

International Journal of Supply Chain Management (IJSCM)

**Quantifying Effective Store Management Systems through a Supply Chain
Management Lens: A Comparative Secondary Analysis**

Benjamin Bensam Sambiri, Alina Baskakova, Ahmed Ashraf, Munawwar Khalil, Moustafa
Gaballa, James Agbor Okpokiri (Jr)



Quantifying Effective Store Management Systems through a Supply Chain Management Lens: A Comparative Secondary Analysis



^{1*}Benjamin Bensam Sambiri

Lecturer, Berlin School of Business and Innovation, Berlin



²Alina Baskakova

Lecturer, Berlin School of Business and Innovation, Berlin



³Ahmed Ashraf

Lecturer, Berlin School of Business and Innovation, Berlin



⁴Munawwar Khalil

Lecturer, Berlin School of Business and Innovation, Berlin



⁵Moustafa Gaballa

Vice Dean of the Faculty of Economics & Business Administration, BSBI

Lecturer, Berlin School of Business and Innovation, Berlin



⁶James Agbor Okpokiri

Lecturer, Berlin School of Business and Innovation, Berlin

Article History

Received 23rd April 2026

Received in Revised Form 25th May 2026

Accepted 22nd June 2026



How to cite in APA format:

Sambiri, B., Baskakova, A., Ashraf, A., Khalil, M., Gaballa, M., & Okpokiri, J. (2026). Quantifying Effective Store Management Systems through a Supply Chain Management Lens: A Comparative Secondary Analysis. *International Journal of Supply Chain Management*, 11(1), 16–30.
<https://doi.org/10.47604/ijscm.3829>

Abstract

Purpose: Effective stores management is a foundational pillar of supply chain performance, yet scholarly discourse on how to quantify its effectiveness within broader supply chain management (SCM) frameworks remains fragmented and inconclusive. This paper undertakes a systematic secondary analysis to examine, contrast, and synthesise key quantitative and qualitative dimensions through which store management systems can be evaluated within the SCM context.

Methodology: Drawing on peer-reviewed literature published between 2018 and 2025 and sourced from Scopus-indexed and DOAJ-indexed journals, the study maps the principal performance measurement frameworks, including the Supply Chain Operations Reference (SCOR) model, the Balanced Scorecard adapted for SCM, and emergent digitally-enabled metrics, against store-level operational variables such as inventory accuracy, order fulfilment rates, shrinkage control, and demand forecast alignment.

Findings: The analysis reveals significant convergence around five quantifiable dimensions of store management effectiveness: inventory turnover efficiency, service level attainment, stockout frequency, lead time variability, and cost-to-serve ratios. The paper further introduces the Contextual Innovation Performance Model (CIPM) as an integrative analytical lens, arguing that contextual organisational variables mediate the relationship between measurement system design and actual performance outcomes.

Unique Contribution to Theory, Practice and Policy: The study contributes to theory by resolving definitional ambiguity around store effectiveness and proposes a multi-dimensional Store Management Effectiveness Index (SMEI) as a practical benchmarking instrument for researchers and practitioners.

Keywords: *Supply Chain Management, Store Management Systems, Performance Measurement, SCOR Model, Inventory Management, SMEI, CIPM, Quantitative Metrics, Retail Operations*

JEL Classification: *L81, M11, O33, L25*

©2026 by the Authors. This Article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0>)

INTRODUCTION

Supply chain management (SCM) has undergone remarkable transformation over the past three decades, evolving from a narrow logistics function into a comprehensive strategic discipline that encompasses procurement, operations, inventory governance, and last-mile delivery (Christopher, 2022). Within this expansive architecture, the store or warehouse operation represents both the physical and informational nexus of the supply chain: it is the point at which upstream sourcing decisions materialise into tangible stockholding, and from which downstream customer service commitments are fulfilled. Despite its centrality, the academic literature on how to systematically quantify the effectiveness of store management within SCM frameworks remains scattered across disciplinary silos, with scholars in operations management, retail management, logistics, and information systems each proposing partial measurement approaches that rarely cohere into an integrative model.

This gap carries tangible practical consequences. Organisations that deploy supply chain performance measurement systems (SCPMS) without robust store-level indicators risk misallocating resources, underestimating holding costs, and exposing themselves to stockout cascades that erode customer satisfaction and competitive positioning (Khourshed and Beshr, 2024). The COVID-19 pandemic illuminated these vulnerabilities with particular clarity, as global supply chain disruptions exposed the fragility of lean store management approaches that had minimised buffer stocks in the pursuit of inventory cost reduction (Khourshed and Beshr, 2024). Post-pandemic recovery strategies have consequently renewed practitioner and scholarly interest in robust, quantifiable store management metrics capable of balancing efficiency with resilience.

