DIJEMSS: Dinasti International Journal of Education Management and Social Science
E-ISSN: 2686-6331
P-ISSN: 2686-6358
DINASTI PUBLISHER
https://dinastipub.org/DIJEMSS dinasti.info@gmail.com +62 811 7404 455
DOI: https://doi.org/10.38035/dijemss.v6i1
https://creativecommons.org/licenses/by/4.0/
Received: 12 August 2024 | **Revised:** 10 October 2024 | **Publish:** 10 October 2024

The Measurement of Supply Chain Management Performance at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory Unit in 2020 – 2023 Using The Supply Chain Operation Reference-Fuzzy Analytical Hierarchy Process (SCOR-FAHP) Method

Audina Afriani[1], Pratami Wulan Tresna[2], Luthfi Thirafi[3]
[1]Universitas Padjadjaran, Jawa Barat, Indonesia, e-mail: audina20002@mail.unpad.ac.id
[2]Universitas Padjadjaran, Jawa Barat, Indonesia, e-mail: pratami@unpad.ac.id
[3]Universitas Padjadjaran, Jawa Barat, Indonesia, e-mail: luthfi.thirafi@unpad.ac.id

Corresponding Author: audina20002@mail.unpad.ac.id

Abstract: PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit is a sugar-producing company which collaborates with suppliers and distributors along its supply chain. The challenges which are faced by PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit, are delays in raw material deliveries and production schedules, limitations and mismatches of raw materials with criteria, and production outcomes not meeting targets. Therefore, it is necessary to measure supply chain management performance in order to know the conditions and assess the performance of supply chain management at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit, from 2020 to 2023. Furthermore, the methods used were SCOR as the model for mapping the measurement matrix and FAHP was used in order to determine the priority weights for each criterion in the matrix. The supply chain management performance measurement results at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit, from 2020 to 2023, obtain a score of 81.24, which is categorized into good category. However, there are still 5 KPIs which need improvement, in which it can be achieved by improving record-keeping and documentation with software assistance, sorting raw materials, and implementing the SCOR-FAHP method in supply chain management performance measurement.

Keyword: SCOR, FAHP, Supply Chain Management, Performance, Measurement

INTRODUCTION

Indonesia is well-known as an agrarian country, which means that mostly the livelihoods of the Indonesian people depend on plantation, development, and agricultural products, both in the processing industry and services. One of the most important agricultural commodities for plantation development is sugarcane. The process of planting sugarcane is conducted in order to meet the consumption of granulated sugar in Indonesia. Therefore, the Indonesian government, through its policy, issued Presidential Regulation No. 40 of 2023 on

the Acceleration of National Sugar Self-Sufficiency for 2024/2045 in order to support the provision of White Crystal Sugar (GKP) in meeting the need for granulated sugar in Indonesia through sugarcane planting efforts.

Sugarcane planting efforts in Indonesia are conducted in several provinces, one of which is North Sumatra. The sugarcane planting activities in North Sumatra are managed by PT. Perkebunan Nusantara II (PTPN II) and conducted in several plantation locations. Furthermore, according to the Central Bureau of Statistics (BPS) of North Sumatra in 2023, there are two regencies in North Sumatra which produce sugarcane: Deli Regency and Langkat Regency. The purpose of sugarcane production in North Sumatra is to meet the granulated sugar needs of the community; especially, for the people of North Sumatra. One of the entities fulfilling the sugar needs in North Sumatra is PT. SGN Sei Semayang Sugar Factory unit, located in Deli Serdang Regency, as one of the sugar producers in North Sumatra under the auspices of PTPN II.

