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Measuring Supply Chain Performance and Developing Competitive Strategy on Small Medium Enterprise Craft Industry using SCOR-AHP Model

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ABSTRACT
Small and medium enterprises (SMEs) require support to evolve into established organizations due to their strong flexibility to change. Nonetheless, numerous obstacles confront SMEs in their efforts to develop and compete. This study seeks to evaluate supply chain performance and the formulation of competitive strategies inside small and medium-sized enterprises (SMEs). This serves as an option for assessing supply chain performance while emphasizing the formulation of competitive strategies to enhance it, encompassing the management of material, information, and financial flows from both supply and demand perspectives. The evaluation of supply chain performance is conducted with the SCOR model, which relies on the identification of Key Performance Indicators (KPIs) derived from the outcomes of the SMEs business mapping process. Subsequently, multi-criteria decision making (MCDM) employing the Analytical Hierarchy Process (AHP) is utilized to assign weights to the KPI criteria for assessing supply chain performance and guiding competitive strategy creation. The study's results identified the indicators categorized into planning, production, sourcing, delivery, and returns. The measurement of supply chain performance suggests that the case study industry has a value of 84.11, signifying commendable performance. Moreover, competitive strategies, using Kraljic Matrix, Six Sigma, Lean Method, or mixed strategies, have been suggested to enhance supply chain performance and business competition, informed by the outcomes of the SCOR model and the MCDM approach.
Keyword: Competitive Strategies, MCDM, SME, Supply Chain Performance

ABSTRAK
Usaha kecil dan menengah (UKM) memerlukan dukungan untuk berkembang menjadi organisasi yang mapan karena fleksibilitasnya yang kuat untuk berubah. Meskipun demikian, banyak kendala yang dihadapi UKM dalam upaya mereka untuk berkembang dan bersaing. Studi ini berupaya mengevaluasi kinerja rantai pasokan dan perumusan strategi kompetitif di dalam usaha kecil dan menengah (UKM). Ini berfungsi sebagai opsi untuk menilai kinerja rantai pasokan sekaligus menekankan perumusan strategi kompetitif untuk meningkatkannya, yang mencakup pengelolaan arus material, informasi, dan keuangan dari perspektif penawaran dan permintaan. Evaluasi kinerja rantai pasokan dilakukan dengan model SCOR, yang bergantung pada identifikasi Indikator Kinerja Utama (KPI) yang diperoleh dari hasil proses pemetaan bisnis UKM. Selanjutnya, pengambilan keputusan multikriteria (MCDM) yang menggunakan *Analytical Hierarchy Process* (AHP) digunakan untuk menetapkan bobot pada kriteria KPI untuk menilai kinerja rantai pasokan dan memandu pembuatan strategi kompetitif. Hasil studi mengidentifikasi indikator yang dikategorikan ke dalam perencanaan, produksi, pengadaan, pengiriman, dan pengembalian. Pengukuran kinerja rantai pasokan menunjukkan bahwa industri studi kasus memiliki nilai 84,11, yang menandakan kinerja yang terpuji. Selain itu, taktik kompetitif menggunakan beberapa metode seperti Kraljic Matrix, Six Sigma, Lean Method, ataupun campuran dari ketiganya telah disarankan untuk meningkatkan kinerja

rantai pasokan dan persaingan bisnis, berdasarkan hasil model SCOR dan pendekatan MCDM.
Keyword: MCDM, Performansi Rantai Pasok, Strategi Kompetitif, Usaha Kecil dan Menengah (UKM)

1. Introduction

Indonesia, Small and medium-sized enterprises (SMEs) play a significant role in the advancement of the national economy. According to data from the Ministry of Cooperatives and SMEs, SMEs contributed 61.07% to the gross domestic product and employed 97% of the total workforce in Indonesia [1]. Especially for the creative sector in Indonesia plays a crucial role, as evidenced by four fundamental indicators: gross domestic product, employment, corporate activity, and foreign commerce [2], [3]. Consequently, the small and medium-sized enterprise on creative industry need enhancement to facilitate economic advancement.

Despite possessing remarkable potential, challenges persist in the expansion of SMEs. The primary issues in SMEs are the lead-time between manufacturing and distribution [4], [5], [6], [7] and insufficient expertise concerning operations and management [8]. In the contemporary era, particularly with intense industrial competitiveness and the Covid-19 pandemic, there exists heightened susceptibility in supply chain risk management, presenting significant issues for all industrial sectors. This is crucial for assisting SMEs in expediting their growth through methods focused on efficiency and effectiveness, particularly in the development of high-quality, cost-effective products.

In exploring global challenges SMEs face in supply chain management, three significant studies highlight regional insights with broader implications. A study on Moroccan SMEs details their efforts in implementing sustainability within circular supply chains, revealing challenges such as resource constraints and regulatory hurdles that are applicable globally [9]. In India, Economic Policy Uncertainty-induced Trade Supply Chain Vulnerability is examined, showing how firm size influences productivity and trade participation while emphasizing the need for strategic resilience amid uncertainties [10]. Meanwhile, in Nigeria, research focuses on how environmental factors, including customer demands and regulatory requirements, drive the adoption of Green Supply Chain Management (GSCM), underscoring their contribution to sustainable development goals [11]. Each of these studies offers valuable insights into the innovative strategies and challenges shared globally by SMEs in supply chain management, resonating well with the broader need for strategic advancement to enhance competitiveness, efficiency, and effectiveness, particularly in high-quality, cost-effective production.

Small to medium firms (SMEs) necessitate strategic advancement to achieve achievement and enhance their competitiveness. This strategy aims to enhance supply chain performance, potentially accelerating growth to improve efficiency and effectiveness, particularly in producing high-quality, low-cost products. Supply chain management is an optimal strategy for enhancing competitive advantages [12]. The competitive advantages within the sector compelled market competition to focus not just on product quality but also on reducing prices and accelerating time to market.

