Halal Supply Chain Performance Measurement with Supply Chain Operations Reference Approach

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ABSTRACT

Bakso Mantul is a household industry produces ready-to-eat packaged frozen meatballs with sales areas in South Sumatra, Indonesia. The absence of halal certification of the products failed the business to get benefit of increasing income and consumer's trust. The obligation to certify halal products is based on the Law of the Republic of Indonesia No. 33 of 2014. The preparation and performance measurement of halal supply chain management implemented by Micro, Small, and Medium Enterprises (MSMEs) could support to obtain the certification. The purpose of the study is to prepare Key Performance Indicators (KPIs) using Supply Chain Operations Reference (SCOR) as a form of standardization. SCOR could be used to maintain the products' halal quality and measure the performance of all halal supply chain activities in the cycle view push process. From the validation results carried out by internal and external respondents of MSMEs, 12 KPIs obtained are considered valid and could be used to measure the performance of halal supply chain. From the measurement, a value of 50.78 is still categorized as average based on the Snorm De Boer system. The KPI analysis using the Traffic Light System (TLS) shows that seven KPIs are satisfying, four are not satisfactory, and one is marginal.

Keywords: halal supply chain, supply chain operations reference, key performance indicators, and traffic light system

A. Introduction

The industrial sector has the largest percentage contribution to the structure of Gross Domestic Product (GDP) with an achievement value of 19.87% in the second quarter of 2020 (Kementerian Perindustrian RI, n.d.). One type of business in the industrial sector that contributes to an increase in Indonesia's GDP growth is Micro, Small, and Medium Enterprises (MSMEs) with the biggest increase in 2019 reaching 22.9% and absorbing 97% of Human Resources (HR) (Lokadata, n.d.). MSMEs contributed more than 50% of Indonesia's Gross Domestic Product (GDP) from 2010 to 2019 with the best achievement of 60.3% in 2019 although there was a significant decline in 2020 due to the disruption of COVID-19. The Ministry of Cooperatives and Small and Medium Enterprises (UKM) has also made efforts to project an increase in MSMEs through the transformation of MSMEs from informal to formal forms with legal ownership in the form of a Business Identification Number (NIB) and halal certification (PIAK, 2021). The

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large potential of the halal market is supported by most of the Indonesian population, which is 86.88% Muslim (PIAK, 2021). Another similar thing is also predicted in the global market by Global View Research which shows the biggest interest and increase in purchases is in meat and processed products. One of the MSMEs that market processed meat products is Bakso Mantul MSME. However, until now the MSME still does not have halal product certification. Another urgency of concern for MSME Bakso Mantul is the Law of the Republic of Indonesia No. 33 of 2014 concerning the Halal Product Guarantee which requires a halal certification for products that enter, circulate, and trade in Indonesia. The supply chain of MSME Bakso Mantul can be seen below in Figure 1.

The desire to submit a halal application from Bakso Mantul is a commitment that needs to be supported by halal supply chain management in the business processes carried out. The process of implementing the halal supply chain for MSMEs can be assisted by external parties, one of which is universities that have qualified resources to develop a halal framework for MSMEs (Vanany, 2022). Considering the characteristics of MSMEs that do not have as big a profit as the company, the contributions made by external parties will certainly be very useful in strengthening the implementation of the MSME halal system in Indonesia. Obtaining halal certification can be started by building the concept of a halal supply chain in a business strategy. Performance measurement is one of the main processes that need to be carried out in building a business strategy through a balanced matrix measurement with the inclusion of new performance indicators such as measuring aspects of halal products and Islamic value factors that must be met in the halal supply chain. The most suitable solution model for building halal supply chain performance at Bakso Mantul MSME is the Supply Chain Operations Reference (SCOR).

The selection of the SCOR method is based on the flexibility of the model that can be used in simple and complex business processes so that it can help MSMEs to carry out a thorough evaluation through the results of assessment and comparison of halal supply chain performance (Thakkar et al., 2009). The measurement of the halal supply chain in the push process at Bakso Mantul MSME is expected to be able to improve the quality of operations from the design of a halal logistics system so that the MSME can meet the operational requirements for submitting applications for halal legality from the food commodities they are undergoing. The purpose of measuring the halal supply chain is to review the achievement of MSME from each performance indicator assessed from a production and quality perspective (Sutawidjaya & Nawangsari, 2020).