The production process of granulated sugar at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit, applies supply chain management in its operations. Supply chain management is the management of the flow of goods and services which include all activities involved in transforming raw materials into final products (Bangun et al., 2023). Furthermore, the implementation of supply chain management at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit, starts with the upstream process by collaborating with suppliers, namely three plantations: Semayang, Bulu Cina, and Helvetia, which are responsible for supplying harvested Sugarcane Raw Materials (BBT) to PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit. The delivered Sugarcane Raw Materials (BBT) will be processed for 3 – 4 months to be converted into granulated sugar, which is then sold to vendors or distributors through a tender system at the downstream stage.

The challenges faced in the supply chain management at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit, include delays in the delivery of Sugarcane Raw Materials (BBT) due to the limited number of trucks and cane harvesters, extreme weather conditions causing trucks to be held up in the plantations, and obstacles in the harvesting process. These delivery delays of Sugarcane Raw Materials (BBT) result in a shortage of raw materials at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit, impacting the factory's productivity. Table 1 below shows idle time that exceed the target of 5 hours.

Table 1. Sugarcane Raw Material Supply Idle Time Data at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit (2020 – 2023)

Description	YEAR			
	2020	2021	2022	2023
Plan (hour)	5	5	5	5
Realization (hour)	340	92,5	326	18,7

Source: PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit RKAP Data (2020 – 2023)

PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit takes several measures by conducting annual evaluations at the end of each production year. These evaluations were conducted to produce reports detailing issues encountered during the production process, which were then submitted to the plantation authorities. Sugarcane harvesting at the plantation and sugar production at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit, are conducted once a year with duration of 3 to 4 months each year. The target annual supply of Sugarcane Raw Materials (BBT) is 180,000 to 250,000 tons. However, the actual condition shows that the annual supply of Sugarcane Raw Materials (BBT) from 2020 to 2023 has consistently faced limitations and it has not met the RKAP standards, as shown in Table 2 below.

Table 2. Sugarcane Raw Material Supply Data at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit (2020 – 2023)

Description	YEAR			
	2020	2021	2022	2023
RKAP (ton)	238.753,82	181.431,00	219.000,10	243.000,00
Realization (ton)	59.319,5	102.250,89	173.047,14	110.439,04

Source: PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit RKAP Data (2020 – 2023)

Another factor affecting the limitation of Sugarcane Raw Material (BBT) supply is the land dispute issues related to Land Use Rights (HGU) at the plantations supplying PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit, which causes fluctuations and inconsistencies in the sugarcane plantation areas. Furthermore, the limitations and fluctuations in plantation land result in a restricted supply of Sugarcane Raw Materials (BBT) or levels below the RKAP standards; besides, they lead to fluctuations. In addition to the limited supply of Sugarcane Raw Materials (BBT), some of the Sugarcane Raw Materials (BBT) do not meet the Sweet, Clean, Fresh (MBS) criteria due to delays in the delivery of Sugarcane Raw Materials (BBT), causing part of the harvested Sugarcane Raw Materials (BBT) to be held up in the fields. Table 3 below shows the data on the amount of Sugarcane Raw Materials (BBT) which do not meet the Sweet, Clean, Fresh (MBS) criteria.

Table 3. Defective Sugarcane Raw Material Data at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit (2020 – 2023)

Description	2020	2021	2022	2023
Raw Material Shipped (ton)	59.321,95	102.250,89	173.047,14	110.439,04
Defective Raw (ton)	4.152,5365	6.135,0534	13.843,7712	7.730,7328

Source: PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit RKAP Data (2020 – 2023)

Sugarcane Raw Materials which do not meet the Sweet, Clean, Fresh (MBS) criteria cannot be returned to the supplier and they still will be processed. However, it will impact production quantity, as BBT which does not meet MBS criteria will result in a lower yield (sugar content in the cane), as shown in Table 4 below.

Table 4. RKAP and Yield Realization Data at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit (2020 – 2023)

Description	2020	2021	2022	2023
RKAP (%)	7	6,16	7	6,5
Realization (%)	3,5	5,31	5,5	6,16

Source: PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit RKAP Data (2020 – 2023)

The low yield and limited supply of Sugarcane Raw Materials (BBT) below RKAP standards have resulted in production outcomes which also fall below RKAP standards and tend to be fluctuating from 2020 to 2023, as shown in Table 5 below.

