

# Supply Chain-Performance Management Integration in Total Facilities Operation & Maintenance (KPI Driven Excellence for TFM – O&M)

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**Abstract** - Total Facilities Management (TFM) organizations increasingly depend on end-to-end supply chains and data-rich performance systems to deliver reliable, safe, and sustainable operations. This conceptual manuscript proposes an integrated framework—TFM-SCPA (Supply Chain-Performance Alignment) that links strategic intent, supply-chain design, and KPI governance across strategic, tactical, and operational levels. Building on industry practice from India, the GCC, and Western markets, and reflecting lessons from COVID-19 disruptions, the paper articulates a KPI architecture, a resilience toolkit, and a pragmatic 12-month implementation roadmap. It was developed with testable propositions for future empirical research and provide a managerial playbook for O&M leaders seeking measurable, auditable value creation in availability, lifecycle cost, user experience, and sustainability.

**Keywords:** Facilities Management; O&M; KPIs; Balanced Scorecard; Supply Chain; Resilience; GCC; Saudi Arabia; ISO 41001; Asset Management

## Highlights

- Introduces the TFM-SCPA framework aligning strategy, supply-chain design, and KPI governance.
- Presents a cascaded KPI architecture with auditable data sources and review cadences.
- Translates pandemic-era shocks into a resilience toolkit for O&M supply chains.
- Provides a 0–365 day implementation roadmap and a managerial playbook for practitioners.
- Offers testable propositions to stimulate empirical research in the GCC and beyond.

## 1. Introduction

Facilities O&M performance depends on synchronized workflows across procurement, suppliers, service partners, technicians, and occupants. Yet, in many organizations, supply-chain decisions (e.g., sourcing strategy, inventory policies, SLAs) are decoupled from KPI governance (e.g., availability, response time, cost-to-serve, energy intensity). This decoupling produces avoidable downtime, higher lifecycle costs, and fragmented customer experience.

This paper addresses the integration gap by proposing TFM-SCPA—an alignment framework that translates strategic intent

into supply-chain choices and measurable results through a disciplined KPI stack. The contribution is deliberately high-level to support cross-sector adoption in TFM contexts spanning India, the GCC (with a focus on Saudi Arabia), and Western markets.

## 2. Practice Backdrop and Gap

Practitioners widely use Balanced Scorecard perspectives (financial, customer, internal process, learning & growth) and cascaded KPIs. However, O&M programs often struggle with: (i) unclear goal articulation and target-setting, (ii) weak linkage between leading drivers and lagging results, (iii) inconsistent data lineage across systems (CMMS, BMS, CAFM, ERP), and (iv) limited feedback from user experience into supply decisions. Global markets show uneven maturity—Western markets exhibit stronger standardization and technology adoption; GCC markets are rapidly professionalizing; India is scaling fast with diverse operating models.

## 3. The TFM-SCPA Framework (Supply Chain-Performance Alignment)

TFM-SCPA is a five-layer model: Strategy, Chain, Assets, People, Experiences (S-C-A-P-E). Each layer defines design choices and measurable outcomes.

### 3.1 Strategy

Clarify value priorities (e.g., uptime, cost optimization, decarbonization, user comfort) and risk appetite. Select relevant standards (e.g., ISO 41001 for FM, ISO 55000 for asset management) and define governance rhythms (monthly ops reviews, quarterly strategy reviews).

### 3.2 Chain

Design sourcing and logistics to match service criticality: multi-sourcing for critical spares, VMI/consignment for fast-movers, local buffers for long-lead items, and collaborative SLAs with tiered suppliers. Align contracts with measurable service outcomes.

### 3.3 Assets

Map asset criticality and failure modes. Set maintenance strategies (condition-based, reliability-centered) and link to spare parts policies. Leverage BIM/CMMS/BMS integration for data integrity and lifecycle analytics.

### 3.4 People

Define roles, competencies, and safe work practices. Use tiered visual management (daily/weekly boards) and standard work. Incentivize suppliers and teams on shared KPIs and continuous improvement.

### 3.5 Experiences

Capture voice-of-customer (occupants, client), translate feedback into service design and supplier scorecards, and close the loop via dashboards and service recovery protocols.

