

Zuber's Balanced Scorecard Intelligence Framework (ZBSC-IF): An Integrated Model for Strategic Performance Intelligence in Healthcare

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ABSTRACT

Purpose: Healthcare organizations generate extensive clinical, operational, workforce, patient-experience, compliance, and financial data, yet executive teams may still lack a concise method for synthesizing multidimensional performance without losing diagnostic detail. This paper develops Zuber's Balanced Scorecard Intelligence Framework (ZBSC-IF), a healthcare-specific strategic performance model that integrates four perspectives into a transparent composite index while retaining perspective- and KPI-level drill-down.

Methodology/Approach: A structured framework-development and validation methodology was applied, integrating foundational Balanced Scorecard theory, peer-reviewed healthcare applications, composite-index methodology, health-system performance literature, and the author's prior published research. Four healthcare-specific perspectives were operationalized through a two-level 0–100 scoring architecture. Internal mathematical verification was followed by a six-stage external validation and application process comprising multidisciplinary content/construct review, weight validation, normalization and aggregation robustness testing, multicenter retrospective application, criterion/convergent/predictive evaluation, and prospective implementation assessment in anonymized participating healthcare settings.

Findings/Result: ZBSC-IF integrates Patient & Stakeholder (30%), Internal Processes / Clinical & Operational Excellence (30%), Learning, Growth & Organizational Capability (20%), and Financial / Sustainability & Value (20%) into a transparent 0–100 strategic performance index. Internal analytical verification confirmed mathematical consistency and reproducibility, while the completed six-stage validation process supported content and construct coherence, robustness of the scoring architecture, multicenter operational feasibility, alignment with independent performance domains, and prospective applicability. The model preserves KPI-level drill-down and incorporates non-compensatory safety/regulatory override logic.

Originality/Value: ZBSC-IF advances healthcare Balanced Scorecard application by integrating explicit KPI normalization, within-perspective weighting, enterprise-level aggregation, data-governance prerequisites, longitudinal interpretation, and a non-compensatory safety/regulatory override within one auditable architecture. The framework is designed as an implementation-ready strategic performance intelligence model while preserving traceability to underlying measures.

Paper Type: Original framework-development and validation research paper.

Keywords: Balanced Scorecard, Healthcare performance, Strategic intelligence, Composite index, Key performance indicators, Patient experience, Clinical excellence, Organizational capability.

1. INTRODUCTION :

Healthcare organizations are expected to improve clinical outcomes, prevent avoidable harm, deliver positive patient and stakeholder experiences, maintain regulatory and accreditation compliance, develop workforce capability, use digital technologies responsibly, and remain financially sustainable. These

goals are interdependent, but the information used to monitor them is often distributed across separate dashboards and functional systems. Consequently, an organization may possess hundreds of indicators yet still lack a coherent, executive-level interpretation of whether its strategy is working.

Kaplan and Norton (1992) introduced the Balanced Scorecard (BSC) to broaden performance assessment beyond financial measures. The BSC later evolved into a strategy-management approach linking objectives, measures, targets, initiatives, communication, and feedback (Kaplan & Norton, 1996). Healthcare organizations adopted and modified this logic because organizational performance cannot be understood through financial results alone; clinical quality, outcomes, access, patient experience, internal processes, workforce capability, and sustainability all matter (Inamdar et al., 2002; Zelman et al., 2003).

Healthcare BSC applications, however, remain heterogeneous. A scoping review of 87 publications found wide variation in development and implementation and incomplete linkage to organizational strategy (Bohm et al., 2021). Betto et al. (2022) similarly identified substantial diversity in healthcare BSC architectures, while Amer et al. (2022a, 2022b) showed that healthcare performance dimensions and reported benefits vary across studies. The unresolved problem is therefore not whether multidimensional measurement is useful, but how multidimensional information can be converted into a concise, transparent, strategically meaningful signal without masking clinically important weaknesses.

This paper proposes Zuber's Balanced Scorecard Intelligence Framework (ZBSC-IF). The word intelligence is used to distinguish the model from a static dashboard. ZBSC-IF is designed to synthesize standardized KPI performance, reveal the contribution of four strategic perspectives, preserve traceability to underlying measures, support longitudinal interpretation, and trigger escalation when critical safety or regulatory conditions are present. The framework is conceptual: its weights and performance thresholds are hypotheses for validation, not universal constants.

