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Analysis Of The Impact Of Soybean Supply Delays On Production Efficiency At PT Saripangan Makmur Sejahtera

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Abstract

This study aims to analyze the impact of soybean supply delays on production efficiency at PT Saripangan Makmur Sejahtera, a company engaged in the food processing industry, particularly tofu production. Soybeans are the main raw material that plays a crucial role in ensuring smooth production processes; therefore, any delay in supply can directly affect operational performance. This research employs a qualitative approach using a descriptive case study method. Data were collected through direct observation during an internship program, interviews with the production manager and production supervisor, and documentation review, including raw material usage data, production schedules, and soybean supply reports. Data analysis techniques consisted of data reduction, data presentation, and conclusion drawing. The results indicate that delays in soybean supply lead to decreased production output, increased idle time (waste time) among workers, and inefficient utilization of production facilities and machinery. The primary causes of supply delays are the company's dependence on a single supplier and limited safety stock availability. Therefore this study recommends supplier diversification and improved raw material inventory management to enhance production efficiency and ensure sustainable operational performance.

Keywords: Soybean supply, Production Efficiency, Supply Chain Management, Case Study

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INTRODUCTION

The food processing industry constitutes a strategic pillar of national economic development, contributing significantly to daily consumption needs, employment generation, SME growth, and food security. Despite global economic volatility and recurring supply chain disruptions, this sector has demonstrated notable resilience. Academic literature consistently emphasizes that food processing exerts strong forward and backward linkages, acting as a catalyst for growth across multiple economic sectors (Hilman & Ester, 2019; Husni & Rosadi, 2015). In an increasingly competitive global market, operational efficiency has emerged as a critical determinant of manufacturing success, directly influencing production costs, resource utilization, and overall firm performance (Heizer *et al.*, 2017).

Efficient production systems are essential for transforming raw materials into market-ready goods, particularly within small and medium enterprises (SMEs). However, production continuity is frequently compromised by raw material shortages, quality inconsistencies, and suboptimal inventory management (Syawal *et al.*, 2025). Inventory functions as a strategic buffer against demand fluctuations; inadequate stock levels risk unmet customer orders and lost revenue (Afianti & Azwir, 2017). In food manufacturing, raw material availability is especially critical. For tofu producers, soybean supply directly dictates production continuity. Delays or disruptions in soybean procurement lead to machine and labor idle time, reduced output, and diminished operational efficiency (Stevenson et al., 2007; Chopra & Meindl, 2019).

From a Lean Manufacturing perspective, supply delays constitute waiting waste, a non-value-added activity that inflates operational costs without enhancing product value (Ohno, 1988). This inefficiency is frequently exacerbated by single-supplier dependency. Heavy reliance on one source amplifies vulnerability to price volatility, capacity constraints, and distribution bottlenecks (Alhidayatullah et al., 2025). Supplier diversification and long-term contractual agreements are widely recommended to mitigate supply chain risks and stabilize SME operations (Rahadian Dzaki et al., 2025). Despite extensive theoretical discussion on supply chain resilience, empirical studies examining the quantitative impact of raw material delays on production efficiency in soybean-dependent SMEs remain limited.

Initial operational assessments at PT Saripangan Makmur Sejahtera, a recognized tofu manufacturer holding a MURI record for production volume and certified under national halal and health hygiene standards, reveal persistent soybean supply delays. The company's reliance on a single supplier has resulted in frequent production

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halts, underutilized capacity, and measurable declines in production efficiency. These operational disruptions underscore the need for a systematic evaluation of how supply interruptions affect manufacturing performance.

Therefore, this study aims to analyze the impact of soybean supply delays on production efficiency at PT Saripangan Makmur Sejahtera. By quantifying the relationship between supply disruptions and operational performance, this research provides actionable insights for inventory optimization, supplier diversification, and lean process improvement. The findings are expected to support evidence-based decision-making for food-processing SMEs facing similar supply chain vulnerabilities.

Objectives

This study aims to identify the key internal and external factors contributing to soybean supply delays at PT Saripangan Makmur Sejahtera and formulate strategic recommendations to mitigate the adverse effects of supply disruptions on production efficiency and strengthen raw material supply chain resilience. The findings are intended to support operational decision-making and process optimization within soybean-dependent food manufacturing SMEs.

