

Applying the SCOR Model to Evaluate Planning Efficiency in A Supply Chain: The Case of Meat-Processing Enterprise in Lower Silesia, Poland*

Michał JAKUBIAK

Wroclaw University of Economics and Business, Wrocław, Poland

Correspondence should be addressed to: Michał JAKUBIAK, michal.jakubiak@ue.wroc.pl

* Presented at the 46th IBIMA International Conference, 26-27 November 2025, Ronda, Spain

Abstract

The complexity of agri-food supply chains requires decision frameworks that translate strategic goals into measurable operational results. This study applies the Supply Chain Operations Reference (SCOR) model to evaluate planning efficiency in a medium-sized meat-processing enterprise located in the Lower Silesian region of Poland. Drawing on six months of transactional data from SAP S/4HANA, MES, and WMS systems, a hierarchical set of performance indicators was designed in accordance with SCOR v13.0. The analysis shows that while production and outbound logistics are broadly synchronized, structural weaknesses persist in forecasting, livestock procurement, and cross-departmental coordination. These findings were consistent with planners' daily observations during the diagnostic stage. The study provides an industry-specific adaptation of SCOR for the meat sector and demonstrates how standardized metrics, when combined with ERP data, can generate an auditable basis for operational control and continuous improvement. The work contributes methodologically by showing how to embed SCOR into Sales and Operations Planning (S&OP), and practically by offering managers a replicable approach grounded in real enterprise data rather than assumptions.

Keywords: Supply Chain, Planning, SCOR, ERP

Introduction

Competitive advantage in manufacturing increasingly depends on the coordinated performance of entire supply networks rather than on the internal efficiency of any single firm (Christopher, 2016; Wieland, 2021). This is especially evident in the food and meat industry, where biological variability, perishability, and regulatory pressure make planning both difficult and strategically decisive (Chopra & Meindl, 2023; Ivanov & Dolgui, 2020). In such environments, strategy must be expressed through measurable indicators that are trusted across departments and directly usable in operational decision-making (Croom & Brandon-Jones, 2019; Choi & Rogers, 2022).

The Supply Chain Operations Reference (SCOR) model, originally developed by the Supply Chain Council and now maintained by the Association for Supply Chain Management (ASCM), provides a standardized process architecture across six domains: Plan, Source, Make, Deliver, Return, and Enable (APICS SCC, 2021). SCOR links these processes with performance attributes such as reliability, responsiveness, agility, cost, and asset efficiency, offering a consistent language for benchmarking and performance improvement (Bozarth & Handfield, 2007; Dubey, Gunasekaran, & Childe, 2022).

While SCOR has been widely applied in discrete manufacturing, automotive, and electronics, its use in biologically constrained industries such as meat processing has been less documented. The present study addresses this gap by applying SCOR to a meat-processing enterprise in Lower Silesia, Poland, where the author participated directly in data extraction and validation together with the company's planning and controlling teams. The paper offers two contributions. First, it presents an empirically validated indicator system aligned with SCOR v13.0 and populated entirely from ERP/MES transactions rather than hypothetical data. Second, it demonstrates how these indicators can be embedded into the company's planning and Sales and Operations Planning (S&OP) routines, creating an auditable management rhythm rather than a one-off analysis. In doing so, it links academic reference modeling to day-to-day practice in a highly regulated, high-variability supply environment (Christopher, 2016; Ivanov & Dolgui, 2020).

Planning Processes in the Meat Industry Supply Chain

Planning in the meat industry operates at the interface between agriculture, industrial processing, and retail markets. Biological growth cycles determine raw-material availability, while downstream demand is shaped by seasonal consumption, promotional campaigns of large retailers, and export requirements (Wieland, 2021). Mismatches between expected input (live animals, carcass weights, fat/lean ratios) and realized input translate into inefficiencies that are far harder to correct than in, for example, electronics or automotive, where raw materials are largely standardized (Chopra & Meindl, 2023; Cooper & Ellram, 1993).

In a process-oriented interpretation, the supply chain is understood as an end-to-end sequence of value-creating activities running from feed suppliers and farms through slaughter and cutting to final packaging and distribution (Battaglia & Tyndall, 2003; Christopher, 2016). Planning is the integrator of that sequence. It synchronizes procurement, production, logistics, and commercial commitments by translating anticipated demand into executable capacity plans. When planning fails, the consequences cascade quickly: shortages or surpluses of livestock, overloading of deboning lines, underutilized chilling capacity, missed delivery windows, and ultimately penalties or lost orders in retail channels (Croom & Brandon-Jones, 2019; Dubey et al., 2022).