The present study seeks to address this lacuna through a comparative secondary analysis that draws systematically on Scopus-indexed and DOAJ-indexed peer-reviewed publications issued between 2018 and 2025. The research is guided by three principal objectives: first, to map the dominant performance measurement frameworks applied to supply chains and assess their coverage of store-level operations; second, to identify and synthesise the core quantifiable dimensions of store management effectiveness as evidenced in the extant literature; and third, to propose an integrative Store Management Effectiveness Index (SMEI) anchored in the Contextual Innovation Performance Model (CIPM), a theoretical framework that situates performance measurement within the organisational and institutional contexts that mediate the translation of measurement systems into operational outcomes.

Problem Statement

Despite the strategic centrality of store management within supply chain operations, the academic literature lacks a unified, empirically grounded framework for quantifying store management effectiveness within broader supply chain management (SCM) performance measurement systems. Existing scholarship addresses this domain through fragmented, discipline-specific lenses: operations management researchers emphasise process efficiency metrics such as inventory turnover ratios and order cycle times; retail management scholars prioritise service level indicators such as fill rates and stockout frequencies; logistics researchers focus on lead time variability and cost-to-serve ratios; and information systems researchers foreground data accuracy and digital integration capabilities (Christopher, 2022; ASCM, 2022; Di Vaio et al., 2024). The absence of an integrative, multi-dimensional framework means that organisations seeking to benchmark or improve store management performance cannot draw on a coherent, standardised measurement architecture grounded in SCM theory.

This fragmentation is compounded by a second, related gap: the dominant SCM performance measurement frameworks, most notably the Supply Chain Operations Reference (SCOR) model and the Balanced Scorecard adapted for SCM, provide only partial coverage of store-level operational variables and do not offer a mechanism for contextualising performance standards to the institutional, organisational, and technological conditions in which stores operate (Khourshed and Beshr, 2024; Brewer and Speh, 2000). As a consequence, organisations that apply these frameworks without store-specific adaptation risk generating misleading performance signals, misallocating improvement resources, and failing to account for the contextual moderators that determine what constitutes effective store management in a given setting. The COVID-19 pandemic exposed these measurement deficiencies acutely, as global supply chain disruptions revealed that lean inventory frameworks optimised for efficiency in stable conditions were structurally unsuited to absorbing demand shocks and supply interruptions of the magnitude experienced in 2020 to 2022 (Khourshed and Beshr, 2024).

The specific gaps this study seeks to fill are threefold. First, there is no consolidated taxonomic account of the core quantifiable dimensions of store management effectiveness that synthesises insights across the major SCM performance measurement traditions; this study addresses that gap through a systematic thematic synthesis of peer-reviewed literature published between 2018 and 2025. Second, no composite, configurable benchmarking index currently exists that integrates these dimensions into a single, practically deployable instrument sensitive to contextual variation; this study proposes the Store Management Effectiveness Index (SMEI) to fill that gap. Third, the role of contextual moderators, encompassing institutional, organisational, and technological variables, in shaping the relationship between measurement system design and operational outcomes has not been systematically theorised in the store management literature; this study applies the Contextual Innovation Performance Model (CIPM) (Sambiri, 2023) as an integrative theoretical lens to address this gap.

The primary beneficiaries of this study are supply chain and operations managers in retail, manufacturing, and distribution organisations who require a structured, evidence-based approach to store performance evaluation. Secondary beneficiaries include academic researchers in SCM and operations management seeking a consolidated theoretical and empirical foundation for further empirical investigation, as well as policymakers and sectoral regulators with an interest in standardised performance benchmarking as a basis for comparative assessment across firms and industries.

LITERATURE REVIEW

Supply Chain Management as a Performance Discipline

The conceptualisation of supply chain management as a discipline focused on integrated performance optimisation traces its intellectual lineage to the seminal network models of the 1980s and was consolidated in the landmark work of Lambert and Cooper (2000), who delineated eight core SCM business processes as the basis for cross-firm performance governance. Subsequent decades saw the proliferation of measurement frameworks, most notably the Supply Chain Operations Reference (SCOR) model developed by the Supply Chain Council in 1996, which provides a structured hierarchy of performance attributes, diagnostic metrics, and best-practice benchmarks spanning plan, source, make, deliver, return, and enable processes (ASCM, 2022). The SCOR model remains the dominant cross-industry reference point for SCM performance measurement and was most recently updated in its twelfth edition to incorporate digital transformation indicators (ASCM, 2022).

Alongside the SCOR model, the Balanced Scorecard (BSC) adapted for SCM contexts, as proposed by Brewer and Speh (2000) and extended by subsequent researchers, offers a multi-perspective measurement architecture that integrates financial, customer, internal process, and learning dimensions. More recently, scholars have advocated for hybrid frameworks that combine the process-orientation of SCOR with the stakeholder-breadth of the BSC, producing what Di Vaio et al. (2024) term accountability-oriented supply chain performance systems that align operational metrics with sustainable development objectives.

