Designing A Supply Chain Management Model For Sharia Medical Textile Products Study At PT XYZ

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ABSTRACT

This research focuses on designing a supply chain management model for Sharia-compliant medical textile products at PT XYZ, in response to the growing demand for halal medical textile products in Indonesia. Sharia medical textiles include products such as masks, medical clothing, and bandages produced in accordance with Islamic law, ensuring the use of halal materials, cleanliness in production processes, as well as fair and transparent business practices. With the increasing number of Sharia hospitals, it is crucial for PT XYZ to consider factors such as religious compliance, safety, security, and product quality throughout the supply chain.This study uses a descriptive-qualitative method, collecting data through interviews, observations, and document studies. The analysis is conducted using dynamic simulation and SWOT analysis, focusing on compliance with Sharia principles, such as halal raw materials and clean production processes. The developed supply chain management model is optimized through procurement, production, and distribution that align with Sharia principles, and it is evaluated through optimistic, realistic, and pessimistic scenarios. The results show that this model has the potential to improve the efficiency and effectiveness of PT XYZ's supply chain while ensuring compliance with halal standards. This research provides a practical framework for integrating Sharia principles into the medical textile supply chain, supporting the development of halal products in Indonesia's healthcare market.

Keywords: *Supply chain Management, Sharia Medical Textile Products, Sharia Principles, SWOT Analysis, Dynamic Simulation.*

1. Introduction

Sharia medical textiles are textile products used in medical care, such as masks, medical clothing, or bandages, produced in accordance with Sharia principles. These principles include ensuring the materials are halal, the production process is clean from contamination, and that the handling complies with Islamic law. The growing demand for Sharia-compliant products, especially with the development of Sharia hospitals and increasing Muslim consumer awareness, has made compliance with Sharia principles an essential factor in supply chains (Tieman et al., 2012; Hassan & Harun, 2016).

Supply chain management is an integrated management system that coordinates all stages from suppliers to end consumers. A well-designed supply chain model can help companies optimize production and distribution, improve efficiency, reduce costs, and enhance customer satisfaction (Chopra & Meindl, 2016). The medical textile industry is one that particularly relies on effective supply chain management to ensure safety and quality, as medical textiles are critical for the health and safety of medical staff and patients (Basheer et al., 2018).

During the COVID-19 pandemic, the demand for medical textile products surged, but disruptions in global transportation and regulations presented significant challenges (Jafarnejad et al., 2019). Moreover, halal standards have become increasingly relevant, especially in Indonesia, where the halal industry and the development of Sharia-compliant hospitals are advancing rapidly (Ministry of Religious Affairs, 2023). Designing a supply chain model specifically for Sharia medical textiles is essential to meet these growing needs, ensuring compliance with Islamic law and maintaining quality and safety standards throughout the supply chain.

The design of a supply chain management model specifically for medical textile products in Indonesia includes several key elements such as demand forecasting, inventory management, supplier selection, and transportation optimization. Transportation optimization is a method to minimize transportation costs in the supply chain by selecting the most efficient routes and modes of transportation. Transportation optimization can help companies reduce costs and improve efficiency in product distribution.

The intersection of the medical textile industry and the halal market in Indonesia is becoming increasingly significant, particularly with the rise of Sharia hospitals. As Indonesia's sharia economy grows, the demand for halal-certified products, including medical textiles, is also increasing. The medical textile industry is crucial in providing products such as surgical gowns, drapes, and wound care materials that meet halal standards. This alignment is particularly relevant as the number of Sharia-compliant hospitals in Indonesia continues to rise, driven by the country's large Muslim population and the government's support for the sharia economy.

Source: Data from various sources, processed by PT XYZ
Figure 1. Indonesia hospital market overview 2020-2024

The development of Sharia hospitals in Indonesia is part of a broader effort to enhance the country's position in the global halal market. As of 2023, the growth of sharia-compliant financial services and healthcare facilities has been substantial. The government has set ambitious goals to make Indonesia a leading producer of halal products by 2024. This growth is mirrored in the healthcare sector, where Sharia hospitals adhere to Islamic principles in their operations, including the use of halal-certified medical textiles. This ensures that all aspects of patient care, from food to medical supplies, align with Islamic law, thereby increasing the trust and satisfaction among Muslim patients.

The halal industry in Indonesia has experienced quite rapid development in recent years. This is due to the increasing demand for quality and safe halal textile products for consumers. However, on the other hand, many companies still do not apply sharia principles in the production of medical textile products. Shariah principles are very important to apply in this industry because medical textile products are often used for health care and patient safety. Therefore, it is necessary to design a supply chain management model for sharia medical textile products.

One of the medical textile companies in Indonesia that has the potential to develop Islamic medical textile products is PT XYZ. PT XYZ is one of the well-known medical textile manufacturers in Indonesia. However, there are still shortcomings in the supply chain management of Islamic medical textile products at PT XYZ, especially in the aspect of fulfilling sharia principles. This problem makes it difficult for PT XYZ to meet market demand with sharia compliance.

Various studies have been conducted on supply chain management, especially for medical textile products. Several studies have revealed that designing a good supply chain model can improve efficiency and effectiveness in supply chain management (Chandra et al., 2018; Jumawan et al., 2020; Mohanty et al., 2021). However, there is no research that specifically discusses the design and development of a supply chain management model for Islamic medical textile products in Indonesia, especially at PT XYZ. Therefore, this research aims to design and develop a supply chain management model for Islamic medical textile products at PT XYZ.

With regard to the development of Islamic Hospitals, the Indonesian Ulama Council launched data on the development of the number of Hospitals, sharia service systems and the number of Hospitals that carry out halal certification from 2011-2022. The development of Islamic hospitals can be seen in Figure 1. This proves that Islamic hospitals marked by Islamic hospital certification are a major need.

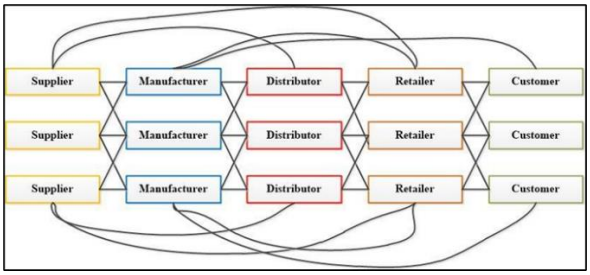
In this research, the method used is descriptive-qualitative method with data collection techniques through interviews, observations, and document studies. The data that has been collected is then analyzed using descriptive analysis techniques and SWOT analysis. The benefit of this research is to provide solutions for PT

XYZ in improving the quality and safety of sharia medical textile products produced. In addition, this research can also contribute to the design of the sharia medical textile industry in Indonesia.

The results of this study are expected to serve as a reference for other medical textile companies in developing a supply chain management model for Islamic medical textile products. It is hoped that the results of this research can provide significant benefits for companies, communities, and the medical textile industry as a whole in an effort to improve the quality and safety of Islamic medical textile products in Indonesia.

Supply Chain Management

Supply chain management (SCM) is a series of management activities in an organizational network from upstream to downstream, from initial raw materials to finished products that reach consumers. Ravindran (2016) states that the supply chain consists of the following: A set of stages (e.g., suppliers, manufacturers, distributors, retailers, and customers) that are physically distinct and geographically separated where inventory is stored or converted in form and or value. A coordinated set of activities related to the procurement of raw materials, the production of semi-finished and finished products, and the distribution of these products to customers within and outside the chain.



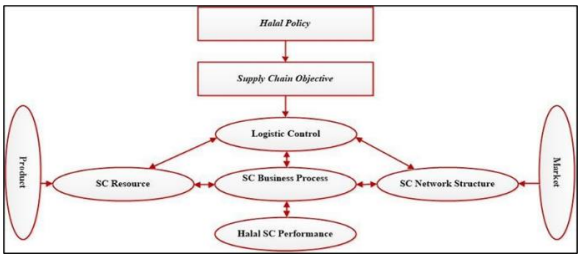
Source: SCM, Chopra and Meindl (2016)

Figure 2. Supply chain management model

Chopra and Meindl (2016) provide a definition of supply chain, as follows: a supply chain consits of all parties involved, directly or indirectly, in fulfilling a customer request. Chopra and Meindl (2016) further stated that in any organization, such as a manufacturer, the supply chain includes all functions involved in receiving and filling customer requests. Ravindran (2016) states that the supply chain network consists of suppliers, manufacturers, distribution centers, retailers and customers.

Halal Supply Chain Management

Halal supply chain management is the management of halal networks with the aim of extending halal integrity from source to consumer point of purchase. Tieman (2012) explains that halal logistics and halal supply chain management are important disciplines for the halal industry in providing raw materials to finished products to consumers. Halal Supply Chain Management (HSCM) is the management of halal networks with the aim of extending halal integrity from source to consumer point of purchase.



Source: Halal SCM, (Tieman et al., 2012)

Figure 3. Halal supply chain management model

Halal supply chain management is defined as the management of the halal network with the aim to extend halal integrity from the source to the consumer's point of purchase. To ensure that products are truly halal at the consumer's point of purchase, it is important to determine what the principles are in halal supply chain management (Tieman et al., 2012). Halal logistics and halal supply chain management are important disciplines for the halal industry in extending halal integrity from source to consumer point of purchase (Tieman and Ghazali, 2012). Tieman (2011) argues that the foundation of halal supply chain management is determined by three factors, namely: direct contact with haram (prohibited), contamination risk, and Muslim consumer perception.