Through the addition of halal value to the logistics process, the procurement, management, storage, and distribution of goods must comply with general principles

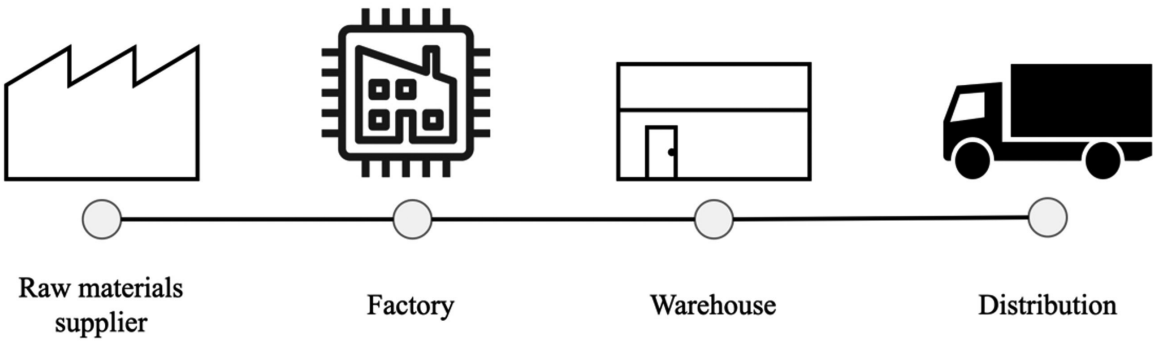
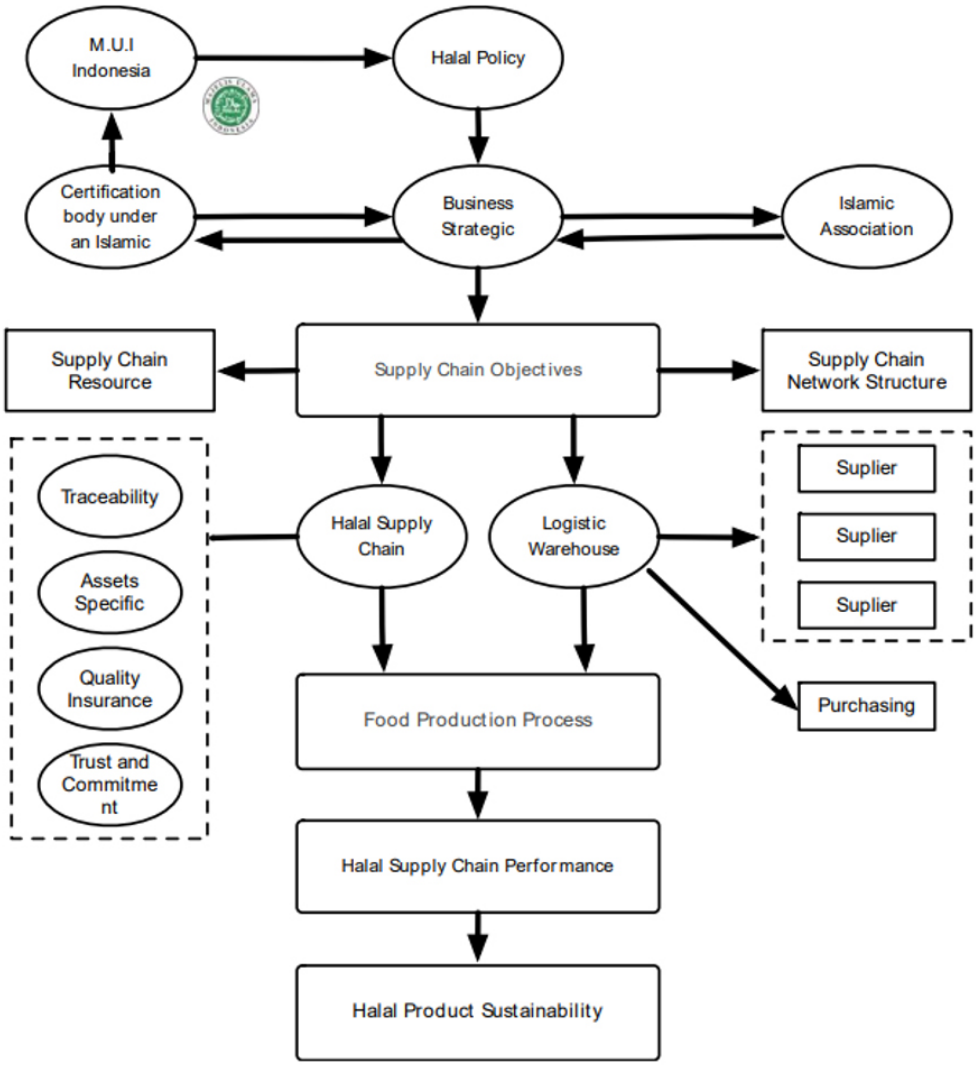


