FINANCIAL SUSTAINABILITY OF PUBLIC HOSPITALS: ALTERNATIVE FINANCING MODELS AND OPERATIONAL COST EFFICIENCY

Article derived from Comparative panel study · 5 CECH · Romania · 2022–2024

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***BACKGROUND:** The financial sustainability of public hospitals represents one of the most pressing challenges facing the Romanian healthcare system. Romania allocates approximately 6.0–6.3% of gross domestic product to healthcare, compared to a European Union average of 10.9%, generating a recurring cycle of structural underfunding: undersized weighted case tariffs, supplier arrears, depreciated infrastructure, and large-scale emigration of qualified staff.*

***METHODS:** This article is based on a 97-page scientific work consisting of a mixed-methods integrated study combining a scoping review of international literature (Preferred Reporting Items for Systematic reviews - extension for Scoping Reviews) with a comparative panel analysis based on official secondary data. The sample comprises five County Emergency Clinical Hospitals: Bihor/Oradea, Cluj-Napoca, Târgu Mureș, Constanța and Iași/Saint Spiridon, for the period 2022–2024. Data sources include annual hospital activity reports, Joint Order of the Ministry of Health and National Health Insurance House no. 1018/528/2025 (Annex 23A - data on diagnosis-related groups), NHIH and National Institute of Statistics reports, and international references from the OECD and ECDC.*

***RESULTS:** The share of personnel expenditure increased from 58–64% in 2022 to 65–67% in 2024, approaching the critical threshold of 70%. The case mix index ranges from 1.57 (CECH Constanța) to 2.25 (CECH Târgu Mureș), without corresponding tariff adjustment. The weighted case tariff of CECH Bihor (1,854 lei in 2024) is 13.5% below the sample average. CECH Cluj-Napoca demonstrates that operational efficiency and clinical quality can coexist: in-hospital mortality of 1.78%, patient satisfaction of 97.96%, and a case mix index of 2.22 in 2024.*

***CONCLUSIONS:** Structural underfunding - not managerial inefficiency - is the primary cause of the sustainability crisis. Centralised procurement (estimated savings 20–35%), DRG tariff reform, and energy performance contracts (energy savings 30–50%) are the interventions with the highest composite impact–speed–feasibility score. The paper proposes the Trifocal Financial Sustainability Model and a decision matrix with 13 recommendations addressed to national policymakers, supervisory authorities, and hospital management.*

***Keywords:** financial sustainability, public hospitals, diagnosis-related group financing, weighted case tariff, operational efficiency, alternative financing models, Romania*

1. INTRODUCTION

Healthcare systems in Central and Eastern Europe face, in the early decades of the twenty-first century, a structural contradiction that is increasingly difficult to manage: the continuous rise in demand for medical services - driven by demographic ageing, the expansion of chronic diseases, and rising citizen expectations - , against a backdrop of relatively stagnant public resources and financing models conceived in their essence in the second half of the last century. Romania is no exception to this rule; rather, it illustrates it with particular acuity.

Romanian public hospitals absorb, according to data from the National Health Insurance House (NHIH, 2024), the largest share of healthcare system expenditure, yet operate under conditions of chronic financial fragility: recurring arrears, depreciated infrastructure, large-scale emigration of qualified staff, and a financing model dominated almost exclusively by the weighted case tariff (WCT), calculated through the diagnosis-related groups (DRG) system. This tariff does not reflect the real costs of medical care and contains no adequate incentives for efficiency, quality, or organisational innovation [1, 2].

Romania allocates to healthcare one of the lowest percentages of GDP in the European Union - approximately 6.0–6.3% during 2020–2023, compared to an EU average of 10.9% (Organisation for Economic Co-operation and Development - OECD, 2024). From this allocation, public hospitals capture approximately two thirds, operating under conditions of systemic, not episodic, financial insufficiency. The consequence is a recurring cycle: undersized DRG tariffs → arrears to pharmaceutical and medical supply vendors → compromised quality → migration of solvent patients to the private sector → worsening deficits [3].

In a context where the salary expenditure of public hospitals tends to equal - and, in continuity scenarios, to exceed - the volume of payments made for actual medical services (Academy of Economic Studies & Regina Maria, 2025), the question of medium- and long-term financial sustainability is no longer a purely academic one, but one with immediate public policy implications [4].

The central research problem can be formulated as follows: under conditions of a dominant financing model based on the DRG tariff - insufficient in level and inadequately adjusted for real clinical complexity - and growing pressures on operational expenditure, particularly salary and pharmaceutical costs, what are the alternative financing models applicable in the Romanian context and what mechanisms for operational cost efficiency are feasible and demonstrably effective for public hospitals?

Four specific objectives derive from this problem: (SO1) critical mapping of financing models applicable to public hospitals based on international literature; (SO2) diagnosis of the current situation of financing and operational expenditure in Romanian public hospitals; (SO3) empirical evaluation of the financial and operational performance of a panel of five County Emergency Clinical Hospitals (CECH) in Romania during 2022–2024; and (SO4) development of a practical working framework for public policy decision-makers and hospital management.

