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STRATEGIC SUSTAINABILITY MANAGEMENT IN REGIONAL HOSPITALS IN JAVA, INDONESIA: A COMPARATIVE ASSESSMENT

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ABSTRACT

Objective: This study examines Strategic Sustainability Management (SSM) in two Type B regional hospitals in East Java and Central Java, Indonesia, across four dimensions: service, operational, financial, and strategic governance sustainability. Environmental sustainability is excluded from the assessment.

Research Design & Methods: A comparative multiple-case design using quantitative scoring of secondary data was employed. Publicly available annual government performance reports were analysed through document content analysis. Indicators were scored on a three-point scale and aggregated into equally weighted dimension indices expressed as percentages. Robustness checks examined alternative scoring assumptions, category thresholds, and indicators reported by both hospitals. The reports covered 2024 for East Java and 2023 for Central Java.

Findings: Operational sustainability reached 100% in both hospitals, while strategic governance sustainability ranged from 93.8% to 94.4%. Financial sustainability scored 88.9–100%, placing both hospitals in the sustainable category. Service sustainability was the weakest dimension, with scores of 71.4–73.3%, classified as moderate. No dimension fell into the low category. The service dimension remained the weakest across robustness checks, although its classification depended on the threshold applied. Differences between hospitals should be interpreted cautiously because the reporting years differed.

Contributions: This study provides a replicable, document-based method for profiling hospital sustainability using routine government performance reports. The findings highlight potential gaps between strong governance and financial indicators and comparatively weaker service performance.

Novelty: Unlike assessments relying on purpose-built indicators, this study applies transparent, rule-based scoring to routine government performance reports, distinguishing management instruments from reported outcomes. The index excludes environmental sustainability and therefore does not constitute a comprehensive sustainability assessment.

Keywords: Strategic Sustainability Management; Financial Sustainability; Healthcare Governance; Environmental Sustainability; Public Hospitals

JEL codes: I18, H83, Q01

Article type: research paper

INTRODUCTION

Sustainability has moved from the margins to a recurring theme in healthcare management research, yet the literature still lacks agreement on how it should be defined and what it does to organisational performance (Rahat et al., 2023). Hospitals make the difficulty plain. They rely on specialised knowledge, professional competence, and the quality of the care they deliver, and they must answer to many parties at once: clinicians, managers, patients, regulators, and the wider community (Jalilvand et al., 2024). Managing their performance therefore means looking beyond efficiency toward quality and durability.

Pressure on hospitals is also growing from the demand side. Chronic conditions account for a rising share of the disease burden and generate long-term, resource-intensive care needs (Hacker, 2024). In Indonesia, the expansion of national health insurance has widened access, but it has also raised questions about financing, service quality, and the capacity of providers to absorb demand (Agustina et al., 2019).

Hospitals also leave a sizeable environmental footprint. A global input–output assessment estimated that health care generates between 1% and 5% of total global environmental impacts, depending on the indicator, and more than 5% of some national impacts (Lenzen et al., 2020). Together with the social mission of care and the economic limits of public budgets, this places hospitals squarely within triple-bottom-line thinking, in which

economic, social, and environmental results are managed jointly rather than traded off one at a time (Elkington, 1997). Emissions tell the same story: health care is estimated to account for about 4.4% of global net greenhouse gas emissions (Karliner et al., 2019), and international guidance now asks health systems to cut emissions and prepare for climate risk (World Health Organization, 2023). Environmental and financial sustainability are also linked in practice, because energy, water, and waste are recurring costs as well as environmental loads.

Indonesian public hospitals operate within a decentralised health system (Mahendradhata et al., 2017), and regional hospitals (RSUD) have been given growing managerial autonomy. A systematic review of that autonomy found improvements in infrastructure, service types, and revenues, but only a marginal effect on efficiency, effectiveness, and quality, with weak policy capacity, governance structures, and human resources named as barriers (Basabih & Widhakuswara, 2025). Similar concerns appear in the wider evidence on hospital autonomy in developing countries and on public hospital reform in Asia and the Pacific (De Geyndt, 2017; Gauld et al., 2018; Ravaghi et al., 2018).

A further weakness lies in how performance information is used. Research on Indonesian public hospitals shows that accounting and reporting routines changed little in their organisational role despite repeated reform (Fahlevi, 2016), which suggests that annual performance reports are still treated mainly as compliance documents rather than as tools for strategic judgement. This is a missed opportunity. Explicit, measurable performance standards are the core of results-oriented public management (Hood, 1991), and measurement from several perspectives is what allows managers to see whether a gain in one area is bought at the expense of another (Kaplan & Norton, 1992).

Existing work on hospital sustainability measurement falls into three streams. Reviews of hospital performance indicators have catalogued large indicator sets (Hadian et al., 2024), and a review of indicator-based environmental and social assessments found heterogeneous terminology, mostly qualitative indicators, and no standardised indicator set (Meßmann et al., 2024). Composite indices built from open data and website disclosures, such as a recent index that integrates ESG and digital transformation for hospitals, rest on externally collected data (Takeda et al., 2025). Indonesian studies of regional hospitals, in turn, often examine a single theme, such as autonomy reform, cost recovery, or financial performance (Basabih & Widhakuswara, 2025; Maharani et al., 2015; Wartono et al., 2025). What is missing is a transparent, rule-based way of reading the multi-dimension content of the routine performance reports that Indonesian regional hospitals already file, together with an explicit statement of what such reports cannot show.

This study responds to that gap through Strategic Sustainability Management (SSM), an approach that embeds sustainability in planning, implementation, and performance evaluation. It treats the annual performance report as the evidence base and asks two questions: which SSM practices are visible in the reports of regional hospitals in Java, and how far do the reported indicators reflect service, operational, financial, and strategic governance sustainability? Answering them contributes a replicable, document-based way of profiling hospital sustainability and gives managers and regional governments a comparative view of where reported strength lies and where it is not matched by service indicators. The study is positioned within the clean and sustainable business agenda in a bounded way. It profiles the service, operational, financial, and governance conditions on which a hospital's capacity to pursue environmental goals depends, but it does not score environmental performance, because routine performance reports contain little environmental information. The Discussion sets out how an environmental dimension could be added to the same index. The scope is deliberately narrow: one Type B regional hospital in each of two Java provinces, East Java and Central Java. Both hospitals publish complete performance reports under the same national reporting framework, which makes their documents formally comparable, and two adjacent provinces on one island limit differences in regulatory and regional context (see Cases and Data Sources). The cases are illustrative rather than representative. The study is a sustainability assessment limited to four dimensions; it is not a comprehensive assessment that includes environmental performance.