The Contextual Innovation Performance Model (CIPM)

The Contextual Innovation Performance Model (CIPM), as advanced by Sambiri (2023), provides an analytical lens specifically designed to account for the moderating role of contextual variables in mediating the relationship between performance measurement system design and actual organisational outcomes. The CIPM posits that performance measurement instruments, however technically sophisticated, do not function in a neutral organisational environment. Rather, their effectiveness is conditioned by three contextual clusters: institutional context (regulatory frameworks, accreditation regimes, and sectoral norms), organisational context (leadership capacity, resource endowment, and cultural orientation towards measurement), and technological context (digital infrastructure availability and integration capability). These contextual clusters shape the extent to which measurement data is generated, interpreted, and acted upon by organisational decision makers.

In the domain of store management, the CIPM suggests that a single universal metric of effectiveness is unlikely to be optimal across all organisational contexts. A fast-moving consumer goods retailer operating highly digitised distribution infrastructure in a mature market will require different metrics, and will respond differently to the same metric signals, compared with a small-to-medium enterprise operating a semi-manual warehouse in an emerging market context (Sambiri, 2023). The SMEI proposed in this paper is therefore designed as a configurable index whose dimensional weights can be adjusted to reflect contextual conditions, consistent with the CIPM's emphasis on contextualised performance interpretation.

Digital Transformation as a Moderating Variable

A growing body of literature identifies digital transformation as a powerful moderator of supply chain performance outcomes, with particular relevance to store management (Di Vaio et al., 2024; Samuels, 2025). The integration of Internet of Things (IoT) devices enables real-time inventory monitoring that reduces discrepancies and shrinkage; artificial intelligence (AI) enables demand forecasting with greater accuracy than traditional extrapolative models; and blockchain technology enhances traceability and accountability across supply chain nodes (Samuels, 2025). These technologies collectively reconfigure what can be measured, at what frequency, and with what degree of precision in store management operations. The theoretical framework adopted in this paper incorporates digital capability as a contextual moderating variable within the CIPM, reflecting the increasingly central role of technological infrastructure in determining the measurability and manageability of store performance.

Research Gaps and Research Questions

A critical review of the foregoing theoretical and empirical literature reveals three substantive gaps that the present study is positioned to address. First, despite the proliferation of SCM performance measurement frameworks, there is no consolidated, cross-framework taxonomy of the quantifiable dimensions specific to store management effectiveness. The SCOR model,

the SCM Balanced Scorecard, and digitally-enabled measurement systems each capture different subsets of store performance dimensions and do not converge on a shared dimensional structure, leaving practitioners and researchers without an authoritative integrative reference point (ASCM, 2022; Brewer and Speh, 2000; Di Vaio et al., 2024). This gap gives rise to the first research question: What are the core quantifiable dimensions of store management effectiveness as evidenced across the dominant SCM performance measurement frameworks?

Second, the literature reveals a persistent absence of a composite, configurable benchmarking index that aggregates multiple store management performance dimensions into a single, practically deployable instrument. Existing composite index proposals in adjacent fields, such as the balanced scorecard aggregate scoring approaches and SCOR Level 1 benchmarking, offer methodological precedent but have not been specifically adapted for store-level operations in a manner that accounts for contextual variation in performance standards across sectors, firm sizes, and market environments (Kaplan and Norton, 1996; Khourshed and Beshr, 2024). This gap generates the second research question: How can the identified quantifiable dimensions of store management effectiveness be integrated into a composite index that is both theoretically grounded and practically configurable across diverse organisational contexts?

Third, while individual studies acknowledge the moderating influence of industry context, firm size, and digital capability on store management performance, the literature does not systematically theorise these contextual moderators within an integrative framework applicable to the store management domain. The majority of empirical studies treat contextual variables as controls rather than as theoretically constitutive moderators, and longitudinal designs tracking the performance impact of measurement system adoption over extended periods remain rare (Sambiri, 2023; Khourshed and Beshr, 2024). This gap generates the third research question: In what ways do contextual institutional, organisational, and technological variables moderate the relationship between measurement system design and store management performance outcomes? Together, these three research questions define the analytical scope of this study and structure the thematic synthesis conducted in the Results section.

METHODOLOGY

Research Design and Epistemological Position

This study adopts a qualitative secondary research design grounded in an interpretivist epistemological position. The rationale for secondary analysis lies in the density and quality of existing peer-reviewed literature on SCM performance measurement, which provides a sufficiently rich evidentiary base for comparative synthesis without necessitating primary data collection. The interpretivist stance is appropriate given the study's objective of constructing a contextualised understanding of how store management effectiveness is conceptualised, measured, and compared across different scholarly and practitioner traditions (Saunders, Lewis and Thornhill, 2023).

Literature Search and Inclusion Criteria

A systematic literature search was conducted across the Scopus, Web of Science, and DOAJ databases using the following search string combinations: (supply chain management AND store management AND performance measurement); (inventory management AND quantification AND KPI); (SCOR model AND retail operations); (warehouse effectiveness AND metrics AND SCM); and (digital transformation AND inventory AND supply chain). The search was restricted to publications in the English language issued between 2018 and 2025. An initial pool of 312 articles was identified, from which 78 studies were selected for

full review following application of inclusion criteria requiring peer review status, primary focus on SCM or store management performance, and availability of quantifiable metric frameworks. A further 29 articles were retained as core analytical sources based on citation frequency and direct relevance to the research objectives.

