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KEY PERFORMANCE INDICATORS AND ORGANIZATIONAL PERFORMANCE: A SYSTEMATIC LITERATURE REVIEW OF FRAMEWORKS, IMPLEMENTATION, AND HUMAN RESOURCE MANAGEMENT IMPLICATIONS

INDIKATOR KINERJA UTAMA DAN KINERJA ORGANISASI: TINJAUAN KEPUSTAKAAN SISTEMATIS TENTANG KERANGKA KERJA, IMPLEMENTASI, DAN IMPLIKASI BAGI MANAJEMEN SUMBER DAYA MANUSIA

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ABSTRACT

This systematic literature review synthesizes extant research on Key Performance Indicators (KPIs) and organizational performance. Following PRISMA 2020 guidelines and the PICOC framework, a systematic search was conducted across Scopus, Web of Science, and Emerald Insight databases. Applying structured inclusion/exclusion criteria and quality appraisal using a modified Critical Appraisal Skills Programme (CASP) checklist, 43 peer-reviewed studies published between 2021 and 2026 were included in the final synthesis. Thematic synthesis identified five overarching themes: (1) KPI Framework Design and Methodological Foundations; (2) KPI Culture, Communication, and Organisational Adoption; (3) Technology-Enabled KPI Monitoring and Analytics; (4) Cross-Sectoral KPI Applications and Contextual Adaptation; and (5) HRM-KPI Integration and People Performance Management. Findings reveal that while technology-enabled KPI systems have advanced rapidly, organisational culture, employee awareness, and leadership communication remain persistent barriers to effective implementation. The review proposes the Integrated KPI-Performance Framework (IKPF) bridging measurement design, organisational culture, and digital enablement. Organisations should invest simultaneously in robust KPI systems and a culture of performance transparency and accountability.

Keywords: Key Performance Indicators; Performance Measurement; Human Resource Management; Organizational Performance; SMART Criteria; Digital KPI Monitoring

ABSTRAK

Tinjauan literatur sistematis ini merangkum penelitian yang ada mengenai Indikator Kinerja Utama (IKU) dan kinerja organisasi. Dengan mengikuti pedoman PRISMA 2020 dan kerangka kerja PICOC, pencarian sistematis dilakukan di basis data Scopus, Web of Science, dan Emerald Insight. Dengan menerapkan kriteria inklusi/eksklusi terstruktur dan penilaian kualitas menggunakan daftar periksa Critical Appraisal Skills Programme (CASP) yang dimodifikasi, 43 studi yang telah ditelaah sejawat dan diterbitkan antara tahun 2021 dan 2026 dimasukkan ke dalam sintesis akhir. Sintesis tematik mengidentifikasi lima tema utama: (1) Desain Kerangka Kerja KPI dan Landasan Metodologis; (2) Budaya KPI, Komunikasi, dan Penerapan Organisasional; (3) Pemantauan dan Analisis KPI yang Didukung Teknologi; (4) Penerapan KPI Lintas Sektor dan Adaptasi Kontekstual; dan (5) Integrasi HRM-KPI dan Manajemen Kinerja Karyawan. Temuan menunjukkan bahwa meskipun sistem KPI yang didukung teknologi telah berkembang pesat, budaya organisasi, kesadaran karyawan, dan komunikasi kepemimpinan tetap menjadi hambatan yang terus-menerus terhadap implementasi yang efektif. Tinjauan ini mengusulkan Kerangka Kerja KPI-Kinerja Terintegrasi (IKPF) yang menjembatani desain pengukuran, budaya organisasi, dan pemberdayaan digital. Organisasi harus berinvestasi secara bersamaan dalam sistem KPI yang kuat serta budaya transparansi dan akuntabilitas kinerja.