This research seeks to provide a supply chain performance measurement framework and formulate a competitive strategy to enhance the long-term innovative competitiveness of SMEs. Performance measurement is essential for evaluating the current status and assessing the efficacy and efficiency of a business process [13]. Prior studies have sought to assess supply chain performance. The SCOR-Fuzzy-ANP technique [14] is utilized for identifying supply chain risk management, SCOR-BPMN is employed for supply chain process mapping [15], and SCOR-DEMATEL is applied to evaluate the effectiveness of green supply chain management [16], [17]. The Supply Chain Operations Reference (SCOR) model is extensively utilized and has demonstrated efficacy as a robust instrument for describing, evaluating, and identifying possibilities to enhance the efficiency of industrial workflows [5]. Moreover, SCOR enables organizations to pinpoint enhancements and evaluate expenses, dependability, responsiveness, and agility [18], [19], [20].

The SCOR approach assesses performance through measuring indicators derived from business process mapping. Subsequently, multicriteria decision-making utilizing the analytical hierarchy approach is applied

not only to assess supply chain performance but also to identify the performance attributes that are most crucial for enhancing business outcomes. Specifically, SCOR-AHP has been applied in various industry sectors, such as manufacturing [21], agricultural [22], and garment [23]. Thus, this study formulates competitive strategies grounded in prioritized critical metrics derived from the evaluation outcomes of the SCOR model and multicriteria decision-making methodologies. To our knowledge, the SCOR model and the development of competitive strategy have yet to be deployed in Small Medium Enterprise-Craft Industry. The SCOR-AHP combination is innovative for the craft industry as it introduces a structured evaluation methodology traditionally used in larger industries into the unique context of SMEs, enabling them to systematically prioritize critical performance metrics. Prior research has using SCOR to assess supply chain performance, although has not established a competitive strategy formulation based on the evaluation outcomes for small and medium-sized enterprises on craft industry. Hence, this innovative approach not only fulfils a gap in current research but also enhances the strategic landscape for SMEs in the craft industry, pushing the boundaries of the existing state of the art in supply chain management practices.

2. Method

A case study of a small to medium-sized on creative industry, GNB, specializing in handicrafts, particularly bag products crafted from natural materials. The SME is situated in Yogyakarta, Indonesia. This study was executed in the subsequent phases. Initially, ascertain the supply chain flow for the SMEs business process. The company's supply chain is initially delineated, commencing with the acquisition of materials from suppliers, followed by the manufacturing process on the production floor, and concluding with the marketing of products via distributors and retailers to consumers. Furthermore, at this juncture, a comprehensive identification of the business processes for each department inside the SME is conducted.

Secondly, delineating the business process inside a supply chain framework (planning, sourcing, manufacturing, delivery, and returns). This research employs SCOR (Supply Chain Operation Reference) 12 to assess supply chain performance and formulate competitive strategies. The SCOR model is a cohesive framework connecting suppliers, manufacturers, and customers. The supply chain management system comprises five components: plan, source, make, delivery, and return [5], [24]. The plan serves as a framework for the operational procedures of the supply chain to maintain equilibrium between demand and resources. Source include the activities of ordering, shipping, receiving, moving raw materials, and delivering goods and/or services. Manufacturing encompasses all actions that convert raw resources into final products. Moreover, delivery is the process of fulfilling orders and transferring goods to customers and return is the process of returning goods from customers that do not meet customer expectations.

Third, the formulation of the performance measuring metric system (SC performance indicators). According to Pujawan [19] and Rica et al. [20], the SCOR model is categorized into three tiers of measuring indicators. Level 1 encompasses five essential components: planning, sourcing, manufacturing, delivery, and return, which provide fundamental information from the core business process. Level 2 refers to the dimension or configuration level that categorizes each process from Level 1, with the objective of streamlining and enhancing the flexibility of the supply chain. Level 3 key performance indicators are derived from the comprehensive analysis of supply chain activities, encompassing planning, procurement, manufacturing, shipping, and returns.

The weighing of performance indicators utilising multicriteria decision-making (analytical hierarchy approach). The weighing of key performance indicators is conducted via decision-making criteria, namely the analytical hierarchy approach. The questionnaire includes pairwise comparisons derived from KPIs at levels 1, 2, and 3, obtained from the third stage. Expert-conducted importance level weighting on SME stakeholders, illustrating the ranking of essential KPIs. The validity of the weighting utilised is indicated by consistency ratios (CR) less than 0.1. Pairwise comparisons of KPIs at levels 1, 2, and 3, derived from direct observation, were included in a questionnaire. SMEs stakeholders rated the importance of KPIs, ensuring validity with consistency ratios (CR). Thus, there were no modifications made to standard SCOR metrics when adapting Levels 1-3 for the craft industry. This decision reflects the model's effectiveness, as direct observation of SME operations justified the selection of KPIs.

This study employed one expert for the AHP evaluation. This is accomplished by selecting specialists with comprehensive knowledge, policies, and strategic positions in business and operational activities. Consequently, we engage experts from the company who serve as operational directors, responsible for

production and operational management. The consistency ratios (CR) were ensured by setting and adhering to strict thresholds for acceptance, a standard practice in multicriteria decision-making using the Analytical Hierarchy Process (AHP). Specifically, the CR values were calculated for all pairwise comparison matrices derived from the KPIs at levels 1, 2, and 3. These ratios were compared against a standard threshold, with ratios below 0.1 being deemed acceptable. This threshold ensures that the judgments made in the pairwise comparisons are consistent and reliable. If any CR exceeded the 0.1 threshold, the comparisons were reviewed and adjusted until consistency was achieved, thereby validating the weighting of the performance indicators used in the study.

Fifth, evaluating supply chain efficacy. The metric indicator comprises three scores, specifically: (1) A lower score is preferable. This score signifies that a reduced metric value correlates with superior quality, (2) Greater is preferable. This score signifies that a higher metric value correlates with superior quality, (3) Nominal is superior. The quality of this score is established by a certain nominal, with the evaluation indicating that the closer the nominal is, the higher the metric quality.

The Snorm De Boer normalisation technique use a scale of 0-100 to derive the value of each metric in equations (1) and (2).

$$\text{Lager is better, } Snorm = \frac{(Si - Smin)}{(Smax - Smin)}\ x\ 100 \tag{1}$$

$$\text{Lower is better, } Snorm = \frac{(Smax - Si)}{(Smax - Smin)}\ x\ 100 \tag{2}$$

Where *Si* represents the real score, *Smin* denotes the minimum value, and *Smax* signifies the maximum value.