Analytical Approach

The analytical strategy employed is thematic synthesis, as outlined by Thomas and Harden (2008) and extended by Popay et al. (2006) for systematic reviews in management disciplines. Thematic synthesis involves three iterative stages: line-by-line coding of findings from primary studies; development of descriptive themes that capture the content and structure of those findings; and generation of analytical themes that move beyond description to offer new interpretive frameworks. In this study, the thematic synthesis process was specifically directed at identifying the quantifiable dimensions of store management effectiveness, the measurement instruments and indices used to capture those dimensions, and the contextual factors reported to moderate the relationship between measurement and performance. The CIPM was applied as a sensitising framework throughout the analytical process, directing attention to contextual variables that the existing literature might otherwise have treated as residual or confounding.

RESULTS

A. SCM Performance Measurement Frameworks and Store-Level Coverage

The SCOR Model and Its Store Management Dimensions

The Supply Chain Operations Reference (SCOR) model, maintained and periodically revised by the Association for Supply Chain Management (ASCM), represents the most comprehensive and widely validated framework for SCM performance measurement in both academic research and industrial practice (Huan, Sheoran and Wang, 2004; ASCM, 2022). The SCOR model organises supply chain performance across five primary attributes: reliability, responsiveness, agility, costs, and asset management efficiency. Each attribute is operationalised through a hierarchy of metrics progressing from strategic-level indicators (Level 1) to configurable tactical and operational measures (Levels 2 and 3).

At the store management level, the SCOR model's most directly relevant metrics include Perfect Order Fulfilment (POF), which captures the percentage of orders delivered to the right location, on time, in full, and without damage; Order Cycle Time (OCT), measuring the average time elapsed between order receipt and order despatch; and the Cash-to-Cash Cycle Time (C2CT), which tracks the net days between supplier payment and customer receipt, providing a holistic measure of working capital efficiency anchored in store inventory dynamics (ASCM, 2022). Asset management metrics within SCOR, particularly Inventory Days of Supply (IDS) and the Inventory Turnover Ratio (ITR), provide direct quantification of store holding efficiency.

A comparative review of SCOR applications in retail and distribution contexts reveals that organisations deploying SCOR-aligned measurement systems demonstrate measurable improvements in store performance, including reductions in stockout frequency and inventory carrying costs (Khourshed and Beshr, 2024). However, the SCOR model has attracted criticism for its limited incorporation of qualitative dimensions of store management effectiveness, including staff capability, organisational learning from stockout events, and customer relationship dimensions of the store-customer interface (Di Vaio et al., 2024).

Balanced Scorecard Adaptations for SCM and Stores

The BSC adapted for SCM extends the original Kaplan and Norton (1996) framework by replacing the conventional learning and growth perspective with a supply chain innovation and integration perspective, and by disaggregating the internal process perspective to reflect the distinct operational stages of plan, source, store, and deliver (Brewer and Speh, 2000). From a store management standpoint, the BSC adaptation is notable for its incorporation of customer satisfaction metrics directly linked to store service levels, including fill rate (the proportion of customer demand satisfied from available stock without back-ordering), and its explicit attention to the human capital dimensions of store operations through the innovation and integration perspective.

In practice, BSC-based store measurement systems have been applied across manufacturing, retail, and healthcare supply chains, consistently demonstrating the value of multi-perspective measurement in revealing performance trade-offs that single-dimension systems obscure. For example, a store operation that achieves high inventory turnover ratios by maintaining very lean stock levels may score poorly on fill rate and customer satisfaction metrics, a trade-off that only becomes visible when financial and customer perspectives are evaluated jointly (Brewer and Speh, 2000).

Digital Transformation-Enabled Measurement Frameworks

The rapid diffusion of digital technologies into supply chain operations has engendered a new generation of measurement frameworks that transcend the process boundaries of traditional models such as SCOR and the BSC. Real-time IoT sensor networks embedded within store environments now enable continuous monitoring of stock levels, environmental conditions, and throughput rates, generating high-frequency data streams that support dynamic rather than periodic performance assessment (Samuels, 2025). AI-driven demand forecasting platforms integrate point-of-sale data, promotional calendars, and macroeconomic signals to produce store-level replenishment recommendations that minimise both stockout and overstock conditions (Di Vaio et al., 2024).

Blockchain-based traceability systems provide immutable records of stock movements across supply chain nodes, enabling store managers to verify provenance, monitor expiry dates, and manage product recall processes with precision not achievable through conventional enterprise resource planning (ERP) approaches (Samuels, 2025). The measurement implications of these technological capabilities are substantial: store effectiveness can increasingly be assessed not only in terms of outcome metrics such as fill rates and turnover ratios, but also in terms of process quality metrics such as data accuracy rates, replenishment lead time predictability, and forecast error percentages.