Kata kunci: Indikator Kinerja Utama; Pengukuran Kinerja; Manajemen Sumber Daya Manusia; Kinerja Organisasi; Kriteria SMART; Pemantauan KPI Digital

INTRODUCTION

Organisations in the twenty-first century operate in environments of unprecedented complexity, volatility, and competitive intensity. The capacity to measure, interpret, and act upon performance information is no longer a managerial luxury but a strategic

imperative. Key Performance Indicators (KPIs) serve as the primary instruments through which organisations translate strategic ambitions into measurable targets, monitor progress against objectives, and diagnose underperformance in real time (Camilleri, 2024; Armstrong & Taylor, 2023). Despite decades of practitioner interest and a growing scholarly literature, understanding of KPIs remains fragmented across disciplines.

Performance measurement has deep theoretical roots, from Drucker's (1954) management by objectives to Kaplan and Norton's (1992) Balanced Scorecard. KPIs represent the operational manifestation of this impulse: specific, quantifiable metrics through which strategic goals are monitored and governed (Armstrong & Taylor, 2023). Camilleri (2024) defines KPIs as critical navigation instruments enabling leadership to steer organisational performance toward predetermined destinations.

Persistent tensions exist in KPI theory and practice. Amoah and Minishi-Majanja (2022) found that nearly 80% of Ghanaian university libraries lacked clearly stated, measurable KPIs of which staff were aware, highlighting the chasm between KPI prescription and practice. Abdel-Razik et al. (2023) demonstrated that structured KPI discussion meetings produced measurable service delivery improvements, suggesting that culture and communication not merely design determine KPI effectiveness. Kadomura et al. (2024) showed that presenting KPI targets without narrative context from leaders yielded no significant improvement in employee attitudes.

Concurrently, AI, Industry 4.0, and cloud computing have transformed the technological landscape of KPI management. Machine learning enables predictive KPI analytics (Alghamdi et al., 2025; Wan et al., 2021), cloud-native platforms support real-time monitoring (Ameer & Fatahi Valilai, 2025), and large language models extract KPI data from unstructured documents with increasing accuracy (Martin-Domingo et al., 2025).

Theoretical Framework

Performance Management Theory, rooted in Drucker (1954) and developed through the Balanced Scorecard (Kaplan & Norton, 1992), positions measurement as an integrated system spanning financial, customer, internal process, and learning dimensions. Armstrong and Taylor (2023) define performance management as a continuous process of identifying, measuring, and developing individual and team performance aligned with strategic goals. Agency Theory frames KPIs as mechanisms to reduce information asymmetry between principals and agents (Armstrong & Taylor, 2023). Systems Theory positions KPIs as feedback mechanisms within adaptive organisational systems (Heydarzadeh et al., 2025). Signalling Theory explains that KPI effectiveness depends not only on metric precision but on the credibility and narrative richness of their communication (Kadomura et al., 2024).

Research Questions

This review is guided by four research questions: RQ1: What methodological approaches have been employed for KPI framework design, prioritisation, and validation? RQ2: What organisational, cultural, and communicative factors facilitate or impede KPI adoption and effectiveness in HRM practice? RQ3: How have digital technologies transformed KPI monitoring, prediction, and reporting? RQ4: What are the HRM implications of KPI frameworks, and what knowledge gaps warrant future investigation?

RESEARCH METHODS

This systematic literature review follows PRISMA 2020 guidelines (Page et al., 2021), operationalised through the multi-stage process described by Carrera-Rivera et al. (2022) with rigour following the standards of Booth et al. (2021) and Purssell and McCrae (2024). The three-phase methodology encompasses planning, conducting, and reporting (Tranfield et al., 2003).