Subsequently, supply chain performance metrics are assessed utilising the SC Performance Index, with the outcomes analysed through a traffic light system: green light (≥ 80) indicates satisfactory performance, yellow light (60-80) signifies unmet performance expectations, and red light (≤ 60) denotes unsatisfactory results.

$$\text{SC Performance Index } = \sum_{k}^{n} (Wi\ x\ Wj\ x\ Wk)\ x\ Snormk \tag{3}$$

Where, *Wi* is the weight of the level 1 score, *Wj is* The weight of the level 2 score (dimension), *Wk* isThe weight of the level 3 score (KPI), *Snormk* is Snorm De Boer from the previous equation (1) and (2), The SC Performance Index is The cumulative value from k to n of the number of KPIs.

Sixth, the development of competitive strategies to enhance the performance of SMEs. The competitive strategies in this study using Kraljic Matrix, Six Sigma, Lean Method, or mixed strategies. The Kraljic matrix categorizes supply items based on two primary dimensions: risk and profit, serving as a highly effective method for precise provider segmentation. The lean manufacturing methodology enhances production line performance by optimizing efficiency, speed, and cost-effectiveness while minimizing space, inventory, worker hours, and waste. Moreover, Six Sigma is an effective instrument for assessing and regulating the quality of products and services. The fundamental phases of Six Sigma are Define, Measure, Analyze, Improve, and Control (DMAIC).

3. Results and Discussion

3.1. Supply Chain Dynamics and SME Operational Procedures

Figure 1 illustrates the outcomes of the identification of the supply chain flow for GNB small to medium firms.

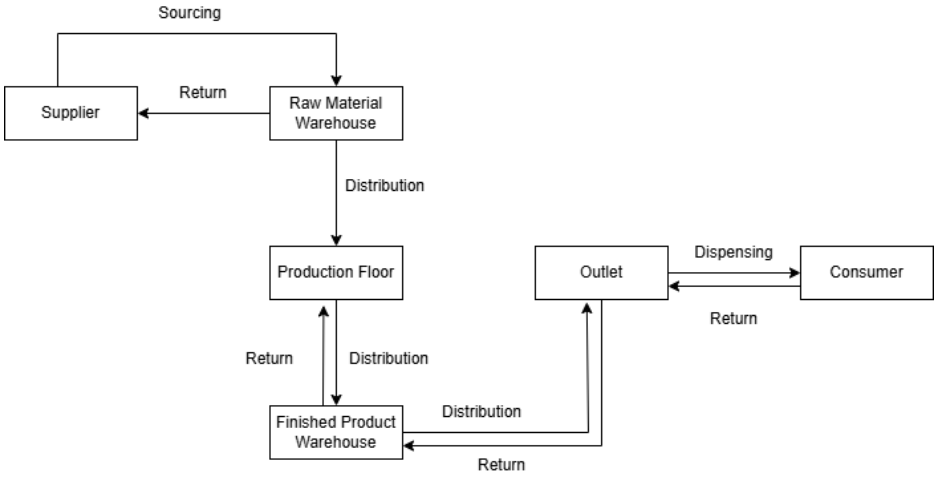
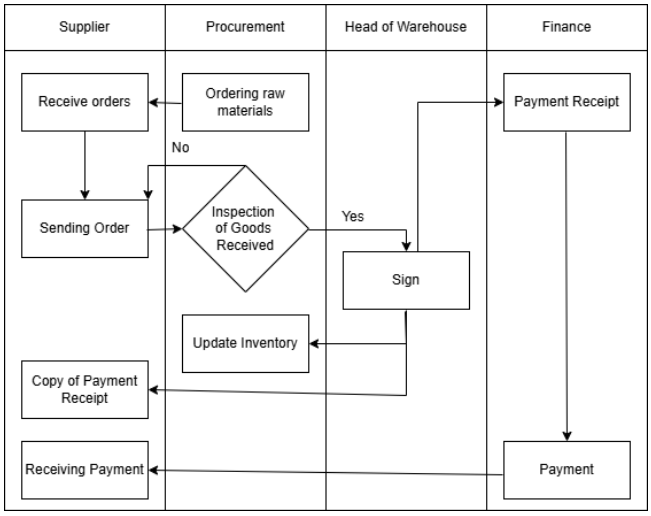
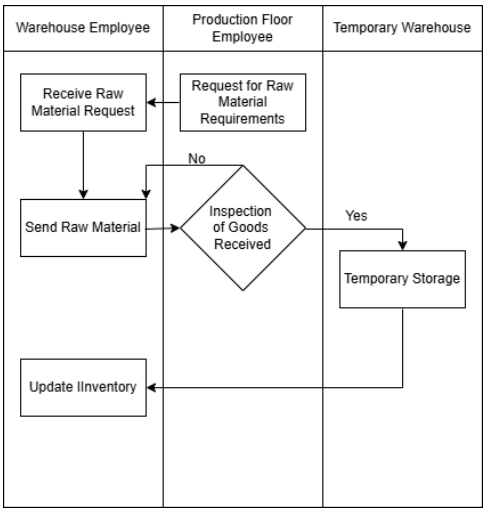


Figure 1. GNB's SME supply chain flow pattern

The subsequent outline delineates the intricate supply chain dynamics among the several departments, shown in Figure 2-4:

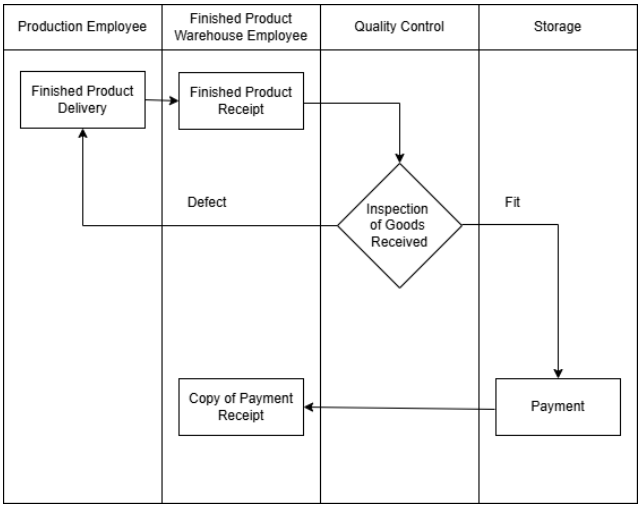


(a)