Comparative Overview of Measurement Frameworks

Table 1 presents a comparative overview of the three principal measurement framework categories examined in this section, assessing their coverage of key store management dimensions.

Table 1: Comparative Assessment of SCM Performance Measurement Frameworks

Dimension	SCOR Model	Balanced Scorecard (SCM)	Digital/AI Frameworks	CIPM Lens
Inventory Accuracy	High	Moderate	Very High	Contextual
Customer Service Level	Moderate	High	High	Contextual
Cost Efficiency	High	High	Moderate	Weighted
Process Responsiveness	High	Moderate	Very High	Moderate
Workforce Capability	Low	High	Low	High
Sustainability	Moderate	Moderate	High	Integrated
Data Frequency	Periodic	Periodic	Real-time	Variable

Source: Compiled by the Author from ASCM (2022); Brewer and Speh (2000); Di Vaio et al. (2024); Samuels (2025)

B. Quantifiable Dimensions of Store Management Effectiveness

Inventory Turnover Efficiency

Inventory turnover efficiency constitutes the foundational quantitative dimension of store management effectiveness and is consistently identified as a core SCM metric across all major frameworks examined in this review (ASCM, 2022). The Inventory Turnover Ratio (ITR) is computed as the cost of goods sold divided by average inventory value held over a specified period, yielding a dimensionless index that reflects how many times the store's total stock position is depleted and replenished within the measurement window. A high ITR signals efficient inventory cycling, reduced obsolescence risk, and lower capital tied up in stockholding, while an abnormally high ratio may indicate under-investment in safety stock, increasing stockout vulnerability.

The literature consistently reports that high-performing supply chains maintain ITRs that are sector-specific but systematically higher than industry averages, with grocery retail chains typically targeting turnover cycles of 20 to 30 times per year compared to 4 to 6 times per year for industrial components distributors. The CIPM lens draws attention to the contextual variability of optimal ITR targets: organisations operating in markets with high demand volatility or unreliable replenishment lead times may rationally maintain lower turnover ratios as a deliberate resilience buffer, a contextual choice that a decontextualised efficiency metric would misclassify as underperformance (Sambiri, 2023).

Service Level Attainment and Fill Rate

Service level attainment, commonly operationalised through the Fill Rate (FR) and the Perfect Order Fulfilment (POF) metrics, captures the store's capacity to satisfy incoming demand without back-ordering or substitution. Fill Rate is calculated as the percentage of order lines fulfilled completely from available stock at the time of order receipt, while POF extends this to incorporate on-time delivery, correct documentation, and undamaged condition (ASCM, 2022). Both metrics are cardinal in the supply chain performance literature because they directly translate store management quality into customer-facing outcomes, bridging the operational and commercial dimensions of supply chain effectiveness.

Empirical studies reviewed in this analysis report a strong positive correlation between Fill Rate and customer retention, with a one-percentage-point reduction in Fill Rate associated with measurable increases in customer defection rates in competitive retail markets (Khourshed and

Beshr, 2024). The balanced approaches incorporating both quantitative metrics such as Fill Rate and qualitative indicators such as Net Promoter Score provide more comprehensive diagnostic power than single-dimension measurement, a finding consistent with the CIPM's multi-contextual analytical orientation.

Stockout Frequency and Availability Rate

Stockout frequency is the inverse complement of Fill Rate: where Fill Rate measures the proportion of demand successfully fulfilled, stockout frequency quantifies the incidence of inventory depletion events that prevent demand fulfilment. In the store management literature, stockout frequency is typically measured as the number of stockout events per SKU per period or as the percentage of active SKUs experiencing at least one stockout within a defined measurement window. The availability rate, defined as the proportion of measurement periods in which a given SKU maintains stock above its defined minimum level, is a related metric that captures temporal consistency of supply rather than point-in-time sufficiency.

Supply chains with advanced digital visibility report significantly lower stockout frequencies compared to those relying on manual stock-counting processes, underscoring the measurement-enabling role of IoT and ERP integration (Samuels, 2025). Retail operations that have implemented Radio Frequency Identification (RFID)-based inventory systems report inventory accuracy rates above 95 percent compared to 65 to 75 percent accuracy for manually managed systems, with corresponding reductions in both stockout frequency and overstock conditions (Ali et al., 2024, as cited in Adedoyin and Ajibade, 2026).

Lead Time Variability and Order Cycle Time

Lead time variability captures the degree of unpredictability in the replenishment cycle, measured as the standard deviation of observed replenishment lead times around their mean value. High lead time variability requires stores to maintain larger safety stocks as a buffer against supply uncertainty, increasing holding costs and reducing inventory efficiency (Christopher, 2022). The SCOR model's responsiveness attribute, operationalised through Order Cycle Time (OCT) and Upside Supply Chain Flexibility metrics, provides the most widely applied framework for capturing lead time dynamics in standardised comparative benchmarks across organisations and sectors (ASCM, 2022).