Sharia Principles in Medical Textile Supply Chain

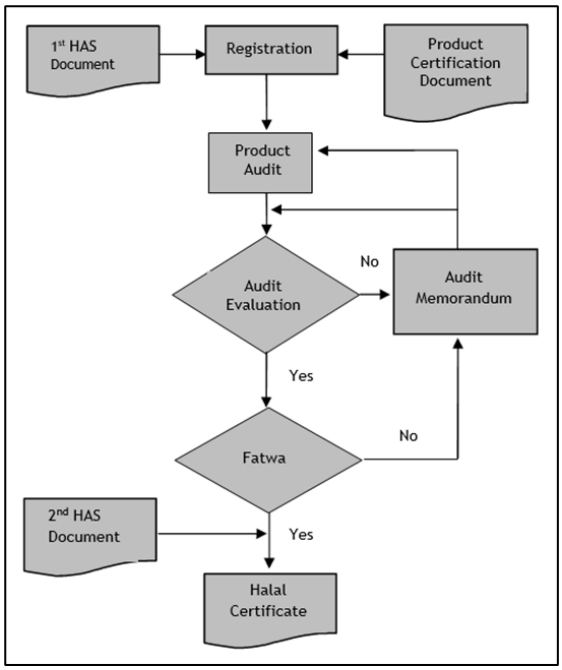
The supply chain in the context of Shariah includes various elements that must adhere to the principles of halal and thayyib. According to the Global Halal Fashion Standard, the key principles are compliance with Islamic law, ethical practices and transparency. This principle ensures that all processes in the supply chain, from raw material selection to final distribution, follow strict halal standards.

Based on Fatwa MUI No. 01 of 2024 which regulates halal standards and sharia conformity recommendations for medical device products. The sharia principles that must be applied in SCM include:

- **Halal and Thayyib**: All raw materials and products must be halal and good (thayyib).
- **Justice**: All transactions must be fair and not harm any party.
- **Transparency**: All processes and information must be transparent.
- **No Elements of Riba, Gharar, and Maisir**: There must be no elements of riba (interest), gharar (uncertainty), and maisir (gambling) in any transaction.

Halal Management System

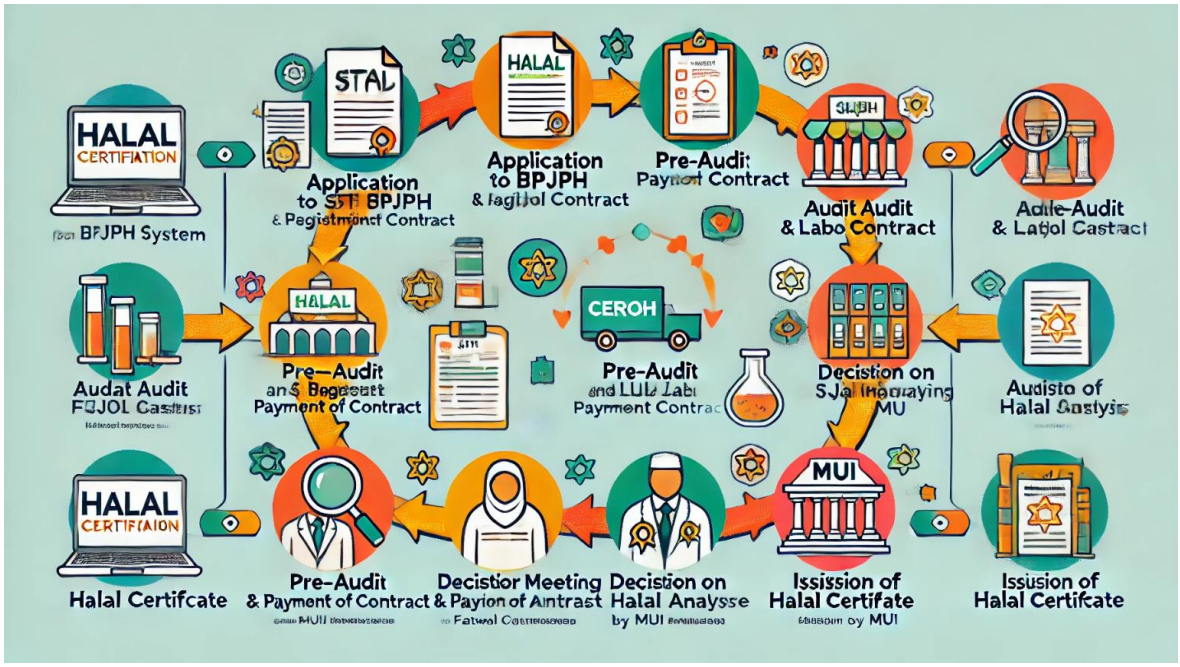
Halal Management System (SNI 99001:2016) is a standard designed to ensure that products are produced in accordance with sharia provisions. This standard covers organizational management, risk management, and halal quality assurance from the beginning to the end of the production process. The implementation of SNI 99001:2016 helps companies like PT XYZ to ensure that all their operations are free from contamination with haram materials and are carried out in compliance with sharia rules.



Source: Halal management system (SNI 99001:2016)
Figure 4. Halal audit system

Halal Guidelines and Regulations

Law No. 33/2014 on Halal Product Guarantee regulates that all products circulating and traded in Indonesia must have halal certification. Companies are required to undergo a certification process that involves rigorous audits and verifications to ensure compliance with halal principles. This law provides legal certainty and strengthens the regulation of the halal certification process, which is now issued by BPJPH based on MUI fatwa. In addition, the implementation of this law is regulated in Government Regulation No. 31 of 2019. In addition, there is also Fatwa of the Indonesian Ulama Council Number 01 of 2024 which regulates halal standards and recommendations for sharia conformity for medical device products issued on March 22, 2024, focusing on determining halal standards and recommendations for sharia conformity for medical device products.



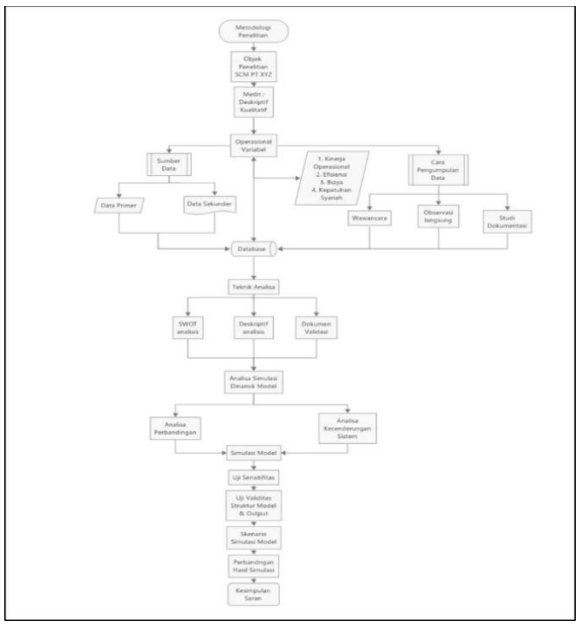
Source: Halal guideline system (JPH No. 33/2014)
Figure 5. Halal product guarantee

2. Research Method

2.1 Population and Sample

The population in this study are all Halal medical textile products produced by PT XYZ. This population can be categorized based on the type of medical fabric that has special technology. In addition, the population can also be categorized based on distribution areas, such as domestic and international.

The sample in this study is a small part of the population chosen to represent the entire population. The sample must be selected in a representative manner so that the research results can be generalized to the entire population. The selected sample will be analyzed through several research variables, namely including: Operational Performance, Efficiency, Cost, and Sharia Compliance.



Source: author research, (Hardian,2024)
Figure 6. Research method texmed SSCM

2.2 Research Method

This research uses a qualitative approach to gain an in-depth understanding of the factors affecting the supply chain of Sharia medical textile products at PT XYZ. The qualitative approach allows researchers to explore and analyze the context and meaning associated with the phenomenon under study (Creswell, 2014). This research is a combination of explanatory research and causal research, namely a combination of secondary data analysis and experiments. Exploratory research with secondary data analysis to determine the national situation and problems, while causal research with experiments to determine the relationship between phenomena in the model.

The data sources used in this research include primary and secondary data:

1. **Primary Data**: Obtained through interviews, direct observations, and document studies at PT XYZ.
2. **Secondary Data**: Obtained from company policy documents, raw material procurement guidelines, production procedures, distribution procedures, and relevant literature (Saunders, Lewis, & Thornhill, 2012).