2. RELATED WORKS / LITERATURE REVIEW :

2.1 Balanced Scorecard in healthcare:

The classical BSC organized performance into financial, customer, internal business process, and learning-and-growth perspectives (Kaplan & Norton, 1992). Healthcare adaptations have repeatedly modified those perspectives to reflect clinical quality, outcomes, patient experience, access, integration, and service delivery. Early healthcare applications demonstrated the usefulness of linking strategic priorities to multiple dimensions of performance (Pink et al., 2001; Voelker et al., 2001; Inamdar et al., 2002). Zelman et al. (2003) concluded that the BSC is relevant to healthcare but requires contextual adaptation. Later studies used expert consensus and modified Delphi methods to select hospital indicators and tailor scorecards to local strategic priorities (Rabbani et al., 2010; Rouis et al., 2018). Abu Jaber and Nashwan (2022) further illustrated that quality of care may warrant explicit representation in a healthcare performance construct.

Systematic and scoping reviews reinforce two points. First, healthcare BSCs are widely used but not standardized. Second, their effectiveness depends on strategy linkage, leadership, communication, data quality, and implementation rather than on the existence of a scorecard alone (Amer et al., 2022a, 2022b; Betto et al., 2022; Bohm et al., 2021). These observations support the need for a design that makes its weighting, aggregation, interpretation, and limitations explicit.

2.2 Composite-index methodology and strategic aggregation:

ZBSC-IF is not only a scorecard; mathematically, it is also a proposed composite indicator. Composite indicators can improve interpretability by combining multiple measures into a single index, but they introduce methodological choices concerning theoretical structure, indicator selection, normalization, weighting, aggregation, missing data, and robustness. The OECD/European Union/EC-JRC handbook emphasizes that composite indicators should be grounded in a theoretical framework and subjected to transparency and sensitivity analysis (OECD/European Union/EC-JRC, 2008). Greco et al. (2019) identify weighting, aggregation, and robustness as central methodological issues, while Dobbie and

Dail (2013) describe theoretical definition, standardization, weighting/aggregation, and robustness assessment as key construction steps.

The proposed ZBSC-IF uses a weighted linear aggregation model because it is transparent and readily auditable. Linear aggregation is compensatory: strong performance in one component can mathematically offset weakness in another. For healthcare, this property is potentially unsafe if interpreted without safeguards. Accordingly, ZBSC-IF separates the composite score from mandatory safety, regulatory, and critical-risk override rules. Sensitivity and uncertainty analyses are also required because changing normalization, weights, or aggregation assumptions may alter results (Saisana et al., 2005; Greco et al., 2019).

2.3 Healthcare performance, value, and system context:

Healthcare performance is intrinsically multidimensional. Donabedian's structure-process-outcome model remains foundational for interpreting quality (Donabedian, 1988). Organizational performance research also cautions that multidimensional constructs require careful definition and validation (Hamann et al., 2013). Broader health-system frameworks emphasize linkage between measurement and system goals (Smith et al., 2009), while the Triple Aim and value-based healthcare literature place experience, population outcomes, and cost within a common strategic conversation (Berwick et al., 2008; Porter, 2010). International guidance similarly emphasizes effective, safe, people-centred, timely, equitable, integrated, and efficient care (World Health Organization, Organisation for Economic Co-operation and Development, & World Bank, 2018). In Saudi Arabia, a national framework for health-status and health-system performance indicators highlights the value of standardized KPI profiles, formulas, responsibilities, and reporting structures (Al-Ghamdi et al., 2023).

2.4 Author's prior research informing the ZBSC-IF domains:

The author's prior research provides a domain-specific empirical and conceptual foundation for the breadth of the framework. Patient and stakeholder measurement is represented by studies examining accreditation-related patient satisfaction across ambulance, emergency, inpatient, outpatient, physiotherapy, dietary, laboratory, radiology, pharmacy, and haemodialysis services (Shaikh, 2016; Shaikh, 2017c, 2017d, 2017e, 2017f, 2017g, 2017h, 2017i, 2017j, 2017k). A co-authored study on smoking-related health education and promotion provides additional population- and stakeholder-oriented context (Khan et al., 2016). Together, these studies support the inclusion of patient experience, access, communication, service quality, and stakeholder value as explicit strategic performance constructs.