LITERATURE REVIEW

Studies of sustainability in healthcare organisations draw on a broad theoretical base but no shared definition (Rahat et al., 2023). In this study, hospital sustainability means the capacity to keep delivering service, operational, financial, and governance performance over a long horizon while adapting to change in the health system. Resilience research supports this reading, since it describes durable health systems as those able to absorb shocks and still maintain their core functions (Kruk et al., 2015).

Strategic Sustainability Management in Public Hospitals

SSM is used here as an organising perspective rather than a tested model. It asks whether sustainability is written into what an organisation plans, how it carries plans out, and how it evaluates and corrects itself. The logic comes from public-sector performance management: explicit targets, measurable indicators, and accountability for results (Hood, 1991), complemented by measurement from multiple perspectives (Kaplan & Norton, 1992). In hospitals, the accountability structures that carry this logic, such as boards, reporting lines, and performance contracts, are themselves a research subject (Jalilvand et al., 2024).

Service Sustainability

Service sustainability concerns whether a hospital can keep providing care of consistent quality to today's patients without weakening its ability to do so tomorrow. Donabedian (1988) distinction among structure, process, and outcome remains the standard way of thinking about quality. In routine hospital reporting, the dimension is captured through bed-use indicators (BOR, ALOS, BTO, TOI), mortality indicators such as the net and gross death rates (Pratama, 2023), and patient experience measures, which are linked to clinical safety and effectiveness (Doyle et al., 2013; Manary et al., 2013).

Operational Sustainability

Operational sustainability refers to the capacity to organise processes and resources efficiently enough to keep operations running over time. Efficiency analysis compares the resources used with the outputs produced (Jacobs et al., 2006), and here the dimension is read through four management functions: target planning, programme implementation, evaluation, and risk control. Risk control matters particularly in hospitals, because safe care depends on systems designed to prevent and catch error rather than on individual vigilance alone (Kohn et al., 2000).

Financial Sustainability

Financial sustainability is the ability to remain solvent and to fund services through revenue growth, cost recovery, and achievement of financial targets. Health financing scholarship stresses efficiency, transparency, and accountability as the objectives that financing arrangements should serve (Kutzin, 2013). For Indonesian regional hospitals, the cost recovery rate has been examined as a central indicator of financial independence under decentralisation (Maharani et al., 2015), and recent evidence indicates that liquidity supports financial performance while a revenue structure that depends on service income does not, on its own, raise it (Wartono et al., 2025). Service and financial results have also been studied together at hospital level, for example in a regional hospital in East Java (Candrasari et al., 2018).

Strategic Governance Sustainability

Strategic governance sustainability is the degree to which sustainability principles are built into strategy and decision-making. It is observed here through strategic objectives, annual performance targets, and performance agreements. Evidence on hospital autonomy in developing countries shows that governance design determines whether managerial freedom turns into better performance (De Geyndt, 2017; Ravaghi et al., 2018), and that decentralisation can affect equity, efficiency, and resilience in different directions depending on local institutional arrangements (Abimbola et al., 2019).

Environmental Sustainability in Hospitals

Environmental sustainability in hospitals concerns the resources a hospital consumes and the emissions and waste it generates in delivering care. Hospitals run continuously, use large amounts of energy and water, and produce infectious and hazardous waste. Health care as a whole is estimated to generate between 1% and 5% of global environmental impacts depending on the indicator (Lenzen et al., 2020) and about 4.4% of global net greenhouse gas emissions (Karliner et al., 2019). Guidance from the World Health Organization treats low-carbon and climate-resilient operation as part of what makes a health system durable (World Health Organization, 2023), which parallels the resilience reading used above (Kruk et al., 2015).

In Indonesia, hospitals are subject to environmental health requirements (Kementerian Kesehatan, 2019) and to rules on the management of hazardous and toxic waste from health facilities (Kementerian Lingkungan Hidup dan Kehutanan, 2015), so environmental performance is a compliance matter as well as a sustainability goal. Environmental sustainability is nonetheless not one of the four dimensions scored in this study. The four dimensions capture the service, financial, and institutional conditions for sustainable hospital operation, and the environmental pillar is treated as a boundary of the index and an extension for future work (see Discussion).

State of the Art and Research Gap

The literature offers well-developed accounts of each dimension taken separately, but little evidence on how the four dimensions appear together in the routine reports that Indonesian regional hospitals already produce. Work on regional hospital autonomy has concentrated on financial and service outcomes (Basabih & Widhakuswara, 2025), while sustainability reviews point to the absence of agreed definitions and measures (Rahat et al., 2023). The four dimensions are therefore treated as complementary analytical lenses rather than causal variables, and the study advances two descriptive expectations instead of testable hypotheses: governance and operational dimensions will be stronger than service and financial dimensions, and the two Java hospitals will show broadly comparable profiles across the four dimensions. With two cases and no statistical test, the expectations only discipline interpretation: they are compared with the results in the Discussion, and no causal or inferential claim is

attached to them. Evidence is also thin on how environmental indicators could be added to a report-based profile of this kind for Indonesian regional hospitals; this study marks that gap rather than filling it.

Three features separate this study from the streams above. First, it relies on routine government reports rather than purpose-collected indicators, so the indicator set is whatever the hospitals themselves report, and its coverage is narrower than the indicator pools reviewed by Meßmann et al. (2024). Second, scoring is rule-based and anchored to national reference values and hospital-set targets, so each score can be traced to a document, in contrast to approaches whose indicators are mostly qualitative and hard to compare (Meßmann et al., 2024). Third, existence items (whether a plan, agreement, or evaluation exists) are kept apart from result items (whether targets and reference values are met), so that any gap between management instruments and reported results becomes visible. The contribution is therefore a modest methodological one: a transparent way of profiling selected sustainability dimensions from routine reports. It does not claim a validated sustainability measure, and the framework is not tested against external outcomes.