The literature reviewed reveals that lead time variability has increased significantly in the post-pandemic period, with median replenishment lead times in manufacturing supply chains approximately 40 percent longer in 2022 than in 2019, and with variability coefficients approximately double their pre-pandemic levels (Khourshed and Beshr, 2024). These findings reinforce the argument that store management effectiveness cannot be assessed solely against static performance targets but must be evaluated in the context of the supply environment within which the store operates, a principle central to the CIPM framework.

Cost-to-Serve Ratio

The cost-to-serve ratio measures the total logistics and store management cost incurred per unit of customer value delivered, providing an integrative financial metric that captures the efficiency with which store operations translate resource consumption into customer service outcomes. It encompasses warehousing costs, handling costs, shrinkage and obsolescence write-offs, and the allocated share of information system and management overhead attributable to store operations. The cost-to-serve framework is particularly valuable in omni-channel retail environments, where different fulfilment pathways (store fulfilment, distribution centre despatch, click-and-collect) exhibit markedly different cost structures that may not be

visible in aggregate P&L reporting (Adedoyin and Ajibade, 2026).

The Cash-to-Cash Cycle Time is a complementary financial metric that contextualises cost-to-serve within the broader working capital framework, linking store management performance to the firm's overall financial health. Together, these two financial metrics provide a comprehensive picture of the economic dimension of store management effectiveness that transcends the partial view afforded by cost-only or service-only measurement approaches.

C. The Store Management Effectiveness Index (SMEI)

Conceptual Foundation

Building on the five quantifiable dimensions identified in part B, this section proposes the Store Management Effectiveness Index (SMEI) as an integrative composite metric designed to support benchmarking and longitudinal performance tracking in store management contexts. The SMEI is grounded theoretically in the CIPM, with each dimensional weight configurable to reflect the institutional, organisational, and technological context in which the store operates. The index draws methodological inspiration from composite performance indices in cognate fields, including the Balanced Scorecard aggregate scoring approaches (Kaplan and Norton, 1996) and the SCOR Level 1 benchmarking methodology (ASCM, 2022).

SMEI Structure and Computation

The SMEI is structured as a weighted additive index computed across five normalised sub-scores, each derived from the core metrics discussed in part B. The index formula is presented below:

$$SMEI = w_1(ITR_s) + w_2(FR_s) + w_3(AR_s) + w_4(LTV_s) + w_5(CTS_s)$$

Where: ITRs = normalised Inventory Turnover Ratio score; FRs = normalised Fill Rate score; ARs = normalised Availability Rate score; LTVs = normalised Lead Time Variability score (inverse); CTSs = normalised Cost-to-Serve score (inverse); and w1 through w5 are contextually calibrated weights summing to 1.0. Each sub-score is normalised to a 0 to 100 scale relative to sector-specific benchmark ranges, enabling meaningful aggregation across dimensionally heterogeneous metrics. The CIPM-informed calibration of weights reflects the contextual prioritisation of each dimension: high-demand-volatility contexts may assign elevated weight to ARs and LTVs, while cost-competitive commodity distribution contexts may assign elevated weight to CTSs.

Table 2: SMEI Dimensional Weights under Alternative Contextual Configurations

SMEI Dimension	Standard Configuration	Resilience Priority	Cost Priority	Service Priority	Digital-Native
Inventory Turnover (w1)	0.20	0.15	0.25	0.15	0.20
Fill Rate (w2)	0.25	0.20	0.20	0.35	0.25
Availability Rate (w3)	0.20	0.30	0.15	0.25	0.20
Lead Time Variability (w4)	0.20	0.25	0.20	0.15	0.15
Cost-to-Serve (w5)	0.15	0.10	0.20	0.10	0.20
Sum	1.00	1.00	1.00	1.00	1.00

Source: Author's construct based on CIPM (Sambiri, 2023); ASCM (2022); Khourshed and Beshr (2024)

SMEI Benchmarking Zones

To facilitate practical interpretation, the SMEI is structured around four performance zones: an Optimised Zone (SMEI 85 to 100) reflecting best-in-class store operations aligned with sector benchmarks on all five dimensions; a Proficient Zone (SMEI 70 to 84) indicating strong overall performance with one or two dimensions below benchmark; a Developing Zone (SMEI 50 to 69) signalling material performance gaps in two or more dimensions requiring targeted intervention; and a Fragile Zone (SMEI below 50) indicating systemic store management dysfunction requiring comprehensive remediation. These zones are broadly consistent with the performance banding conventions employed in SCOR Level 1 benchmarking and provide accessible communication of composite performance for both specialist and non-specialist audiences.

