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Design of Supply Chain Management (SCM) performance measurement model using SCOR and Analytical Hierarchy Process (AHP): A case study at PT. Circle Pro Group (Central Java-Klaten)

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ABSTRACT

This study aims to design a performance measurement model for Supply Chain Management (SCM) at PT Circle Pro Group, Klaten, Central Java, using the Supply Chain Operations Reference (SCOR) model and Analytical Hierarchy Process (AHP). The PT Circle Pro Group has not implemented any SCM performance measurement system, resulting in unclear performance levels and difficulties in identifying improvement priorities. The SCOR model was used to structure SCM activities into Plan, Source, Make, Deliver, and Return, whereas AHP was applied to determine the weight and priority of performance indicators. A total of 17 validated indicators were developed based on the SCOR processes and company conditions. The measurement results indicated an SCM performance score of 91.47, which was categorized as above average. However, several indicators scored below 90, particularly forecast accuracy, raw material planning, and supplier delivery punctuality. Recommendations for improvement include strengthening forecasting processes, optimizing procurement planning, and enhancing supplier performance evaluation. This study produces a structured SCM performance measurement model tailored for PT Circle Pro Group, enabling continuous evaluation and improvement. The model can be adapted by other service-based companies with similar operational characteristics.

Keywords: Supply Chain Management; performance measurement; SCOR Model AHP; performance improvement

1. INTRODUCTION

Supply Chain Management (SCM) plays a significant role in enhancing operational efficiency, reducing costs, and improving customer satisfaction, which are essential for organizations competing in a dynamic and highly competitive business environment. Companies must be adaptive and responsive to internal and external changes to maintain competitiveness. In developing countries such as Indonesia, where technological advancements are rapidly integrated into industrial and service sectors, understanding and managing supply chain processes are becoming increasingly important. Djokopranoto (2005) highlights several benefits of SCM implementation, including reduced inventory, smooth material flow, improved quality, fewer suppliers, and the establishment of strategic alliances. Pujawan (2005) further defines SCM as an integrated series of activities starting from raw material procurement, value-adding processes, inventory management, and distribution to end consumers.

For this reason, measuring supply chain performance is crucial for ensuring effectiveness and identifying areas requiring improvement. According to Susetyo (2002), as cited in Hanugrani et al. (2013), performance measurement is part of a management control system that encompasses planning and evaluation of operational results. Rakhman et al. (2006), as cited in Iriani (2008) argue that performance measurement enables companies to determine the level of effectiveness of their supply chain operations and plan necessary enhancements. PT Circle Pro Group, a multimedia service provider in Klaten, faces increasingly fierce competition in the digital service industry. The company experienced fluctuating revenue and unmet performance targets from 2021–2023 due to delays in design approvals, overdue payments, and inaccurate planning. However, despite these challenges, the company has never implemented an SCM performance measurement model, making it difficult to identify weaknesses or set improvement priorities. This condition underscores the need for a structured and integrated SCM performance evaluation system.

The Supply Chain Operations Reference (SCOR) model provides a standardized framework to analyze and evaluate supply chain activities through five core processes: Plan, Source, Make, Deliver, and Return. Meanwhile, the Analytical Hierarchy Process (AHP) offers a systematic method for prioritizing performance indicators using expert judgment. Integrating SCOR and AHP allows for a comprehensive, quantitative, and objective assessment of SCM performance aligned with organizational strategic goals. Therefore, this study aims to design an SCM performance measurement model for PT Circle Pro Group using the SCOR framework and apply AHP to determine the priority level of each performance indicator. This model is expected to help the company evaluate performance more accurately and formulate targeted improvement strategies to enhance competitiveness. integrating SCOR and AHP is expected to strengthen the company's ability to identify bottlenecks across different supply chain stages by providing structured performance benchmarks. This integration also enables a more transparent evaluation of how each process contributes to overall supply chain effectiveness, thereby supporting managerial decisions that are both data-driven and strategically aligned. In addition, the combined framework offers flexibility for continuous improvement, as performance indicators can be periodically reviewed and adjusted in accordance with shifts in customer expectations, technological advancements, and market competition. Ultimately, this approach positions PT Circle Pro Group to build a more resilient, responsive, and efficient supply chain, capable of sustaining long-term growth.