METHODS

Research Design

A comparative multiple-case design was used, with a quantitative treatment of secondary data. Each hospital counts as one case, and the aim is to identify patterns across cases rather than to estimate causal effects (Eisenhardt, 1989; Yin, 2018). SSM serves as the analytical lens: for each case the question is whether its documents show the capacity to sustain service continuity, operational stability, resource resilience, and a consistent strategic direction. Figure 1 summarises the logic that runs from source documents to sustainability categories.



Figure 1. Analytical framework: from performance reports to sustainability categories

Cases and Data Sources

The cases are Type B regional general hospitals (RSUD) owned by regional governments in two provinces on the island of Java: East Java and Central Java. They were chosen purposively using five conditions: (a) ownership by a regional or city government; (b) a publicly available performance or accountability report for 2021–2025; (c) quantitatively measurable performance indicators; (d) information on strategic planning and programme realisation; and (e) service or financial trend data covering several years. Hospitals with narrative-only reports, or with reports that omitted a whole dimension, were excluded. The omission of single indicators within a dimension did not lead to exclusion, because few reports publish every indicator; such omissions are handled as described under Index Calculation and Aggregation. Restricting the study to Java keeps the cases within one island and a broadly comparable regional setting, at the cost of the wider geographical variety that a multi-island sample would offer.

Case selection was conducted in three stages. First, Type B regional general hospitals in East Java and Central Java were identified as potential cases. Second, the availability and suitability of their Laporan Kinerja Instansi Pemerintah (LKjIP) and related official documents were considered in relation to the predefined eligibility criteria (a)–(e). Third, one hospital from each province was selected to support a comparative analysis of hospital performance. The selection process followed a purposive, information-oriented approach, prioritising the relevance of the cases to the research objectives and the suitability of the available documentation for comparative assessment. The two cases are referred to as Hospital EJ and Hospital CJ, representing East Java and Central Java, respectively. This case selection strategy was not based on random sampling; therefore, the findings are intended to provide contextual analytical insights rather than statistically generalisable conclusions about all Type B regional general hospitals (Yin, 2018).

The data come from Government Agency Performance Reports (Laporan Kinerja Instansi Pemerintah, LKjIP) and related institutional documents, including strategic plans, performance agreements, key performance indicator reports, programme budget realisation reports, risk management documents, and hospital service statistics. The reporting year differs between the two cases: 2024 for East Java and 2023 for Central Java, as shown in the results tables. The difference and its implications are explained under Reporting Years and Comparability below.

Indicators and Analysis Procedure

Indicators were grouped under the four dimensions. Service sustainability comprises bed efficiency (BOR, ALOS, BTO, TOI), clinical quality (NDR, GDR), and the Community Satisfaction Index (IKM). Operational sustainability comprises target planning, programme implementation, evaluation implementation, and risk control. Financial sustainability comprises the sales growth rate (SGR), the cost recovery ratio (CRR), and financial target achievement. Strategic governance sustainability comprises strategic objectives, annual performance targets, performance agreements, and average performance achievement. Environmental sustainability is not scored. The reports were read for environmental content, such as energy, water, waste, and emissions, but they contain too little to support an indicator set, so the environmental pillar is treated in the Discussion rather than in the index.

Indicator selection followed three principles. First, the service indicators are the standard hospital performance indicators used in Indonesian hospital reporting (Departemen Kesehatan Republik Indonesia, 2005) and the national community satisfaction index (Kementerian PANRB, 2017), so each has an external reference value. Second, the financial indicators are those the hospitals report as ratios or budget realisation; cost recovery in particular has been used as a measure of financial independence in Indonesian regional hospitals (Maharani et al., 2015). Third, the operational and governance items follow the management functions of SSM (planning, implementation, evaluation, and risk control) and the strategic-planning items that hospital sustainability frameworks place under governance and management (Meßmann et al., 2024). Indicators that a report did not publish could not be added, so the indicator set is limited to what routine reports contain. This is a constraint of the document-based design, not a claim that these indicators exhaust each dimension.

Analysis followed four steps. First, document content analysis identified and extracted indicators from each report and turned narrative information into measurable units (Hsieh & Shannon, 2005). Second, each indicator was assigned an ordinal score from 1 to 3 using the rules under Scoring Criteria below. Third, the scores within each dimension were aggregated into a dimension index expressed as a percentage of the maximum attainable score, as set out under Index Calculation and Aggregation. Fourth, the indices were compared across hospitals to identify dominant patterns and the balance among dimensions, taking account of the difference in reporting years (see Reporting Years and Comparability).

Scoring Criteria

Every indicator was scored on a three-point ordinal scale: 3 when the target or reference standard was met or exceeded, 2 when it was partly met, and 1 when it was not met. The same scale was applied to all indicators and to both hospitals, and Table 1 shows how it was applied in each dimension. Where a report states a numerical target, the score follows the degree of target attainment. Where an indicator has a national reference range, as the bed-efficiency indicators do, the score follows the position of the reported value relative to that range. Where an indicator has no target but a multi-year series, as sales growth does, the score follows the direction and consistency of change over the most recent years. For operational and governance indicators, which record whether a management instrument exists and is used, a score of 3 requires both documented evidence of the instrument and evidence of its implementation in the report. A score of 2 is assigned when the indicator demonstrates partial attainment, an improving trend toward the target or reference standard, or documented evidence of the management instrument without sufficient evidence of its implementation. A score of 1 is assigned when the target or reference standard is not attained without evidence of meaningful improvement, when the indicator shows a deteriorating trend, or when the relevant management instrument is neither documented nor evidenced as implemented. For indicators with numerical targets or reference ranges, partial attainment is determined by the reported value's proximity to the applicable threshold and the extent of the remaining gap. Because the underlying indicators have different units and reference criteria, no single numerical margin is imposed across all indicators; instead, the applicable criteria are specified for each indicator in Table 1. Where the available report does not provide sufficient evidence to distinguish partial from non-attainment, the score is assigned conservatively based on the documented evidence.