Figure 1 Supply Chain Flow of Bakso Mantul MSME

in Islamic law by avoiding contamination or contamination with sources that can cushion the halal of a product (Tieman et al., 2012). With the concept of implementing a halal supply chain, it can be ensured that the product received is a product that has been proven legal by the competent authorities in accordance with applicable terms and conditions. The principles of halal supply chain management through KPIs are important to maintain quality and quality in the production and service processes so that they can not only meet customer needs but also provide services and gain customer trust.

The Halal Assurance System (HAS) is a term issued by LPPOM MUI (The Assessment Institute for Foods, Drugs, and Cosmetics, the Indonesian Council of Ulama) to describe the framework of a company that will receive supervision within a certain period to provide direction to relevant agencies regarding the halal production process (Kasmari et al., 2020). Law No. 33 2014 concerning Halal Product Guarantee (UU-JPH) issued by the President of the Republic of Indonesia, contains the strengthening and regulation of halal regulations based on applicable law. There are many processes in the language of this Law, such as the supply of raw materials, storage, sales, and distribution. The guarantee



Source: Kasmari et al., (2020)
Figure 2 Business Strategy on Halal Ownness

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of halal products itself is not only devoted to food commodities but also medicinal products, chemicals, and objects that are used to take their benefits. described in the law (Marhaini et al., 2015).

After successfully conducting halal certification, business actors have the responsibility to maintain product quality in accordance with halal product guidelines. Authorized institutions will also monitor the quality of products that have successfully obtained halal certification to ensure the halal product. The existence of this requires business actors to be able to build strategic business concepts that can integrate halal supply chain processes.

Supply Chain Operations References (SCOR) is a model developed and supported by the Supply Chain Council (SCC) as a cross-industry standard for supply chains which was first published in 1996 and last updated in 2017 (APICS, 2017). SCOR itself is a management tool and reference model for supply chain processes, from suppliers to goods to customers. The SCOR model has been developed to describe the business activities carried out in each phase of the company to meet and satisfy customer demands. With the SCOR, companies can describe industrial processes that are interconnected in the supply chain. SCOR itself has succeeded in describing and providing the basis for supply chain improvement for global and specific projects (Kasmari et al., 2020). Based on the figure, there are four levels in the SCOR hierarchy process. The levels that are generally used in the industry are the top three levels. The first level in the SCOR model defines the scope and segmentation of the supply chain which focuses on the main processes consisting of plan, source, make, delivery, and return.

Analytical Hierarchy Process or AHP is a method for solving a complex problem in an unstructured situation into several more structured component parts in the form of a hierarchy (Pranoto et al., 2013). Hierarchy itself is the definition of a sequence of levels or levels that indicate a rank position. Hierarchy in AHP can be defined as a structural arrangement of complex problems into a multilevel structure. In addition, the design of AHP can be carried out in situations where ideas, feelings, and emotions also influence the decision process which is then calculated by providing numerical values to determine the priority of existing alternatives (Taha, 2007).

Snorm De Bour is one of the normalization techniques that has an important role in achieving the equation of weight and scale at the final value of the performance measurement (Prasetyo et al., 2021).

$$Snorm = \frac{Si - Smin)}{Smax - Smin} \times 100 \qquad (1)$$

Where:
Si = Actual indicator score achieved
Smin = Worst performance score achieved
Smax = Best performance indicator achievement score

A traffic Light System (TLS) is a quality inspection tool that uses color indicators as a performance assessment of performance indicators with three color indicators consisting of red, yellow, and green (Alda et al., 2013). The analysis of the performance assessment for each color indicator is as follows:

- The red indicator is for the Snorm value for the red indicator below the value of 60.
- The yellow indicator is for the threshold value of 60 to 80.
- The value is above 80.