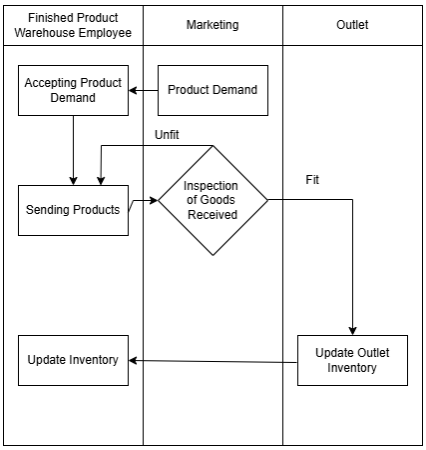


(b)

Figure 2. Business Process: (a) Supplier with Raw Material Warehouse; (b) Raw Material Warehouse with Production Floor



(a)



(b)

Figure 3. Business Process between (a) Production Floor and Finished Goods Warehouse, (b) Finished Goods Warehouse and Outlet

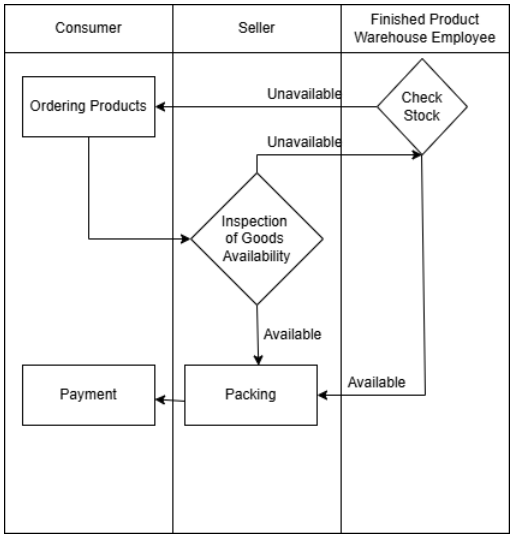


Figure 4. Business Process between Retail Outlet and Consumer

3.2. Aligning Business Processes with the SCOR Model

Upon identifying the supply chain flow, the subsequent step is to delineate the GNB small-medium enterprise business process within the SCOR model illustrated in Table 1. The primary process encompasses the mapping of essential activities: Plan, Source, Make, Deliver, and Return.

Table 1. Correlation of Business Processes with the SCOR Model

No	Business Process	Scor Level 1	Scor level 2	Executor Unit	Explanation
1	Process for scheduling production	Plan	Plan Source	Production	The production schedule planning involves the formulation of a production timetable based on the existing product inventory. This strategy seeks to structure the manufacturing schedule to ensure timely delivery of products
	Planning for Quantity Determination	Plan	Plan Make	Marketing	The marketing department assesses previous data to forecast quantities, which then dictates the product volume to be produced in the forthcoming period
	Research Strategy Development	Plan	Plan Make	Marketing	This planning is conducted to ascertain the evolution of market demands, hence providing insights into innovation in the development of bag items
2	Assessment of raw material appropriateness	Source	Source Stocked Product	Raw Material Warehouse	The warehousing department assesses the acceptability of raw materials, which are deemed appropriate if they conform to the specified type and quantity required
	Procurement of raw materials	Source	Source Stocked Product	Raw Material Warehouse	The procurement of raw materials is contingent upon the volume utilised in the production of bags at GN
3	Reception	Source	Source Stocked Product	Raw Material Warehouse	Raw materials received from suppliers in the warehouse are accompanied by invoices and order documentation. The invoice and order records are subsequently verified.

No	Business Process	Scor Level 1	Scor level 2	Executor Unit	Explanation
4	Storage	Source	Source Stocked Product	Raw Material Warehouse	Upon receipt of the raw materials, they will be kept in the raw material storage warehouse, followed by an update of the inventory status in the raw material warehouse database
5	Making	Make	Make To Stocked	Production	
6	Distribution to Outlet	Deliver	Deliver Stock Product	Finished Product Warehouse	Distribution to the production floor, finished goods warehouse, and shop The distribution is executed by each segment. The warehouse will dispatch raw supplies to the production floor. If the production department demands a specific quantity based on an order, the production floor dispatches the completed product to the finished goods warehouse, which subsequently distributes the items to the shop according to the desired number and kind of finished product
	Dispensing to Consumer	Deliver	Deliver Retail Product	Sale	The dispensing process occurs at every outlet or shop selling GNB items when a customer intends to purchase a product. The process begins with product selection, followed by packaging, and concludes with the customer settling the cost with the cashier
7	Return to Supplier	Return	Source Return Defective Product	Raw Material Warehouse	The return to supplier involves the restitution of goods to the provider under specific conditions, such as the presence of broken items that render raw materials unusable
	Return from Consumer	Return	Deliver Return Defective Product	Sale	Customers may return broken items for reservation, aimed at enhancing customer loyalty to GNB. Returns received by SMEs include commodities damaged by the owner and goods destroyed via commercial activity. Returned items are received by SMEs, repaired, and subsequently returned to customers, with the repair incurring additional expenses for consumers to SMEs

3.3. Design Metrics-SC Performance Indicators

After the business process is formed, the next step is to create a supply chain flow pattern using the SCOR language and approach, as shown in Figure 5.

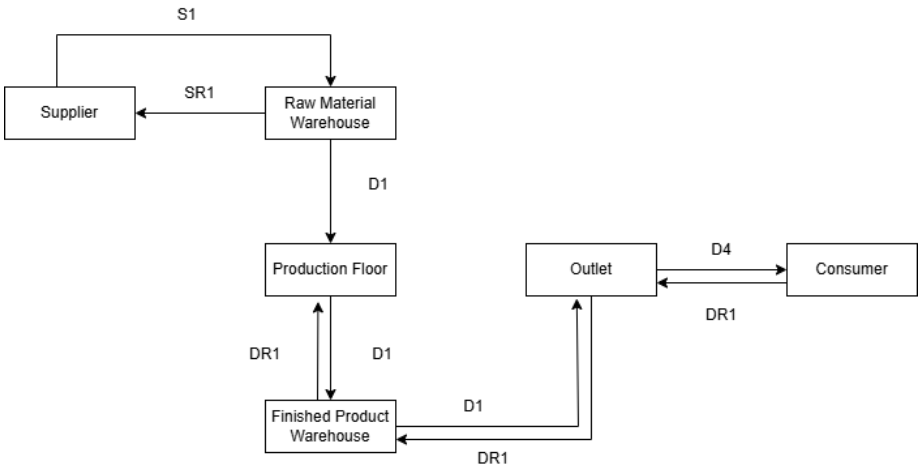


Figure 5. Supply chain flow diagram utilizing SCOR

Description (S1) source stocked product (product procurement process from suppliers). (SR1) source return defective product (product return from warehouse to supplier). (D1) Deliver stocked product (product delivery to the production floor, finished warehouse, and store). (DR1) Deliver a return defect (the consumer returns a damaged product for repair). (D4) Deliver retail products (product sales) to consumers through stores.