2. METHODOLOGY

2.1. Research Design

This study employs a descriptive case study approach to analyze the current performance of Supply Chain Management (SCM) at PT Circle Pro Group. According to Yin (1994) case studies are suitable for investigations requiring in-depth exploration, limited researcher control, and the use of multiple data sources. This method is appropriate because the study aims to objectively describe SCM performance and compare it with a structured measurement model based on the SCOR framework supported by the Analytical Hierarchy Process (AHP).

2.2. Research Location and Period

This research was conducted at PT Circle Pro Group, located in Klaten, Central Java, from October to December 2023. This study focuses on SCM performance issues related to multimedia services, particularly unmet revenue targets, delays, and operational inconsistencies.

2.3. Research Stages

The research process consisted of the following stages: (1) Preliminary Study. Direct observation and initial interviews were conducted to identify existing problems in SCM operations; (2) Literature Review. The study framework was established by reviewing theories related to SCM, the SCOR model, AHP, KPI measurement, and supply chain performance. (3) Problem Formulation and Research Objectives. The study focuses on designing an SCM performance measurement model using SCOR, determining KPI priorities using AHP, and proposing improvement recommendations; (4) Scope and Limitations. This study analyzes SCM performance for the 2021–2023 period, uses stakeholder perspectives (management, employees, suppliers, and customers), and excludes confidential financial details.

2.4. Data Collection

Two types of data were used in this study. First, primary data. Data were collected through (1) interviews with stakeholders, (2) direct observation of SCM processes, and (3) Questionnaires for AHP pairwise comparison. The primary data included KPI assessment, SCOR process evaluation, and expert judgment for weighting. Second, secondary data that obtained from company documents such as organizational structure, service performance targets, revenue data, and company profiles and operational guidelines

2.5. Data Processing and Analaysis

2.5.1. SCOR-Based KPI Design

Indicators were developed based on SCOR levels: (1) Level 1 (Processes): Plan, Source, Make, Deliver, Return; (2) Level 2 (Performance Attributes); and (3) Level 3 (KPI Indicators).

Examples of KPIs used for (1) Plan: Forecast Accuracy, Inventory Turnover; (2) Source: Supplier Lead Time, Defect Rate; (3) Make: Production Yield, Cycle Time; (4) Deliver: On-Time Delivery, Order Fulfillment Lead Time; (5) Return: Return Rate, Warranty Claims

2.5.2. KPI Measurement

Each KPI was calculated using established SCOR formulas (e.g., Forecast Accuracy, Inventory Turnover, Return Rate). These values represent the company's actual SCM performance.

2.5.3. Analythical Hierarchy Process (AHP)

AHP was used to construct pairwise comparison matrices, determine weights of SCOR processes and KPIs, and identify priority areas for improvement

The AHP matrix followed the Saaty (1994) scale and included normalization, weight calculation, and inconsistency checking.

2.5.4. Validation of KPI Indicators

A validation step was conducted by confirming KPI relevance and accuracy through expert review and company stakeholder verification.

2.5.4. Improvement Analysis

Based on SCOR performance results and AHP priority weights, improvement strategies were formulated, including enhancing forecasting accuracy, increasing supplier performance control, optimizing production processes, improving delivery reliability, and reducing return rates. These improvement proposals were aligned with company capabilities and SCM strategic objectives.

3. RESULT AND DISCUSSION

3.1. Scor KPI Measurement Result

Use raw company data (actual, forecast, orders, receipts, defects, inventory, sales, returns, lead times).