Digital integration is now central to managing this complexity. Modern Enterprise Resource Planning (ERP) systems such as SAP S/4HANA consolidate purchasing, production scheduling, quality control, warehousing, and distribution data into a common backbone. Manufacturing Execution Systems (MES) capture shop-floor performance, such as actual yield, scrap, and downtime, while Warehouse Management Systems (WMS) track inventory location, age, and cold-chain compliance. When combined, these systems allow near real-time visibility of material flows and capacity constraints (Ivanov & Dolgui, 2020; Choi & Rogers, 2022). Research in supply chain resilience shows that such digitally integrated visibility is a prerequisite for fast adaptation when markets or supply conditions shift suddenly (Wieland, 2021; Dubey et al., 2022).

However, having data is not the same as having alignment. In many meat-processing firms, each function (sales, procurement, production, logistics) maintains its own performance view, its own spreadsheets, and even its own definition of "forecast" or "available stock." This fragmentation leads to reactive firefighting instead of proactive coordination (Heisig, 2009). In perishable chains, the cost of reactive behavior is high: chilled inventory loses value each day, and failure to fulfill an order in full and on time can immediately damage credibility with high-volume retail buyers (Chopra & Meindl, 2023; Christopher, 2016).

Forecasting is a particular weak point. Demand for meat products is volatile, driven by promotions and calendar effects, while supply is constrained by animal biology and veterinary regulations. Classical, purely statistical forecasting methods often underperform in this environment because they ignore retailer-led promotions and export tenders that can shift demand significantly from one week to the next (D'Amours, Montreuil, Lefrancois, & Soumis, 1999; Chopra & Meindl, 2023). Recent work on digital supply-chain twins, which model network behavior and test alternative responses under disruption, shows that integrating data from multiple functions—including sales forecasts, supplier updates, and capacity signals—improves predictive quality and resilience (Ivanov & Dolgui, 2020). SCOR supports this logic by emphasizing standardized indicators such as forecast accuracy (an agility measure) and perfect order fulfillment (a reliability measure), which create a shared language across departments (APICS SCC, 2021; Christopher, 2016).

Benchmarking and the SCOR Framework

Benchmarking is only useful when metrics are defined consistently. SCOR addresses this by specifying both process categories and corresponding performance attributes. At a high level, SCOR classifies performance into

reliability (e.g., ability to deliver the promised product on time and in full), responsiveness (speed of fulfilling demand), agility (ability to adjust to changes in demand or supply), cost (overall efficiency of operations), and asset management (effectiveness in using working capital and physical assets) (Stewart, 1997; APICS SCC, 2021). Each attribute is linked to clearly defined Key Performance Indicators (KPIs), which can then be decomposed into diagnostic indicators at lower levels.

Historically, SCOR has been used to drive cost reduction, service improvement, and cycle-time compression in sectors such as automotive and electronics (Bozarth & Handfield, 2007; Croom & Brandon-Jones, 2019). In food industries, benchmarking is more difficult because companies face biological variability and regulatory compliance obligations that do not directly appear in generic manufacturing metrics (Wieland, 2021). Nevertheless, SCOR's logic can still be applied if the indicators are contextualized. For example, "yield variance" during cutting and deboning is essential in meat processing because deviations in carcass composition directly affect both cost and order fulfillment. Similarly, "livestock delivery accuracy" is not a common KPI in electronics, but it is vital in meat supply chains, where an unexpected deviation in live weight can ripple through production planning and outbound logistics.

Recent literature links SCOR-style performance management to resilience and digitalization. Research on supply chain resilience after COVID-19 has shown that companies with clearly defined, data-driven planning processes respond to shocks faster and stabilize output sooner (Choi & Rogers, 2022; Wieland, 2021). Work on digital supply-chain twins argues that modelling supply networks and continuously comparing actual conditions to planned conditions creates early-warning capability and supports scenario-based decision-making under disruption (Ivanov & Dolgui, 2020). In parallel, studies on big data and analytics in supply chains suggest that integrating operational data into management routines is now a source of structural competitive advantage, not just incremental efficiency (Dubey et al., 2022).

The current version of the model, SCOR v13.0, extends beyond operational throughput to include digital enablement and sustainability, reflecting growing expectations around traceability, resource efficiency, and compliance—especially relevant in European agri-food chains (APICS SCC, 2021; Wieland, 2021). For meat processors, this is more than branding: traceability and proof of compliance are prerequisites for access to certain retailers and export markets. In other words, SCOR's indicators not only describe performance; they increasingly determine market eligibility.