LITERATURE REVIEW

Operations Management

Operations management is a core managerial discipline focused on coordinating production and service processes to transform inputs into value-added outputs (Heizer et al., 2017; Ariani, 2014). As a universal function, it applies across manufacturing and service sectors encompassing activities in offices, warehouses, retail, and industrial facilities to ensure resources are strategically allocated to deliver goods and services that meet quality standards and customer expectations (Ambarwati & Supardi, 2020).

Supply Chain Management (SCM)

Supply Chain Management (SCM) refers to the integrated coordination of activities governing the flow of goods, services, and information from raw material suppliers to end consumers (Heizer et al., 2017). SCM encompasses procurement, production, logistics, distribution, and information management, with the objective of ensuring product availability at the right time, quantity, and cost while maximizing customer satisfaction and competitive advantage (Syamil et al., 2023).

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Raw Material Supply Delays

Supply delay occurs when required raw materials fail to arrive according to planned schedules, stemming from factors such as market scarcity, price volatility, supplier capacity constraints, or distribution disruptions (Stevenson et al., 2007). In manufacturing systems, such delays can halt production, reduce output, increase idle time, and compromise customer order fulfillment. Recurrent delays often signal underlying weaknesses in supply chain planning or supplier selection, warranting systematic analysis to assess their operational impact.

Single-Supplier Dependency

Suppliers constitute the primary source of raw materials and foundational inputs in supply chains (Indrajit & Djokopranoto, 2002). Heavy reliance on a single supplier amplifies operational vulnerability, increasing exposure to delivery delays, supply disruptions, and logistics inefficiencies that may erode customer loyalty and constrain business growth (Hananto et al., 2024). As suppliers provide essential resources for production (Darmawan et al., 2013), strategic supplier selection, continuous evaluation, and proactive relationship management are critical to mitigating dependency risks and optimizing supply chain resilience.

Production Efficiency

Production efficiency measures the extent to which organizations maximize output while minimizing input utilization (Puspitasari, 2017). It reflects optimal resource management, waste reduction, and sustained operational performance improvement. In manufacturing contexts, efficiency is a key determinant of productivity and competitiveness, as efficient systems enable higher-quality output, cost containment, and stronger market positioning (Ali, 2013; Putri *et al.,* 2025; Pristianingrum, 2017). Enhancing process efficiency has been empirically shown to increase throughput and support sustainable productivity gains.

Waste Waiting/Idle Time in Production

Within Lean Manufacturing frameworks, waiting time represents a non-value-added waste category *(muda)* (Ohno, 1988). Waiting occurs when production processes are interrupted due to unavailable materials or resources. Raw material supply delays are a primary driver of waiting waste, forcing machinery and labor to remain idle while incurring operational costs without generating output. Recognizing

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waiting as waste enables organizations to identify supply disruptions not merely as scheduling issues but as systemic inefficiencies that degrade overall production performance.

METHODOLOGY

Research Design and Approach

This study employs a qualitative descriptive case study approach to examine how soybean supply delays impact production efficiency at PT Saripangan Makmur Sejahtera. A qualitative design was selected to capture context-specific operational dynamics, including procurement coordination, managerial decision-making, and workflow disruptions (Hardani *et al.,* 2020; Sugiyono, 2020). The case study framework enables an in-depth investigation of real-world supply chain challenges within their natural operational setting.

Unit of Analysis

The unit of analysis comprises two key operational roles directly involved in raw material procurement and daily production oversight: the Production Manager (responsible for soybean procurement) and the Head of Production. These individuals were selected due to their direct authority over supply chain coordination and production scheduling, ensuring access to accurate, decision-relevant insights.

Data Collection Methods

Data were gathered through primary and secondary sources using purposive sampling. Primary data were collected via semi-structured interviews and direct observation of daily production and material receiving processes. Secondary data included internal production logs, soybean delivery schedules, and procurement records. Triangulation across interviews, observation, and documentation ensured comprehensive data coverage and minimized single-source bias (Hardani et al., 2020; Sugiyono, 2013).

Trustworthiness (Validity and Reliability)

Trustworthiness was established following Lincoln and Guba's criteria. Credibility was ensured through prolonged engagement, source/technique triangulation, and member checking with key informants. Transferability was addressed via a thick description of the operational context. Dependability was maintained through a

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systematic audit trail documenting data collection and analytical procedures. Confirmability was achieved by grounding findings exclusively in empirical evidence and cross-verifying interpretations with academic and industry supervisors (Hardani et al., 2020; Moleong, 2005).