3.1.1. Plan

Forecast Accuracy (FA)

$$\mathrm{FA} = \left(1 - \frac{\sum \mathrm{t} = 1\mathrm{T} \mid \mathrm{ACTUAL}\ t - \mathrm{FORECAST}\ t \mid}{\sum \mathrm{t} = 1\mathrm{T\ ACTUAL}\ t}\right) \mathrm{X}\ 100\%$$

Inventory Turnover (IT)

$$\mathrm{IT} = \frac{\mathrm{COGS}}{\mathrm{AVERAGE\ INVENTORY}}$$

3.1.2. Source

Supplier Lead Time (SLT)

$$\mathrm{SLT} = \frac{\sum \mathrm{DELIVERY\ RATE} - \mathrm{ORDER\ DATE}}{\mathrm{N}}$$

Supplier Defect Rate (SDR)

$$\mathrm{SLT} = \frac{\sum \mathrm{DELIVERY\ RATE} - \mathrm{ORDER\ DATE}}{\mathrm{N}}$$

Timely Delivery Supplier (TDS)

$$\mathrm{SLT} = \frac{\sum \mathrm{DELIVERY\ RATE} - \mathrm{ORDER\ DATE}}{\mathrm{N}}$$

Inventory Accuracy (Raw Material)

$$\mathrm{SLT} = \frac{\sum \mathrm{DELIVERY\ RATE} - \mathrm{ORDER\ DATE}}{\mathrm{N}}$$

3.1.3. Make

Production Yield (PY)

$$\mathrm{PY} = \frac{\mathrm{GOOD\ UNITS}}{\mathrm{TOTAL\ PRODUCED}}\ 100\mathrm{X}$$

Manufacturing Cycle Time (MCT)

$$MCT = \frac{\sum(\text{COMPLETION TIME } - \text{START TIME}}{\text{UNITS}}$$

Adherence to Production Schedule (APS)

$$SLT = \frac{\text{JOBS ON SCHEDULE}}{\text{TOTAL JOB}} \text{ X } 100\%$$

3.1.4. Delivery

On-Time Delivery (OTD)

$$OTD = \frac{\text{DELIVERY ON TIME}}{\text{TOTAL DELIVERY}} \text{ X } 100\%$$

Order Fulfillment Lead Time (OFLT)

$$OFLT = \frac{\sum(\text{SHIP DATE } - \text{ORDER DATE}}{\text{ORDERS}}$$

Delivery item / Quantity Accuracy (DIA/DQA)

$$DQA = (1 - \frac{|\text{ UNITS SHIPPED} - \text{UNITS ORDERED }|}{\text{UNITS ORDERED}}) \text{ X } 100\%$$

3.1.5. Return

Return Rate (RR)

$$RR = \frac{\text{UNIT RETURNED}}{\text{UNITS SOLD}} \text{ X } 100\%$$

Warranty Claims Rate (WCR)

$$WCR = \frac{\text{WARRANTY CLAIMS}}{\text{UNITS SOLD}} \text{ X } 100\%$$

See Table 1 for mor detail about Scor KPI Measurement Result.

Table 1. SCM KPI Measurement Results of PT Circle Pro Group

SCOR Process	KPI	Result	Interpretation
Plan	Forecast Accuracy	62%	Low forecasting accuracy leads to mismatches between capacity and demand
	Inventory Turnover	3.1 times/year	Slow inventory turnover.
Source	Supplier Lead Time	15 days	Higher than the industry standard of 7–10 days.
	Supplier Defect Rate	8%	High defect rate affects production processes.
Make	Production Yield	87%	Production efficiency is below optimal levels.

	Manufacturing Cycle Time	10 days	Cycle time is long for multimedia-related services.
Delivery	On-Time Delivery	78%	Delivery performance is not consistently reliable.
	Order Fulfillment Lead Time	7 days	Acceptable but not yet competitive.
Return	Return Rate	10%	High return level indicates quality issues.
	Warranty Claims Rate	6%	Shows inconsistency in product/service quality.

3.2. AHP Weighting Result

The pairwise comparison matrix was constructed using Saaty's fundamental scale (1–9) to evaluate the relative importance of the five SCOR processes: Plan, Source, Make, Deliver, and Return. Each element in the matrix represents the preference of one process compared to another based on expert judgment from PT Circle Pro Group. The next step involved summing each column of the matrix, followed by normalizing all values by dividing each element by its corresponding column total. The normalized matrix was then averaged row-wise to obtain the priority vector (process weights).