Table 5. RKAP and Actual Production Results at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit (2020 – 2023)

Description	2020	2021	2022	2023
RKAP (ton)	16.729,48	11.209,68	15.375,99	615.795,00
Realization (ton)	31.576,45	5.388,50	9.074,00	6.792,00

Source: PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit RKAP Data (2020 – 2023)

This situation results in the work plans, costs, and targets not aligning with the established RKAP standards. Consequently, the company's revenue becomes suboptimal, leading to fluctuating minimum cost allocation standards set by PT. Sinergi Gula Nusantara

Sei Semayang Sugar Factory unit, through RKAP. Given the issues at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit, there is a need to conduct study on supply chain management performance in order to understand and assess the conditions, implementation, and performance of supply chain management at the company. In addition, supply chain performance measurement is the process of evaluating the effectiveness and efficiency of a company's operational activities or strategies (Syamil et al., 2023).

The performance measurement in this study used the Supply Chain Operations Reference (SCOR) model and Fuzzy Analytical Hierarchy Process (FAHP) in order to measure supply chain management performance variables. The SCOR measurement model is commonly used in order to describe matrices for measuring supply chain management (Sriwana et al., 2021). The FAHP model is applied in order to evaluate and assign weights to the measurement matrix (Rizkillah et al., 2022). Normalization of each indicator's parameters is performed by using Snorm De Boer (Sriwana et al., 2021). The reason for using the SCOR and FAHP measurement models is that to develop a hierarchical measurement matrix for process, performance attributes, and KPIs to objectively, consistently, and accurately assess supply chain management performance, providing a basis for evaluation at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit.

During its operations, PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit, has not yet measured supply chain management performance by using the SCOR-FAHP method and it has only measured efficiency at various levels; such as, time, factory, energy, and production quantity. Therefore, the researcher intends to measure supply chain management performance in order to provide a basis for improvements to optimize supply chain management at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit, from the start until the product reaches the customer.

METHOD

This study used a quantitative approach and descriptive analysis. The data used included primary and secondary data. Primary data consisted of flow data and weighting results for supply chain management performance measurement. Secondary data included literature reviews from previous research journals and related books. The population encompassed all supply chain management activities at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit, from 1988 to 2023. Moreover, sampling was conducted through purposive sampling, and the sample included supply chain management activity data from 2020 to 2023, comprising data on supply chain system flows, production flows, financial flows, and information flows. The study was conducted at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit, from February 2024 to July 2024. Furthermore, the research instrument used a pairwise comparison questionnaire in order to understand the weights at each level in the SCOR measurement model and as a tool in order to measure supply chain management performance. The questionnaire was given to three respondents: the General Manager, Processing Manager, and Assistant Finance and Administration Manager. Data processing involved mapping the supply chain management structure for qualitative data and it was measured by using SCOR-FAHP through Microsoft Excel for quantitative data. The research procedures included: (1) Identifying supply chain management processes, (2) Validating performance indicators, (3) Developing a SCOR matrix with a hierarchical structure including core processes (level 1), performance attributes (level 2), and KPIs validated by the General Manager (level 3), (4) Performing FAHP weighting by converting comparison results into TFN scale, determining Fuzzy Synthesis value, vector, defuzzification, normalizing fuzzy vector weights, determining weighting values for each criterion, normalizing Snorm De Boer, and calculating final values.

RESULTS AND DISCUSSION

Supply Chain Management Implementation

The supply chain management structure at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit, involves establishing partnerships through contractual agreements with suppliers; specifically, plantations owned by PTPN II, including Perkebunan Semayang, Bulu Cina, and Helvetia. As a result, PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit, does not conduct supplier selection. When the sugarcane harvesting season begins, usually in January, the District Unit will issue a Harvest and Transport Order (SPTA) to the plantations. The selection of vendors or distributors is based on criteria where the vendor who submits the highest price during the tender process is chosen. Generally, 2 to 3 vendors win the tender each year.