### 4. KPI Architecture: From Strategy to Daily Management

We propose a cascaded KPI stack that links leading drivers and lagging outcomes, with clear formulas, data sources, cadence, and ownership.

Level	Objective	Example KPI	Formula (Illustrative)	Primary Data Source	Cadence & Owner
Strategic	Lifecycle value	Asset Availability (%)	$\text{Uptime} / \text{Total Time} \times 100$	CMMS, BMS	Monthly   Head of FM
Strategic	Energy & carbon	kWh/m <sup>2</sup> ; tCO <sub>2</sub> e	$\text{Energy} / \text{GFA}; \text{Emission Factors}$	BMS, Utility Bills	Monthly   Energy Lead
Tactical	Service reliability	First-Time Fix Rate (%)	$\text{Jobs fixed on first visit} / \text{Total jobs} \times 100$	CMMS	Weekly   Ops Manager
Tactical	Supply resilience	Critical Spare Coverage (days)	$\text{On-hand qty} / \text{Daily burn}$	ERP, Stores	Weekly   Supply Lead
Operational	Responsiveness	Average Response Time (min)	$\Sigma \text{ response time} / \# \text{ incidents}$	CAFM/Helpdesk	Daily   Supervisor
Operational	Quality	Right-First-Time (%)	$\text{No rework jobs} / \text{Total jobs} \times 100$	CMMS QA	Daily   Team Lead

### 5. Resilience Toolkit for O&M Supply Chains

Disruptions (pandemics, geopolitics, extreme weather) challenge O&M continuity. A resilience toolkit includes: multi-sourcing for critical components; risk-tiered inventory; scenario-based capacity buffers; supplier financial health monitoring; digital work instructions; and remote diagnostics. Govern with an integrated risk register tied to KPIs (e.g., coverage days, alternate supplier lead-time, mean time to recover).

### 6. Implementation Roadmap (0–365 Days)

Phase	Focus	Key Deliverables	Success Signals
0–30 days	Baseline & risk	Data audit; critical asset list; supplier tiering; current KPI map	Single source of truth; top-10 risks identified
31–90 days	Design & pilot	TFM-SCPA design; KPI stack; supplier scorecards; pilot site	Pilot shows >10% improvement in response/FTF
91–180 days	Scale & digitize	Rollout to priority sites; automated dashboards; training	Coverage days $\geq$ target; uptime trending +
181–365 days	Optimize & sustain	Contract refresh with outcome-based SLAs; CI cadence	Sustained gains; audit-ready KPI lineage

### 7. Propositions for Future Research

- P1: Supply-chain multi-sourcing for critical spares positively affects asset availability, mediated by coverage days.
- P2: Driver KPIs (e.g., FTF, response time) mediate the relationship between supplier integration and customer satisfaction in TFM settings.
- P3: Data lineage maturity (system integration and auditability) moderates the effect of KPI governance on lifecycle cost reduction.
- P4: Resilience practices (buffers, alternates, remote diagnostics) reduce mean time to recover after shocks.
- P5: Outcome-based SLAs with shared incentives improve right-first-time performance versus input-based contracts.

### 8. Managerial Playbook (Checklist)

- Define 3–5 value priorities and translate to the KPI stack (strategic → operational).
- Tier suppliers; set dual sourcing for critical items; agree alternates and MOQ rules.
- Link asset criticality to spares policy and maintenance strategy (RCM/CBM).
- Establish data lineage across CMMS–BMS–CAFM–ERP; automate dashboards.
- Create supplier scorecards and quarterly business reviews with improvement charters.
- Institutionalize PDCA/Kaizen with daily/weekly visual management.
- Embed safety and sustainability KPIs (e.g., TRIR; kWh/m<sup>2</sup>; water intensity).

### 9. Ethical & Governance Considerations



Ensure fair labor practices across the extended supply chain; protect worker safety; maintain data privacy in connected systems; and avoid greenwashing by tying sustainability claims to auditable metering and verified factors.

### **10. Limitations and Next Steps**

This is a conceptual, practice-led manuscript and does not present empirical testing. Future work should use multi-site datasets from GCC contexts to validate the propositions and quantify effect sizes.

### **Acknowledgments**

This manuscript adapts and substantially extends prior internal notes on KPIs, performance management, and FM market contexts, reframing them into an original, integrated framework and playbook for publication.

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