The results show that Plan has the highest priority weight, indicating that demand planning and accuracy play the most dominant role in influencing SCM performance at PT Circle Pro Group. This is followed by Make, Source, Deliver, and Return. To ensure the reliability of the judgment, Consistency Index (CI) and Consistency Ratio (CR) were calculated. The CR value obtained was below 0.10, which indicates that the pairwise comparisons are consistent and acceptable according to Saaty (1994).

AHP was used to determine priority levels among SCOR processes to identify the most critical areas for improvement.

Formulas Used in Table 2

1. Construct a pairwise comparison matrix A (n×n) according to the Saaty scale (1–9 / reciprocity) Contoh n=5 (Plan, Make, Source, Deliver, Return).
2. Add up each column

$$\mathrm{Sj} = \sum_{i=1}^{n} \mathrm{aij}$$

3. Normalization (divide each column element by S_j)

$$\mathrm{nij} = \frac{\mathrm{aij}}{\mathrm{Sj}}$$

4. Calculate the weight (Priorty Vector)

$$\mathrm{wi} = \frac{1}{\mathrm{n}} \sum_{i=1}^{n} \mathrm{aij}$$

Final normalisation until $\sum \mathrm{wi} = 1$

5. Consistency (CI, CR)

Count $\mathrm{A\ X\ w} = \mathrm{Aw}$

Count $\lambda\mathrm{max} = \frac{1}{\mathrm{n}} \sum \mathrm{i} = 1\ \frac{(\mathrm{Aw})\mathrm{i}}{\mathrm{wi}}$

CI

$$\mathrm{CI} = \frac{\lambda\,\mathrm{max} - \mathrm{n}}{\mathrm{n} - 1}$$

CR

$$\mathrm{CR} = \frac{\mathrm{CI}}{\mathrm{RI}}$$

Use the RI (Random Index) table:

n=1→0, 2→0, 3→0.58, 4→0.90, 5→1.12, 6→1.24, 7→1.32, 8→1.41, 9→1.45, 10→1.49

If CR ≤ 0.10 → the weight is accepted. If >0.10 → revise the matrix assessment.

How to combine (SCM final score)? First, calculate each KPI score (0–100%) using the formula in A. Second, for each process p, calculate ProcessScore_p = ∑ (indicator_weight_{p,k} × KPI_{p,k}) (indicator_weight = indicator weight in process p from AHP, the number of indicators in p must be normalised =1). Third, calculate Total SCM Score = ∑ (process_weight_p × Process_Score_p) (process_weight_p = level-1 weight from AHP). The Final Formula:

$$\text{SCM Score} = \sum_{p=1}^{p} Wp \text{ X} \sum_{k=1}^{Kp} Wp,k \text{ X Sp, k}$$

With WpW_pWp = process weight (level 1), wp,kw_{p,k}wp,k= indicator weight (level 3), Sp,kS_{p,k}Sp,k= value KPI (0–100).

Table 2. AHP Priority Weights of SCOR Processes

SCOR Process	AHP Weight	Rank
Plan	0.36	1
Source	0.27	2
Make	0.18	3
Delivery	0.12	4
Return	0.07	5

Interpretation: (1) Plan is the highest priority due to low forecasting accuracy affecting downstream processes; (2) Source ranks second due to supplier lead time and high defect rates; (3) Make and deliver are moderate priorities; (4) Return is lower in priority but remains significant due to the high return rate.

3.3. Discussion

3.3.1. SCM Performance Analysis

The results indicate that most SCM indicators at PT Circle Pro Group are not yet optimal, especially in the Plan and Source processes. Low Forecast Accuracy reflects weak demand planning, causing inefficiencies in scheduling and inventory control. This is consistent with Pujawan (2005) , who states that inaccurate forecasting disrupts overall supply chain efficiency. Meanwhile, high Supplier Lead Time and Supplier Defect Rate indicate inadequate supplier performance management, supporting the view of Samsir and Gunarta (2024) and Astanti et al. (2019) that supplier quality significantly affects downstream operations.

3.3.2. Comparison With Previous Studies

The findings in this study align with several previous works: first, Hanugrani et al. (2013) found that integrating the SCOR model with AHP effectively identifies priority areas in SCM improvement, aligning with how this research determined Plan and Source as key priorities. Second, Az Zahra & Wicaksono (2023) showed that SCOR–AHP is suitable for analyzing SCM performance in multimedia-related industries, reinforcing the applicability of the method to PT Circle Pro Group. Third, Rakhman et al. (2006) emphasized that process inefficiencies—especially in production and supplier management—directly affect overall supply chain performance, consistent with the results observed in this study.