3.1 Search Protocol: PICOC Framework

The PICOC (Population, Intervention, Comparison, Outcome, Context) framework guided keyword selection and search string construction. Table 1 presents the PICOC decomposition for

Table 1. PICOC Framework for Search Strategy Development

PICOC Element	Description	Keywords and Synonyms
Population	Organisations, teams, HR departments, service providers, manufacturing firms	Organisation*, firm*, enterprise*, employee*, workforce, staff performance, HR department
Intervention	KPI design, implementation, communication, monitoring, and evaluation systems	"key performance indicator*" OR "KPI*" OR "performance indicator*" OR "performance metric*" OR "balanced scorecard" OR "performance measurement system*"
Comparison	Comparison across sectors, technologies, or methodological approaches	"performance management" OR "performance appraisal" OR "performance evaluation" OR "performance monitoring" OR "benchmark*"
Outcome	Organisational performance, staff performance, productivity, quality, efficiency	"organisational performance" OR "staff performance" OR "employee performance" OR "productivity" OR "service quality" OR "operational efficiency"
Context	HRM, healthcare, supply chain, manufacturing, digital transformation	"human resource management" OR "HRM" OR "performance management system" OR "digital KPI" OR "smart KPI" OR "Industry 4.0"

3.2 Database Selection and Search String

Searches were conducted in Scopus, Web of Science (Core Collection), and Emerald Insight selected for comprehensive coverage of business management, HRM, engineering, and interdisciplinary research. The final search string, combining PICOC elements using Boolean operators, was: ("key performance indicator*" OR "KPI*" OR "performance indicator*" OR

"performance metric*") AND ("performance management" OR "organisational performance" OR "employee performance" OR "operational efficiency") AND ("framework*" OR "implementation" OR "design" OR "measurement" OR "monitoring"). Searches were restricted to peer-reviewed journal articles and conference proceedings published between January 2020 and May 2026 in the English language.

3.3 Inclusion and Exclusion Criteria

Table 2 presents the explicit inclusion and exclusion criteria applied during the screening and eligibility stages.

Table 2. Inclusion and Exclusion Criteria

Criterion Type	Inclusion	Exclusion
Publication Type	Peer-reviewed journal articles; conference proceedings from high-quality venues	Books, book chapters, grey literature, editorials, opinion pieces
Temporal Scope	Published 2020-2026	Published before 2020 (except canonical theoretical works)
Language	English language only	Non-English language publications
Topical Focus	Studies explicitly addressing KPI design, implementation, monitoring, evaluation, or linkage to organisational/staff performance	Studies using 'KPI' only as incidental terminology without substantive engagement with KPI methodology
Research Design	Empirical (quantitative, qualitative, mixed methods), conceptual/theoretical, systematic reviews, case studies	Studies lacking clear methodology; duplicate publications; retracted articles
Quality Threshold	Articles scoring above 0.55 on the modified CASP quality appraisal tool	Articles failing the quality threshold; studies with significant unacknowledged methodological limitations

3.4 Screening and Study Selection: PRISMA Flow

The screening process followed four sequential stages: Identification, Screening, Eligibility, and Inclusion, as specified by PRISMA 2020 (Page et al., 2021). Initial database searches yielded 1,247 records (Scopus: n=521; Web of Science: n=418; Emerald Insight: n=308). Following deduplication, 934 unique records remained. Title and abstract screening reduced the pool to 187 records. Full-text eligibility assessment resulted in exclusion of 144 articles: not relevant to KPI methodology or performance management (n=89); insufficient methodological rigour (n=31); did not address organisational or staff performance (n=24). The final corpus comprised 43 peer-reviewed studies. Table 3 summarises the PRISMA flow statistics.

Table 3. PRISMA 2020 Flow Diagram Statistics

PRISMA Stage	Records (n)
Records identified via database searches	1,247
Records identified from other sources (manual search)	12
Records after duplicate removal	934
Records screened (title and abstract)	934
Records excluded at screening stage	747
Full-text articles assessed for eligibility	187
Full-text articles excluded (with reasons)	144
Studies included in final synthesis	43

3.5 Quality Appraisal

Quality appraisal employed a modified CASP checklist adapted for heterogeneous research designs (Zainul Abidin & Teoh, 2026; Randles & Finnegan, 2023). The instrument comprised eight criteria scored on a three-point scale (0=No; 0.5=Partial; 1=Yes), yielding maximum scores of 8.0 with a minimum threshold of 4.4 (0.55 threshold). Criteria covered: (1) clear statement of research aims; (2) appropriate methodology; (3) adequate data collection description; (4) justified analytical approach; (5) transparent reporting; (6) acknowledgement of limitations; (7) contribution to existing knowledge; and (8) relevance to review objectives.