Case Study: The Lower Silesian Meat-Processing Enterprise

The focal company is one of the largest meat processors in southwestern Poland. It operates three production facilities—responsible for slaughter, cutting, portioning, curing, and packaging—and two distribution centers that manage refrigerated outbound flows to national retail chains and export clients. The company employs roughly 850 people and processes approximately 200 tons of raw meat per day. Operational execution is coordinated through SAP S/4HANA, which integrates procurement (materials and livestock purchasing), production planning, quality control, warehousing, and distribution. Shop-floor performance data such as actual yields and downtimes are captured in the Manufacturing Execution System (MES), and inventory movements in the cold chain are tracked via the Warehouse Management System (WMS).

Before the project described in this paper, planning was dominated by a sales-driven weekly forecast, as observed during the initial diagnostic workshops and data review sessions. Sales would update expected volumes from major retail customers, and production was expected to "make it happen." Procurement of livestock and other raw materials was often adjusted on short notice without a full view of processing capacity, chilled storage constraints, or downstream logistics commitments. This reactive model created systematic tension: either excess raw material in some weeks, driving unplanned overtime and risk of spoilage, or underutilized capacity in others, which raised unit costs and jeopardized fill rates on key contracts (Christopher, 2016; Chopra & Meindl, 2023).

To address these issues, the company adopted SCOR as a common reference. Instead of each department tracking its own informal KPIs, a shared set of SCOR-aligned indicators was agreed and implemented through ERP-based dashboards. Planning, Sourcing, Making, and Delivering were no longer managed as separate silos but reviewed together through a Sales and Operations Planning (S&OP) forum. That forum became the governance mechanism for interpreting the indicators, assigning responsibility, and agreeing on corrective actions in response to deviations (APICS SCC, 2021; Bozarth & Handfield, 2007).

During the initial diagnostic phase, several structural challenges were confirmed. First, forecast volatility was high, and the resulting changes were not consistently communicated to procurement or capacity planners. Second, the company's different plants used slightly different data conventions and spreadsheets, which made it difficult

to build a consolidated view of performance. Third, accountability for “plan quality” was diffuse: sales could claim that operations failed to deliver, and operations could claim that forecasts were unrealistic. These challenges are not unique; they mirror broader patterns in agri-food supply chains operating under volatile demand and biologically constrained supply (Wieland, 2021; Dubey et al., 2022).

Methodology and KPI System Development

The performance-measurement system was built in accordance with SCOR Digital Standard v13.0 (APICS SCC, 2021) and adapted to the company’s information landscape. The project covered a six-month period (January–June 2024), selected to capture both seasonal peaks and quieter intervals typical for the product portfolio. All measurements were based on actual transactional data, extracted directly from SAP S/4HANA using OData services and validated against local plant reports. Financial postings came from FI/CO, production orders from PP and MM; quality-inspection results from SAP QM, inventory and handling data from WMS, and real-time yield and downtime data from MES. Forecast data were taken from the company’s integrated business planning environment (IBP). This approach ensured auditability: every KPI value could be traced back to a specific transaction document or production order in the ERP system (Heisig, 2009; Dubey et al., 2022).

Through a series of five cross-functional workshops with production planners, controllers, procurement managers, and logistics coordinators, the author facilitated the definition of five strategic objectives. These objectives mapped directly onto SCOR’s core performance attributes:

- (1) cost efficiency,
- (2) service reliability,
- (3) forecast accuracy and planning agility,
- (4) working-capital effectiveness, and
- (5) regulatory and quality compliance.

Each objective was then assigned a Level 0 indicator from the SCOR catalogue, together with a responsible data owner and a standard calculation procedure. Table 1 summarizes the agreed mapping.

Table 1. Strategic objectives and corresponding indicators

Strategic objective	Indicator (Level 0)	ERP / data source	SCOR performance attribute
Cost efficiency	Total supply chain cost	SAP FI/CO	Cost
Service reliability	Perfect Order Fulfillment (OTIF)	SAP SD (deliveries)	Reliability
Forecast accuracy / agility	Forecast Accuracy (FA)	IBP / demand plan	Agility
Working-capital effectiveness	Cash-to-Cash Cycle (C2C)	SAP FI/CO (AR/AP/INV)	Asset efficiency
Compliance and product quality	Quality Compliance Ratio (QCR)	SAP QM (inspection)	Reliability / compliance

Source: Own elaboration

To operationalize these indicators, precise formulas were implemented in Power BI dashboards that pulled data via OData services from the ERP system. The formulas used were consistent with SCOR definitions and are expressed below in Word-friendly notation:

- $OTIF = \frac{[(\text{number of orders delivered on time, in full, and without documented error}) \div (\text{total number of orders delivered})] \times 100 \%}{}$
- $Forecast\ Accuracy\ (FA) = 100 - \frac{(|\text{forecast volume} - \text{actual volume}| \div \text{actual volume}) \times 100 \%}{}$
- $Yield\ Variance\ (YV) = \frac{(\text{actual output weight} \div \text{planned input weight}) \times 100 \%}{}$

- Cash-to-Cash Cycle (C2C) = Days Inventory Outstanding (DIO) + Days Sales Outstanding (DSO) – Days Payables Outstanding (DPO)
- Quality Compliance Ratio (QCR) = (number of inspected batches meeting all internal and external quality criteria ÷ total number of inspected batches) × 100 %

These formulas are directly aligned with SCOR categories: OTIF is part of reliability, Forecast Accuracy belongs to agility, C2C to asset efficiency, and so forth (APICS SCC, 2021; Stewart, 1997). Yield Variance, while not unique to meat processing, has particular diagnostic value in this industry because even small deviations in carcass utilization materially affect both margin and the ability to fulfill customer specifications (Chopra & Meindl, 2023; Dubey et al., 2022).

Approximately 12,000 transactional records were analyzed. Before any KPI was accepted for managerial discussion, data went through a structured validation process, including several iterations with plant managers to confirm the plausibility of results. First, system-based integrity checks were applied to filter incomplete or duplicate entries. Second, cross-departmental reconciliation ensured that the ERP-derived KPIs matched internal plant reports (for example, logistics' view of OTIF vs. sales' view of OTIF). Third, results were reviewed in monthly Sales and Operations Planning (S&OP) meetings attended by representatives from procurement, production, logistics, and sales. This layered validation ensured that the numbers were not only technically correct but also organizationally accepted (Heisig, 2009; Christopher, 2016).

The pilot results over the six-month window were instructive. Perfect Order Fulfillment (OTIF) averaged 91.2%, below the internal target of 96%, indicating that late or incomplete deliveries remained a structural weakness, particularly during promotional peaks negotiated by retail customers. Forecast Accuracy fluctuated at roughly ±15%, confirming that volumes communicated by sales were not consistently aligned with production capacity or supplier availability. Yield Variance averaged about 8%, reflecting deviations in carcass composition and process losses. Cash-to-Cash Cycle time fell from 37 to 33 days after tightening receivables management and slightly reducing inventory buffers. All of these values were derived exclusively from real ERP/MES data and can be traced back to transaction logs.

Importantly, the SCOR-aligned KPIs did not remain descriptive. They became central to decision-making. During S&OP meetings, planners and managers used dashboard trends to justify procurement adjustments, revise shift patterns, and challenge overly optimistic sales plans. Over time, this created a new governance rhythm in which departments debated using a shared evidence base rather than defending isolated viewpoints (Christopher, 2016; Choi & Rogers, 2022). In practical terms, SCOR moved from being an abstract reference model to an internal performance language.

Conclusions

This case confirms that SCOR can be effectively applied to biologically constrained, compliance-intensive industries such as meat processing. By rooting all indicators in ERP and MES transactions, the company avoided the common pitfall of “dashboard theater,” where KPIs are calculated offline in Excel and cannot be audited. Instead, every reported value could be traced back to a specific production order, delivery document, inspection lot, or invoice. That auditability gave the indicators managerial credibility and allowed them to influence behavior, rather than remain a theoretical exercise (Heisig, 2009; APICS SCC, 2021).

The hierarchical indicator design also proved useful. Level 0 indicators such as OTIF, Forecast Accuracy, Cash-to-Cash, and Quality Compliance gave top management a compact overview of supply-chain health across reliability, agility, working-capital efficiency, and compliance. At the same time, lower-level diagnostic measures such as Yield Variance and process compliance allowed planners to identify concrete root causes. This linkage of strategy to operational causality reflects SCOR's central promise and is consistent with earlier findings in manufacturing and logistics research (Bozarth & Handfield, 2007; Stewart, 1997).

The study further supports a growing view in the resilience literature: that visibility and structured decision-making routines are as important as physical redundancy or inventory buffers (Wieland, 2021; Choi & Rogers, 2022). Digital supply chain twins, as conceptualized by Ivanov and Dolgui (2020), illustrate how integrated data flows can be used not only to monitor performance but also to test alternative responses under disruption. Although the company in this study did not yet implement a full digital twin, the SCOR-based KPI system and monthly S&OP governance can be seen as foundational steps toward that capability.