Data Analysis Techniques

Data were analyzed using Miles and Huberman's interactive model, comprising data reduction, data display, and conclusion drawing/verification. Qualitative data were systematically coded, categorized, and synthesized to identify recurring patterns related to supply disruptions. Additionally, a Fishbone (Ishikawa) diagram was constructed to visually map and prioritize the root causes of soybean delivery delays, enabling structured problem decomposition and actionable insight generation (Sulianta, 2024; Miles & Huberman, 1992).

RESULTS AND DISCUSSION

Descriptive Analysis of Respondent's Profiles

This study was conducted at PT Saripangan Makmur Sejahtera, a tofu manufacturing company where soybean serves as the primary raw material. The company implements a weekly procurement system with limited storage capacity to maintain raw material quality. Data were collected through direct observation, semi-structured interviews, and documentation of production records, daily material requirements, ordering systems, and inventory levels. Starting with the Production Manager (responsible for soybean procurement) and the Head of Production (overseeing daily operations). These respondents were selected due to their direct involvement in supply chain management and production control, ensuring access to accurate operational insights.

Production Process Analysis

The production process at PT Saripangan Makmur Sejahtera transforms soybeans into finished tofu products through multiple processing stages. Production continuity is highly dependent on soybean availability. Under normal conditions, daily production targets are consistently achieved. However, supply delays force production halts until materials arrive, resulting in unmet targets and delayed customer deliveries.

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Table 1. Production Raw Material Price

Raw Materials	Price/kg
Soybeans (Main Ingredient)	Rp 10.500
Garlic	Rp 35.000
Butter	Rp 21.000
Tumeric	Rp 6.700
Salt	Rp 8.000

Raw Material Consumption Patterns

Daily soybean consumption reaches approximately 280 kg, calculated from 14 kg per production batch across 20 daily batches. Weekly consumption totals 1,960 kg. The company maintains a safety stock of only 150 kg, insufficient to cover even one full day of production (requiring 280 kg). This minimal buffer exposes the company to significant production disruption risks when supply delays occur.

Table 2. Company Raw Material Usage

Raw Materials	Per Day	Per Week
Soybeans (Main Ingredient)	280 kg	1.960 kg
Garlic	5 kg	35 kg
Butter	5 kg	35 kg
Tumeric	2 kg	14 kg
Salt	5,25 kg	36,75 kg

Table 3. Soybean Cost and Production Requirements

Raw Materials	Daily Requirement	Price/Kg	Total Cost
Soybeans	280 kg	Rp10.500	Rp 2.940.000

Table 4. Soybean Cost and Production Requirements

Daily Production	
Soybeans per batch	14 kg
Number of meals per day	20 batches
Total daily soybean requirement	280 kg

Those table quantifies daily and weekly material consumption, revealing that soybean represents the highest volume and cost component. The 150 kg safety

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stock covers only ~10 production batches (50% of daily needs), creating operational vulnerability.

Procurement System and Costs

The company employs a fixed weekly ordering system, purchasing 1,960 kg of soybean at a total cost of Rp 20,580,000 plus Rp 150,000 transportation fees, totaling Rp 21,000,000 weekly. However, this rigid system lacks flexibility to respond to supply disruptions. Interviews revealed that suppliers frequently experience stockouts, and market scarcity triggers price volatility, both causing delivery delays that directly impact production schedules

Table 5. Weekly Soybean Ordering Costs

No	Cost Type	Quantity (kg)	Total Cost
1	Soybeans	1960 kg	Rp 20.850.000
2	Transportation Costs		Rp 150.000
Total			Rp 21.000.000

Inventory Management and Storage Policy

PT Saripangan Makmur Sejahtera maintains a one-week inventory policy to preserve soybean quality, as prolonged storage causes deterioration. Weekly stock monitoring shows consistent depletion from 2,110 kg (Monday) to 150 kg (Sunday), with the remaining stock serving as a safety buffer. However, this 150 kg buffer is inadequate for bridging supply gaps, as it supports only 10 production batches versus the required 20 daily batches.