Operational Conditions

Efficiency measurements which are conducted by PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit, reveal operational conditions which tend to be inefficient. It is proved by the production time, quantity of Sugarcane Raw Materials (BBT), quantity of production results, and yield, which are not yet optimal. These conditions are detailed in the efficiency achievement data presented in Table 6 below.

Table 6. Efficiency Achievement Data at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit, (2020 – 2023)

Year	Efficiency Achievement				
	Production on Time	Inventory Quantity	Production Quantity	Warehousing Cost	Yield
2020	18,75%	24,84%	9,42%	20%	50%
2021	8,33%	56,45%	48,07%	24%	86,20%
2022	17,80%	79,01%	59,01%	3%	78,57%
2023	25,92%	45,44%	43%	3%	94,77%

Source: PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit RKAP Data (2020 – 2023)

Supply Chain Management Performance Using SCOR-FAHP

The measurement of supply chain management performance involves designing a model comprising core processes, performance attributes, and KPIs. In this study, the KPIs were validated by the General Manager amount to 21. Criteria weighting was conducted by using the FAHP method based on data collected through questionnaires distributed to 3 respondents. After distributing the questionnaires, a pairwise comparison matrix was created based on the three predetermined levels. The criteria weights should achieve a consistency ratio (CR) of <0.1. If the performance indicators are inconsistent, the questionnaire is revised until consistent weights are obtained. The results of the pairwise comparison matrix for process criteria (level 1), were averaged by using the geometric mean, are shown below.

Table 7. Recap of Process Criteria Questionnaire Results

PROCESS	*PLAN*	*SOURCE*	*MAKE*	*DELIVER*	*RETURN*
PLAN	1	1,59	3	6,26	7,61
SOURCE	0,63	1	3	5,74	6,80
MAKE	0,33	0,33	1	3,56	3,98
DELIVER	0,16	0,17	0,28	1	3,56
RETURN	0,13	0,15	0,25	0,28	1

Source: Processed by the Researcher (2024)

Weighting was measured by using FAHP by converting the pairwise comparison weights into TFN scale in order to determine the Fuzzy Synthesis value, as seen in the Fuzzy Synthesis values for process criteria (level 1) in Table 8 below.

Table 8. Fuzzy Synthesis Values for Process Criteria

PROSES	S_i

	Lower	*Middle*	*Upper*
PLAN	0,15	0,42	0,92
SOURCE	0,12	0,23	0,81
MAKE	0,05	0,20	0,52
DELIVER	0,03	0,11	0,31
RETURN	0,02	0,04	0,14

Source: Processed by the Researcher (2024)

The vector values and defuzzification from the Fuzzy Synthesis value for process criteria (level 1) were calculated as follows.

1. *V(Plan ≥ Plan)* = 1, because $m_1 = m_1$; 0,42 = 0,42
2. *V(Make ≥ Plan)* = $\frac{l_1 - u_2}{(m_2 - u_2) - (m_1 - l_1)}$, because $m_3 \leq m_1$; 0,19 ≤ 0,27.

The results of vector value and defuzzification for process criteria (level 1) are shown in Table 9 below.

Table 9. Vector Values and Defuzzification for Process Criteria

PROSES	*PLAN*	*SOURCE*	*MAKE*	*DELIVER*	*RETURN*	Defuzzification
PLAN ≥	1	1	1	1	1	1
SOURCE ≥	0,87	1	1	1	1	0,87
MAKE ≥	0,89	1,14	1	1	1	0,89
DELIVER ≥	0,54	0,85	1,16	1	1	0,54
RETURN ≥	0,30	0,13	0,73	0,98	1	0,13

Source: Processed by the Researcher (2024)

Fuzzy weights were determined by summing the defuzzified values (\(d'\)) for each criterion, as shown in the following example calculation for the process plan criteria.