Based on the mapping in the previous stage, the researcher can identify the criteria that affect the supply chain performance, which consists of score level, metrics, and work attributes. The metrics are determined based on the results of detailed business process mapping, which is then used to identify the supply chain performance attributes (responsiveness, reliability, flexibility, cost, and assets). The classification process is shown in Table 2.

Table 2. Classification of metrics into performance attributes

No	SCOR		METRICS	Performance Attributes
	L1	L2		
1	Plan	Plan Source	Production Schedule Planning Timeframe	Responsiveness
2		Plan Make	Time Period for Determining Product Quantity	
3		Plan Make	Time to identify customer needs	Reliability
4	Source	Source Stocked Product	Raw material suitability	Reliability
5		Source Stocked Product	Fulfilment of raw materials	
6		Source Stocked Product	Delivery time	Responsiveness
7		Source Stocked Product	Ease of obtaining raw materials	Flexibility
8		Source Stocked Product	Raw material procurement costs	Cost
9		Source Stocked Product	Raw material inventory	Asset
10	Make	Make to stocked	Number of defect products	Reliability
11		Make to stocked	Product manufacturing lead time	Responsiveness
12		Make to stocked	Cost	Cost
13		Make to stocked	Machine life cycle	Asset
14	Deliver	Deliver Retail Product	Sales of products at outlets (dispensing)	Reliability

No	SCOR		METRICS	Performance Attributes
	L1	L2		
15		Deliver Stock Product	Finished product waiting time	Responsiveness
16		Deliver Retail Product	Distribution cost	Cost
17		Deliver Retail Product	Availability of outlets and cooperation partners	Asset
18	Return	Deliver Return Defective Product	Complaint level from customers	Reliability
19		Source Return Defective Product	Return of defective raw materials to suppliers	
20		Deliver Return Defective Product	Consumer complaints served	Responsiveness

3.4. Performance Indicator Weighting

According to the weighting process, the core process SOURCE has the highest score, with a score of 0.413. Then the rank priority process is MAKE (0.304), DELIVER (0.163), PLAN (0.079), and RETURN (0.041). For the final weighting results of each key performance indicator, the top 8 ranks of KPIs are SF-1 (0.185), MRL-1 (0.140), SA-1 (0.112), DA-1 (0.105), MR-1 (0.094), DRL-1 (0.083), MC-1 (0.047), and DR-1 (0.036). The top 8 ranked KPIs represent 80% of the total importance level for all KPIs. This enables the development of improvement strategies for SMEs to incorporate not only the top 8 KPIs, but also the results of KPI evaluations that have not met the company's targets.

Table 3. Multicriteria Decision Making-Analytical Hierarchy Process

Main Process	Weight Level 1	Dimension (Level 2)	Wight Level 2	Key Performance Indicator (Level 3)	Weight level 3	Final Weight
Plan	0.079	Responsiveness	0.309	Production Schedule Planning Timeframe (PR-1)	0.65	0.016
				Time Period for Determining Product Quantity (PR-2)	0.35	0.009
		Reliability	0.581	Time to identify customer needs (PRL-1)	1	0.046
Source	0.413	Reliability	0.079	Raw material suitability (SRL-1)	0.4	0.013
				Fulfilment of raw materials (SRL-2)	0.6	0.020
		Responsiveness	0.154	Delivery time (SR-1)	1	0.063
		Flexibility	0.448	Ease of obtaining raw materials (SF-1)	1	0.185
		Cost	0.047	Raw material procurement costs (SC-1)	1	0.020
		Asset	0.272	Raw material inventory (SA-1)	1	0.112
Make	0.304	Reliability	0.461	Number of defect products (MRL-1)	1	0.140
		Responsiveness	0.310	Product manufacturing lead time (MR-1)	1	0.094
		Cost	0.156	Cost (MC-1)	1	0.047

Main Process	Weight Level 1	Dimension (Level 2)	Wight Level 2	Key Performance Indicator (Level 3)	Weight level 3	Final Weight
		Asset	0.073	Machine life cycle (MA-1)	1	0.022
Deliver	0.163	Reliability	0.512	Sales of products at outlets (dispensing) (DRL-1)	1	0.083
		Responsiveness	0.219	Finished product waiting time (DR-1)	1	0.036
		Cost	0.086	Distribution cost (DC-1)	1	0.014
		Asset	0.645	Availability of outlets and cooperation partners (DA-1)	1	0.105
Return	0.041	Reliability	0.400	Complaint level from customers (RRL-1)	0.6	0.010
				Return of defective raw materials to suppliers (RRL-2)	0.4	0.007
		Responsiveness	0.600	Consumer complaints served (RR-1)	1	0.025

3.5. Measuring Supply Chain Performance

Based on the results of the SCOR assessment provided in Table 4, the final performance measurement results in the case of GNB's SME were 84.111. This score shows that the supply chain performance in the case study is included in the good category. However, not all SMEs earned a positive category rating, therefore it is still required to design a strategy for improving or raising performance for SMEs. In addition, in the instance of GNB, the findings of the traffic light analysis also suggest that there are still many KPIs that require improvement (red and yellow light) to attain green light.