Figure 6 outlines the research methodology used to develop the Sharia-compliant supply chain management (SSCM) model for medical textiles. It presents a step-by-step framework for gathering and analyzing data, leading to the formulation and validation of the Texmed SSCM model. Here's a detailed explanation of the components:

1. **Research Methodology**: The process begins with defining the research methodology, focusing on evaluating the supply chain management (SCM) of PT XYZ and ensuring that it adheres to Sharia principles.
2. **Data Collection**:
    - **Primary Data**: Includes data from direct interviews, observations, and document studies conducted at PT XYZ. This data provides practical insights into how the company operates and where Sharia compliance may need to be strengthened.
    - **Secondary Data**: Consists of policy documents, procurement guidelines, production procedures, and relevant literature. This data complements the primary data by providing a broader context for understanding existing SCM practices.
3. **Operational Variables**: These variables are crucial in evaluating performance, including:
    - **Operational Efficiency**
    - **Cost Efficiency**
    - **Sharia Compliance**
4. **Data Analysis Techniques**: After data collection, analysis is conducted through:
    - **SWOT Analysis**: To identify strengths, weaknesses, opportunities, and threats within the current SCM.
    - **Descriptive Analysis**: To explore and describe the operational processes related to Sharia compliance in detail.
    - **Document Validation**: To ensure that all documents used in the analysis are authentic and relevant.
5. **Dynamic Simulation Model**: After the analysis, a simulation model is built to test different scenarios for optimizing the Sharia supply chain management model, including:
    - **Sensitivity Tests**: To check how changes in certain variables (like costs or operational efficiencies) impact the overall performance.
    - **Validation Tests**: Using tools like Microsoft Excel to validate the results. **Mean Absolute Percentage Error (MAPE)**: The MAPE method is used to validate the accuracy of the model predictions by comparing the predicted values to the actual values. This ensures that the model is reliable. A lower MAPE indicates a more accurate prediction model.
6. **Comparison & Scenario Simulation**: The final stage involves running simulations for optimistic, realistic, and pessimistic scenarios, allowing for a comparison of outcomes and helping to identify the best strategies for PT XYZ.

In summary, Figure 6 presents a systematic approach to developing a Sharia-compliant supply chain model by integrating qualitative research methods, in-depth analysis, and dynamic simulations to ensure compliance, efficiency, and scalability in the medical textile industry.

2.3 Data Analysis Technique

System analysis uses modelling as a tool, for various reasons and the benefits that can be gained from using models as system representations. In analysis with a dynamic system approach, modelling becomes very important in the problem-solving stage. The stages that must be carried out in solving problems with a dynamic

system approach are not too different from the stages in other modelling and simulation in general. Modelling and simulation using Powersim program and validation test using Microsoft Excel.

2.4 Analysis Techniques

2.4.1. SWOT Analysis

SWOT analysis is used to identify the internal and external factors affecting the sharia-compliant medical textile supply chain at PT XYZ. It helps in formulating the strengths, weaknesses, opportunities, and threats faced by PT XYZ (Gürel & Tat, 2017).

2.4.2. Descriptive Analysis

Descriptive analysis is employed to detail the procurement, production, and distribution processes of sharia-compliant medical textile products at PT XYZ. The collected data from interviews, observations, and document studies are qualitatively analyzed to identify emerging themes and narratively describe the findings (Miles, Huberman, & Saldaña, 2014).

2.4.3. Document Validity

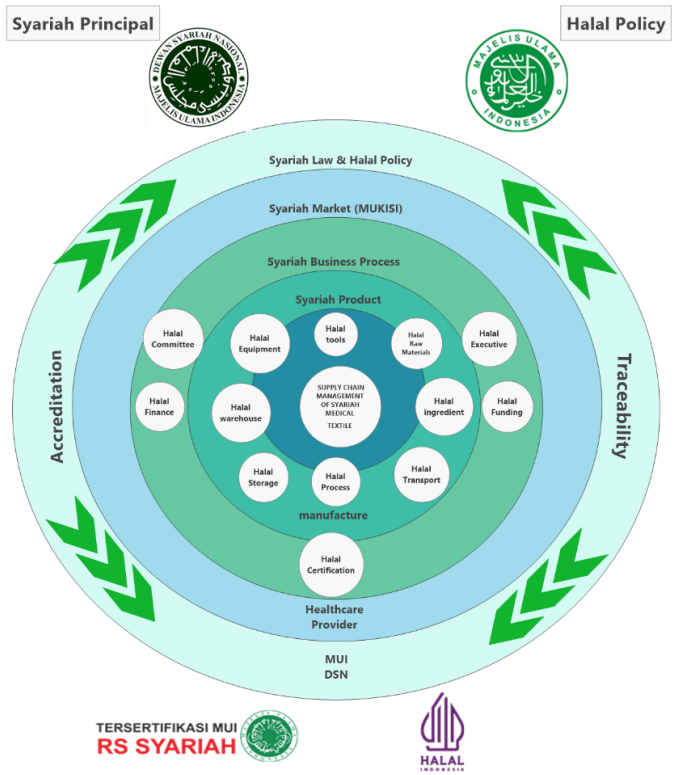
The researcher will verify the validity of documents by checking their clarity, authenticity, and credibility. Documents that are unclear, inauthentic, or lack sufficient credibility will be disregarded in the analysis to ensure the quality and validity of the data used (Lincoln & Guba, 1985).

2.5 Problem Formulation and Definition

The initial and crucial step before problem formulation and definition is understanding the system to be analysed. Without a proper understanding, problem formulation and definition might be unrepresentative, biased, and deviated from the analysis goals. Proper problem formulation and definition set the ultimate goals, guiding the analysis towards achieving targeted outputs, ensuring the analysis remains focused and relevant.

2.6 Conceptual System Development

Conceptual system development involves identifying the actors involved in the system, determining their roles, and understanding their interactions. This phase includes establishing cause-and-effect relationships to illustrate information flow and system operations. Identifying and limiting the system's scope is essential due to the potential complexity and vastness of the system. The proposed supply chain model for medical textiles is as follows:



Source: author concept, (Hardian,2024)

Figure 7. TexMed SSCM

The concept of the Sharia-compliant Medical Textile Supply Chain (SSCM) is an intricate framework designed to ensure that every aspect of the supply chain adheres to Islamic principles. This concept is visually represented in the diagram through multiple concentric circles, each highlighting different layers of compliance and components. Here's a detailed explanation:

Halal Product Components

To ensure halal compliance, medical textiles require halal raw materials, ingredients, and processes. Equipment, storage, and transportation must also adhere to Islamic guidelines. Halal certification is essential to verify compliance. Additionally, financial transactions, investments, and leadership must align with Islamic principles.

Business Process Layer

Sharia Business Process: This involves applying sharia principles in the business processes, ensuring fairness, transparency, and justice in all transactions. It requires adherence to DSN-MUI Fatwa No. 107, focusing on halal and thayyib, justice, transparency, and the prohibition of riba, gharar, and maisir.

Market and Policy Layer

- Sharia Market (MUKISI): This involves the integration and cooperation with the Sharia market, aligning the supply chain with market requirements and demands specific to sharia compliance.
- Sharia Law & Halal Policy: The outermost layer ensures that the entire supply chain adheres to sharia laws and halal policies set by authoritative bodies like MUI (Majelis Ulama Indonesia) and DSN (Dewan Sharia Nasional).

Traceability and Accreditation

- Traceability: Ensuring traceability at every step of the supply chain is crucial for maintaining transparency and integrity. This allows stakeholders to trace the origin and processing of the products.
- Accreditation: Accreditation by recognized halal certification bodies ensures that the entire supply chain process adheres to the required standards and principles.

Healthcare Provider

Healthcare Provider: The final application of the halal medical textiles is within healthcare providers, particularly those operating under sharia-compliant frameworks such as Sharia hospitals. These institutions ensure that all medical textiles used within their facilities comply with halal standards, providing assurance to Muslim patients.

This comprehensive approach ensures that every aspect of the supply chain, from raw materials to the final product, adheres to Islamic principles, providing a robust framework for sharia-compliant medical textiles.

3. Result and Discussion

3.1. Demographics

The study's respondents included 15 key personnel from PT XYZ, comprising managers, production supervisors, and logistics staff. The majority of respondents had over five years of experience in the medical textile industry.

PT XYZ is a company operating in the garment and medical textile sector. Established in 2018, the company founders bring over 20 years of experience in the linen and apparel industry. PT XYZ has grown to become one of the leading producers of medical textiles in Indonesia. The company upholds the following values: Commitment, Trustworthiness, Innovation Leadership, Proactiveness, and Sharia Principles.

The data obtained from the respondents includes information related to the production process, raw material procurement, quality inspection, packaging, storage, and distribution of medical textile products at PT XYZ. Data obtained from PT XYZ shows that the raw material supply chain to product distribution in conventional SCM is organized, but does not pay attention to halal aspects. Procurement of raw materials from suppliers who are not halal-certified, production processes that are not closely monitored regarding halal, quality inspections that do not include halal, as well as packaging, storage and distribution that do not pay attention to sharia aspects make conventional SCM different from sharia SCM.

Table 1. Data variable for research method

Production Data	Daily Production Capacity	Production Cycle Time	Number of workers in production division
Raw Material Procurement Data	Source of raw materials	Procurement frequency	Procurement volume
Quality Data	Product defect rate	Quality inspection frequency	Quality certification
Packaging and Storage Data	Type of packaging	Warehouse capacity	Storage system
Distribution Data	Transportation method	Distribution distance	Delivery time

Source: Idea & research of author, Hardian (2024)

The outlines the conventional supply chain management (SCM) for medical textiles, detailing the various stages from raw materials to the final customer (healthcare provider). The healthcare provider represents the end consumer of medical textiles. Distributors, retailers, and agents are responsible for delivering the final products to the healthcare providers. Distributors manage bulk distribution to various retailers and agents, retailers sell the products directly to the healthcare providers, and agents act as intermediaries, possibly providing specialized or localized service to healthcare providers. Suppliers, principals, or brand owners are responsible for supplying the medical textiles to distributors, retailers, and agents, and they may also own the brand and ensure quality standards. The manufacturing stage involves the actual production of medical textiles, which includes various processes detailed in the lower part of the flowchart. Logistics involves the transportation and storage of materials and products between different stages of the supply chain. The garment industry (downstream tier 3) involves the final stage of textile production, focusing on creating finished garments and medical textiles ready for use.