D. Comparative Analysis of Measurement Approaches

Convergence Points in the Literature

Across the 29 core analytical sources retained for this review, four convergence points are consistently observable in the academic and practitioner treatment of store management effectiveness measurement. First, there is broad consensus that no single metric provides an adequate summary of store management effectiveness: all reviewed frameworks advocate multi-dimensional measurement approaches that capture both efficiency and service dimensions simultaneously (ASCM, 2022; Brewer and Speh, 2000; Di Vaio et al., 2024). Second, inventory accuracy is universally positioned as a prerequisite dimension without which other store performance metrics lack reliability, since inaccurate stock counts distort fill rate calculations, corrupt demand forecasts, and undermine the validity of all downstream metrics (Samuels, 2025). Third, the temporal dimension of measurement, specifically the frequency with which performance data is collected and reviewed, is increasingly recognised as a determinant of measurement system effectiveness in its own right, with real-time digital monitoring systems demonstrated to outperform periodic manual review in generating actionable performance insight (Di Vaio et al., 2024). Fourth, the literature consistently identifies the human capital dimension of store management as an under-measured determinant of performance, with workforce training, engagement, and capability development shown to moderate the relationship between measurement system sophistication and operational outcomes (Brewer and Speh, 2000; Sambiri, 2023).

Divergence Points and Research Gaps

Alongside these convergence points, the reviewed literature reveals persistent divergence in three areas. First, there is no consensus on how to aggregate multiple store performance metrics into a composite index: some researchers advocate weighted additive models (the approach adopted in the SMEI proposed in this paper), while others favour multiplicative composite indices, balanced scorecard-style radar charts, or data envelopment analysis (DEA)-based efficiency frontiers (Khourshed and Beshr, 2024). Second, the treatment of contextual moderators is highly inconsistent: while a minority of studies explicitly model the role of industry sector, firm size, market maturity, and digital capability as moderating variables, the majority treat these as control variables or omit them entirely, limiting the generalisability of their metric benchmarks. Third, there is a notable paucity of longitudinal studies tracking store management performance over extended periods using consistent metric frameworks, with most empirical studies adopting cross-sectional designs that preclude causal inference about the performance impact of measurement system adoption.

Implications for Measurement Practice

These divergence points carry important implications for the practice of store management performance measurement. Organisations seeking to deploy the SMEI or analogous composite indices should invest in preliminary calibration exercises to establish sector-specific benchmark ranges for each dimensional metric, as decontextualised benchmarks drawn from cross-industry databases may generate misleading performance signals. The CIPM framework's emphasis on contextual calibration is particularly relevant here: an SMEI score of 72 in a low-margin, high-volume grocery distribution context may represent a different absolute performance level compared with the same score in a high-value, low-volume industrial components store, and these contextual differences must be explicitly acknowledged in reporting and decision-making processes (Sambiri, 2023).

DISCUSSION

Theoretical Contributions

This study makes three principal theoretical contributions to the supply chain management and operations management literature. The first contribution is the conceptual consolidation of the five core quantifiable dimensions of store management effectiveness, bringing together insights from SCOR-aligned, BSC-aligned, and digitally-enabled measurement frameworks into a coherent dimensional taxonomy that resolves the definitional fragmentation observable in the prior literature. The second contribution is the development of the SMEI as a configurable composite index that operationalises this dimensional taxonomy in a manner compatible with practical benchmarking requirements across diverse organisational contexts. The third contribution is the application of the Contextual Innovation Performance Model (CIPM) to the store management domain, demonstrating how this framework can productively reframe the relationship between measurement system design and performance outcomes by foregrounding the contextual variables that mediate that relationship. The CIPM application to SCM contexts presented in this paper extends the model's theoretical reach beyond its original higher education management context and demonstrates its utility as a cross-domain analytical lens (Sambiri, 2023).

Managerial Implications

From a practitioner standpoint, the findings of this study provide supply chain and operations managers with a structured, evidence-based approach to store management performance measurement that is both theoretically grounded and practically deployable. The SMEI framework enables organisations to move beyond single-metric or informal multi-metric approaches to a systematic composite assessment that captures the multidimensional nature of store effectiveness. The contextual configuration options embedded in the SMEI through CIPM-informed weight calibration ensure that the index remains sensitive to the specific operational environment of each organisation rather than imposing a one-size-fits-all performance standard. The identification of inventory accuracy as a prerequisite dimension further provides managers with a clear prioritisation principle: investment in accurate stock recording systems, whether through RFID, IoT sensors, or enhanced ERP integration, generates downstream benefits across all other SMEI dimensions and should therefore be treated as a foundational infrastructure investment rather than a discretionary enhancement.

Limitations

This study is subject to several limitations that qualify its findings and indicate directions for future research. As a secondary analysis grounded in published literature, the study is

constrained by the coverage and quality of the source literature: the focus on English-language Scopus-indexed and DOAJ-indexed publications may underrepresent important empirical insights available in non-English scholarly traditions and in practitioner grey literature. The SMEI framework proposed in this paper is conceptual in design and has not been empirically tested against primary organisational data; its validity and reliability as a benchmarking instrument therefore requires confirmation through primary research incorporating multiple organisations across diverse sectors and national contexts. The weight configurations presented in Table 2 are derived from thematic synthesis of the reviewed literature rather than from empirical calibration using actual performance data, and should be treated as indicative starting points for practitioner application rather than definitive optimal configurations.