Figure 1. Soybean Storage Facility



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Table 5. Weekly Soybean Stock Realization

Day	Requirement (kg)	Soybeans Stock (kg)	Difference (kg)	Notes
Monday	280	2.110	1.830	Sufficient
Tuesday	280	1.830	1.550	Sufficient
Wednesday	280	1.550	1.270	Sufficient
Thursday	280	1.270	990	Sufficient
Friday	280	990	710	Sufficient
Saturday	280	710	430	Sufficient
Sunday	280	430	150	Sufficient
Total Weekly Soybean Requirement				1.960

Discussion

Analysis: Fishbone Diagram

Fishbone analysis identified four categories of factors contributing to soybean supply delays:

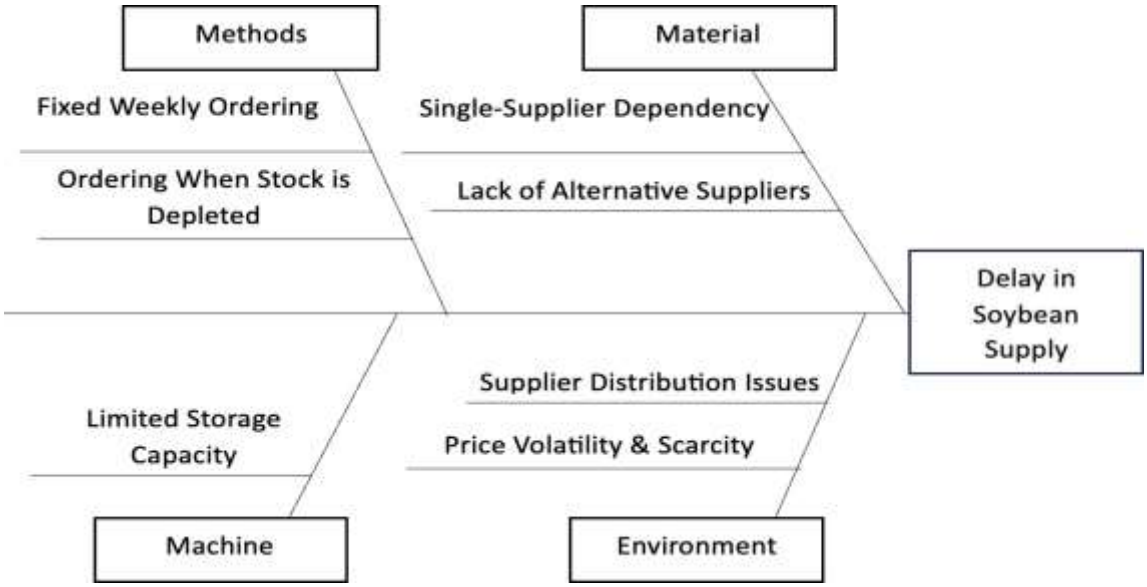


Figure 2. Fishbone Diagram

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The root causes across four dimensions: (1) Method: rigid weekly ordering without contingency planning; (2) Material: single-supplier dependency without alternatives; (3) Environment: market scarcity, price volatility, and weather-related import disruptions; (4) Machine/Infrastructure: limited storage capacity preventing bulk stockpiling. This multi-causal framework demonstrates that delays stem from both internal policy rigidity and external market uncertainties.

Single-Supplier Dependency Risk

The company relies exclusively on one soybean supplier, creating significant operational vulnerability. Both informants confirmed that this dependency prevents alternative sourcing when the primary supplier experiences stockouts or delivery delays. This finding aligns with supply chain risk literature indicating that single-source procurement amplifies exposure to disruption, price fluctuations, and capacity constraints (Umma et al., 2021; Monoarfa *et al.*, 2025).

DISCUSSION

Interpretation of Findings

This study demonstrates that soybean supply delays exert a direct and significant impact on production efficiency at PT Saripangan Makmur Sejahtera. The findings reveal that production efficiency is fundamentally contingent upon raw material availability. When soybean supplies arrive as scheduled, the company achieves optimal production targets with effective utilization of labor and facilities. Conversely, supply disruptions trigger production halts, generating waiting waste (idle time) and suboptimal asset utilization. This confirms that supply delays affect not only output volume but also overall resource efficiency. These findings align with supply chain management literature emphasizing that suppliers constitute a critical success factor in manufacturing competitiveness (Utama, 2021; Syamil et al., 2023). Supplier performance directly influences production costs, product pricing, and operational continuity. When suppliers fail to meet delivery commitments, manufacturers face material shortages, production stoppages, and potential financial losses.