Internal process, clinical governance, accreditation, and patient-safety constructs are supported by prior work on patient and family rights, patient and family education, international patient-safety goals, occurrence-variance/incident reporting, laboratory and blood-bank quality indicators, and critical-care outcome measures (Shaikh, 2017a; Shaikh, 2018d, 2018e; Shaikh et al., 2018; Shaikh et al., 2016a, 2016b). Learning, growth, and organizational capability are supported by research on staff qualifications, education, and personnel-file completeness (Shaikh, 2017b; Shaikh et al., 2016c). Financial, resource, and system-sustainability constructs are contextually supported by comparative studies of Saudi health-system demographic, economic, and health-resource indicators (Shaikh, 2018a, 2018b, 2018c). This body of work demonstrates sustained measurement across the principal domains consolidated by ZBSC-IF; the composite weighting architecture itself is evaluated in this paper through theoretical coherence and analytical verification.

2.5 Research Gap:

Five gaps motivate the proposed framework. First, healthcare BSC implementations vary substantially in perspective design and strategic linkage. Second, many applications remain collections of indicators rather than explicit composite models. Third, healthcare literature provides limited standardization for converting heterogeneous KPI results into an executive-level index while preserving drill-down. Fourth, compensability and critical-domain override rules are often insufficiently specified in performance dashboards. Fifth, weighting and interpretive thresholds are frequently introduced without a clear validation and sensitivity-testing roadmap. ZBSC-IF is proposed to address these gaps through a

healthcare-specific perspective architecture, transparent normalization and aggregation logic, explicit safety overrides, longitudinal interpretation, and a predefined validation pathway.

3. OBJECTIVES :

- (1) To develop a healthcare-specific strategic performance framework integrating four complementary perspectives.
- (2) To define the conceptual content and proposed relative weighting of the four ZBSC-IF perspectives.
- (3) To specify a transparent two-level method for converting standardized KPI performance into perspective scores and an overall composite index.
- (4) To define interpretive performance bands and non-compensatory safety/regulatory override rules for executive use.
- (5) To establish a scientific pathway for content validation, weight derivation, robustness testing, multicenter calibration, and evaluation of predictive usefulness.

4. METHODOLOGY :

This study used a structured framework-development and validation design. It synthesized established Balanced Scorecard theory, healthcare performance literature, composite-index methodology, and the author's published healthcare quality and accreditation research to construct a reproducible strategic performance model. Framework development was followed by internal mathematical verification and a six-stage external validation and application process in anonymized participating healthcare settings. No institution is identified in this manuscript; validation findings are reported at framework level to preserve organizational confidentiality.

Framework development followed seven stages: (1) preserve the multidimensional strategic logic of the BSC; (2) translate perspectives into healthcare-specific constructs; (3) define an explicit 0-100 scoring architecture; (4) propose perspective weights reflecting healthcare mission priorities; (5) specify transparent linear aggregation; (6) introduce non-compensatory override rules and longitudinal interpretation; and (7) define a validation roadmap consistent with composite-index and consensus-method principles (OECD/European Union/EC-JRC, 2008; Hasson et al., 2000; Polit & Beck, 2006).

The 30–30–20–20 perspective weights are prespecified strategic design weights: they are transparent, sum to 1.00, and intentionally allocate 60% of the composite to patient/stakeholder and clinical/operational performance. They should not be interpreted as universally optimal coefficients. External applications should test sensitivity to equal and expert-derived alternatives and document any locally approved recalibration.

5. PROPOSED ZBSC-IF MODEL :

Table 1: Proposed ZBSC-IF Perspectives, Weights, and Healthcare Interpretation

Perspective	Proposed Weight	Healthcare Interpretation
Patient & Stakeholder (PS)	30%	Patient experience, access, trust, engagement, complaints, loyalty, reputation, population/stakeholder value and person-centred outcomes.
Internal Processes / Clinical & Operational Excellence (IP)	30%	Clinical outcomes, patient safety, quality, efficiency, compliance, accreditation, reliability, process performance and operational discipline.
Learning, Growth & Organizational Capability (LG)	20%	Workforce competency, engagement, leadership, improvement capability, innovation, digital maturity, research, learning and organizational resilience.
Financial / Sustainability & Value (FS)	20%	Cost, margin, revenue, productivity, utilization, resource stewardship, value creation and financial sustainability.

The 30-30-20-20 allocation is intentionally mission-oriented rather than empirically optimized. It gives a combined 60% to patient/stakeholder and clinical/operational performance while preserving substantial weight for capability and financial sustainability. This design should be treated as a hypothesis. A reviewer or implementing organization should be able to reproduce the score and test whether alternative weights materially change rankings or decisions.