The analysis of traffic lights in the GNB supply chain performance evaluation indicates that at level 1, the deliver and return processes have effectively met consumer needs, as evidenced by the green and yellow traffic light results. Improvements are still required for the KPI in the yellow light category. Additional barriers include machinery nearing the end of its economic lifespan, impacting manufacturing quality and efficiency, and delays in the make-to-order process, causing prolonged waiting times for finished products. Addressing these issues requires engaging with suppliers to improve delivery timelines, optimizing inventory management to balance stock levels, upgrading or maintaining manufacturing equipment to reduce downtime, and enhancing order management to streamline the production cycle. Recognizing these problem areas within the traffic light framework enables GNB to implement focused strategies for improving supply chain performance.

Several indicators, including the timeframe plan for calculating product amount, have assessments below 60 and are categorized as red light. Moreover, at the source level, there is a red indicator regarding the delivery timeline for raw materials and raw material inventory. The delivery period for raw materials from suppliers ranges from 10 to 20 days, resulting in occasional shortages due to delays when goods are out of stock. The inventory of raw materials at GNB ranges from 40 to 60 units, classified as medium inventory, which may result in the accumulation of raw materials. Moreover, at the manufacturing level encompassed by the red light, the economic lifespan of the machine has diminished in quality following the last 2-3 years of utilization. Similarly, at the delivery level, there is a red indicator for the waiting time of finished products, which at GNB continues to encounter issues for make-to-order items. GNB manufactures craft products available for sale from stock and also produces items upon request. However, for made-to-order products, delivery timelines frequently experience delays due to pending processing (KPI - waiting time for finished products).

Table 4. Assessment of Supply Chain Performance Index and Evaluation of Traffic Light

Main Process	Key Performance Indicator	WEIGHT	Actual Value (Si)	Minimal Value (Smin)	Maximal Value (Smax)	SNORM	SCORE
Plan	Production Schedule Planning Timeframe (PR-1)	0,016	2	1	7	8,333,333,333	1,327

Main Process	Key Performance Indicator	WEIGHT	Actual Value (Si)	Minimal Value (Smin)	Maximal Value (Smax)	SNORM	SCORE
	Time Period for Determining Product Quantity (PR-2)	0,009	2	1	3	50	0,429
	Time to identify customer needs (PRL-1)	0,046	1	1	3	100	4,608
Source	Raw material suitability (SRL-1)	0,013	4	1	5	75	0,980
	Fulfilment of raw materials (SRL-2)	0,020	5	1	5	100	1,960
	Delivery time (SR-1)	0,063	2	1	3	50	3,175
	Ease of obtaining raw materials (SF-1)	0,185	4	1	5	75	13,878
	Raw material procurement costs (SC-1)	0,020	2	1	5	75	1,466
	Raw material inventory (SA-1)	0,112	3	1	5	50	5,616
Make	Number of defect products (MRL-1)	0,140	1	1	5	100	14,010
	Product manufacturing lead time (MR-1)	0,094	1	1	5	100	9,436
	Cost (MC-1)	0,047	2	1	5	75	3,557
	Machine life cycle (MA-1)	0,022	3	2	4	50	1,104
Deliver	Sales of products at outlets (dispensing) (DRL-1)	0,083	4	1	5	75	6,245
	Finished product waiting time (DR-1)	0,036	1	1	3	50	3,556
	Distribution cost (DC-1)	0,014	1	1	3	100	1,394
	Availability of outlets and cooperation partners (DA-1)	0,105	4	1	5	75	7,861
Return	Complaint level from customers (RRL-1)	0,010	1	1	5	100	0,989
	Return of defective raw materials to suppliers (RRL-2)	0,007	5	1	5	100	0,659

Main Process	Key Performance Indicator	WEIGHT	Actual Value (Si)	Minimal Value (Smin)	Maximal Value (Smax)	SNORM	SCORE
	Consumer complaints served (RR-1)	0,025	4	1	5	75	1,854
TOTAL							84.11

3.6. Development of Competitive Strategies to Enhance SME Performance

3.6.1. Enhancement Strategies

The suggested enhancement techniques are derived from the analysis of performance improvement solutions in the SME case study, considering the outcomes of the KPI assessment inside the red traffic light category. According to the SCOR measurement results, GNB's current performance is relatively robust but requires enhancement. Table 5 presents the proposed enhancement solutions derived from the assessment of traffic light indicators for red and yellow light key performance indicators (KPIs).

Table 5. Proposed Improvement Strategies

Process	Dimension	Key Performance Indicator	Solution
Red traffic light			
Plan	Responsiveness	Time Period for Determining Product Quantity (PR-2)	Forecasting based on market condition and customer demand
Source	Responsiveness	Delivery time (SR-1)	(1) Improving scheduling process and delivery time, (2) Supplier selection based on location, availability, and loyalty
Source	Asset	Raw material inventory (SA-1)	Improving cycle time and implementing lean system
Make	Asset	Machine life cycle (MA-1)	Maintain equipment each period regularly
Deliver	Responsiveness	Finished product waiting time (DR-1)	Minimize lead time of finished products, especially reduce non-value-added activities (for example using lean approach, 5S system, etc.)
Yellow traffic light			
Source	Reliability	Raw material suitability (SRL-1)	Supplier evaluation and selection considering responsive supply chains strategy
Source	Flexibility	Ease of obtaining raw materials (SF-1)	(1) Improving safety stock, (2) Supplier selection based on location and availability
Source	Cost	Raw material procurement costs (SC-1)	Enhance raw material costs
Make	Cost	Cost (MC-1)	Increase profits and minimize production costs
Deliver	Reliability	Sales of products at outlets (dispensing) (DRL-1)	Improving marketing strategies
Deliver	Asset	Availability of outlets and cooperation partners (DA-1)	Increasing cooperation partners and for craft's SMEs, it is necessary to schedule product exhibition events.

Process	Dimension	Key Performance Indicator	Solution
Return	Responsiveness	Consumer complaints served (RR-1)	Customer service utilities

3.6.2. Strategies for Long-term Improvement in SMEs

The multicriteria decision-making analysis utilizing the analytical hierarchy process (AHP) has identified eight critical terms that account for 80% of the overall significance of all KPIs. The indicators comprise SF-1, MRL-1, SA-1, DA-1, MR-1, DRL-1, MC-1, and DR-1. Consequently, the long-term enhancement strategies for SME proposals are produced according to the significance of these metrics.