The fabric industry (middle tier 2) includes processes that transform yarn into fabric, such as finishing (final treatment of fabrics to achieve desired properties), dyeing/printing (coloring and printing designs on the fabric), weaving/knitting (creating fabric by interlacing yarns), and preparation (initial treatments to prepare yarns for weaving or knitting). The yarn industry (middle tier 1) focuses on producing yarn from fibers, involving winding/package (preparing yarn for further processes), RS/OE/MVS spinning (techniques for spinning fibers into yarn), and pre-spinning (preliminary processes before spinning). The fibre industry (upstream) involves sourcing and processing raw fibers, including synthetic fibre (production of synthetic fibers from petrochemicals) and natural fibre (harvesting and preparing natural fibers such as cotton or wool). This structured approach ensures that each stage of the supply chain is clearly defined, from raw material procurement to the final delivery of medical textile products to healthcare providers. The flowchart highlights the complexity and interconnectedness of the supply chain, emphasizing the importance of each tier in maintaining quality and efficiency in the production of medical textiles.

3.2. Result analysis & Modelling

Table of Comparison: Operational Performance, Efficiency, Cost, and Compliance with Sharia Principles.

The following table compares the operational performance, efficiency, cost, and compliance with sharia principles between conventional SCM and Sharia SCM at PT XYZ:

Table 2. Comparison conventional & Sharia SCM

Aspect	Conventional SCM	Sharia SCM
Halal Compliance	Not considered	Highly prioritized throughout the entire process
Halal Certification	Not mandatory	Mandatory, audited every 6 months
Production Process	Focus on efficiency, no specific halal steps	All equipment is purified according to sharia
Quality Inspection	Only includes technical and aesthetic aspect.	Includes halal compliance inspection
Packaging	Focus on product protection, halal not considered	Uses halal packaging materials
Storage	No special attention to halal compliance	Storage conditions are regulated to maintain halal
Distribution	Focus on speed and cost	Ensures product are not contaminated during transport
Operational Performance	High efficiency, lower cost	Relatively high efficiency, additional cost for halal audit
Sharia Compliance	Not followed	Strictly adhered to throughout the supply chain

Source: Research of author, Hardian (2024)

These differences illustrate that while conventional SCM prioritizes efficiency and cost, Sharia SC M focuses on ethical standards and consumer trust, each with distinct challenges and opportunities.

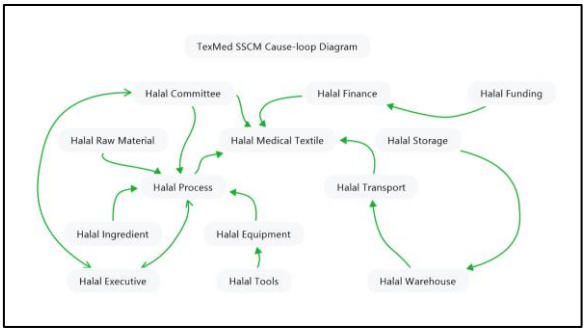
Table 3. SWOT Analysis of Conventional SCM

Strength	Weaknesses	Opportunities	Threats
High efficiency, low operational costs, high distribution speed	No Shariah compliance, potential contamination with non-halal materials	Large market potential, technological support	Intense competition, regulatory changes

Table 4. SWOT Analysis of Sharia SCM

Strength	Weaknesses	Opportunities	Threats
Sharia complience, assured product quality, high consumer trust	High operational costs, complex production processes	Increased demand for halal products, regulatory support	Certification costs, challenges in maintaining quality during distribution

Source: Research of author, Hardian (2024)



Source: Research of author, Hardian (2024)
Figure 8. Cause-loop diagram TexMed SSCM

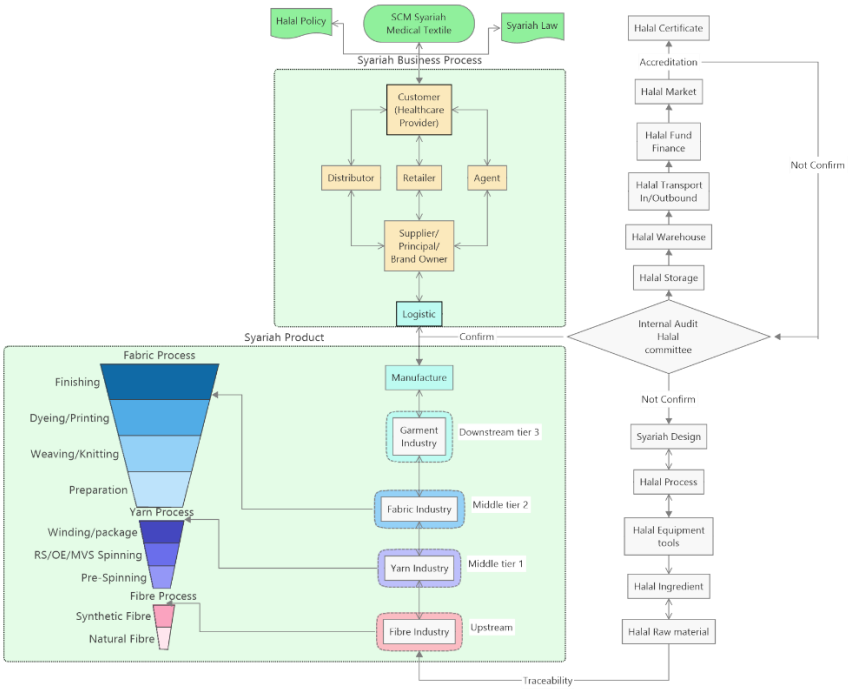
The TexMed SSCM (Sharia Supply Chain Management) cause-loop diagram details the interdependencies and flow of processes ensuring a sharia-compliant supply chain for medical textiles. Here's a detailed explanation of the causal relationships and the corresponding input-output correlations: The Halal Committee (input: standards, output: certification) influences Halal Raw Material (input: certified suppliers, output: raw materials).

The Halal Process (input: materials, output: products) is influenced by Halal Ingredient (input: certified sources, output: ingredients) and Halal Equipment (input: compliant procurement, output: equipment). The Halal Executive (input: training, output: compliance) oversees Halal Finance (input: compliant products, output: management) and Halal Funding (input: investments, output: resources). Halal Storage (input: compliant facilities, output: safe storage) maintains integrity across Halal Transport (input: transport services, output: distribution) and Halal Warehouse (input: warehousing, output: secure environment). Each component's output becomes an essential input for the subsequent process, creating a continuous loop that ensures compliance and integrity throughout the supply chain, resulting in a final product that meets halal standards. This integrated approach ensures that every link in the supply chain supports and enhances the overall halal compliance of medical textiles.

The stages of the Sharia Supply Chain Management (SCM) flowchart for medical textiles are comprehensive, ensuring adherence to halal and Sharia principles. The process begins with Halal Policy and Sharia Law, where the input of halal certification standards and Sharia laws leads to the output of guidelines and regulations for the entire supply chain. The Sharia Business Process involves customers (healthcare providers), distributors, retailers, and agents, all ensuring the supply of compliant medical textiles, with manufacturing and logistics adhering to Sharia principles. The Internal Audit by the Halal Committee uses internal audit reports and compliance checks to confirm compliance or identify non-compliance. Halal Raw Material, Ingredient, and Equipment are sourced from certified halal suppliers, ensuring compliant inputs for production. The Halal Process takes these inputs to produce Sharia-compliant products. Sharia Design uses outputs from the halal process to ensure Sharia-compliant design and production stages. Traceability is maintained through documentation at all stages, ensuring transparency.

The Fabric Process includes stages such as finishing, dyeing/printing, weaving/knitting, and preparation, transforming compliant yarn into final fabric ready for garment production. The Yarn Process involves winding/packaging, RS/OE/MVS spinning, and pre-spinning, turning processed fibres into yarn. The Fibre Process handles synthetic and natural fibres, preparing raw fibre materials for yarn production. The Garment Industry (Downstream Tier 3) uses fabric from the fabric industry to produce final medical textiles for healthcare providers. The Fabric Industry (Middle Tier 2) transforms yarn into fabric, while the Yarn

Industry (Middle Tier 1) processes fibres into yarn. The Fibre Industry (Upstream) processes raw fibres for yarn production.



Source: Concept of author, Hardian (2024)
Figure 9. Flow chart Texmed SSCM

Internal Audit by the Halal Committee confirms compliance or initiates re-evaluation and adjustments if non-compliance is found. Halal Storage and Transport involve storing and transporting confirmed compliant products to maintain compliance. The Halal Warehouse prepares products for distribution, while Halal Market and Finance ensure compliant products are market-ready with financial support. Finally, Accreditation and Certification involve confirming compliance at all stages, leading to the final halal certification for products. Each stage ensures the integrity of the medical textile supply chain, with internal audits playing a crucial role in confirming compliance and addressing any non-conformance issues.

Comparison between conventional and Islamic systems

A comparative analysis of conventional and Islamic systems in fabric production revealed several key differences. Both systems experienced declining fabric production over time, but the conventional system consistently produced more. While the conventional system maintained a stable defect rate, the Islamic system showed improvement.