Table 1. Indicators, Scoring Rules, and Aggregation by Dimension

Dimension (indicators scored)	Indicators	Basis for scoring	Score 3 / Score 2 / Score 1
Service (7; 5 for Central Java)	BOR, ALOS, BTO, TOI; NDR, GDR; IKM	Reported value against the national reference range or the hospital's own target; IKM against the satisfaction category in the report	3 = within range or at target (IKM in the top category); 2 = close to the range or target, or moving toward it; 1 = clearly outside and not improving
Operational (4)	Target planning, programme implementation, evaluation implementation, risk control	Evidence in the LKjIP and supporting documents that the instrument exists and is used	3 = documented and implemented, with evidence of results; 2 = documented, implementation only partly evidenced; 1 = absent or only mentioned
Financial (3)	SGR, CRR, financial target achievement	Reported ratio or budget realisation against target; direction of change for SGR	3 = target met or exceeded, or growth positive and rising; 2 = target partly met, or growth positive but below target; 1 = target not met and no improvement
Strategic governance (4)	Strategic objectives, annual performance targets, performance agreement; average performance achievement	Instrument items as for operational; average achievement is the mean of the scores of the individual performance indicators in the LKjIP	Instrument items: as for operational. Average achievement: mean of indicator scores (1–3)

Note: Scores are ordinal (1–3) and indicators are equally weighted within a dimension. A score of 3 on the bed-efficiency and clinical-quality indicators corresponds to the national reference values: BOR 60–85%, ALOS 6–9 days, BTO 40–50 times per year, TOI 1–3 days, NDR below 25 per 1,000 discharges, and GDR below 45 per 1,000 discharges (Departemen Kesehatan Republik Indonesia, 2005). A score of 3 on IKM corresponds to service-quality category A (index 88.31–100) in the community satisfaction survey guideline (Kementerian PANRB, 2017). For indicators with a target in the performance agreement (CRR, financial target achievement, and each performance indicator behind average achievement), a score of 3 corresponds to attainment of 100% of the target or more. Scores of 2 and 1 reflect the author's judgement of the distance from the reference value or target and of the direction of change, so the boundary between them is less sharp than the boundary for a score of 3 (see Validity and Reliability).

Index Calculation and Aggregation

The index of dimension d for a hospital is the sum of its indicator scores as a share of the maximum attainable sum:

$$I_d = [\ \Sigma\ s_i / (3 \times n_d)\ ] \times 100\% \qquad (1)$$

where s_i is the score (1, 2, or 3) of indicator i and n_d is the number of indicators of dimension d that the hospital reports. The "Final score" in Tables 2–5 is the mean score, $\Sigma\ s_i / n_d$, so the index equals the mean score divided by 3. Indicators carry equal weight. An indicator that a report does not publish is excluded from both numerator and denominator instead of being scored as zero, and it is marked in the table. Because the lowest score is 1, an index cannot fall below 33.3%. For the service dimension, the sub-averages for bed efficiency and clinical quality in Table 4 are descriptive only and are not used in the aggregation, so every indicator carries the same weight regardless of the size of its group. Percentages are computed from unrounded sums, and scores are shown to two decimals for readability. As a worked example, the service index of East Java is (3 + 1 + 2 + 3 + 2 + 1 + 3) / (3 × 7) = 15/21 = 71.4%, and that of Central Java is (2 + 2 + 3 + 1 + 3) / (3 × 5) = 11/15 = 73.3%.

Dimension indices are reported separately and are not combined into a single composite index. The dimensions measure different things, theory offers no basis for weighting them, and a composite would let strong results on one dimension offset weak results on another, which would hide the imbalance this study looks for. An index below 60% is classed as low sustainability, 60% to below 80% as moderate, and 80% or above as sustainable. These thresholds are an interpretive convention adopted for this study, not empirical cut-offs, so results close to a boundary should be read with care. Table 6 re-classifies the results under three alternative sets of cut-offs.

Two checks show how far the results depend on these rules. If the two unreported service indicators of Central Java (BTO and TOI) were scored 1, the lowest score, instead of being excluded, its service index would be 13/21 = 61.9% (or 17/21 = 81.0% if both were scored 3). If the sub-averages were aggregated instead of the individual indicators, the service indices would be 75.0% for East Java and 77.8% for Central Java. Service remains moderate when the sub-averages are aggregated and when the two indicators are scored 1, but the Central Java classification depends on their exclusion, because scoring both 3 would place it just above the 80% threshold. No other dimension is affected. Further checks on single-coder scoring and on the thresholds are reported in Table 6 (Results).

Reporting Years and Comparability

The two hospitals are observed in different reporting years: 2024 for East Java and 2023 for Central Java. For each hospital, the most recent report that met selection conditions (b) to (e) at the time of data collection was used; for the Central Java hospital this was the 2023 report.

The offset affects interpretation in three ways. First, the study compares two profiles, each drawn from one reporting year. It does not compare the hospitals' performance in the same period and should not be read as a ranking. Second, the effect of the offset differs by indicator type. Operational and governance items record whether management instruments exist and are used, and these change slowly, so a one-year offset matters little for them. Utilisation, mortality, and revenue indicators (BOR, BTO, NDR, GDR, SGR) respond to demand, case mix, and tariffs and can move noticeably between years, and 2023 may still have been a year of post-pandemic normalisation in hospital utilisation. A difference in these indicators, such as the sales growth score (3 in East Java, 2 in Central Java), therefore cannot be attributed to the hospitals alone. Third, comparisons among a hospital's own four dimensions are not affected, because all four come from the same report.

For this reason the Results and Discussion give more weight to the pattern across dimensions within each hospital than to differences between the hospitals, and treat the latter as indicative. A like-for-like comparison would use the same reporting year or a multi-year average, which is proposed as a next step. Tables 2–5 show the reporting year of each case.

Validity and Reliability

Validity was supported by triangulating across institutional documents, relying on indicators defined by the hospitals themselves, and applying the same scoring rules to every case. Because the procedure uses only published documents and fixed rules, it can be repeated for other hospitals. Three limits apply: reports differ in year and completeness, the scoring scale is coarse and its middle and lower bands rest on the author's judgement, and the scores were assigned by one coder, so inter-coder agreement could not be assessed. Three steps limit the effect of this. The rule for a score of 3 is explicit and externally anchored, so the share of indicators scoring 3 does not depend on the coder's judgement; Table 6 reports this share. Alternative recodings of the judgement-based scores (2 and 1) are also reported, with the range they imply for each index. Even so, an independent second coder and an agreement statistic such as weighted kappa are needed before the scores can be treated as reliable beyond these two cases.