The suggested long-term enhancement solutions are grounded in driver supply chain framework, emphasizing facility, sourcing, and pricing drivers [27]. This methodology relies on the assessment of the significance of KPIs, with the most critical KPIs encompassing three primary processes: SOURCE, MAKE, and DELIVERY. The SOURCE and MAKE processes align with the supply chain development plan for sourcing drivers, while the DELIVERY process corresponds with facility and pricing drivers. This idea is illustrated in Figure 6, where potential approach strategies are developed to meet the attainment of KPIs.

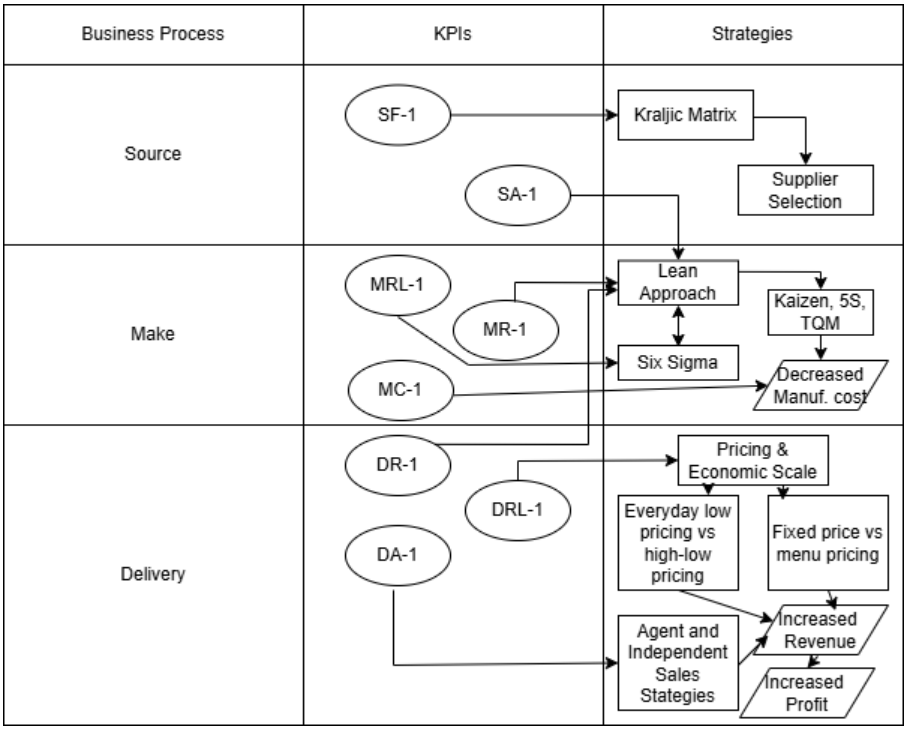


Figure 6. Strategic mapping for sustained enhancement based on Critical Key Performance Indicators

The main business processes requiring enhancement are Sourcing, Make, and Delivery. In the sourcing process, two critical KPIs to consider in developing a business success strategy are the accessibility of raw materials (SF-1) and raw material inventory levels (SA-1). The technique for SF-1 involves initially segmenting suppliers using Kraljic matrix analysis. The Kraljic matrix categorizes supply items based on two primary dimensions: risk and profit [28], [29], [30], serving as a highly effective method for precise provider segmentation (Figure 7).

Kraljic matrix analysis of GNB SME focuses on leveraged assets that exhibit low risk and high profitability. The material required by GNB possesses features that allow for the easy identification of providers in the market, hence providing multiple alternative sources should the primary supplier be unable to fulfill the raw material requirements. The factors for supplier selection are predicated on cost, geographical proximity, and the strength of the connection. A close contact with suppliers enhances the responsiveness of SMEs. The outcomes of this supplier segmentation research are utilized as a factor in the supplier selection process.

For SA-1 indicator is related to the way that needs to be done to achieve production efficiency so as not to achieve inventory accumulation. So that the formulation of the strategy will be related to the strategy for the make process, with the aim of increasing cycle time and achieving efficiency.

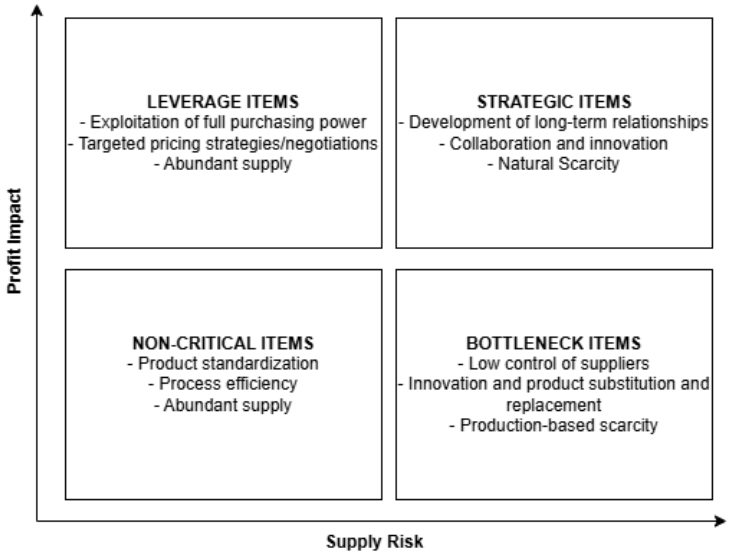


Figure 7. Kraljic Matrix

In the *make* or manufacturing process, the quantity of defective products (MRL-1), the lead time for product production (MR-1), and the incurred costs (MC-1) are critical key performance indicators for business success. MRL-1 is frequently conducted using Six Sigma analysis, while MR-1 can be enhanced through a lean system methodology.

Six Sigma is an effective instrument for assessing and regulating the quality of products and services [31]. The fundamental phases of Six Sigma are Define, Measure, Analyze, Improve, and Control (DMAIC). The define phase is the preliminary step to identify the nature of a product's problem, whereas the measure phase is the primary procedure including the calculation of six sigma. The reason of product defects in DPMO is identified during the analysis phase, followed by recommendations for enhancement and control measures.