B. Methods

The ground framework used in this study is SCOR using a qualitative data approach from the results observation, analysis, and expert interviews and the supporting method is the Analytical Hierarchy Process (AHP). The AHP method approach itself uses a quantitative data approach by calculating the value weights of performance indicators that have been previously designed using the

SCOR method. The variables used in this study are as follows:

- The dependent variable measures the performance of MSMEs using the concept of halal logistics using Key Performance Indicators (KPIs).
- Independent variables; processes and procedures for supplying raw materials, production processes, and tools used in the production process.

Based on the cycle view, it can be categorized from the supply chain flow that has been described cycle view with the push process category. Therefore the scope of discussion based on the cycle view is the procurement cycle and manufacturing cycle which involves two actors, namely suppliers, and manufacturers. At the data collection stage, there are two types of data collected, namely primary data and secondary data. The primary data used is data obtained from the results of questionnaires given to internal and external respondents of MSMEs. While secondary data is data obtained from the results of literature studies. The data to be collected is in the form of literature data related to previous research regarding the relationship between halal labels and business development success. In addition, other data needed is quantitative data in the form of sales, production, and storage.

C. Results and Discussion

This identification process includes the activities carried out along with the divisions responsible for the implementation of these activities. Bakso Mantul MSME has three main business processes, namely the procurement of raw materials, product management, and product distribution. Based on the scope of the cycle view in this study which is a push process, then the business process mapping from MSME Bakso Mantul to the main process of the SCOR model can be seen in Figure 3 below.

Performance indicators or Key Performance Indicators (KPI) of business processes that have been validated based on the SCOR model. The KPI identification process is carried out through the collection of literature studies related to KPIs that affect the business processes of MSMEs. In addition, there is also a consideration of the halal KPI which refers to the procedures for the halal assurance system for products and the requirements for implementing halal certification from the MUI. From the identification carried out,

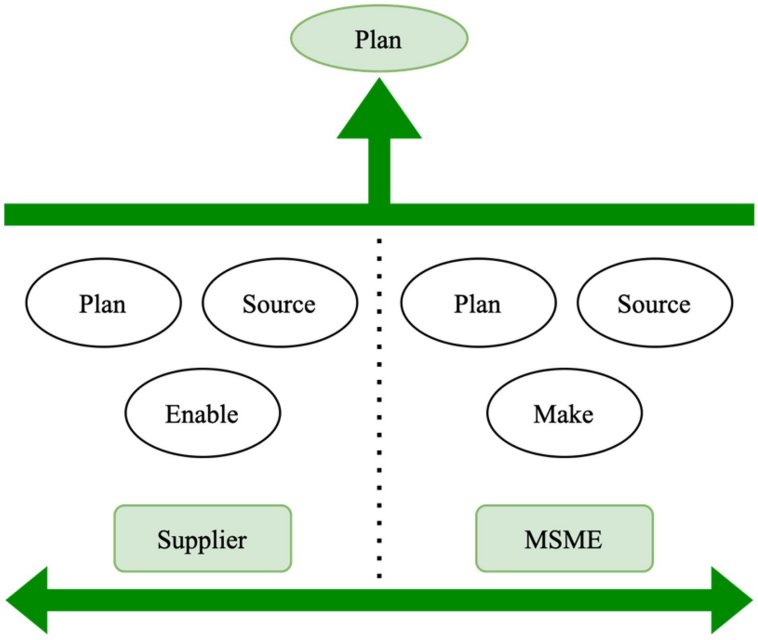

Figure 3 The Main Process of the SCOR Model in Bakso Mantul MSME

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obtained 16 KPI with 7 halal-related KPI.

KPIs that have been identified will be re-validated by the MSME's internal and external respondents consisting of suppliers and MUI halal auditors. Based on the results of KPI validation, it was found that 12 KPIs were considered valid and used for measuring the performance of the MSME supply chain, as shown in Table 1.