Financially, the Islamic system outperformed the conventional system, with increasing revenue and profit compared to the decreasing figures of the conventional system. However, the Islamic system had higher raw material costs and increasing labor costs.

In terms of efficiency, the conventional system had a slightly better on-time delivery (OTD) percentage but longer lead times compared to the Islamic system. Both systems experienced a decline in fabric sold, with the conventional system selling less than the Islamic system.

Fabric production, defect rate, and profit/loss show that the conventional system tends to be better in some metrics such as production and profit, while the Islamic system shows superiority in percentage defect rate and on-time delivery (%OTD). The Islamic system shows better stability in some aspects such as defect rate and OTD.

Analysis of Modeling Scenario

Simulation Model Scenarios
1. Baseline Scenario (Before Implementation)
• Conventional Baseline: Conventional SCM with no changes.
• Sharia Baseline: Sharia SCM with no changes.
2. Post-Implementation Scenarios

• Scenario 1: Increase in Procurement Volume
  o Description: Increase raw material procurement volume by 10%.
  o Impact: Transportation and storage costs increase by 5%.

• Scenario 2: Reduction in Production Time
  o Description: Reduce production time by 10% with new technology.
  o Impact: Production costs increase by 3%.

• Scenario 3: Distribution Optimization
  o Description: Optimize the distribution process to improve efficiency.
  o Impact: Transportation costs decrease by 5%, and delivery time is reduced by 2 days.