3.6 Data Extraction and Synthesis Approach

A standardised data extraction form captured: authors and year; journal and volume; country of study; research design and methods; KPI domain and organisational context; core findings; theoretical frameworks employed; limitations; and quality appraisal scores. Thematic synthesis (Thomas & Harden, 2008; Booth et al., 2021) was employed as the primary synthesis method. Following three-step coding line-by-line coding, development of descriptive themes, and generation of analytical themes five major themes and 18 sub-themes were identified. Inter-coder agreement was achieved through iterative discussion between two research team members, with disagreements resolved by consensus.

RESULTS AND DISCUSSIONS (HASIL DAN PEMBAHASAN)

4. Descriptive Overview of Included Studies

The 43 included studies span 2021-2026, with notable acceleration from 2024 onwards (n=28; 65%), suggesting rapid growth in scholarly interest mirroring digital transformation trends. Studies originate from 24 countries: China (n=7), United States (n=5), United Kingdom (n=4), Malaysia (n=3), and Iran (n=3). Methodologically, the corpus comprises: quantitative (n=18; 42%), mixed-methods (n=11; 26%), conceptual/theoretical (n=8; 19%), systematic reviews (n=4; 9%), and case studies (n=2; 5%). Organisational domains covered include: manufacturing and operations (n=10; 23%); healthcare and public services (n=8; 19%); supply chain and logistics (n=7; 16%); facilities and built environment (n=7; 16%); IT and digital systems (n=6; 14%); and HRM

and people performance (n=5; 12%). Table 4 presents selected representative studies by theme.

Table 4. Summary of Included Studies by Theme (representative studies shown)

Author(s) and Year	Domain	Method	Core Contribution	Theme
Amoah & Minishi-Majanja (2022)	Library/HRM	Quant. survey	KPI culture deficit; 80% of libraries lack clearly stated KPIs of which staff are aware	2, 5
Wan et al. (2021)	IT/Database	LSTM deep learning	Multi-task LSTM for simultaneous KPI mining and performance prediction in DBMS	3
Zhang et al. (2021)	Built Env.	Ontology/case	Ontology-based automated KPI calculation linking BIM to sensor data for building performance	1, 3
Kwee et al. (2021)	R&D/Tech.	Corresp. analysis	RRI and organisational KPIs not as different as assumed; alignment potential demonstrated	2, 5
Zis et al. (2023)	Maritime	Framework design	Economic, environmental, social KPI framework for autonomous shipping in the EU	4
Abdel-Razik et al. (2023)	Healthcare	Quasi-experimental	Structured KPI discussion meetings improve staff performance; infographic communication enhances uptake	2, 5

Samhouri & Abualeenein (2024)	IT Service	FAHP/case study	Fuzzy AHP prioritisation of KPIs in ITIL-based IT service management; SMART compliance scoring	1
Hou et al. (2024)	Facilities	Mixed methods	Participatory KPI method for smart FM tools in shopping centres; 4 KPI categories validated	1, 2, 4
Kadomura et al. (2024)	HRM/CSR	RCT (n=800)	CEO narrative communication essential for KPI-driven attitudinal change; KPI alone insufficient	2, 5
Limón Ulloa & Gil Herrera (2024)	IT/Agile	Case study	Cloud KPI dashboard for agile team performance; measurable improvement in team efficiency	3, 5
Ghadiri Khorzoughi et al. (2025)	Supply chain	ML/survey (n=331)	Random Forest algorithm identifies critical KPIs for Supply Chain Quality Management 4.0	3, 4
Teo et al. (2025)	Public housing	Delphi (n=16)	51 validated KPIs for tenancy management; 96% consensus achieved in two-round expert Delphi	1, 4
Ameer & Fatahi Valilai (2025)	Supply chain	Causal AI (GCP)	Cloud-native causal AI for real-time supply chain KPI monitoring; distinguishes causation from correlation	3, 4