W' = (d' (A1), d'(A2),...,d' (An))^T

W' = (1 + 0,87 + 0,89 + 0,54 + 0,13) = 3,43

The normalization of weights (W) is shown in the following calculation for process criteria.

1. $W(d'_1) = \frac{d'_1}{W'} = \frac{1}{3,43} = 0,29$
2. $W(d'_2) = \frac{d'_2}{W'} = \frac{0,87}{3,43} = 0,25$

The results of weight normalization for process criteria are shown in Table 10 below.

Table 10. Weight Normalization for Process Criteria

Process	W	Ranking
PLAN	0,29	1
SOURCE	0,25	3
MAKE	0,26	2
DELIVER	0,16	4
RETURN	0,04	5

Source: Processed by the Researcher (2024)

Each KPI has different parameters, so that normalization by using the Snorm De Boer method was applied to the 21 KPIs, as shown in Table 11 below.

Table 11. Results of *Snorm De Boer Normalization* for KPIs

KPI	Final Value
Time for production planning	100
Time required to revise and adjust production scheduling if the production does not meet the criteria	100
Percentage of accuracy in the quantity of raw material delivery from suppliers	51,42
Percentage of defect-free raw material deliveries by suppliers	93

Percentage of accuracy in the quantity of raw materials available in the warehouse or cane yard station according to inventory records	100
Percentage of timely raw material deliveries by suppliers	50,57
Availability of procurement staff	79,17
Availability of additional labor	98,53
Percentage of accuracy in the number of production units compared to the target units	39,88
Percentage of defective products produced during the manufacturing process	99,99
Percentage of solid waste that can be utilized	100
Percentage of adherence to the production schedule compared to production planning	50,57
Availability of production staff	78,38
Availability of additional labor	95,08
Percentage of accuracy in the inventory of finished products in the warehouse or sugar storage compared to inventory records	100
Percentage of defect-free product deliveries from the company	100
Time allowed by the company for product pickup by customers (vendors)	33,33
Costs incurred during the delivery stage	88,38
Availability of labor	100
Availability of additional labor	95,65
Percentage of defective products returned to the company	100

Source: Processed by the Researcher (2024)

Normalization calculation using Snorm De Boer.

$$Snorm = \frac{S_i - S_{min}}{S_{max} - S_{min}} x\ 100$$
$$= \frac{4-1}{4-1} x\ 100$$
$$= 100$$

The calculation for each KPI can be seen in the KPI Pre-value calculation example below.

$$P_i = 100\ x\ 1$$
$$= 100$$

The results of the calculation can be seen in Table 12 below.

Table 12. KPIs Value

KPI	Attributes	KPI	KPI Values	Total Attribute Value
PLAN	*Responsiveness*	Time for production planning	100	100
	Agility	Time required to revise and adjust production scheduling if the production does not meet the	100	100
SOURCE	*Reliability*	Percentage of accuracy in the quantity of raw material delivery from suppliers	3,60	93,4
		Percentage of defect-free raw material deliveries by suppliers	55,8	
		Percentage of accuracy in the quantity of raw materials available in the warehouse or cane yard station according to inventory records	34	
	Responsiveness	Percentage of timely raw material deliveries by suppliers oleh pemasok	50,57	50,57
	Asset	Availability of procurement staff	17,42	94,27
		Availability of additional labor	76,85	
MAKE	*Reliability*	Percentage of accuracy in the number of production units compared to the target units	22,33	66,33