RESULT

The results are presented in two layers. An overview across the four dimensions comes first (Figure 2). The dimension-level tables then follow in the order of the analytical framework: operational, strategic governance, service, and financial sustainability. Shading in the percentage rows follows the category thresholds defined in the Methods. Percentages are calculated from unrounded indicator scores as set out in Equation 1, and the reporting year of each case is shown in the tables (2024 for East Java, 2023 for Central Java). The tables also show the number of indicators scored, because it differs between the cases for service. The two profiles are not a ranking, and the last subsection reports robustness checks.

Overview Across Dimensions

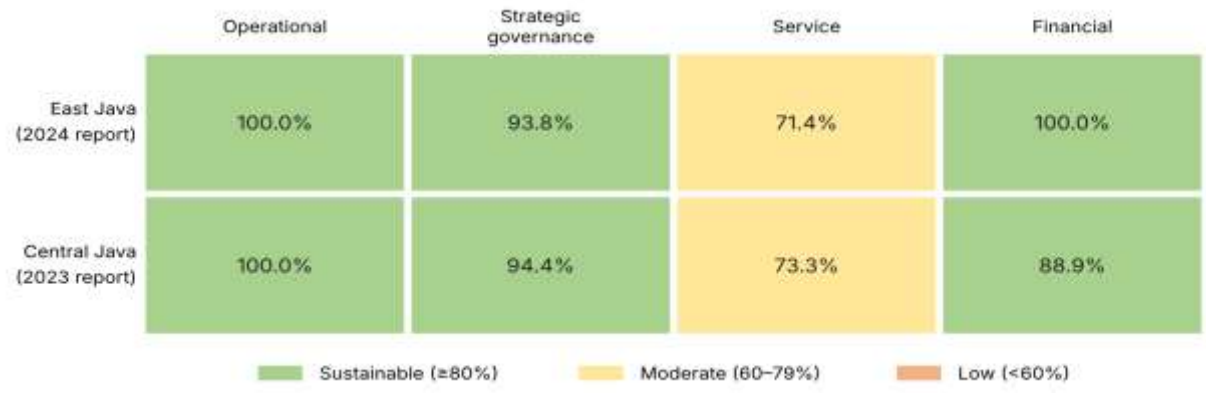


Figure 2. Sustainability index (%) by dimension and hospital (East Java, 2024 report; Central Java, 2023 report; service index based on 7 indicators for East Java and 5 for Central Java; the profiles are not same-year comparisons)

Figure 2 shows that operational, strategic governance, and financial sustainability fall in the sustainable category in both hospitals. Operational indices are 100% in both, and governance indices are 93.8% in East Java

and 94.4% in Central Java. Financial indices are 100% in East Java and 88.9% in Central Java. Service is the only dimension in the moderate category, at 71.4% in East Java and 73.3% in Central Java. No dimension is classed as low.

At the level of the individual hospitals, East Java shows a strong profile apart from service (71.4%), with full operational and financial sustainability. Central Java has the same operational index, a similar governance index, a financial index of 88.9%, and a service index of 73.3%. In both hospitals, service is the dimension where the indicators fall furthest below the planning and financial indicators. Because the two hospitals are observed in different reporting years, the differences between them are indicative; the pattern across dimensions within each hospital is the firmer finding (see Reporting Years and Comparability).

Operational Sustainability

Table 2. Operational Sustainability Scores by Hospital

Hospital (province)		**East Java**	**Central Java**
Year		2024	2023
Indicators scored		4 of 4	4 of 4
Target planning		3	3
Programme implementation		3	3
Evaluation implementation		3	3
Risk control		3	3
Final score	Score	3.00	3.00
	Percentage	**100.0%**	**100.0%**
	Category	Sustainable	Sustainable

Source: LKjIP of each hospital; author's scoring.

Table 2 shows that operational sustainability is in the sustainable category in both hospitals, with an index of 100% in each. Target planning, programme implementation, evaluation implementation, and risk control all score 3 in East Java and Central Java.

Strategic Governance Sustainability

Table 3. Strategic Governance Sustainability Scores by Hospital

Hospital (province)		**East Java**	**Central Java**
Year		2024	2023
Indicators scored		4 of 4	4 of 4
Strategic objectives		3	3
Annual performance targets		3	3
Performance agreement		3	3
Average performance achievement		2.25	2.33
Final score	Score	2.81	2.83
	Percentage	**93.8%**	**94.4%**
	Category	Sustainable	Sustainable

Source: LKjIP of each hospital; author's scoring.

Table 3 places both hospitals in the sustainable category, with indices of 93.8% in East Java and 94.4% in Central Java. Strategic objectives, annual performance targets, and performance agreements score 3 in both. Average performance achievement is the weakest component, at 2.25 in East Java and 2.33 in Central Java, below the maximum score of 3. The mean scores are 2.81 and 2.83, which correspond to the indices above.

Service Sustainability

Table 4. Service Sustainability Scores by Hospital

Hospital (province)		East Java	Central Java
Year		2024	2023
Indicators scored		7 of 7	5 of 7
Bed efficiency	BOR	3	2
	ALOS	1	2
	BTO	2	-
	TOI	3	-
Average, bed efficiency (descriptive)		*2.25*	*2.00*
Clinical quality	NDR	2	3
	GDR	1	1
Average, clinical quality (descriptive)		*1.50*	*2.00*
Community Satisfaction Index (IKM)		3	3
Final score	Score	2.14	2.20
	Percentage	**71.4%**	**73.3%**
	Category	Moderate	Moderate

Note: BOR = Bed Occupancy Rate; ALOS = Average Length of Stay; BTO = Bed Turn Over; TOI = Turn Over Interval; NDR = Net Death Rate; GDR = Gross Death Rate; - = not reported. The bed-efficiency and clinical-quality averages are descriptive and are not used in the index. The index is 15/21 for East Java (seven indicators) and 11/15 for Central Java (five indicators; BTO and TOI excluded). On the five indicators reported by both hospitals, the indices are 66.7% (East Java) and 73.3% (Central Java).
Source: LKjIP of each hospital; author's scoring.