The Analytic Hierarchy Process (AHP) method is used to weigh KPIs using a pairwise comparison matrix approach for each KPI. Data input processed in the Expert Choice software is the value of pairwise comparisons between comparison criteria. The data input process is carried out according to the results of the weighting assessment of each respondent. The assessment is declared consistent if the ratio of Inconsistency is lower than 0,1 (Winston, 2004).

Data collected is raw data from the checklist of MSME documents. The data is then processed according to the measurement needs of each KPI. The data used in the performance calculation is data for the last four months, namely April, May, June, and July 2022. The results of the calculation of performance per KPI are first normalized by Snorm De Boer. After obtaining the normalization results for each performance indicator, the next step is to measure the performance of the halal supply chain from Bakso Mantul MSME with performance measurements based on the data obtained. From the calculation results, the final performance value of the MSME supply chain is obtained as in Table 2.

At the first level, four main processes are mapped to business processes based on the SCOR model, namely plan, source, make, and enable. After validating the suitability of the business processes and main processes, there is one main process that is not in line with the MSME mission, namely the enable main process. Based on the main process mapping that has been adjusted, KPI identification is carried out through a review of the needs of MSME which is reviewed based on literature studies and the provisions for halal submissions from LPPOM MUI. From the identification results, 16 KPIs were obtained which were then validated by the MSME, to get 12 KPIs on the performance attributes of reliability and responsiveness.

Based on the results of data processing

Table 1 KPI Weighted Result

Key Performance Indicators	Global Weight
KPI-1 Accuracy of Production Schedule	0.38
KPI-2 Certification Document Completeness Ratio	0.08
KPI-3 Ratio of Timely Delivery of Raw Materials	0.01
KPI-4 Level of Defects of Purchased Raw Materials	0.01
KPI-5 Percentage of Halal-Certified Raw Materials	0.07
KPI-6 Ratio of Non-Halal/Unclean Non-Halal Substances to Raw Materials in Storage Areas	0.04
KPI-7 Ratio of Non-Halal/Unclean Non-Halal Substances for Finished Products in Storage Areas	0.03
KPI-8 Ratio of Expired Labels on Packaging of Finished Products Sold	0.02
KPI-9 Ratio of Expired Labels on Raw Material Packaging Used	0.02
KPI-10 Revenue Ratio of Main Raw Materials (Meat) Not Contaminated with Non-Halal/Unclean Substances	0.12
KPI-11 Production Process Efficiency	0.04
KPI-12 Percentage of Product Reject	0.19

Table 2 Supply Chain Performance Result Score

Proses Utama (Level 1)	Key Performance Indicators (Level 3)	Snorm	KPI Score Value	Total Score
Plan	KPI-1	41.17	15.64	50. 78
	KPI-2	38.97	2.96	
	KPI-3	61.98	0.81	
Source	KPI-4	100.00	0.90	
	KPI-5	90.91	6.36	
	KPI-6	100.00	3.50	
	KPI-7	100.00	3.40	
	KPI-8	0.00	0.00	
	KPI-9	45.45	0.91	
Make	KPI-10	100.00	12.30	
	KPI-11	100.00	3.80	
	KPI-12	100.00	18.70	

from the measurement of the overall performance of the halal supply chain at MSME Bakso Mantul, the performance value was 50.78 for the MSME halal supply chain. To find out the achievements that have been made by the MSME on each KPI, the next stage of analysis is to group the values of each performance based on the Traffic Light System (TLS) as follows. In the plan process, there are two performance attributes consisting of three performance indicators namely KPI-1, KPI-2, and KPI-3 with performance results based on TLS as shown in Table 3.

Based on the KPI results in the main plan, it can be seen that there are two KPIs that do not give satisfactory results, namely KPI-1 and KPI-2 with one KPI-2 categorized as marginal or sufficient. The existence of two unsatisfactory KPIs is a separate note for the MSME to improve the performance of the production schedule by reducing the implementation of production that exceeds the specified schedule. In the source, there is one performance attribute, namely reliability which consists of six performance indicators. The performance indicators are KPI-4, KPI-5, KPI-6, KPI-7, KPI-8, KPI-9, and KPI-10 with the performance results obtained based on the TLS as shown in Table 4.