		Percentage of defective products produced during the manufacturing process proses	37	
		Percentage of solid waste that can be utilized	7	
	Responsiveness	Percentage of adherence to the production schedule compared to production planning	50,57	50,57
	Asset	Availability of production staff	17,24	91,4
		Availability of additional labor	74,16	
DELIVER	*Reliability*	Percentage of accuracy in the inventory of finished products in the warehouse or sugar storage compared to inventory records	82	100
		Percentage of defect-free product deliveries from the company	18	
	Responsiveness	Time allowed by the company for product pickup by customers (vendors)	33,33	33,33
	Cost	Costs incurred during the delivery stage	88,38	88,38
	Asset	Availability of labor	19	96,48
		Availability of additional labor	77,48	
RETURN	*Reliability*	Percentage of defective products returned to the company	100	100

Source: Processed by the Researcher (2024)

The calculation of the value for each performance attribute can be seen in the example of calculating the reliability performance attribute value in the planning process below.

$$P_i = \sum_{j=i}^{n} S_{ij} W_j$$

$$P_i = 100 \; x \; 1$$

$$= 100$$

The calculation results can be seen in Table 13 below

Table 13. Attribute Value

Process	Attributes	Attribute Value	Total Criteria	Process
PLAN	*Responsiveness*	70	100	
	Agility	30		
SOURCE	*Reliability*	20,55	77,04	
	Responsiveness	19,72		
	Asset	36,77		
MAKE	*Reliability*	27,20	66,83	
	Responsiveness	17,70		
	Asset	21,94		
DELIVER	*Reliability*	1	72,55	
	Responsiveness	11,67		
	Cost	20,33		
	Asset	39,56		
RETURN	*Reliability*	100	100	

Source: Processed by the Researcher (2024)

Final Supply Chain Management Performance Value

The calculation of the final value for each process can be seen in the example of calculating the process plan criteria value below.

$$P_i = \sum_{j=i}^{n} S_{ij} W_j$$

$$P_i = 100 \; x \; 0{,}29$$

$= 0{,}29$

The calculation results can be seen in Table 14 below.

Table 14. Final Performance Value of Supply Chain Management

Process	Total for each process	Weight	Final Value
PLAN	100	0,29	29
SOURCE	77,04	0,25	19,26
MAKE	66,83	0,26	17,48
DELIVER	72,55	0,16	11,61
RETURN	100	0,04	4
Total			**81,24**

Source: Processed by the Researcher (2024)

Table 15. Monitoring Indicators

Process	Total Each Process
<40	*Poor*
> 40 - 50	*Marginal*
> 50 - 70	*Average*
> 70 - 90	*Good*
> 90	*Excellent*

Source: Sriwana et.al., (2021)

The final result of measuring supply chain management performance by using the SCOR-FAHP method at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit, is 81.24, indicating that the supply chain management performance at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit is categorized into the >70 scale category, which means that it is quite good. However, the supply chain management performance still needs improvement and optimization, particularly in KPIs which have not yet met planning targets. The highest weight is on the planning process with a weight of 0.29, which indicates that planning has the highest priority in the supply chain activities at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit while the lowest weight is on the return process with a weight of 0.04 which means that the return process has the lowest priority in the supply chain activities.

There are 5 KPIs which are still not optimal: (1) Percentage of accuracy in the quantity of raw material delivery from suppliers, (2) Percentage of timeliness of raw material delivery by suppliers, (3) Percentage of accuracy in the production schedule compared to the targeted units, (4) Percentage of accuracy in the quantity of produced units compared to the targeted units. These three KPIs need attention by recording and documenting the production process by using specialized software as a tool for managing supply chain activities, so that the data can be factual and accurate when submitted to the plantation parties. Furthermore, PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit can conduct routine coordination in order to discuss the scheduling of harvesting, delivery schedules, strict control of sugarcane quality, issues, and planning targets. For KPI (5), the timeframe given by the company to customers for product pickup is still not optimal so that communication with distributors (vendors) regarding product availability which needs to be promptly transported from the sugar warehouse should be improved. It will allow distributors (vendors) to provide an appropriate number of transport trucks based on the amount of product available in the warehouse, minimizing time, cost, and effort waste.