Heydarzadeh et al. (2025)	Manufacturing	Conceptual	MLMV-VSM integrating operational, environmental, social KPIs; cross-layer interdependency analysis	1, 4
Alghamdi et al. (2025)	Public service	AI/ML predictive	KPI prediction for Hajj/Umrah services; supports Saudi Vision 2030 strategic alignment	3, 4
Mani et al. (2025)	Built Env.	Fuzzy Delphi/FAHP	52 KPIs across 6 domains for building circular economy assessment; validated prioritisation	1, 4
Abeysiriwardana & Jayasinghe-Mudalige (2025)	R&D/Agriculture	Thematic analysis	KPIs as binding and bonding mechanism for R&D commercialisation and collaboration accountability	2, 5
Martin-Domingo et al. (2025)	Airlines/ESG	LLM comparison	LLMs automate environmental KPI extraction from sustainability reports; accuracy increases to 70%+	3
Corsini et al. (2025)	Sustainability	AI/collaborative	AI-driven collaborative framework for strategic circularity KPI definition integrating ML and stakeholders	3

5. Thematic Synthesis

Theme 1: KPI Framework Design and Methodological Foundations (RQ1)

Twenty-two studies (51%) addressed methodological dimensions of KPI framework design. Samhouri and

Abualeenein (2024) demonstrated that Fuzzy Analytic Hierarchy Process (FAHP) provides a robust approach to KPI prioritisation, outperforming traditional AHP by accounting for human subjectivity and uncertainty in pairwise comparisons. Their ITIL-based application produced a hierarchical KPI system with indicators elevated based on SMART compliance scores. Mani et al. (2025) developed the Building Circularity KPI Framework comprising 52 indicators across six domains through a two-round fuzzy Delphi followed by FAHP, with disassembly and material durability ranked highest. Heydarzadeh et al. (2025) proposed the Multi-Layer Multi-Variable Value Stream Mapping (MLMV-VSM) framework, integrating operational, environmental, and social KPIs while capturing cross-layer interdependencies including human-centric metrics such as operator stress and fatigue. Expert consensus via Delphi methodology emerged as a preferred validation approach: Teo et al. (2025) achieved 96% expert consensus in the second round (up from 74% in the first) for 51 tenancy management KPIs. Zhang et al. (2021) extended the SMART tradition through ontology-based automation of KPI calculation, linking KPI formulae to heterogeneous data sources through a semantic layer.

Theme 2: KPI Culture, Communication, and Organisational Adoption (RQ2)

Twelve studies addressed human, cultural, and communicative dimensions of KPI adoption. Amoah and Minishi-Majanja (2022) found that nearly 80% of Ghanaian university libraries lacked clearly stated KPIs of which staff were aware, attributing this to insufficient training, poor internal communication, and absence of management commitment. Abdel-Razik et al. (2023) demonstrated through a quasi-experimental study that structured KPI discussion meetings using infographics and SWOC analysis produced measurable improvements in primary healthcare service performance over one year. Kadomura et al. (2024) conducted an RCT among 800 Panasonic employees, revealing that presenting KPI numbers in isolation produced no significant attitudinal change, while adding a CEO narrative conveying strategic rationale generated significantly positive employee attitudes. This confirms that the 'story behind the numbers' is as critical as the numbers themselves (Camilleri, 2024; Armstrong & Taylor, 2023). Participatory approaches combining expert interviews, focus group discussions, and Delphi processes enhance both technical validity and professional acceptance (Hou et al., 2024; Teo et al., 2025).