• Results of the Sharia SCM Supply Chain Model

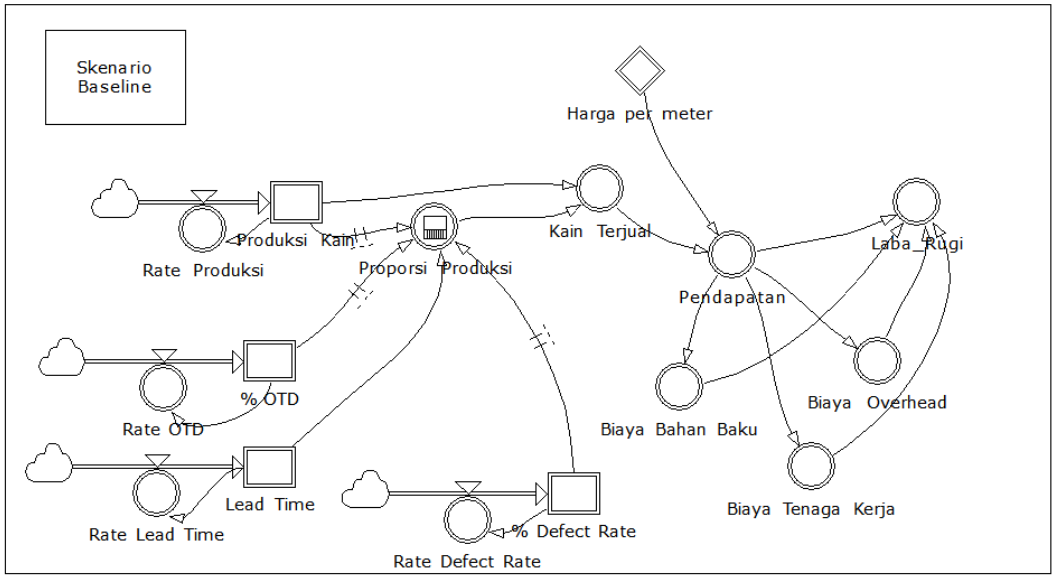


Figure 10. Baseline model scenario

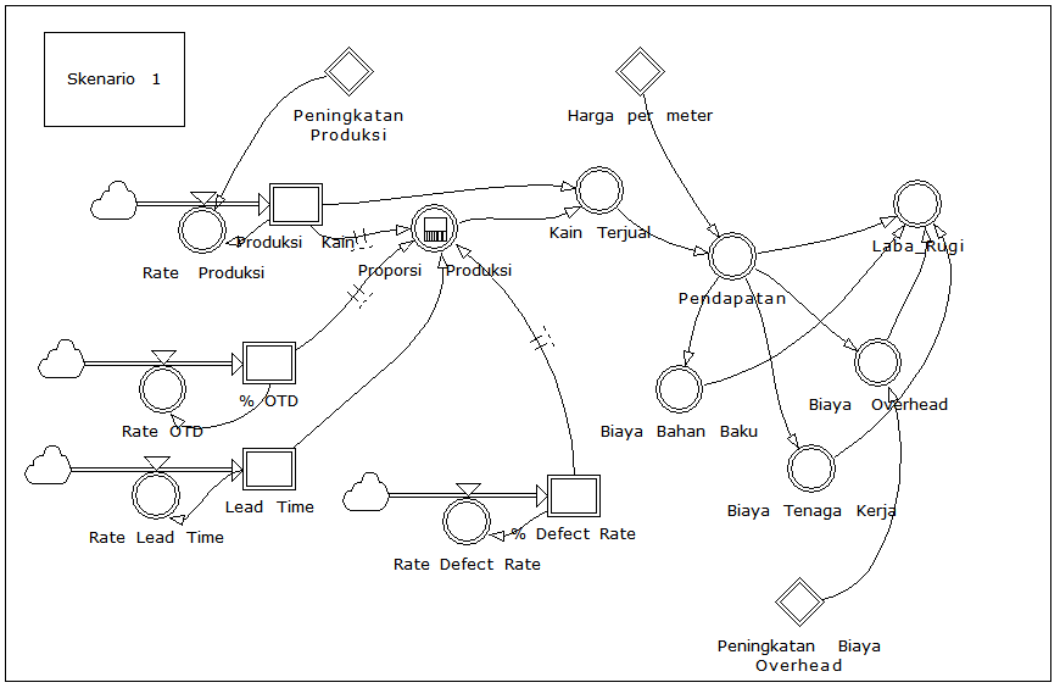


Figure 11. Simulation model scenario 1

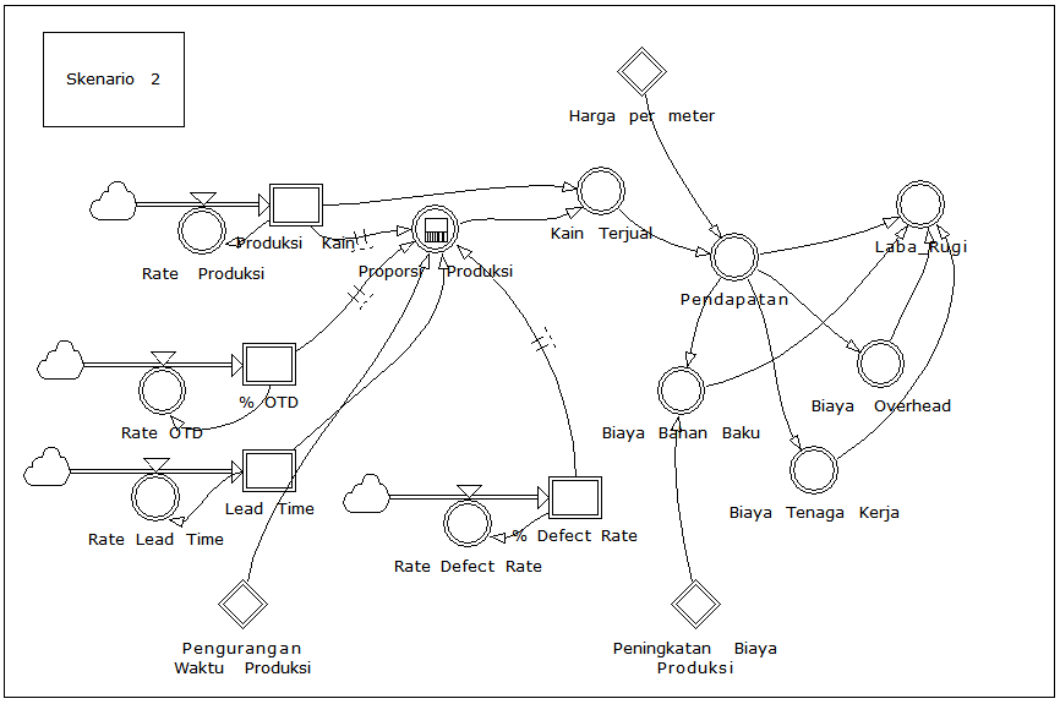


Figure 12. Simulation model scenario 2

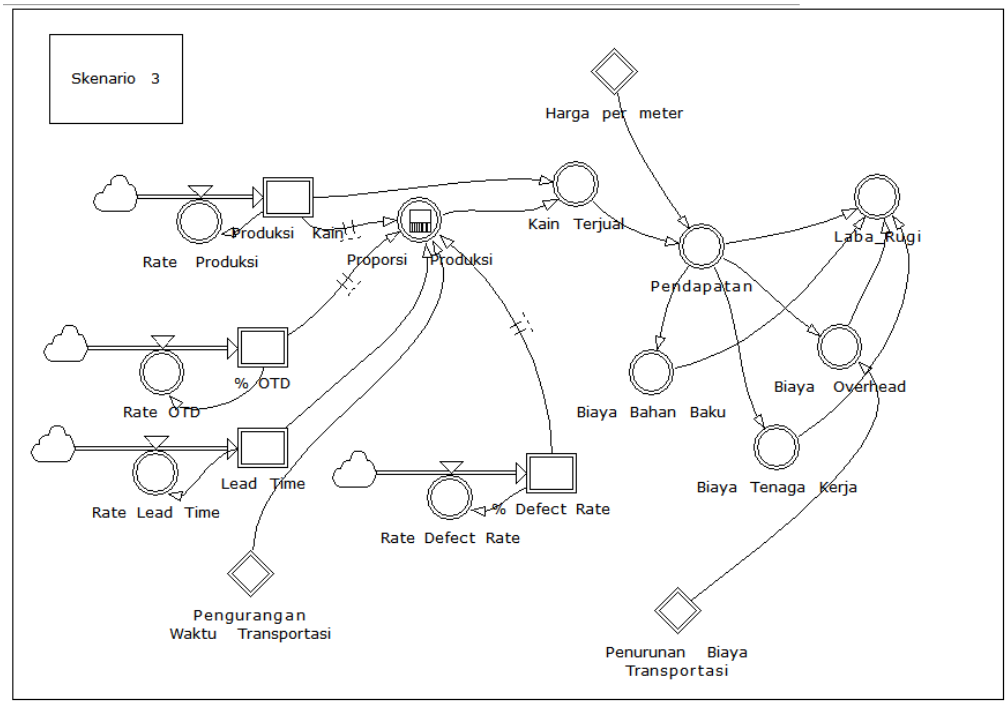


Figure 13. Simulation model scenario 3

Comparison Graphs Before and After Scenario Implementation

A. Fabric Production

The graph compares fabric production over time between the conventional and Sharia systems under different scenarios.

1) Baseline Scenario:

• Conventional (Baseline): Fabric production in the conventional system shows a consistent decline from 1,500 meters to around 1,000 meters over 50 months.

• Sharia (Baseline): The Sharia system baseline scenario shows a consistent increase from around 1,000 meters to about 1,300 meters over 50 months.

2) Scenario 1:
• Conventional (Scenario 1): This scenario shows a faster decline in production compared to the baseline, indicating more significant issues or constraints in the system.
• Sharia (Scenario 1): Shows a slower increase in production compared to the baseline, indicating fewer improvements or constraints.

3) Scenario 2:
• Conventional (Scenario 2): The production decline is slightly less steep than in Scenario 1 but still shows a downward trend.
• Sharia (Scenario 2): Shows a more significant increase in production compared to Scenario 1 and the baseline, indicating substantial improvements in the system.

4) Scenario 3:
• Conventional (Scenario 3): The decline in production is the steepest among all scenarios, indicating significant issues in maintaining production levels.
• Sharia (Scenario 3): This scenario shows the most significant increase in production, with production levels reaching nearly 1,500 meters by the end of 50 months.

B. Defect Rates and OTD

Image 4.24 Comparison graph of defect rates and OTD

The graph compares defect rates and On-time Delivery (OTD) over time between the conventional and Sharia systems under different scenarios.

1) Baseline Scenario:
• Conventional (Baseline): The defect rate in the conventional system shows a consistent decrease from around 60 meters to about 50 meters over 50 months.
• Sharia (Baseline): The Sharia system baseline scenario shows a consistent increase from around 40 meters to about 50 meters over 50 months.

2) Scenario 1:
• Conventional (Scenario 1): This scenario shows a steeper decline in defect rates compared to the baseline, indicating significant improvements in quality control.
• Sharia (Scenario 1): Shows a steeper increase in OTD compared to the baseline, indicating better adherence to delivery schedules.

3) Scenario 2:
• Conventional (Scenario 2): The defect rate decline is less steep than in Scenario 1 but still shows improvement.
• Sharia (Scenario 2): Shows a more significant increase in OTD compared to Scenario 1 and the baseline, indicating substantial improvements in delivery performance.

4) Scenario 3:
• Conventional (Scenario 3): The decline in defect rates is the steepest among all scenarios, indicating a large improvement in quality control.
• Sharia (Scenario 3): This scenario shows the most significant improvement in OTD, reaching around 50 meters by the end of 50 months.

C. Sales Results

The graph compares sales over time between the conventional and Sharia systems under different scenarios.

1) Baseline Scenario:
• Conventional (Baseline): Sales in the conventional system show a consistent decline from around 70 million rupiahs to about 55 million rupiahs over 50 months.

• Sharia (Baseline): The Sharia system baseline scenario shows a consistent increase from around 50 million rupiahs to about 65 million rupiahs over 50 months.
2) Scenario 1:
• Conventional (Scenario 1): This scenario shows a faster decline in sales compared to the baseline, indicating more significant issues in maintaining sales levels.
• Sharia (Scenario 1): Shows a slower increase in sales compared to the baseline, indicating fewer improvements or constraints.

3) Scenario 2:
• Conventional (Scenario 2): The decline in sales is less steep than in Scenario 1 but still shows a downward trend.
• Sharia (Scenario 2): Shows a more significant increase in sales compared to Scenario 1 and the baseline, indicating substantial improvements.

4) Scenario 3:
• Conventional (Scenario 3): The decline in sales is the steepest among all scenarios, indicating significant issues in maintaining sales levels.
• Sharia (Scenario 3): This scenario shows the most significant increase in sales, reaching around 70 million rupiahs by the end of 50 months.

D. Profit/Loss Results

The graph compares profit/loss over time between the conventional and Sharia systems under different scenarios.

1) Baseline Scenario:
• Conventional (Baseline): Profit/loss in the conventional system shows a consistent decline from around 7 million rupiahs to about 5.5 million rupiahs over 50 months.
• Sharia (Baseline): The Sharia system baseline scenario shows a consistent increase from around 4 million rupiahs to about 5 million rupiahs over 50 months.

2) Scenario 1:
• Conventional (Scenario 1): This scenario shows a faster decline in profit/loss compared to the baseline, indicating more significant financial issues.
• Sharia (Scenario 1): Shows a slower increase in profit/loss compared to the baseline, indicating fewer improvements or constraints.

3) Scenario 2:
• Conventional (Scenario 2): The decline in profit/loss is less steep than in Scenario 1 but still shows a downward trend.
• Sharia (Scenario 2): Shows a more significant increase in profit/loss compared to Scenario 1 and the baseline, indicating substantial financial improvements.

4) Scenario 3:
• Conventional (Scenario 3): The decline in profit/loss is the steepest among all scenarios, indicating significant financial issues.
• Sharia (Scenario 3): This scenario shows the most significant increase in profit/loss, reaching around 5.5 million rupiahs by the end of 50 months.

E. Fabric Sold (Meters)

Image 4.27 Comparison graph of fabric sold

The graph compares fabric sold over time between the conventional and Sharia systems under different scenarios.

1) Baseline Scenario:
• Conventional (Baseline): Fabric sold in the conventional system shows a consistent decline from around 1,400 meters to about 1,100 meters over 50 months.
• Sharia (Baseline): The Sharia system baseline scenario shows a consistent increase from around 1,000 meters to about 1,300 meters over 50 months.

2) Scenario 1:
• Conventional (Scenario 1): This scenario shows a faster decline in fabric sold compared to the baseline, indicating more significant issues in maintaining sales levels.
• Sharia (Scenario 1): Shows a slower increase in fabric sold compared to the baseline, indicating fewer improvements or constraints.

3) Scenario 2:
• Conventional (Scenario 2): The decline in fabric sold is less steep than in Scenario 1 but still shows a downward trend.
• Sharia (Scenario 2): Shows a more significant increase in fabric sold compared to Scenario 1 and the baseline, indicating substantial improvements.

4) Scenario 3:
• Conventional (Scenario 3): The decline in fabric sold is the steepest among all scenarios, indicating significant issues in maintaining sales levels.
• Sharia (Scenario 3): This scenario shows the most significant increase in fabric sold, with sales reaching around 1,300 meters by the end of 50 months.

Model simulation for 50 periods

A fifty-period simulation was conducted to assess the performance of the production process. The results indicate a decline in fabric production, likely caused by efficiency issues or increased production problems. Consequently, fabric sales also decreased, leading to a drop in revenue and overall profit. While the company faced challenges in production, there were some positive developments. On-time delivery improved, suggesting enhanced efficiency in that area. However, the time required to complete production increased. Additionally, the quality of the fabric improved as evidenced by a decreasing defect rate.

Dynamic simulation models help visualize trends and patterns in production, defect rate, revenue, profit/loss, and other metrics. Using historical data to build predictive models helps in understanding future performance based on parameter changes.

Sensitivity Test

To perform the input parameter sensitivity test, we will change some key parameters and see how the changes affect the output results. The analysis below presents sensitivity tests of various factors that affect earnings.

Sensitivity tests show that profit/loss is significantly affected by changes in labor costs, raw material costs, and overhead costs.

Fabric production, fabric sold, and revenue are not significantly affected by changes in %OTD, lead time, and defect rate.

Validation Test MAPE

Validation is the process of determining whether a model can be used as a substitute for the real system when used for experimental purposes. The goal of model validation is to assess the feasibility of a built model, determining whether it accurately represents the reality under study and can produce convincing conclusions.

In dynamic system modeling, validation can be performed in several ways, including direct structure tests without processing the model, structure-oriented behavior tests with model processing, and comparison of the model's behavior with the real system (quantitative behavior pattern comparison) (Daalen and Thissen, 2001). One of the tests used for this purpose is the Mean Absolute Percentage Error (MAPE), which is a relative measure concerning percentage errors. This test can be used to determine the compatibility between forecasted data and actual data.