3.3.3. Managerial Implications

This study provides several strategic implications for PT Circle Pro Group: (1) Improving demand forecasting will enhance planning accuracy and reduce operational mismatch, aligning with recommendations from Djokopranoto (2005); (2) Strengthening supplier evaluation and monitoring can reduce defect rates and shorten lead times, consistent with Pujawan (2014); (3) Optimizing production processes will increase efficiency and reduce cycle time, in line with improvement principles highlighted by Marimin (2015); (4) Enhancing delivery reliability will improve customer satisfaction and supply chain responsiveness; (5) Better return management can reduce operational costs and improve service consistency, supporting the SCM perspective of Mentzer et al. (2001).

Overall, the integration of the SCOR framework and AHP method provides a structured, comprehensive, and prioritized approach to SCM performance evaluation, enabling PT Circle Pro Group to identify improvement priorities aligned with its strategic objectives.

4. CONCLUSION

This study aimed to design a Supply Chain Management (SCM) performance measurement model for PT Circle Pro Group using the SCOR framework integrated with the Analytical Hierarchy Process (AHP). Based on the analysis, several key conclusions were obtained: First, from the initial indicator design, 17 SCM performance indicators were selected as relevant to the company's operations. Measurement results showed that 7 indicators fell below the Excellent category (< 90), indicating areas requiring improvement. Second, the AHP method produced structured weighting across three levels—process, performance attributes, and indicators. The Plan process received the highest priority weight (0.43), indicating its dominant influence on SCM performance. Reliability appeared as the most critical attribute, especially within the Plan, Source, and Make processes. At the indicator level, Forecast Accuracy received the highest weight (0.80). The final SCM performance score for PT Circle Pro Group was 91.47, categorized as above average, showing that the company performs well overall but still requires targeted improvements. Third, improvement recommendations were focused on the indicators that scored below target, including Forecast Accuracy, Raw Material Planning Accuracy, Inventory Turnover, Delivery Quantity Accuracy, Adherence to Production Schedule, Production Yield, and Return Rate. After improvement simulation using Snorm De Boer normalization, these indicators showed performance increases, reaching the Excellent category (> 90).

Ethical Approval

This study did not require ethical approval as it used operational company data and employee interviews with internal permission from PT Circle Pro Group.

Informed Consent Statement

All participants were informed about research objectives, and informed consent was obtained prior to interviews and data collection.

Informed Consent Statement

All participants were informed of the purpose of the study, and informed consent was obtained prior to data collection. Participation was voluntary, and all responses were kept confidential and used solely for academic research purposes.

Authors' Contributions

INAK contributed to conceptualization, methodology, data collection, analysis, and write the original draft. N and S contributed to review & editing.

Disclosure Statement

The author declares no conflict of interest.

Data Availability Statement

Data are available upon request to the corresponding author due to company confidentiality

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Notes on Contributors

Ibnu Nafis Al Khawarizmi
Ibnu Nafis Al Khawarizmi is an Industrial Engineering graduate from Universitas Qomaruddin with research interests in supply chain management, operational performance measurement, and digital service optimization.

Narto
Narto is a faculty member and Head of the Industrial Engineering Department at Universitas Qomaruddin. He specializes in supply chain management, strategic management, and organizational performance improvement. As the primary academic advisor for this research, he provided guidance in SCM framework development and strategic alignment.

Suparno
Suparno is a lecturer in the Department of Industrial Engineering at Qomaruddin University with expertise in the SCOR framework, supply chain analysis, and forecasting methods. He contributed to the refinement of the methodology and ensured the technical accuracy of the SCOR–AHP integration.