Table 4 shows that service sustainability is moderate in both hospitals, at 71.4% in East Java and 73.3% in Central Java. Bed efficiency averages 2.25 in East Java and 2.00 in Central Java, and the components differ: East Java scores 3 on BOR and TOI but only 1 on ALOS, while Central Java scores 2 on both BOR and ALOS. Clinical quality is the more uneven component. East Java records an average of 1.50, pulled down by a GDR score of 1, and Central Java averages 2.00, with a GDR score of 1 offset by an NDR score of 3. The Community Satisfaction Index scores 3 in both hospitals. No BTO or TOI values are reported for Central Java, so its index rests on five indicators rather than seven; scoring them 1 would give 61.9% and scoring them 3 would give 81.0%, so the category for Central Java is sensitive to this exclusion (Table 6). The mean scores are 2.14 for East Java and 2.20 for Central Java.

Financial Sustainability

Table 5. Financial Sustainability Scores by Hospital

Hospital (province)		**East Java**	**Central Java**
Year		2024	2023
Indicators scored		3 of 3	3 of 3
SGR		3	2
CRR		3	3
Financial target		3	3
Final score	Score	3.00	2.67
	Percentage	**100.0%**	**88.9%**
	Category	Sustainable	Sustainable

Note: SGR = Sales Growth Rate; CRR = Cost Recovery Ratio.
Source: LKjIP of each hospital; author's scoring.

Table 5 shows that both hospitals are in the sustainable category: East Java reaches 100% and Central Java 88.9%. The difference lies in the sales growth rate, which scores 3 in East Java and 2 in Central Java, whereas the cost recovery ratio and financial target achievement score 3 in both.

Robustness Checks

Because scoring involved one coder, a coarse scale, and conventional thresholds, Table 6 reports how the indices and categories change under six alternative treatments. Scenario A recodes every score of 2 as 1 (a strict reading of the boundary), and scenario B recodes every score of 1 as 2 (a lenient reading); the average performance achievement item, which is already a mean, is left as reported. Check C adds the two unreported Central Java service indicators at the lowest and highest score. Check D uses only the five service indicators that both hospitals

report. Check E counts the share of indicators scoring 3, whose rule is explicit and does not depend on the coder's judgement. Check F recomputes the categories under alternative cut-offs.

Table 6. Robustness Checks on the Dimension Indices

Check	Measure	East Java (2024)	Central Java (2023)
Base case (Equation 1)	Service index	71.4% (Moderate)	73.3% (Moderate)
Base case (Equation 1)	Financial index	100.0% (Sustainable)	88.9% (Sustainable)
A. Strict: scores of 2 recoded as 1	Service index	61.9% (Moderate)	60.0% (Moderate)
A. Strict: scores of 2 recoded as 1	Financial index	100.0% (Sustainable)	77.8% (Moderate)
B. Lenient: scores of 1 recoded as 2	Service index	81.0% (Sustainable)	80.0% (Sustainable)
A and B	Operational and governance indices	Unchanged (Sustainable)	Unchanged (Sustainable)
C. Unreported BTO and TOI added	Service index	Not applicable	61.9% if scored 1; 81.0% if scored 3
D. Five common service indicators only	Service index	66.7% (Moderate)	73.3% (Moderate)
E. Share of indicators scoring 3	Service	42.9% (3 of 7)	40.0% (2 of 5)
E. Share of indicators scoring 3	Governance	75.0% (3 of 4)	75.0% (3 of 4)
E. Share of indicators scoring 3	Financial	100.0% (3 of 3)	66.7% (2 of 3)
E. Share of indicators scoring 3	Operational	100.0% (4 of 4)	100.0% (4 of 4)
F. Cut-offs 65% and 85%	Categories changed	None	None
F. Cut-offs 70% and 90%	Categories changed	None	Financial: Sustainable to Moderate
F. Cut-offs 55.6% and 77.8% (equal thirds of the 33.3–100% range)	Categories changed	None	None

Note: Indices are percentages of the maximum attainable score; categories use the 60% and 80% cut-offs unless stated. Scenarios A and B recode only scores assigned to single indicators.

Source: author's calculation from Tables 2–5.

Three results stand out. First, service is the lowest-ranked dimension in every scenario in both hospitals, and its share of indicators at full score is also the lowest (42.9% and 40.0%, against 66.7–100% elsewhere), so the within-hospital pattern is not an artefact of the boundary between scores 1 and 2. Second, the category labels are less stable than the ranking. Service moves from moderate to sustainable under lenient recoding (81.0% and 80.0%), the Central Java service category depends on how BTO and TOI are treated, and the Central Java financial index moves to moderate under strict recoding or under the 70% and 90% cut-offs. The labels should therefore be read as approximate bands. Third, on the five service indicators that both hospitals report, East Java scores 66.7% against 73.3% for Central Java, a larger gap than in the base case (71.4% against 73.3%). Because the reporting years also differ, this gap is not interpreted as a difference in performance. The operational and governance categories remain sustainable in every scenario.

DISCUSSION

Strong Managerial Foundations, with a Caveat

The most consistent result is the strength of the managerial base. Planning, programme implementation, strategic objectives, and annual targets reach the top score in both hospitals, which fits the formal, plan-centred character of the government performance reporting system under which hospitals report. That strength is real, but it needs careful reading. Near-identical top scores are what one would expect where indicators record whether a plan or agreement exists, and they say less about whether the plan changes what happens on the ward. Studies of Indonesian public hospitals have observed that reporting and accounting routines changed little in their role despite reform (Fahlevi, 2016), and research on accountability structures stresses that governance instruments matter when they are used to steer decisions (Jalilvand et al., 2024). Read this way, the results show hospitals that have built the machinery of SSM, namely planning, agreements, and monitoring, more clearly than they show that the machinery is delivering.

