data Collection Procedures

The data collection process will be conducted in several stages.

Initially, ethical approval will be obtained from MidOcean University before commencing the study. Subsequently, an official approval letter will be requested from the administration of Al-Baha Health Cluster to facilitate access to the participating hospitals.

Following institutional approval, the researcher will coordinate with hospital administrators and department managers to distribute the questionnaire to eligible participants. The questionnaire will be administered electronically using Microsoft Forms or Qualtrics, with paper-based copies made available where necessary to increase the response rate.

Participants will receive an information sheet explaining the purpose of the study, emphasizing that participation is voluntary and that all responses will remain confidential. Data collection is expected to take approximately four weeks, after which the completed questionnaires will be screened, coded, and entered into IBM SPSS Statistics for analysis.

13. Ethical Considerations

Ethical principles will be strictly observed throughout the study.

Participation will be entirely voluntary, and informed consent will be obtained from all respondents before data collection. Participants will be informed that they may withdraw from the study at any stage without any consequences.

To ensure confidentiality, no personal identifiers such as names or employee numbers will be collected. The collected data will be used solely for academic purposes and stored securely in password-protected electronic files accessible only to the researcher. The findings will be reported honestly and objectively without fabrication, falsification, or manipulation of data.

14. Study Boundaries

Geographical Boundary

The study will be conducted in hospitals affiliated with Al-Baha Health Cluster in the Kingdom of Saudi Arabia.

Time Boundary

The study is expected to be carried out during the 2026–2027 academic year.

Subject Boundary

The study focuses on examining the impact of Supply Chain Management practices—namely Supplier Relationship Management, Inventory Management, Information Sharing, Strategic Procurement, and Logistics Integration—on Operational Efficiency in hospitals.

Population Boundary

The target population consists of hospital administrators, supply chain managers, procurement officers, pharmacy managers, warehouse supervisors, inventory officers, and operations managers working in hospitals under Al-Baha Health Cluster.

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