Based on the KPI results in the main source, it can be seen that there are two KPIs that give satisfactory results, namely KPI-4 to KPI-7 and KPI-10, while KPI-8 and KPI-9 give unsatisfactory results. Two KPIs that give unsatisfactory results need to consider improvement from the MSME so that the performance of these KPIs becomes better and contributes greatly to the total supply chain final score.

The next analysis on the main make consists of one performance attribute, namely reliability, and two performance indicators, namely KPI-11 and KPI-12. The performance results obtained from the performance attributes in the main make based on TLS can be seen below in Table 5.

Based on the results of the KPI on the main process of make, both KPIs provide

Table 3 Traffic Light System on Plan

Key Performance Indicators	Scoring System	Traffic Light System
KPI-1 Accuracy of Production Schedule	*Higher is better*	
KPI-2 Certification Document Completeness Ratio	*Higher is better*	
KPI-3 Ratio of timely delivery of raw materials	*Higher is better*	

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Table 4 Traffic Light System on Source

Key Performance Indicators	Scoring System	Traffic Light System
KPI-4 Level of Defects of Purchased Raw Materials	*Lower is better*	
KPI-5 Percentage of Halal-Certified Raw Materials	*Higher is better*	
KPI-6 Ratio of Non-Halal/Unclean Non-Halal Substances to Raw Materials in Storage Areas	*Higher is better*	
KPI-7 Ratio of Non-Halal/Unclean Non-Halal Substances for Finished Products in Storage Areas	*Higher is better*	
KPI-8 Ratio of Expired Labels on Packaging of Finished Products Sold	*Higher is better*	
KPI-9 Ratio of Expired Labels on Raw Material Packaging Used	*Higher is better*	
KPI-10 Revenue Ratio of Main Raw Materials (Meat) Not Contaminated with Non-Halal/Unclean Substances	*Higher is better*	

satisfactory performance results. KPI-11 measures the level of production efficiency by comparing the results of production with the production time used. In KPI-12, the percentage of rejected products is measured by the comparison of the number of quality products (passing quality inspection) with the total production carried out. Because the two KPIs already have satisfactory results, it is hoped that the MSME will be able to maintain the performance of these two indicators.

To maintain the consistency of the quality produced, the MSME needs to allocate a special Human Resources (HR) officer who handles the halal assurance system in the business supply chain. The allocation of human resources is also considered necessary to carry out internal halal audits of the MSME as one of the requirements for halal certification which requires businesses to have a special team for internal halal audits.

Apart from human resources, the MSME also needs to maintain consistency in the availability of data needed to measure KPIs. Overall, the data required for measuring performance is well-available, but consistency in providing data is still needed so that ideal performance measurement can be carried out according to the measurement time. The existence of good and structured data collection can help the MSME to continue to evaluate through the KPIs that have been prepared.

D. Conclusion

Based on the results of the supply chain performance measurement, the supply chain performance result is 50.78 which is categorized as "average" based on the Snorm De Boer. The measurement results also obtained KPI performance based on the categorization in the Traffic Light System (TLS) for each indicator. There are seven indicators with satisfactory performance, namely KPI-4 level of the defect in raw materials purchased, KPI-5 percentage of halal certified raw materials, KPI-6 ratio of not contaminated with non-halal/unclean

Table 5 Traffic Light System on Make

Key Performance Indicators	Scoring System	Traffic Light System
KPI-11 Production Process Efficiency	*Higher is better*	
KPI-12 Percentage of Product Reject	*Lower is better*	

substances for raw materials in storage areas, KPI-7 ratio of no contaminated by non-halal/ unclean substances for finished products in the storage area, KPI-10 ratio of acceptance of main raw materials (meat) not contaminated by non-halal/unclean substances, KPI-11 production process efficiency, and KPI-12 percentage of reject. One KPI with marginal or sufficient performance is KPI-3 the ratio of timely delivery of raw materials. The other four KPIs showing unsatisfactory performance results are KPI-1 accuracy of production schedules, KPI-2 ratio of completeness of certification documents, KPI-8 ratio of expired labels on the packaging of finished products sold, and KPI-9 ratio of expired labels on the packaging of raw materials used. Indicators that have unsatisfactory performance can be used as evaluations for Bakso Mantul MSME to make improvements and increase performance.

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