Table 1. Study sample - the five CECHs included in the analysis

Hospital	County / Region	Beds	Supervisory Authority	Data Coverage	Primary Source
CECH Bihor (Oradea)	Bihor / West	1,765	Oradea Municipality	2023–2024 complete; 2022 partial	Annual report 2024 [6]
CECH Cluj-Napoca	Cluj / Centre-NW	~1,400	Cluj County Council	2022–2023 complete; 2024 DRG	Annual report 2022–2023 [7]
CECH Târgu Mureș	Mureș / Centre	1,089	Ministry of Health	2024 (DRG data Annex 23A)	Joint Order MH/ NHIH 1018/528/2025 [8]
CECH Constanța "St. Ap. Andrew"	Constanța / South-East	1,325	Constanța County Council	2023 partial (via CCC); 2024 DRG	CCC Report 2023 + Joint Order [8]
CECH Iași "St. Spiridon"	Iași / North-East	~1,700	Iași County Council	2024 (DRG data Annex 23A)	Joint Order MH/ NHIH 1018/528/2025 [8]

CCC = Constanța County Council; DRG = Diagnosis Related Groups; CECH = County Emergency Clinical Hospital.

2. METHODOLOGY

This article is the result of an integrated mixed-methods study, combining: (a) a scoping review of international literature on financing models and mechanisms for operational cost efficiency (PRISMA-ScR; Tricco et al., 2018); and (b) a comparative panel analysis based on official secondary data, applied to a sample of five CECHs in Romania over the period 2022–2024 [5].

Only secondary data were used: annual hospital activity reports, Joint Order of the Ministry of Health (MH)/NHIH no. 1018/528/2025 (Annex 23A - DRG data centralised at national level for 2024), NHIH and National Institute of Statistics (NIS) reports, and international OECD/ECDC references. No primary data were collected from human subjects; the paper requires no ethical approval - it uses exclusively aggregated, anonymised, or public-domain data.

The sample selection criteria pursued: (a) geographical representativeness - one hospital from each of five distinct regions of Romania; (b) homogeneous institutional typology - all CECHs; (c) relevant size - over 1,000 beds; and (d) minimum availability of verifiable public data. Missing data were handled through transparent methodological estimates, explicitly marked as such in the tables. No value was statistically interpolated without documented justification.

Table 1 presents the sample structure. The analysis employed comparative descriptive statistics (absolute values, percentage shares, multi-year trends), benchmarking against national and European references, scenario analysis for estimating the impact of reforms, and sensitivity analysis of own estimates (±10–20% relative to baseline assumptions).

3. RESULTS

3.1. Expenditure structure and the structural financing gap

Analysis of the expenditure structure at the five CECHs reveals a convergent and concerning trend: the rise in the share of personnel expenditure from 58–64% in 2022 to 65–67% in 2024. At CECH Cluj-Napoca, the jump represented 7 percentage points in a single calendar year (from 58.34% in 2022 to 65.21% in 2023), reflecting the direct impact of successive legislative salary increases. At CECH Bihor, the percentage reached 66.47% in 2024, up from 64.18% in 2023.

The critical threshold of 70% of total expenditure represented by personnel costs leaves under 30% of resources available for pharmaceuticals, medical supplies, maintenance, and investment - insufficient to ensure minimum quality standards of care. Capital expenditure (investment) is structurally below 3% of total expenditure at all hospitals in the sample, compared to the recommended optimum of 5–10% for maintaining technical infrastructure capacity (OECD, 2024). Table 2 summarises the expenditure structure.

3.2. Case mix index and the tariff gap

The case mix index (CMI) - the primary DRG financing adjustment factor - ranges from 1.57 at CECH Constanța to 2.25 at CECH Târgu Mureș, a difference of 43% that reflects the clinical profile of the population served and hospital specialisations, not differences in managerial efficiency. Nevertheless, the weighted case tariff (WCT) does not adequately compensate for this complexity disparity.

The WCT of CECH Bihor - 1,854 lei in 2024 - is 13.5% below the estimated sample average (~2,100 lei). This confirms the structural gap documented at national level by the analysis of the Academy of Economic Studies in Bucharest and the Regina Maria network (2025): in 2024, the value of transfers for salary influence (15.5 billion lei) approached the value of payments for service tariffs (16 billion lei) - an unprecedented development in the history of the National Unique Fund for Social Health Insurance [4].

An additional structural aspect with major impact on sustainability is the time lag between the moment of service provision and the moment of settlement by the NHIH. .