Comparison of Efficiency and SCOR-FAHP Measurement Results

The efficiency measurement conducted by PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit has not yet used a specific method, resulting in relatively simple operational measurement activities. Therefore, the Fuzzy AHP measurement model was used in order to evaluate supply chain management performance at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit which will facilitate a detailed assessment of each aspect of the supply chain management.

CONCLUSION

The factual conditions from 2020 to 2023, based on the efficiency calculations by PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit, show inefficiencies due to suboptimal production time efficiency, inventory quantity, production quantity, and yield. Meanwhile, the supply chain management performance from 2020 to 2023 at PT. Sinergi Gula Nusantara Sei Semayang Sugar Factory unit, was measured by using the SCOR-FAHP method, achieved a performance score of 81.24 with a >70 scale, categorized into the "good" category, with the primary priority being the planning criteria and return as the final priority. There are 16 KPIs which are performing well and 3 KPIs which are average: Percentage of accuracy in the quantity of raw material delivery from suppliers, (2) Percentage of timeliness of raw material delivery by suppliers, and (3) Percentage of accuracy in the production schedule compared to production planning. Two other KPIs fall below average: (1) Percentage of accuracy in the quantity of produced units compared to the targeted units and (2) The timeframe allowed by the company to customers (vendors) for product pickup.

REFERENCES

Anindita, K., Ambarawati, I. G. A. A., & Dewi, R. K. (2020). Kinerja rantai pasok di Pabrik Gula Madukismo dengan metode Supply Chain Operation Reference-Analytical Hierarchy Process (SCOR-AHP). *Agrisocionomics: Jurnal Sosial Ekonomi dan Kebijakan Pertanian*, *4*(1), 125–134. https://doi.org/10.14710/agrisocionomics.v4i1.6080

Annisa', F. N., & Dahda, S. S. (2022). Pengukuran supply chain performance pada PT. Ravana Jaya dengan menggunakan model SCOR 12.0 dan AHP. *SITEKIN: Jurnal Sains, Teknologi dan Industri*, *20*(1), 239–247. https://doi.org/10.24014/sitekin.v20i1.19738

Anwar, S. N. (2011). Manajemen rantai pasok (supply chain management): Konsep dan hakikat. *Jurnal Dinamika Informatika*, *3*(2).

Azmiyati, S., & Hidayat, S. (2016). Pengukuran kinerja rantai pasok pada PT. Louserindo Megah Permai menggunakan model SCOR dan FAHP. *Jurnal Al-Azhar Indonesia Seri Sains dan Teknologi*, *3*(4), 163–170. https://doi.org/10.36722/sst.v3i4.230

Chotimah, R. R., Purwanggono, B., & Susanty, A. (2017). Pengukuran kinerja rantai pasok menggunakan metode SCOR dan AHP pada unit pengantongan pupuk urea PT. Dwimatama Multikarsa Semarang. *Industrial Engineering Online Journal*, *6*(4).

Fathoni, M. Y., Prabowo, D. A., Wijayanto, S., Fernandez, S., & Susanto, A. (2022). Analisis kinerja rantai pasok produk kedelai menggunakan metode Supply Chain Operation Reference. *Jurnal Informatika: Jurnal Pengembangan IT*, *7*(2), 74–79. https://doi.org/10.30591/jpit.v7i2.3740

Hidayat, A. N., & Dahda, S. S. (2022). Pengukuran kinerja supply chain management dengan menggunakan metode Supply Chain Operation Referance (SCOR 12.0) berbasis Analytical Hierarchy Process (AHP) dan Objective Matrix (OMAX). *Jurnal Rekayasa Sistem Industri*, *7*(2), 1–7. https://doi.org/10.33884/jrsi.v7i2.5479

Liputra, D. T., Santoso, & Susanto, N. A. (2018). Pengukuran kinerja rantai pasok dengan model Supply Chain Operations Reference (SCOR) dan metode perbandingan berpasangan. *Jurnal Rekayasa Sistem Industri*, *7*(2), 119–125.