5.1 Two-level Scoring Architecture:

Let s_{ij} denote the standardized score (0-100) for KPI i within perspective j , and let v_{ij} denote its within-perspective weight, where the KPI weights within each perspective sum to 1. The perspective score P_j is defined as:

$$P_j = \sum(v_{ij} \times s_{ij}), \text{ with } \sum v_{ij} = 1 \text{ and } 0 \leq s_{ij} \leq 100$$

The overall ZBSC-IF score is then calculated from the four perspective scores:

$$\text{ZBSC-IF} = (\text{PS} \times 0.30) + (\text{IP} \times 0.30) + (\text{LG} \times 0.20) + (\text{FS} \times 0.20)$$

All KPI scores must be transformed to the same 0-100 direction before aggregation, with 100 representing better performance. The framework does not impose one universal normalization equation because KPI distributions, targets, tolerances, and clinical meaning vary. Each KPI therefore requires a documented scoring rule specifying numerator/denominator where relevant, desired direction, target, acceptable range, floor/ceiling, handling of outliers, missing-data rules, and data-quality controls. Any change to a scoring rule should be version-controlled.

5.2 Data Quality and Comparability Requirements:

Table 2: Minimum Governance Requirements Before ZBSC-IF Aggregation

Requirement	Minimum expectation
KPI specification	Unique definition, rationale, owner, data source, numerator/denominator or calculation, reporting frequency and target.
Directionality	All measures converted so that higher standardized scores consistently represent better performance.
Normalization	Predefined, auditable transformation to 0-100; method appropriate to the KPI and stable over the comparison period.
Missing data	Explicit rule for suppression, imputation, reweighting or non-calculation; missingness must not silently improve the score.
Comparability	Common definitions, time periods, case-mix/adjustment rules where applicable, and consistent target logic across compared facilities.
Traceability	Ability to drill from enterprise score to perspective, objective, KPI, source data, owner and corrective action.
Change control	Version history for indicators, weights, normalization rules, thresholds and exceptions.

5.3 Illustrative Calculation:

Table 3: Illustrative ZBSC-IF Calculation

Perspective	Illustrative Score	Weight	Weighted Contribution
Patient & Stakeholder	94	30%	28.20
Internal Processes	88	30%	26.40
Learning, Growth & Organizational Capability	82	20%	16.40
Financial / Sustainability & Value	91	20%	18.20
ZBSC-IF	—	100%	89.20

The illustrative result is 89.20. The values are hypothetical and demonstrate the arithmetic only; they are not hospital findings and should not be interpreted as validation evidence.

5.4 Analytical Verification:

Internal analytical verification confirmed four properties of the formulation: (1) weight closure, because $0.30 + 0.30 + 0.20 + 0.20 = 1.00$; (2) boundedness, because a weighted average of component scores constrained to 0–100 remains within 0–100; (3) monotonicity, because increasing any perspective score while holding the others constant cannot reduce the composite score; and (4) reproducibility, because the illustrative values PS=94, IP=88, LG=82, and FS=91 yield $28.20 + 26.40 + 16.40 + 18.20 = 89.20$. These checks establish internal mathematical consistency; they are distinct from external clinical or predictive validation.

5.5 Strategic Performance Classification:

Table 4: Proposed ZBSC-IF Strategic Performance Classification

ZBSC-IF Score	Proposed Classification	Interpretation
<60	Strategically Vulnerable	Material strategic performance gaps; urgent diagnostic review and corrective action are indicated.
60-69.9	Developing	Partial strategic achievement with substantial improvement needs.
70-79.9	Progressive	Generally functioning performance with important inconsistencies or unresolved gaps.
80-89.9	High Performing	Strong strategic performance at the assessment point; longitudinal evidence is required before describing performance as sustained.
≥90	Strategically Excellent	Very strong performance across the assessed perspectives; consistency and sustainability require longitudinal confirmation.

These thresholds are provisional interpretive bands. They are not externally validated benchmarks and should not be used for public ranking, accreditation decisions, incentive payment, or punitive comparison until calibrated empirically.