The Java cases also show where a strong base still leaves gaps. Average performance achievement, the one governance component that records results rather than the existence of an instrument, scores 2.25 in East Java and 2.33 in Central Java, while the instruments themselves score 3. This is the distance between having the machinery and what it delivers. Both hospitals score 3 on evaluation implementation and risk control, which is encouraging, because safety research argues that hospitals protect quality through systems that anticipate and catch failure rather than through good intentions alone (Kohn et al., 2000), and resilience research identifies the ability to adapt and keep core functions going under strain as the mark of a durable health system (Kruk et al.,

2015). What the data cannot show is whether these functions are used to correct course in practice, which is why the service results below deserve attention.

Where Strength Is Not Matched: Service

The service dimension is where the picture becomes mixed. Both hospitals reach only moderate service sustainability: bed-efficiency scores sit in the middle of the scale, clinical quality averages 1.5 in East Java and 2 in Central Java, and community satisfaction is at the top score in both. The gap between satisfaction and the efficiency and clinical indicators deserves attention. Patient experience is linked to clinical safety and effectiveness (Doyle et al., 2013; Manary et al., 2013), so high satisfaction is not meaningless, yet it records what patients can perceive and cannot replace outcome and process measures (Donabedian, 1988). Reading the indicators together, as the service index does, avoids both over- and under-weighting the patient's voice.

East Java shows the unevenness inside the dimension. It scores 3 on BOR and TOI but only 1 on ALOS, and its gross death rate also scores 1. Strong occupancy and turnover therefore sit alongside weaker length-of-stay and mortality results, a reminder that efficiency, understood as the resources used in relation to the outputs produced (Jacobs et al., 2006), has to be read together with quality (Donabedian, 1988). The service profile of Central Java is flatter, with bed efficiency and clinical quality both averaging 2, but the missing BTO and TOI values limit what can be said about its turnover and mean that its index rests on five indicators rather than seven.

Part of the gap between service and the other dimensions may come from how the dimensions are measured rather than from how the hospitals perform. The operational and governance instrument items are bounded at 3 by design in a formal reporting regime, where a plan or agreement nearly always exists, so these items have little room to differ. Financial and governance targets are set by the hospitals themselves, so attaining them depends partly on how ambitious the target was, whereas most service indicators are judged against national reference ranges that the hospital does not set. Bed-utilisation and mortality indicators also depend on case mix, referral patterns, and demand, which management controls only in part. The lower service scores therefore combine a possible real gap in results with a measurement asymmetry between self-set targets and external references, and the present data cannot separate the two.

Financial Strength, with Room on Revenue Growth

Financial sustainability is a relative strength in Java, and the two hospitals differ only slightly. East Java reaches full sustainability on all three indicators, while Central Java reaches 88.9%, with sales growth (score 2) the only indicator below the top score. Sales growth responds to demand and tariffs, and the two reports cover different years, so this difference should not be attributed to the hospitals alone. The cost recovery ratio is steady in both hospitals, which is consistent with evidence that cost recovery under decentralisation is shaped by local conditions (Maharani et al., 2015), and that a revenue structure resting on service income does not by itself lift financial performance, whereas liquidity does (Wartono et al., 2025). From a financing-policy view, efficiency, transparency, and accountability are the goals that financing arrangements should serve (Kutzin, 2013). A hospital with solid cost recovery but slower revenue growth is managing the cost side of the problem, while the revenue side probably depends partly on factors outside its control, such as local demand and funding rules.

Financial target achievement scores 3 in both hospitals, so financial plans and results are aligned in Java, in contrast to the gap visible in the service indicators. Candrasari et al. (2018) examined service and financial performance jointly in a single regional hospital in East Java because the two cannot be managed separately, and the present results suggest the same need: financial discipline has not yet been matched by equally strong service indicators.

Integrating the Dimensions under SSM

Taken together, the four dimensions support one reading for Java: governance, operations, and finance are ahead of service. Strong planning and financial-management indicators coexist with financial results at or near target, but not with equally strong service indicators; the data show this coexistence and do not show that one causes or fails to cause the other. This partly matches the review finding that regional hospital autonomy improved infrastructure and revenue but contributed only marginally to efficiency, effectiveness, and quality, with governance and human-resource limits as the main barriers (Basabih & Widhakuswara, 2025), and it agrees with wider evidence that the effects of autonomy depend on institutional design (Abimbola et al., 2019; De Geyndt, 2017; Ravaghi et al., 2018). With only two cases, the reading describes a pattern within Java rather than a finding about Indonesia as a whole. The cases are also observed in different reporting years, so the pattern across dimensions within each hospital is firmer than the differences between the two hospitals.

Three implications follow for SSM practice. First, hospitals should treat the performance report as a management tool and not only a compliance document; dimension profiles like those in Figure 2 can be produced each year to see where reported strength is not matched by results. Second, evaluation and risk-control functions deserve the same priority as planning, since they close the loop between plan and result. Third, regional governments and national policy makers should support hospitals with financing and monitoring arrangements that

let them act on what the reports reveal, for example by aligning budgeting, financing rules, and performance monitoring (Gauld et al., 2018; Kutzin, 2013).

What the Cases Support and What Remains Tentative

Four statements are directly supported by the two cases. First, within each hospital the service indicators are the lowest of the four dimensions, and this ordering holds under all robustness checks (Table 6). Second, the operational and governance instruments score 3 in both hospitals, while average performance achievement is below 3 in both. Third, the financial indicators meet or approach their targets in both. Fourth, each profile comes from a single reporting year, and the Central Java service index rests on five of seven indicators.

Other readings remain tentative. That planning strength does not carry over to service outcomes is an interpretation: the design observes reported levels in two cases, not a mechanism. That the top scores on instrument items reflect formal reporting rules more than practice is plausible but untested without interviews or site evidence. That differences in sales growth or service indicators between the hospitals reflect the hospitals themselves, rather than reporting year, case mix, or tariffs, cannot be established. The descriptive expectations set out in the Literature Review are only partly borne out. Governance and operational indices are higher than service, as expected, but the first expectation holds only partly for finance: in East Java the financial index (100%) equals the operational index and exceeds the governance index (93.8%), while in Central Java it is lower than both (88.9%). The second expectation holds in category terms, since each dimension falls in the same category in both hospitals, although this similarity is limited by the unaligned reporting years and the different number of service indicators.