Table 5. Mean Absolute Percentage Error (MAPE) to determine the compatibility between forecasted data and actual data

MAPE	Classification
0 – 10%	Very Good
10 – 20%	Good
20 – 50%	Standard
> 50%	Poor

(Source: Yuhan Xie, MDPI)

The method used to test data validation is the MAPE (Mean Absolute Percentage Error) method. where the formula is as follows. Table 6 shows the result of the analysis.

$$MAPE = \frac{1}{n}\sum_{i=1}^{n}\left|\frac{A_i - F_1}{A_i}\right| \text{x } 100 \qquad (1)$$

Formula description
A_i = actual value
F_1 = predicted value
n = amount of data

Table 6. MAPE result analysis

Variable	MAPE
Fabric Production	77.60%
Fabric Sold	75.68%
Revenue	69.12%
Profit and Loss	0.58%
%OTD (On-Time Delivery)	3.22%
Lead Time	1.47%
% Defect Rate	10.18%

Source: Excel by author, Hardian (2024)

- Production Fabric: The high MAPE (77.60%) indicates that the model has a significant error in predicting fabric production. Improvements need to be made to the model to increase accuracy.
- Fabric Sold: The high MAPE (75.68%) also indicates that the prediction for fabric sold is not accurate enough. This may be due to errors in assumptions or data used in the model.
- Revenue: The MAPE for revenue is 69.12%, which also indicates that the model is not accurate enough in predicting revenue.
- Profit and Loss: The very low MAPE (0.58%) indicates that the model is very accurate in predicting profit and loss. This is probably because profit and loss is more dependent on fixed costs which are easier to predict.
- %OTD: The MAPE for %OTD is 3.22%, indicating that the model is quite accurate in predicting on-time delivery.
- Lead Time: The low MAPE (1.47%) indicates that the model is fairly accurate in predicting lead time.
- % Defect Rate: The MAPE for % defect rate is 10.18%, which indicates a moderate prediction error. This shows that the model is fairly accurate in predicting the defect rate, but can still be improved.

The model has good accuracy in predicting profit and loss, %OTD, and lead time. The accuracy of the model in predicting fabric production, fabric sold, and revenue needs to be improved. This may require revisions to the assumptions used in the model or more accurate data collection. Overall, these results provide good guidance on which areas need to be improved in the model to make more accurate predictions.

Analysis of Modeling Scenarios:

1. Optimistic Scenario:

- Assumptions: The optimistic scenario assumes the most favorable conditions, such as:
  - Increased demand for halal-certified medical textiles due to higher market growth.
  - Improvement in operational efficiency, resulting in lower production costs.
  - Favorable market regulations that simplify compliance with halal standards.
  - Lower raw material prices and better supplier reliability.
- Predicted Outcome:
  - Higher production capacity due to efficient resource allocation.
  - Increased profitability due to lower operational costs and higher demand.
  - Enhanced market share for PT XYZ as a leading provider of Sharia-compliant medical textiles.

2. Realistic Scenario:

- Assumptions: This scenario is based on current market trends and average conditions, such as:
  - Moderate growth in demand for halal medical textiles.
  - Stable operational efficiency and cost management.
  - Standard market regulations and adherence to Sharia compliance without any major regulatory changes.
  - Steady raw material prices and supplier performance.
- Predicted Outcome:
  - Consistent production output, meeting market demand without significant excess or shortage.
  - Stable profitability, maintaining a balance between costs and revenue.

- PT XYZ retains its market position while efficiently managing costs and maintaining Sharia compliance.

3. Pessimistic Scenario:

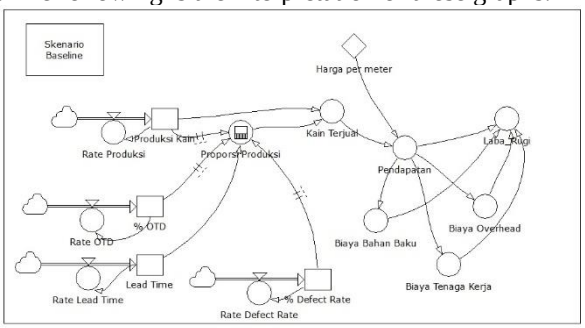
- Assumptions: This scenario assumes unfavorable conditions, including:
  - A decline in demand for Sharia medical textiles due to economic downturns or increased competition.
  - Reduced operational efficiency, leading to increased production costs.
  - Stricter market regulations, requiring additional costs for halal certification and compliance.
  - An increase in raw material costs or unreliable suppliers, causing supply chain disruptions.
- Predicted Outcome:
  - Decreased production output due to inefficiencies and supply chain disruptions.
  - Reduced profitability or even financial losses due to higher costs and reduced demand.
  - PT XYZ may struggle to maintain its market position or may need to re-strategize to cope with the challenges.

Table 7. Aspect, optimistic scenario, realistic scenario, pessimistic scenario

Aspect	Optimistic Scrnario	Realistic Scenario	Pessimistic Scenario
Market Demand	High demand growth for halal textiles	Moderate demand growth	Decline in demand due to market conditions
Operational Efficiency	High efficiency, reduced costs	Stable efficiency	Reduced efficiency
Regulatory Environment	Favorable regulations, easier compliance	Standard compliance requirements	Stricter regulations, increased compliance costs
Raw Material Cost	Lower prices, reliable suppliers	Stable prices	Higher prices, unreliable suppliers
Production Output	Increased output, meeting high demand	Steady production matching demand	Reduced output due to disruptions
Profitability	High profits due to lower costs and higher revenue	Stable profits	Potentioal financial losses due to increased cost

Model Simulation Scenarios and Comparison

The simulation results for the optimistic, realistic, and pessimistic scenarios have been displayed in the form of comparison graphs. The following is the interpretation of these graphs:



Source: PowerSim and model by Author, Hardian (2024)

Figure 10. Baseline scenario chart

The optimistic scenario shows the best performance with higher production, revenue and profit and lower defect rate. The realistic scenario shows a middle-of-the-road performance, with a moderate trend. The pessimistic scenario shows the worst performance with lower production and revenue and higher costs. Impact of Changes in Labor Costs: Labor costs have a significant impact on profit/loss. A decrease in labor costs can reduce losses, while an increase in labor costs can increase losses. Production efficiency and quality are maintained despite changes in labor costs. Companies can use this information to develop better strategies and make more informed decisions based on this scenario analysis.

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4. Conclusion

A comparison between conventional and Sharia systems for fabric production revealed that while the conventional system outperforms in production and profit, the Sharia system excels in defect rate and on-time delivery. To understand system dynamics and predict future performance, a dynamic simulation model was developed. Sensitivity analysis identified labor, raw material, and overhead costs as key factors influencing

profit, but not production or revenue. Model validation using MAPE indicated accurate predictions for profit, on-time delivery, and lead time, but less accuracy for production, sales, and revenue.

Scenario modelling was conducted to explore optimistic, realistic, and pessimistic outcomes. Results showed that production, revenue, and profit are significantly influenced by market conditions. Labour costs were found to have a substantial impact on profit, with reductions leading to lower losses. However, changes in labour costs did not affect production efficiency or quality.

The study provides valuable insights into the performance of conventional and Sharia systems in fabric production. While the conventional system generally outperforms in terms of production and profit, the Sharia system demonstrates strengths in defect rate and on-time delivery. The developed models can be used to predict future performance and inform decision-making. Additionally, the study highlights the critical role of labour costs in influencing profitability.

5. Acknoledgement

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6. References

Ageron, B., Benzidia, S., & Bourlakis, M. (2018, January). Healthcare logistics and supply chain–issues and future challenges. In Supply Chain Forum: An International Journal (Vol. 19, No. 1, pp. 1-3). Taylor & Francis. https://doi.org/10.1080/16258312.2018.1433353

Alfzari, S. A. A. A., & Omain, S. Z. B. (2022). Halal food supply chain practices: a conceptual framework based on conventions theory. International journal of health sciences, 6(S2), 203-215. https://doi.org/10.53730/ijhs.v6ns2.4800

American Nurses Association. (n.d.). Disaster preparedness. https://www.nursingworld.org/practice-policy/work-environment/health-safety/disaster-preparedness/

Anatan, L., & Ellitan, L. (2008). Supply chain management teori dan aplikasi. Bandung: Alfabeta.