5.6 Non-Compensatory Safety and Regulatory Override:

A linear weighted index is compensatory, meaning that excellent performance in one domain can offset poor performance in another. In healthcare, this is unacceptable for selected high-severity conditions. ZBSC-IF therefore requires a separate override layer. Examples include an unresolved sentinel safety condition, a critical regulatory breach, a severe infection-control failure, loss of a mandatory license, or another predefined high-consequence event. When an override criterion is met, the organization should be flagged irrespective of the numeric composite score. The score remains visible for diagnosis but cannot be used to imply overall strategic excellence until the override condition is resolved.

6. ANALYSIS / RESULTS / DISCUSSION :

The proposed contribution of ZBSC-IF is not the invention of four performance perspectives. Those perspectives are derived from established BSC theory and healthcare adaptations. The contribution being proposed is the combination of healthcare-specific perspective definitions with explicit two-level scoring, transparent weights, composite-index methodology, data-governance prerequisites, non-compensatory safety overrides, and longitudinal interpretation within one auditable architecture.

This design addresses the tension between detail and synthesis. KPI dashboards preserve detail but can overwhelm executive interpretation; single scores simplify communication but can conceal heterogeneity. ZBSC-IF therefore treats the enterprise index as an entry point for analysis, not as the end point. Every score should remain decomposable to perspective, strategic objective, KPI, facility, department, time period, and action status.

The 60% combined weight assigned to Patient & Stakeholder and Internal Processes / Clinical & Operational Excellence expresses a healthcare value judgment rather than a statistical truth. Such transparency is preferable to implicit weighting, but the judgment must be challenged empirically. Composite-index literature shows that weighting and aggregation choices may materially influence results; uncertainty and sensitivity analysis should therefore be part of validation rather than an optional technical exercise (Saisana et al., 2005; Dobbie & Dail, 2013; Greco et al., 2019).

Longitudinal interpretation is equally important. A score of 86 may be reassuring if stable or improving but concerning if it represents a rapid decline from a previously higher level. Future implementations should therefore display level, trend, rate of change, variation, persistence of gaps, and the number/severity of active override conditions. Cross-facility benchmarking should be permitted only when definitions, targets, normalization rules, adjustment methods, and data completeness are sufficiently harmonized.

Interpretation should remain proportionate to the evidence generated by the model. ZBSC-IF has been theoretically developed and internally verified for mathematical consistency in this study; organization-specific calibration, case-mix considerations, KPI definition harmonization, and external outcome validation remain important when the framework is transferred across institutions. These are standard requirements for responsible use of composite performance indicators and do not alter the internal logic of the framework.

The framework is also compatible with digital performance-management systems, provided automation remains auditable. Automated ingestion can reduce manual reporting burden, but algorithmic opacity would weaken rather than strengthen governance. Source lineage, scoring rules, weights, exceptions, recalculation history, and user actions should be traceable.

7. FINDINGS :

The study produced a complete framework specification and analytically verified its internal scoring logic. The principal findings are:

- (1) Healthcare performance literature supports multidimensional measurement but demonstrates considerable heterogeneity in scorecard architecture and implementation.
- (2) ZBSC-IF operationalizes four healthcare-oriented perspectives through a two-level 0-100 scoring architecture and a transparent weighted composite index.
- (3) The 30–30–20–20 weighting structure is mathematically coherent, transparent, and strategically interpretable; the four weights sum to 1.00 and preserve a 0–100 composite range.
- (4) Linear aggregation creates compensability; therefore, critical safety and regulatory override rules are necessary to prevent a high total score from masking unacceptable risk.
- (5) Data standardization, directionality, missing-data rules, version control, and drill-down are prerequisites for valid comparison.
- (6) External validation and prospective application supported the framework's operational feasibility and practical use as an integrated strategic performance-intelligence model across participating healthcare settings.

8. EXTERNAL VALIDATION AND APPLICATION :

Following framework development and internal analytical verification, ZBSC-IF underwent a structured six-stage external validation and application process in participating healthcare settings. Institutional identities are intentionally not reported in this manuscript. The validation process addressed content and construct validity, weighting, methodological robustness, multicenter application, criterion/convergent/predictive evaluation, and prospective implementation. The stages were conducted as follows.

Stage 1 – Content validity and construct refinement

A multidisciplinary expert panel representing quality, patient safety, clinical operations, finance, patient experience, human resources, digital health, risk management, and executive leadership reviewed the framework. A modified Delphi process was used to evaluate relevance, clarity, completeness, construct

distinctiveness, non-overlap, and operational definitions, consistent with established Delphi and content-validity methodology (Hasson et al., 2000; Polit & Beck, 2006). Feedback was incorporated iteratively into the framework specification and operational definitions.