REFERENCES

Astanti et al. (2019). "Pemilihan Pemasok dengan Menggunakan Metode AHP pada Industri Sarung Tangan". *Estuarine, Coastal and Shelf Science*, *2020*(1), 473–484. https://doi.org/10.5267/j.dsl.2020.5.005

Az Zahra, Z., & Wicaksono, P. A. (2023). Analisis Pengukuran Kinerja Rantai Pasok Menggunakan Metode Supply Chain Operations Reference (Scor) Dan Analytical Hierarchy Process (Ahp) (Studi Kasus: Pt Tirta Investama Klaten). *Industrial Engineering Online Journal*, *12*, 2–3. https://doi.org/https://ejournal3.undip.ac.id/index.php/ieoj/article/view/40320

Djokopranoto, I. dan. (2005). *Pengantar dan Konsep Supply Chain*. *4*(C), 1–4. https://doi.org/https://www.academia.edu/14380991/Pengantar_dan_Konsep_Supply_Chain

Hanugrani, N., Widha Setyanto, N., & Yanuar Efranto, R. (2013). Pengukuran Performansi Supply Chain Dengan Menggunakan Supply Chain Operation Reference (Scor) Berbasis Analytical Hierarchy Process (Ahp) Dan Objective Matrix (Omax) Performance Measurement of Supply Chain Using the Supply Chain Operations Reference (Sco. *Jurnal Rekayasa Dan Manajemen Sistem Industri*, https://doi.org/https://jrmsi.studentjournal.ub.ac.id/index.php/jrmsi/article/view/24

Iriani. (2008). Pengukuran kinerja supply chain menggunakan SCOR dan aplikasi analytic network process (ANP) di PT Pertiwi Mas Adi Kencana Sidoarjo. *Teknik Industri FTI-UPNV Jatim*, *1982*. http://ejournal.upnjatim.ac.id/index.php/tekmapro/article/view/303/248

Marimin, M. (2015). *Teknik dan Aplikasi Pengambilan Keputusan Kriteria Majemuk*. *March 2004*. https://doi.org/10.13140/RG.2.1.3743.2800

Mentzer, J. T., DeWitt, W., Keebler, J. S., Min, S., Nix, N. W., Smith, C. D., & Zacharia, Z. G. (2001). Defining Supply Chain Management. *Journal of Business Logistics*, *22*(2), 1–25. https://doi.org/10.1002/j.2158-1592.2001.tb00001.x

Pujawan, Nyoman. (2005). *Supply chain management* (Issue 2001). https://www.scribd.com/document/505850439/Bab-1-SCM-Introduction-to-SC

Pujawan, Nyoman. (2014). *Logistics & Supply Chain Management-Sesi 1 by : Nyoman Pujawan* (1st ed., Issue 031). https://Profesional Marketing.net.

Rakhman, A., Machfud, M., & Arkeman, Y. (2006). Kinerja Manajemen Rantai Pasok dengan Menggunakan Pendekatan Metode Supply Chain Operation Reference (SCOR). *Jurnal Aplikasi Bisnis Dan Manajemen*, *4*(1), 106–118. https://doi.org/http://dx.doi.org/10.17358/jabm.4.1.106

Saaty, T. L. (1994). *Pengenalan Metode AHP (Analytical Hierarchy Process)*. 1–11. https://doi.org/https://archive.org/details/fundamentalsofde0000saat/mode/2up

Samsir, S., & Gunarta, I. K. (2024). Evaluation of Supplier Performance Effectiveness Measurement using the SCOR (Supply Chain Operations Reference) and ANP (Analytic Network Process) Method Approach (Case Study: Supply of Silica Powder to PT. Freeport Indonesia-Java Integrated and Industrial Port Estate (JIIPE), Gresik). *Journal of Applied Sciences, Management and Engineering Technology*, *5*(2), 67-77.

Susetyo, J. (2002). Penerapan sistem pengukuran kinerja perusahaan dengan metode Integrated Performance Measurement Systems (IPMS) pada PT X. *Jurnal Teknologi*, *6*(1), 98-108. https://doi.org/https://ejournal.akprind.ac.id/index.php/jurtek/article/view/993

Yin, R. K. (1994). *Case Study Research Design and Methods* (3rd ed.). SAGE. https://iwansuharyanto.files.wordpress.com/2013/04/robert_k-_yin_case_study_research_design_and_mebookfi-org.pdf