Ashing-Giwa, K. T., Padilla, G., Tejero, J., Kraemer, J., Wright, K., Coscarelli, A., ... & Hills, D. (2004). Understanding the breast cancer experience of women: a qualitative study of African American, Asian American, Latina and Caucasian cancer survivors. Psycho-Oncology: Journal of the Psychological, Social and Behavioral Dimensions of Cancer, 13(6), 408-428. https://doi.org/10.1002/pon.750

Basheer, M. F., Hafeez, M. H., Hassan, S. G., & Haroon, U. (2018). Exploring the role of TQM and supply chain practices for firm supply performance in the presence of organizational learning capabilities: a case of textile firms in Pakistan. Paradigms, 12(2), 172-178. https://doi.org/10.5267/j.uscm.2018.9.001

Behiery, V. (2013). Modest Fashion: Styling Bodies, Mediating Faith, edited by Reina Lewis. IB Tauris, 256pp. ISBN: 9781780763828, ISBN-13: 9781780763835. https://doi.org/10.1558/imre.v16i4.507

Charkha, P. G., & Jaju, S. B. (2014). Designing innovative framework for supply chain performance measurement in textile industry. International Journal of Logistics Systems and Management 1, 18(2), 216-230. https://doi.org/10.1504/IJLSM.2014.062327

Chopra, S., & Meindl, P. (2007). Supply chain management. Strategy, planning & operation (pp. 265-275). Gabler. https://doi.org/10.1007/978-3-8349-9320-5_22

Creswell, J., & Kaplan, S. (2019). New York Times: How Juul Hooked a Generation on Nicotine. 2019. Dikutip dari: https://www. nytimes. com/2019/11/23/health/juul-vaping-crisis.html

Daalen, V., & Thissen, W. A. H. (2001). Dynamics systems modelling continuous models. faculteit techniek, bestuur en management (TBM). Delft (NED): Technische Universiteit Delft.

Gurtu, A., & Johny, J. (2021). Supply chain risk management: Literature review. Risks, 9(1), 16. https://doi.org/10.3390/risks9010016

Haryono, H., & Handayani, D. I. (2019). Pemodelan Sistem Traceability Halal Supply Chain dalam menjaga Integritas Produk Makanan Halal Dengan Pendekatan Interpretive Structural Modeling (ISM). PROZIMA (Productivity, Optimization and Manufacturing System Engineering), 2(2), 70-79.

Hassan, S. H., & Harun, H. (2016). Factors influencing fashion consciousness in hijab fashion consumption among hijabistas. Journal of Islamic Marketing, 7(4), 476-494. https://doi.org/10.1108/JIMA-10-2014-0064

Hilletofth, P., & Hilmola, O. P. (2008). Supply chain management in fashion and textile industry. International Journal of Services Sciences, 1(2), 127-147. https://doi.org/10.1504/ijssci.2008.019608

Illyas Tan, M.I., Razali, R.N., Desa, M.I. (2012). Factors that Influencing ICT Adoption in Halal Transportations: A Case Study of Malaysia Halal Logistics Service Providers. International Journal of Computer Science, 9(1), 62-71.

Jafarnejad, A., Momeni, M., Razavi Hajiagha, S. H., & Faridi Khorshidi, M. (2019). A dynamic supply chain resilience model for medical equipment's industry. Journal of Modelling in Management, 14(3), 816-840. https://doi.org/10.1108/JM2-11-2018-0195

Jia, F., Yin, S., Chen, L., & Chen, X. (2020). The circular economy in the textile and apparel industry: A systematic literature review. Journal of Cleaner Production, 259, 120728. https://doi.org/10.1016/j.jclepro.2020.120728

Karadayi Usta, S., & SerdarAsan, S. (2020). A conceptual model of medical tourism service supply chain. Journal of Industrial Engineering and Management, 13(2), 246-265. https://doi.org/10.3926/jiem.3008

Kennedy, M. (2018, October 15). To prevent wildfires, PG&E pre-emptively cuts power to thousands in California. NPR. https://www.npr.org/2018/10/15/657468903/to-prevent-wildfires-pg-e-preemptively-cuts-power-to-thousands-in-california

Khan, M. Z., Al-Mushayt, O., Alam, J., & Ahmad, J. (2010). Intelligent Supply Chain Management. J. Softw. Eng. Appl., 3(4), 404-408. https://doi.org/10.4236/jsea.2010.34045

Khan, M. I., Haleem, A., & Khan, S. (2018). Defining halal supply chain management. In Supply Chain Forum: An International Journal (Vol. 19, No. 2, pp. 122-131). Taylor & Francis.. https://doi.org/10.1080/16258312.2018.1476776

Kim, S. H., & Kwon, I. W. G. (2015). The study of healthcare supply chain management in United States: Literature review. Management Review: An International Journal, 10(2), 34. https://doi.org/10.3390/su9010100

Kumar, D., Singh, J., & Singh, O. P. (2011). Analysis of distribution system of supply chain and relationships between manufacturer and customers for Indian textile industry. International Journal of Business Performance and Supply Chain Modelling, 3(1), 66-85. https://doi.org/10.1504/IJBPSCM.2011.039974

Schönberger, R., & Elbert, R. (2010). Dimensionen der Logistik. Funktionen, Institutionen und Handlungsebenen. Wiesbaden: Gabler. https://doi.org/10.1007/978-3-8349-6515-8

Lee, K. L., Udin, Z. M., & Hassan, M. G. (2014). Global supply chain capabilities in Malaysian textile and apparel industry. International Journal of Supply Chain Management Volume 3, Issue 2, 2014, Pages 31-40.

Los Angeles County Department of Public Health. (2017). Key indicators of health by service planning area. http://publichealth.lacounty.gov/ha/

LPPOM MUI. (2012). Requirement of Halal Certification HAS 23000. Lembaga Pengkajian Pangan Obat-Obatan dan Kosmetika Majelis Ulama Indonesia. Jakarta.

LPPOM MUI. (2014). Surat Keputusan Lembaga Pengkajian Pangan, Obat-Obatan dan Kosmetik Majelis Ulama Indonesia tentang Ketentuan Penulisan Nama Produk dan Bentuk Produk Nomor:SK46/Dir/LPPOM MUIDUI/14. Lembaga Pengkajian Pangan Obat-Obatan dan Kosmetika Majelis Ulama Indonesia. Jakarta.

Mahendrawathi, E., & Pujawan, I. N. (2010). Supply Chain Management Edisi Kedua. Surabaya Penerbit Guna Widya.

McCormack, B., McCance, T., & Maben, J. (2013). Outcome evaluation in the development of person-centred practice. In B. McCormack, K. Manley, & A. Titchen (Eds.), Practice development in nursing and healthcare (pp. 190-211). John Wiley & Sons.

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..

Mia, M. A. H., & Islam, M. A. (2014). Critical success factors for ensuring efficient supply chain management (SCM): A review of literature. Bangladesh Journal of MIS.

Min, H dan Zhou, G. (2002). Supply chain modeling: Past, present, and future. International Journal of Computers and Industrial Engineering 43: 231-249

Mgonja, J.T., Luning, P., dan Van der Vorst JGAJ. (2012). Diagnostic Model for Assessing Traceability System Performance in Fish Processing Plants. J Food Engineer. 118:188–197. https://doi.org/10.1016/j.jfoodeng.2013.04.009

Negrete, J. D. C., & López, V. N. (2020). A sustainability overview of the supply chain management in textile industry. International Journal of Trade, Economics and Finance, 11(5), 92-97. https://doi.org/10.18178/ijtef.2020.11.5.673

Ngah, A.H. dan Zainuddin Y. (2012). Barriers to Halal Supply Chain Adoption among Malaysian Halal Manufactures with General Barriers as a Moderating Factor. Conference Proceedings on INHAC 2012.

Qardhawi, Y. (2000). Halal dan Haram dalam Islam. Surabaya: PT Bina Ilmu.

Ravindran, A. R. (Ed.). (2017). Multiple criteria decision making in supply chain management. CRC Press.

Republik Indonesia. (2014). Undang-Undang No 33 Tahun 2014 tentang Jaminan Produk Halal. Sekretariat Negara. Jakarta. Republik Indonesia.

Peraturan Pemerintah Republik Indonesia Nomor 31 tahun 2019 tentang Peraturan Pelaksanaan Undang Undang No 33 tahun 2014 tentang Jaminan Produk Halal. Sekretariat Negara. Jakarta.

Sandvik, I. M., & Stubbs, W. (2019). Circular fashion supply chain through textile-to-textile recycling. Journal of Fashion Marketing and Management: An International Journal, 23(3), 366-381. https://doi.org/10.1108/JFMM-04-2018-0058

Saptiadi, T., & Koesdiningsih, N. (2022). Analisis Kinerja Rantai Pasokan Menggunakan Metode Supply Chain Operation Reference. Jurnal Fokus Manajemen Bisnis, 12(1), 106-117. https://doi.org/10.12928/fokus.v12i1.6041

Schmidt, N. A., & Brown, J. M. (2017). Evidence-based practice for nurses: Appraisal and application of research (4th ed.). Jones & Bartlett Learning, LLC.

Setiawan, A.K dan Santosa, H. (2006). integrasi supply chain pada industri tekstil: Survey pada retailer dan grosir di Jawa Tengah dan Jawa Timur. Empirika 19: 81-97.

Simatupang, T.M. (2000). Permodelan Sistem. Penerbit Nindika. Klaten.

Sulaiman, S., Aldeehani, A., Aziz, F.A., dan Mustpha, F. (2018). Integrated Halal Supply Chain System in Food Manufacturing Industry. Journal Of Industrial Engineering Research, 2018. 4(3): 1-5.

Tasrif, M. (2004). Model Simulasi Untuk Analisis Kebijakan : Pendekatan Metodologi System Dynamics. Kelompok Peneliti dan Pengembangan Energi. Institut Teknologi Bandung.

Tieman, M., Van der Vorst, J. G., & Ghazali, M. C. (2012). Principles in halal supply chain management. Journal of Islamic Marketing, 3(3), 217-243. https://doi.org/10.1108/17590831211259727

Waharini, F. M., & Purwantini, A. H. (2018). Model pengembangan industri halal food di Indonesia. Muqtasid 9(1).