Theme 3: Technology-Enabled KPI Monitoring and Analytics (RQ3)

Seventeen studies examined technological transformation of KPI monitoring. Machine learning has emerged as a powerful tool: Wan et al. (2021) demonstrated that multi-task LSTM networks simultaneously predict performance curves and identify influential KPIs, outperforming state-of-the-art algorithms. Ghadiri Khorzoughi et al. (2025) applied seven supervised ML algorithms to SCQM 4.0, with Random Forest achieving highest predictive accuracy, identifying digital innovation, supplier responsiveness, and customer satisfaction as most critical KPI drivers. Cloud-native platforms enable scalable, real-time performance management: Ameer and Fatahi Valilai (2025) proposed a Google Cloud Platform-based causal AI framework that identifies underlying causes of supply chain disruptions rather than merely observing

correlations. Martin-Domingo et al. (2025) showed that LLMs (GPT-4.0, o3-mini, DeepSeek R1) can increase environmental KPI extraction accuracy from below 30% to above 70% when explicit KPI terms are incorporated in prompts. Corsini et al. (2025) advanced the frontier by proposing an AI-collaborative framework for strategic circularity KPI definition.

Theme 4: Cross-Sectoral KPI Applications and Contextual Adaptation (RQ4)

This theme documents KPI framework diversity across sectors. In healthcare and public services, Abdel-Razik et al. (2023) and Alghamdi et al. (2025) demonstrate that process indicators outperform pure output metrics in complex service environments. In supply chain, Ghadiri Khorzoughi et al. (2025) and Ameer and Fatahi Valilai (2025) emphasise systemic KPI capture across upstream, internal, and downstream dimensions, with SCQM 4.0 representing a distinct performance paradigm integrating quality management with digital analytics. Zis et al. (2023) confirm the enduring relevance of the Balanced Scorecard's multi-perspective architecture in maritime autonomous shipping. In the built environment, Mani et al. (2025), Zhang et al. (2021), and Hou et al. (2024) collectively document the evolution from narrow operational metrics toward multi-dimensional sustainability assessments integrating economic, environmental, and social performance dimensions.

Theme 5: HRM-KPI Integration and People Performance Management (RQ4)

The fifth theme synthesises findings at the intersection of KPI methodology and people performance management. Five sub-themes emerged: strategic KPI cascading and goal alignment; KPI-based staff performance evaluation; KPI design for diverse and inclusive workforces; KPI literacy and capability development; and ethical dimensions of KPI use in HRM. Abeysiriwardana and Jayasinghe-Mudalige (2025) demonstrated that KPIs function as binding mechanisms creating shared accountability across R&D teams with different disciplinary identities, reducing the cognitive separation between pure and applied research. Kadomura et al. (2024) introduced KPIs as instruments of diversity and inclusion strategy, showing that diversity KPIs without CEO narrative generate no positive attitudinal change. Armstrong and Taylor (2023) recognise KPI literacy as an underinvested component of organisational learning strategy a gap that widens as AI-driven KPI tools proliferate (Ameer & Fatahi Valilai, 2025; Ghadiri Khorzoughi et al., 2025). Kwee et al. (2021) highlight that KPIs are not ethically neutral: choices about which indicators to measure, how to weight competing priorities, and how to use performance data in employment decisions all carry ethical implications requiring explicit governance.

Discussion

The most striking asymmetry in the reviewed literature is between the sophistication of technical KPI developments AI, ML, and cloud-native monitoring and the persistent cultural, communicative, and capability challenges that continue to limit KPI effectiveness in practice. Studies such as Wan et al. (2021), Ghadiri Khorzoughi et al. (2025), Ameer and Fatahi Valilai (2025), and Martin-Domingo et al. (2025) demonstrate impressive technical achievements in KPI prediction, extraction, and monitoring. Yet Amoah and Minishi-Majanja (2022), Abdel-Razik et al. (2023), and Kadomura et al. (2024) provide equally compelling

evidence that human factors represent the primary barriers to KPI effectiveness. This technology-culture gap suggests a dual investment imperative: organisations must simultaneously invest in culture-building, communication strategy, and capability development alongside technological infrastructure.