Single-Supplier Dependency and Operational Vulnerability

A critical finding is that single-supplier dependency amplifies the adverse effects of supply delays. The absence of alternative suppliers leaves the company without contingency options when the primary supplier experiences stockouts or delivery

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failures. This vulnerability corroborates Hananto et al. (2024), who found that mono-supplier reliance increases supply chain disruption risks, inefficient logistics management, and ultimately undermines customer loyalty. The company's limited safety stock (150 kg) covers only 54% of daily requirements (280 kg), rendering it insufficient to bridge supply gaps. This finding reveals a fundamental tension between quality preservation (limiting storage duration) and operational resilience (maintaining adequate buffers). The rigid weekly ordering system, combined with minimal inventory buffers, creates a fragile supply chain highly susceptible to external shocks.

Multi-Causal Nature of Supply Disruptions

Qualitative evidence from semi-structured interviews with the Production Manager (J1) and Head of Production (R1). Both informants consistently identified multiple interrelated factors contributing to supply delays: (1) supplier stockouts due to market scarcity, (2) price volatility affecting material availability, (3) weather-related disruptions to soybean imports, (4) absence of alternative suppliers, and (5) limited storage capacity preventing bulk stockpiling. These findings validate the Fishbone diagram analysis, confirming that delays stem from both external market uncertainties and internal policy rigidities.

The interview data reveal that supply delays are not attributable to a single cause but emerge from complex interactions between environmental factors (market scarcity, import dependencies, weather), supplier limitations (single-source dependency, capacity constraints), and internal policies (weekly ordering, minimal safety stock). This multi-causal framework underscores the need for systemic rather than piecemeal interventions.

Theoretical and Practical Implications

From a theoretical perspective, this study contributes to Lean Manufacturing literature by empirically demonstrating how supply chain disruptions generate waiting waste, a non-value-added activity that degrades operational efficiency (Ohno, 1988). The findings extend existing research by quantifying the efficiency loss (50% production reduction) resulting from raw material delays in SME food manufacturing contexts. From a managerial perspective, the findings indicate that production efficiency cannot be improved solely through internal process optimization. Instead, it requires integrated supply chain strategies addressing both supplier relationships and inventory policies. The recommended interventions, supplier diversification, dynamic safety stock

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management, and flexible procurement scheduling represent evidence-based strategies for enhancing supply chain resilience while maintaining product quality standards.

CONCLUSION

This study demonstrates that soybean supply delays significantly undermine production efficiency at PT Saripangan Makmur Sejahtera. Root cause analysis reveals that disruptions originate from both external and internal determinants. Externally, market scarcity, price volatility, and weather-related import constraints critically affect delivery reliability. Internally, single-supplier dependency, rigid weekly ordering schedules, and limited storage capacity amplify operational vulnerability. Fishbone analysis categorizes these factors into methodological, material, environmental, and infrastructural dimensions. The direct consequence is recurrent production halts, unmet daily output targets (~280 kg/day), and delayed customer deliveries. These findings confirm that non-anticipatory procurement policies and mono-supplier reliance are primary bottlenecks generating waiting waste and reducing asset utilization. The study contributes to supply chain resilience literature by empirically linking raw material dependency to operational inefficiency in SME food manufacturing.

RECOMMENDATIONS

To mitigate supply chain vulnerabilities and restore production efficiency, three strategic interventions are recommended. First, implementing supplier diversification will reduce single-source dependency, enhance procurement flexibility, and stabilize production continuity. Second, establishing a data-driven safety stock policy will balance buffer capacity against storage constraints and raw material shelf-life considerations. Third, transitioning from fixed weekly ordering to a dynamic procurement model aligned with real-time production schedules and variable lead times will improve operational responsiveness. From a managerial perspective, these findings advocate for integrated cross-departmental coordination between procurement and production teams, coupled with adaptive inventory planning. Management should institutionalize supplier performance monitoring, develop contingency protocols for external market fluctuations, and utilize predictive demand forecasting to align procurement with production capacity. Adopting these measures will strengthen supply chain resilience, minimize non-value-added waiting time, and sustain competitive operational performance in the tofu manufacturing sector.

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