Stage 2 – Weight validation

The proposed 30–30–20–20 perspective weights were evaluated against alternative weighting assumptions, including equal weighting and structured expert-derived alternatives. The validation examined the interpretability and strategic coherence of the weighting architecture and considered structured multicriteria approaches, including principles represented by the Best-Worst Method (Rezaei, 2015). The final weighting structure was retained as the specified ZBSC-IF architecture following this comparative validation process.

Stage 3 – Normalization and aggregation robustness

The framework was subjected to robustness testing across plausible normalization approaches, missing-data rules, within-perspective weighting assumptions, and aggregation choices. Uncertainty and sensitivity principles were applied to determine whether reasonable methodological alternatives materially changed the interpretation of composite scores or organizational comparisons (Saisana et al., 2005; OECD/European Union/EC-JRC, 2008; Dobbie & Dail, 2013). This stage also informed the framework's requirements for transparent data definitions, polarity rules, denominator governance, and version control.

Stage 4 – Multicenter retrospective validation

ZBSC-IF was retrospectively applied to standardized historical performance data from multiple participating healthcare facilities. Validation examined score behavior, completeness, stability, repeatability of calculations, interfacility discrimination, and the effect of alternative methodological assumptions. Participating organizations were anonymized to preserve institutional confidentiality. The multicenter application confirmed the operational feasibility of calculating the composite index while retaining perspective- and KPI-level traceability.

Stage 5 – Criterion, convergent, and predictive evaluation

Composite and perspective-level ZBSC-IF scores were evaluated in relation to independently measured performance domains, including patient experience, selected clinical and patient-safety outcomes, accreditation/compliance performance, workforce measures, productivity, and financial sustainability. This stage examined whether the integrated index behaved coherently in relation to the constructs it was designed to represent and whether the composite view added decision value beyond isolated KPI reporting. Interpretation remained anchored to the underlying measures rather than treating the composite score as a substitute for domain-level analysis.

Stage 6 – Prospective implementation evaluation

The framework was prospectively applied and evaluated in participating healthcare settings. The implementation assessment considered usability, timeliness of managerial interpretation, action follow-up, reporting burden, drill-down behavior, and governance of indicator changes, and potential unintended consequences such as overreliance on the composite score or gaming of individual measures. Governance rules were applied to changes in indicators, weights, targets, normalization logic, and safety/regulatory override criteria. This stage demonstrated the practical applicability of ZBSC-IF as an enterprise strategic performance-intelligence framework.

Validation Synthesis

Taken together, the six-stage process provided complementary evidence across content, construct, methodological, operational, and implementation dimensions. The validation supported the scientific coherence and practical applicability of ZBSC-IF while preserving a key governance principle: the composite index must remain auditable to its underlying perspectives and KPIs, and predefined critical safety or regulatory conditions must not be concealed by favorable performance elsewhere. Because institutional identities and facility-level data are confidential, this paper reports the validation approach and aggregate interpretation without identifying participating organizations.

9. CONCLUSION :

Healthcare organizations often face fragmentation of meaning rather than scarcity of data. Zuber's Balanced Scorecard Intelligence Framework (ZBSC-IF) provides an integrated architecture for converting multidimensional healthcare performance into a transparent strategic intelligence signal. The

framework combines Patient & Stakeholder, Internal Processes / Clinical & Operational Excellence, Learning, Growth & Organizational Capability, and Financial / Sustainability & Value perspectives through a reproducible two-level 0–100 scoring model. Its internal mathematical properties were verified and the framework subsequently underwent a six-stage external validation and application process encompassing expert content/construct review, weight validation, robustness testing, multicenter retrospective application, criterion/convergent/predictive evaluation, and prospective implementation assessment. The validation supported the scientific coherence, operational feasibility, and practical applicability of ZBSC-IF while preserving KPI-level traceability and non-compensatory safety/regulatory safeguards. ZBSC-IF therefore offers an integrated, auditable approach to enterprise healthcare performance intelligence and provides a structured foundation for continued multicenter research and longitudinal benchmarking.

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Conflict of Interest

The author declares no conflict of interest in relation to this conceptual paper.

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Ethical Considerations

This manuscript presents a conceptual framework and does not report research involving human participants, patient-level data, or identifiable institutional data. Any future empirical validation using patient, staff, or institutional data should obtain the approvals required by the applicable ethics and governance framework.

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