Kadomura et al.'s (2024) RCT evidence challenges the implicit assumption in much KPI literature that well-designed, clearly communicated indicators automatically motivate required behaviours. Employees respond not merely to the metric but to the meaning it is given meaning-making that depends critically on leadership communication quality. Grounded in Signalling Theory, this confirms that KPIs function as organisational signals whose effectiveness depends on source credibility and narrative richness. Camilleri (2024) operationalises this through the concept of a coherent performance narrative connecting individual targets to team, department, and organisational purpose.

To address identified knowledge gaps and integrate themes, this review proposes the Integrated KPI-Performance Framework (IKPF), conceptualising KPI effectiveness as a function of five interacting dimensions: (1) Framework Quality SMART compliance, FAHP/Delphi prioritisation, cross-dimensional integration; (2) Organisational Culture employee awareness, management commitment, participatory governance; (3) Technology Enablement data infrastructure, AI/ML analytics, real-time monitoring; (4) Leadership Communication narrative strategy, goal alignment cascade, feedback quality; and (5) HRM Integration performance appraisal design, capability development, ethical governance. Sustainable performance improvement requires simultaneous investment across all five dimensions, as weakness in any single dimension creates systemic vulnerabilities that undermine the effectiveness of the others.

CONCLUSION AND SUGGESTION (PENUTUP)

Conclusions

This systematic literature review synthesised 43 peer-reviewed studies on KPIs and organisational performance, identifying five major themes and 18 sub-themes. KPI framework design is methodologically mature, with FAHP, fuzzy Delphi, participatory expert consensus, and ontological formalisation offering robust approaches to prioritisation, validation, and operationalisation. The challenge is not methodological availability but organisations' failure to invest the necessary rigour and stakeholder engagement in the design process. Employee awareness, leadership narrative communication, and participatory governance are the critical human factors determining KPI effectiveness. The persistent evidence of KPI culture deficits across diverse contexts from Ghanaian university libraries to Japanese corporations to Egyptian primary healthcare facilities suggests these challenges are structural and systemic rather than idiosyncratic, requiring sustained organisational development investment rather than one-off training interventions. AI, ML, cloud computing, and LLMs have transformed the technological frontier of KPI management, enabling predictive analytics, real-time monitoring, automated extraction, and intelligent definition support. However, technological sophistication alone is insufficient: the human and organisational dimensions must keep pace with technological capability. HRM practice is both under-served by and

critically important to the KPI literature, with integration of KPI frameworks across strategic alignment, performance appraisal, diversity management, and ethical governance representing a rich agenda for future research and practice development.

Suggestions

Future research should prioritise six directions: (1) Longitudinal studies examining causal relationships between KPI system maturity and sustained organisational performance, controlling for industry, size, and strategic context; (2) Empirical investigation of mediating roles of employee KPI literacy and psychological ownership in the KPI-to-performance pathway; (3) Cross-cultural comparative studies examining how national and organisational culture moderates the impact of CEO narrative strategy on employee KPI engagement; (4) Research on HRM implications of AI-driven KPI systems addressing algorithmic fairness, employee privacy, and governance of data-driven performance appraisal; (5) Empirical testing of the proposed IKPF examining relative contributions of each dimension to performance outcomes; and (6) Mixed-methods studies on how sustainability KPI integration influences employee motivation, organisational culture, and long-term performance. Practically, HR leaders should invest equally in KPI design and KPI communication strategy, recognising that technically excellent metrics communicated without narrative context will fail to motivate intended behaviours. Line managers should be equipped with conversational skills to translate KPI data into personally meaningful performance dialogue. Organisations should build workforce analytical literacy as a core performance management capability.

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