https://doi.org/10.26593/jrsi.v7i2.3033.119-125

Marfuah, U., & Mulyana, A. (2021). Pengukuran kinerja rantai pasok pada PT. SIP dengan pendekatan SCOR dan Analysis Hierarcy Process (AHP). *JISI: Jurnal Integrasi Sistem Industri*, *8*(2), 25–33. https://doi.org/10.24853/jisi.8.2.25-33

Meliantika, Tanjung, W. N., & Nurhasanah, N. (2017). Pengukuran kinerja SCOR pada perencanaan bahan baku di IKM TPT ABC dan XYZ dengan pendekatan Objective Matrix. *Seminar Nasional Inovasi dan Aplikasi Teknologi di Industri 2017*, 1–7.

Misnadesi, & Hartati, M. (2019). Pengukuran kinerja rantai pasok UKM Kalamai Uni War menggunakan metode SCOR dan Fuzzy AHP. *Seminar Nasional Teknologi Informasi, Komunikasi dan Industri (SNTIKI) 11*, 643–655. https://doi.org/10.12928/si.v17i2.12859

Muhammad, Amri, & Yuslidar, C. E. (2012). Evaluasi pengelolaan kinerja rantai pasok dengan pendekatan SCOR model pada swalayan Asiamart Lhokseumawe. *Industrial Engineering Journal*, *1*(1), 44–51. https://doi.org/10.53912/iejm.v1i1.135

Pujawan, I. (2017). *Supply Chain Management*. Surabaya: Guna Widya.

Puspita, R. A. P., Syakhroni, A., & Khoiriyah, N. (2022). Pengukuran kinerja rantai pasok menggunakan metode Supply Chain Operation Reference (SCOR) dan Fuzzy Analytical Hierarchy Process (F-AHP). *Jurnal Teknik Industri*, *1*(2), 120–127. https://doi.org/10.30659/jurti.1.2.120-127

Putri, I. W. K., & Surjasa, D. (2018). Pengukuran kinerja Supply Chain Management menggunakan metode SCOR (Supply Chain Operation Reference), AHP (Analytical Hierarchy Process) dan OMAX (Objective Matrix) di PT. X. *Jurnal Teknik Industri*, *8*(1), 37–46. https://doi.org/10.25105/jti.v8i1.4719

Qarieba, N. A. F., & Rosyada, Z. fanani. (2023). Penilaian kinerja supply chain menggunakan metode Supply Chain Operation Reference (SCOR) dan Analytical Hierarchy Process (AHP) dengan pendekatan proses bisnis (Studi kasus: Departemen purchasing PT Ebako Nusantara (Persero)). *Industrial Engineering Online Journal*, *12*(1).

Rakhman, A., Machfud, & Arkeman, Y. (2018). Kinerja manajemen rantai pasok dengan menggunakan pendekatan metode Supply Chain Operation Reference (SCOR). *Jurnal Aplikasi Bisnis dan Manajemen (JABM)*, *4*(1), 106–118. https://doi.org/10.17358/jabm.4.1.106

Saragih, S., Pujianto, T., & Ardiansah, I. (2021). Pengukuran kinerja rantai pasok pada PT. Saudagar Buah Indonesia dengan menggunakan metode Supply Chain Operation Reference (SCOR). *Jurnal Ekonomi Pertanian dan Agribisnis (JEPA)*, *5*(2), 520–532. https://doi.org/10.21776/ub.jepa.2021.005.02.20

Sriwana, I. K., Hijrah S, N., Suwandi, A., & Rasjidin, R. (2021). Pengukuran kinerja rantai pasok menggunakan Supply Chain Operation Reference (SCOR) di Ud. Ananda. *JISI: Jurnal Integrasi Sistem Industri*, *8*(2), 13–24. https://doi.org/10.24853/jisi.8.2.13-24