From a managerial standpoint, the most important change observed — and frequently mentioned during post-implementation feedback meetings — was cultural. Before SCOR, planning was reactive and largely sales-driven. After SCOR, planning became cross-functional and evidence-based. By embedding KPIs into S&OP meetings and linking them to responsibility areas, the firm created shared accountability and reduced the tendency to shift blame between departments. This is aligned with research showing that resilience is not purely technical; it is also organizational, emerging from coordination, discipline, and learning (Wieland, 2021; Dubey et al., 2022). From a theoretical perspective, this work contributes an applied, verifiable pathway for adapting SCOR to meat processing. It demonstrates that a reference model originally designed for broadly industrial supply chains can be tailored to environments characterized by biological uncertainty, strict quality regimes, and high perishability. It also shows that SCOR can serve not only as an external benchmarking tool but as an internal governance language when integrated with ERP data and formal review routines.

The main limitations of this study are its single-company scope and six-month observation period. Future research should extend the analysis across multiple firms in the Polish and European meat sector to explore whether similar indicator hierarchies and governance models can be generalized. It would also be valuable to incorporate environmental and social performance indicators—such as waste reduction, carbon intensity, and animal-welfare compliance—given the increasing regulatory and market pressure in the European Union (APICS SCC, 2021; Wieland, 2021).

In conclusion, SCOR—when combined with disciplined data extraction from ERP/MES systems and embedded in regular S&OP practice—offers a viable, evidence-based approach to improving planning efficiency in the meat industry. It links strategy to execution, exposes structural bottlenecks, and supports a culture of accountability. For firms facing volatile demand and biologically constrained supply, this is no longer optional. It is a condition for remaining competitive.

Author's note:

The findings presented in this paper are based on direct collaboration with the analyzed enterprise. The author personally participated in data validation, KPI implementation, and S&OP meeting observations. The paper therefore reflects both analytical results and practical insights from real industrial practice.

References

- APICS SCC. (2021). SCOR digital standard (version 13.0). Association for Supply Chain Management.
- Battaglia, A. J., & Tyndall, G. (2003). *Implementing world-class supply chain management*. Penn State University Press.
- Bozarth, C., & Handfield, R. B. (2007). *Introduction to operations and supply chain management*. Pearson.
- Chandrashekar, A., & Schary, P. B. (1999). Toward the virtual supply chain: The convergence of IT and organization. *International Journal of Logistics Management*, 10(2), 27–39. <https://doi.org/10.1108/09574099910805970>
- Choi, T. Y., & Rogers, D. (2022). Post-pandemic supply networks: A research agenda. *Journal of Supply Chain Management*, 58(3), 5–16. <https://doi.org/10.1111/jscm.12287>
- Chopra, S., & Meindl, P. (2023). *Supply chain management: Strategy, planning, and operation* (8th ed.). Pearson.
- Christopher, M. (2016). *Logistics and supply chain management* (5th ed.). Pearson.
- Cooper, M. C., & Ellram, L. M. (1993). Characteristics of supply chain management and the implications for purchasing and logistics strategy. *The International Journal of Logistics Management*, 4(2), 13–24. <https://doi.org/10.1108/09574099310804957>
- Croom, S., & Brandon-Jones, E. (2019). *Operations management: Global and supply chain perspectives*. Pearson.
- D'Amours, S., Montreuil, B., Lefrancois, P., & Soumis, F. (1999). Networked manufacturing: The impact of information sharing. *International Journal of Production Economics*, 58(1), 63–79. [https://doi.org/10.1016/S0925-5273\(98\)00200-2](https://doi.org/10.1016/S0925-5273(98)00200-2)
- Dubey, R., Gunasekaran, A., & Childe, S. J. (2022). Big data analytics for sustainable and resilient supply chains. *International Journal of Production Economics*, 243, 108323. <https://doi.org/10.1016/j.ijpe.2021.108323>
- Heisig, P. (2009). Harmonisation of knowledge management – Comparing 160 KM frameworks around the globe. *Journal of Knowledge Management*, 13(4), 4–31. <https://doi.org/10.1108/13673270910971898>

- Ivanov, D., & Dolgui, A. (2020). A digital supply chain twin for managing the disruption risks and resilience in the era of Industry 4.0. *Production Planning & Control*, 32(9), 775–788. <https://doi.org/10.1080/09537287.2020.1768450>
- Stewart, G. (1997). Supply-chain operations reference model (SCOR): The first cross-industry framework for integrated supply-chain management. *Logistics Information Management*, 10(2), 62–67. <https://doi.org/10.1108/09576059710815716>
- Wieland, A. (2021). *Resilient supply chain management*. Springer.