The computation of six sigma employs the DPO, DPMO, and Sigma Level formulas [32].

$$\text{DPO} = \text{number of defects/ (amounts of defect's possibility X number of examination)} \quad (3)$$

$$\text{DPMO} = \text{DPO X } 1{,}000{,}000 \quad (4)$$

$$\text{Sigma Level} = \text{normsinv } ((1.000.000 - \text{DPMO})/1{,}000{,}000) + 1.5 \quad (5)$$

The lean manufacturing methodology enhances production line performance by optimizing efficiency, speed, and cost-effectiveness while minimizing space, inventory, worker hours, and waste [33], [34]. The objective of the lean methodology is to minimize non-value added (NVA) and necessary but non-value added (NNVA) operations. The predominant method involves utilizing Value Stream Mapping to analyze the production process in its current state and identify enhancement methods for Future State Mapping [35]. Additionally, enhancing the production process typically involves the adoption of 5S principles: Seiri (sorting), Seiton (set in order), Seiso (shine), Seiketsu (standardize), and Shitsuke (sustain), the Kaizen continuous improvement methodology, and Total Quality Management. The execution of the Six Sigma strategy and lean system can attain the MC-1 indicator, with the objective of enhancing production efficiency, hence influencing quality, cost, and production lead time.

Key Performance Indicators (KPIs) pertinent to the delivery process encompass Outlet Availability and Cooperation Partners (DA-1), product sales at outlets (dispensing) (DRL-1), and finished product waiting time (DR-1). The suggested technique is illustrated in Figure 6. The DR-1 indication is intricately linked to the manufacturing process and the attainment of production efficiency, whereby products may be dispatched to

clients upon fulfilling the criteria of the production process. The DA-1 indicator can be enhanced via agents and autonomous sales techniques, hence expanding distribution channels. The present status of GNB SME includes one showroom for independent product marketing, situated in proximity to the production site. Consequently, cultivating product marketing representatives and collaboration can enhance income and reduce facility acquisition expenses. Furthermore, for craft SMEs, essential efforts to enhance product sales and broaden market reach include participation in product showcase events.

DRL-1 can be attained by diverse techniques that enhance product marketing approaches. One approach involves pricing and economies of scale tactics, wherein the most effective marketing tactic is manipulating the selling price. Based on literatures, the fundamental elements of pricing strategies in marketing is the distinction between everyday low pricing and high-low pricing, as well as fixed pricing versus menu pricing techniques [27], [36]. For GNB, implementing fixed prices is best achieved through a high-low pricing strategy. The price shown to consumers remains stable, determined by the profit margin derived from production costs, yet still includes a seasonal discount. Seasonal discounts are contingent upon sales volume and the availability of raw supplies. The product's price may be lowered if target sales are met within a specified timeframe, and if there is an excess of raw material availability, facilitating the achievement of the target turnover. Consequently, a price reduction and seasonal discount may be implemented.

The integration of *mixed strategies*, which combine strategic tools like the Kraljic matrix, Six Sigma, and Lean Methodology with specific Key Performance Indicators (KPIs), is pivotal for enhancing the operational success of SMEs, such as GNB. For the KPI concerning the accessibility of raw materials (SF-1), the Kraljic matrix facilitates precise supplier segmentation by evaluating risk and profit potential, enabling GNB to forge resilient supplier networks. This approach helps maintain steady raw material access, thereby enhancing sourcing efficiency and reliability. In the manufacturing process, implementing Six Sigma, specifically the DMAIC process, addresses the quantity of defective products (MRL-1) by systematically identifying and correcting defects, which improves product quality and reduces associated costs. Concurrently, lean manufacturing techniques help decrease production lead times (MR-1) by optimizing operations and eradicating waste. Tools such as Value Stream Mapping and the 5S principles refine production flow, contributing to production efficiency and aligning with cost management KPIs (MC-1).

The delivery phase sees strategic alignment through efforts targeting Outlet Availability and Cooperation Partners (DA-1) and Finished Product Waiting Time (DR-1). By employing lean principles to minimize production delays, GNB enhances its ability to meet customer expectations. Marketing strategies, informed by insights into pricing tactics and economies of scale, are crucial for improving product sales (DRL-1), using price strategies to boost sales volume and expand market reach. By synchronizing these strategies with their corresponding KPIs, GNB develops a robust framework where each supply chain phase supports competitive advantage and sustainability. This comprehensive strategy ensures GNB achieves operational efficiency and responsiveness, allowing for adaptation to dynamic market conditions and paving the way for sustained growth.

4. Conclusion

The result of measuring supply chain performance using the SCOR-AHP Model, this study has obtained metric performance indicators for measuring supply chain performance on small and medium-sized enterprises of the craft industry/creative industry. Based on the business process of an SME, we build KPIs for each business process, including plan, source, make, delivery, and return. Then, the supply chain performance assessment uses SCOR calculations and multicriteria decision-making based on the Analytical hierarchy process (AHP). According to the weighting process, the core process source has the highest score, with a score of 0.413. Then, the rank priority process is 'make' (0.304), 'deliver' (0.163), 'plan' (0.079), and 'return' (0.041). The final performance measurement results in the case of GNBs (Craft SMEs) based on analyzing traffic lights were 84,111. This score shows that the supply chain performance in the case study is in a good category. However, not all SMEs earned a positive category rating. Therefore, it is still required to design a strategy for improving or raising performance for SMEs. In addition, in the instance of GNB, the findings of the traffic light analysis also suggest that there are still many KPIs that require improvement (red and yellow light) to attain green light. The suggested enhancement techniques are derived from the analysis of performance improvement solutions in the SME case study, considering the outcomes of the KPI assessment inside the red traffic light category (shown in Table 5). Moreover, the multicriteria decision-making analysis using the

analytical hierarchy process (AHP) has identified eight critical terms that account for 80% of the overall significance of all KPIs. The indicators consist of SF-1, MRL-1, SA-1, DA-1, MR-1, DRL-1, MC-1, and DR-1. Consequently, the long-term enhancement strategies for SME proposals are produced according to the significance of these metrics. The suggested long-term enhancement solutions are grounded in supply chain framework drivers, emphasizing facility, sourcing, and pricing drivers. While these enhancements offer valuable insights, the study's limitations must be acknowledged. Future research should address the scalability of the model, its adaptability to different SME contexts, and its applicability across varied market conditions. Exploring data quality and availability issues, and considering cultural and regulatory differences, would enhance the model's versatility for diverse SME environments, ensuring its relevance beyond the craft industry to address unique sector dynamics effectively.

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