Environmental Sustainability: Boundary of the Index and Pathway for Extension

The reports used here contain little on environmental performance, although the environmental footprint of hospitals is substantial (Lenzen et al., 2020). In triple-bottom-line terms (Elkington, 1997), the four dimensions capture the social, economic, and institutional sides of hospital sustainability: service sustainability speaks mainly to the social pillar, financial sustainability to the economic pillar, and operational and strategic governance sustainability to the institutional capacity that holds the two together. The environmental pillar is not scored. This is the most significant limitation of the assessment. The four-dimension index therefore captures organisational and financial sustainability more fully than ecological sustainability, and the label "sustainable" in this study should be read in that sense: a hospital can reach it on all four dimensions and still carry a large, unmeasured environmental burden.

The boundary matters because environmental and organisational sustainability are linked in practice. Energy, water, and waste are recurring operating costs and compliance obligations, so they bear on the financial and operational dimensions as well as on the environment, and health-system guidance treats low-carbon, climate-resilient operation as part of a durable health system (World Health Organization, 2023). Hospitals in Indonesia are already subject to environmental health requirements (Kementerian Kesehatan, 2019) and to rules on hazardous medical waste (Kementerian Lingkungan Hidup dan Kehutanan, 2015), which suggests that the data for environmental indicators are generated in compliance routines even where the performance reports do not publish them.

Table 7 sets out how an environmental dimension could be added with the same 1–3 scoring and equal-weight aggregation, so that it can be read alongside the four dimensions reported here. Scoring such indicators would turn the environmental pillar from an acknowledged gap into a measured dimension, and would let later studies test whether strength in planning and finance carries over to environmental results, as it appears not to carry over to the service indicators in these two cases. Until then, the findings support claims about organisational and financial sustainability only.

Table 7. Candidate Environmental Indicators for Extending the Index

Area	Candidate indicator	Likely data source	Scoring direction
Energy	Electricity use per occupied bed-day (kWh); share of renewable or self-generated energy	Utility bills; facility energy records	Lower use and higher share score higher
Water	Water use per occupied bed-day (m^3)	Utility bills; sanitation records	Lower use scores higher
Hazardous medical waste	Weight generated per occupied bed-day; share handled by a licensed processor	Waste manifests; environmental health reports	Lower generation and full licensed handling score higher
Wastewater	Share of effluent samples meeting the applicable standard	Effluent test reports	Higher share scores higher
Climate	Estimated direct and energy-related greenhouse gas emissions per occupied bed-day; existence of a reduction target	Energy and fuel records; strategic plan	Lower emissions, or a target with progress, score higher

Note: The indicators are proposals for future work; no environmental scores were assigned in this study. Per-bed-day measures allow comparison between hospitals of different size.

Limitations

The findings must be read within six limits. First, there are two cases, one per province, selected purposively, so the results do not generalise to other regional hospitals. Second, the reporting years differ (2024 and 2023), so differences between the hospitals may reflect the year and not the hospital. Third, the Central Java service index rests on five of seven indicators. Fourth, scores were assigned by one coder on a coarse three-point scale, and the boundary between scores 1 and 2 is judgement-based. Fifth, the category thresholds are conventions, and some categories change under alternative cut-offs (Table 6). Sixth, environmental performance is not measured, so a high index on the four dimensions does not show that a hospital is sustainable overall.

CONCLUSION

This study read the annual performance reports of one Type B regional hospital in each of two Java provinces, East Java and Central Java, through an SSM lens. Operational and strategic governance sustainability are strong in both hospitals (100% and 93.8–94.4%), and financial sustainability is also in the sustainable category (100% and 88.9%). Service sustainability is the weakest dimension, at a moderate 71.4% in East Java and 73.3% in Central Java, and no dimension falls in the low category. These categories describe organisational, service, and financial sustainability; environmental sustainability was not scored. In these two hospitals, the reported managerial structures of SSM are largely in place, whereas the service indicators are weaker. The results are descriptive: they show reported levels within each hospital, not a cause. The ordering of dimensions survived alternative scoring, but the category labels did not always do so (Table 6).

Theoretically, the study operationalises SSM as a lens that separates the existence of management instruments from reported results, and shows in two cases that the two can diverge. Methodologically, it offers a document-based, rule-based scoring procedure with stated limits and robustness checks that other researchers can apply to further hospitals. These are contributions to the measurement of selected sustainability dimensions, not a validated measure of hospital sustainability.

For practice, the two cases suggest that hospital managers could use the performance report as a strategic instrument, give evaluation and risk control the same weight as planning, and track service indicators alongside financial targets, and that regional governments could align financing rules, budgeting, and monitoring so that hospitals can act on what their reports show. Because the evidence comes from two hospitals, these are suggestions for local consideration, not recommendations for regional hospitals in general. Several limitations apply. The study relies on secondary data, a coarse scoring scale, and scores assigned by one coder; it covers two cases observed in different reporting years (2024 for East Java and 2023 for Central Java), so differences between the hospitals are indicative only; and it does not score environmental performance, so even the highest indices do not show that a hospital is sustainable overall; it describes patterns rather than supporting causal or statistical generalisation. Future research should add environmental indicators such as those in Table 7, use more hospitals in Java and other regions, with aligned reporting years, combine documents with interviews to test whether planning strength reflects practice, and examine the links among the four dimensions directly.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no financial, personal, or professional conflicts of interest that could have influenced the research, authorship, or publication of this manuscript.

RESEARCH ETHICS STATEMENT

This study uses secondary data from established, publicly available databases. The research does not involve direct interaction with human participants, interviews, surveys, experiments, or collecting personally identifiable information. Therefore, the study does not involve human-subject research requiring informed consent. All data were used solely for academic and research purposes and were analysed in accordance with applicable ethical standards and the terms of access and use of the respective data sources.

AI USAGE STATEMENT

Generative artificial intelligence (AI) tools were utilized exclusively to support the language editing process, including grammatical correction, sentence refinement, and enhancement of the manuscript's clarity, coherence, and readability. AI tools were not employed to generate research data, perform statistical analyses, or

independently develop the study's findings and conclusions. OpenAI ChatGPT (version 5.2) was used by the author solely as a language-editing and writing-support tool. All AI-assisted outputs were carefully reviewed, verified, and subsequently revised by the author to ensure their accuracy, appropriateness, and alignment with the research content prior to manuscript submission.

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