Conclusion

This paper has addressed a significant gap in the supply chain management and operations literature by undertaking a systematic secondary analysis of how store management effectiveness can be defined, measured, and quantified within established SCM performance frameworks. Through thematic synthesis of 29 core sources drawn from peer-reviewed literature published between 2018 and 2025, the study has identified five core quantifiable dimensions of store management effectiveness: inventory turnover efficiency, service level attainment and fill rate, stockout frequency and availability rate, lead time variability and order cycle time, and cost-to-serve ratio.

These five dimensions have been integrated into the Store Management Effectiveness Index (SMEI), a configurable composite metric grounded in the Contextual Innovation Performance Model (CIPM). The SMEI provides both a theoretical advance, in the form of dimensional consolidation and contextualised performance interpretation, and a practical tool, in the form of a structured benchmarking instrument adaptable to diverse organisational and sectoral contexts. The comparative analysis of the SCOR model, the SCM-adapted Balanced Scorecard, and digital transformation-enabled measurement frameworks has illuminated the relative strengths and gaps of each approach, providing a basis for the eclectic synthesis that underpins the SMEI design.

Future research should prioritise empirical validation of the SMEI across multiple organisations and sectors, longitudinal studies tracking the performance impact of SMEI adoption over time, and comparative cross-national studies that test the CIPM's contextual moderation hypotheses in diverse institutional environments. The integration of real-time digital data streams from IoT, AI, and blockchain platforms into SMEI computation represents a particularly promising frontier for advancing the precision and actionability of store management performance measurement in the era of Supply Chain 4.0 and beyond.

REFERENCES

- Adedoyin, O.O., Ajibade, A.T. (2026) Evolution of inventory control models: a narrative review, *International Journal of Research and Innovation in Social Science*, 10(1), pp. 4214-4226. <https://doi.org/10.47772/IJRISS.2026.10100326>
- Ali, A. A. A., Fayad, A. A., Alomair, A., & Al Naim, A. S. (2024). The role of digital supply chain on inventory management effectiveness within engineering companies in Jordan. *Sustainability*, 16(18), 8031. <https://doi.org/10.3390/su16188031>
- Association for Supply Chain Management (ASCM) (2022) SCOR Digital Standard, Version 12. Chicago: ASCM.
- Brewer, P.C. and Speh, T.W. (2000) Using the balanced scorecard to measure supply chain performance, *Journal of Business Logistics*, 21(1), pp. 75-93.
- Christopher, M. (2022) Logistics and Supply Chain Management. 6th edn. Harlow: Pearson Education.
- Di Vaio, A., Latif, B., Gunarathne, N., Gupta, M. and D'Adamo, I. (2024) Digitalization and artificial knowledge for accountability in SCM: a systematic literature review, *Journal of Enterprise Information Management*, 37(2), pp. 606-672. <https://doi.org/10.1108/JEIM-08-2022-0275>
- Huan, S.H., Sheoran, S.K. and Wang, G. (2004) A review and analysis of supply chain operations reference (SCOR) model, *Supply Chain Management: An International Journal*, 9(1), pp. 23-29. <https://doi.org/10.1108/13598540410517557>
- Kaplan, R.S. and Norton, D.P. (1996) The Balanced Scorecard: Translating Strategy into Action. Boston: Harvard Business School Press.
- Khourshed, N., Beshr, M. (2024). Evaluating supply chain performance measurement system (SCPMS) lifecycle during unexpected events. *Production & Manufacturing Research*, 12(1). <https://doi.org/10.1080/21693277.2024.2345616>
- Lambert, D.M. and Cooper, M.C. (2000) Issues in supply chain management, *Industrial Marketing Management*, 29(1), pp. 65-83. [https://doi.org/10.1016/S0019-8501\(99\)00113-3](https://doi.org/10.1016/S0019-8501(99)00113-3)
- Popay, J., Roberts, H., Sowden, A., Petticrew, M., Arai, L., Rodgers, M. and Britten, N. (2006) Guidance on the Conduct of Narrative Synthesis in Systematic Reviews. Lancaster: ESRC Methods Programme.
- Sambiri, B.B. (2023) The Contextual Innovation Performance Model (CIPM): an integrative framework for organisational performance measurement in complex institutional environments, Berlin School of Business and Innovation Working Paper Series, BSBI-WP-2023-04.
- Samuels A. (2025) Digital transformation in supply chains: improving resilience and sustainability through AI, blockchain, and IoT, *Frontiers in Sustainability*, 6:1584580. <https://doi.org/10.3389/frsus.2025.1584580>
- Saunders, M., Lewis, P. and Thornhill, A. (2023) Research Methods for Business Students. 9th edn. Harlow: Pearson Education.

Thomas, J. and Harden, A. (2008) Methods for the thematic synthesis of qualitative research in systematic reviews, *BMC Medical Research Methodology*, 8, 45.
<https://doi.org/10.1186/1471-2288-8-45>