Table 2. Expenditure structure - key financial indicators per CECH (most recent available year)

Indicator	CECH Bihor 2024	CECH Cluj 2023	CECH Târgu Mureș 2024*	CECH Constanța 2023	CECH Iași 2024*
Total effective expenditure (thousand lei)	909,669	—	—	613,798	—
% personnel expenditure / total (critical threshold >70%)	66.47% ⚠	65.21% ⚠	N/A	59.28%	N/A
% pharmaceutical expenditure / total	14.61%	~16%	N/A	N/A	N/A
% capital expenditure / total (est.)	~2.8% ⚠	~2.5% ⚠	N/A	N/A	N/A
Budget execution (% of approved)	88.69%	76.00% ⚠	N/A	82.75%	N/A
Expenditure coverage ratio from revenues	~1.03 ✓	~0.97 ⚠	N/A	~0.95 ⚠	N/A

**Partial data - Joint Order MH/NHIH no. 1018/528/2025, Annex 23A. □ = good; □ = area of concern; N/A = data not publicly available; est. = own estimate.*

Table 3. Comparative DRG indicators - 5 CECHs (2024, Joint Order MH/NHIH no. 1018/528/2025, Annex 23A)

Indicator	CECH Bihor	CECH Cluj	CECH Târgu Mureș	CECH Constanța	CECH Iași
WCT - Weighted Case Tariff (lei, 2024)	1,854 ⚠	~2,100 est.	~2,200 est.	~1,980 est.	~2,050 est.
CMI - Case Mix Index (2024)	2.20	2.22	2.25	1.57 ↓	2.07
ALOS - Average Length of Stay (days)	5.67 ✓	<6.0 est.	N/A	N/A	N/A
Discharges, inpatient (2024)	74,122	53,025 (2023)	~42,000 est.	~55,000 est.	~68,000 est.
In-hospital mortality (%)	3.29%	1.78% ✓	N/A	N/A	N/A
Patient satisfaction (% satisfied)	88.79%	97.96% ✓	N/A	N/A	~88% est.

✓ = good; ⚠ = below sample average / area of concern; ↓ = lowest in sample; est. = own estimate; ALOS = average length of stay.

At CECH Bihor, revenues from December 2024 - invoiced through the e-Invoice system - were settled in January 2025, generating an apparent deficit of 25,625 thousand lei, corrected to a real surplus of +23,303 thousand lei after methodological adjustment. This accounting distortion illustrates one of the systemic vulnerabilities of the current financing mechanism [6]. (Table 3)

3.3. Disparities in operational performance and public transparency

CECH Cluj-Napoca stands out as the best internal performer in the sample: in-hospital mortality of 1.78% (the lowest, remarkable for a tertiary hospital), patient satisfaction of 97.96%, a rising CMI (2.07 in 2022 → 2.22 in 2024), and average length of stay estimated below 6.0 days. This demonstrates that operational efficiency and clinical quality can sustainably coexist - even under structural budgetary pressures [7].

Nevertheless, CECH Cluj-Napoca also feels the structural pressure: the share of personnel expenditure rose by 7 percentage points in a single year (2022 → 2023), and budget execution fell to 76% in 2023 - below the optimal threshold of 90%. This confirms that no organisation is insulated from the structural constraints of the system, regardless of the quality of internal management.

A critical aspect revealed by the analysis is the asymmetry of public transparency: of five CECHs, only one (Cluj-Napoca) publishes complete and verifiable annual reports. CECH Bihor provides partial data →

Table 4. Comparative synthetic diagnosis - quality and transparency indicators (most recent available year)

Indicator	CECH Bihor 2024	CECH Cluj 2023	CECH Târgu Mureș	CECH Constanța 2023	CECH Iași 2024
CMI - Case Mix Index	2.20	2.22	2.25	1.57 ↓	2.07
In-hospital mortality (%)	3.29%	1.78% ✓	N/A	N/A	N/A
Patient satisfaction (% satisfied)	88.79%	97.96% ✓	N/A	N/A	~88% est.
Physician productivity (disch./ phys./year)	399	312.79	N/A	N/A	N/A
HAI rate (%)*	0.81%*	N/A	N/A	N/A	N/A
Public transparency (annual reports)	Partial ⚠	Complete ✓	Absent ✗	Partial ⚠	Absent ✗

**Possible systematic underreporting - NIPH 2023 reference: 3.1%; HAI = healthcare-associated infections. ✓ = good; ⚠ = partial; ✗ = absent.*

for 2024; CECH Constanța - partial data via the county council; CECH Târgu Mureș and CECH Iași have no publicly accessible annual reports. This asymmetry is not accidental - it reflects real differences in the quality of information management and constitutes an independent management variable with direct impact on sustainability. Without reliable public data, effective monitoring by the NHIH, by supervisory authorities, and by citizens is impossible [9]. (Table 4)

4. ALTERNATIVE FINANCING MODELS - COMPARATIVE EVALUATION

The diagnosis from Chapter 3 validates the research premise and motivates the systematic search for alternative financing models. Based on the scoping review and contextual analysis, nine typologies relevant to the Romanian healthcare system are identified, grouped into four categories: reform of payment mechanisms, hybrid organisational models, additional capital sources, and innovative outcome -based instruments.

DRG tariff reform through analytical cost accounting represents the most urgent and feasible model, as it does not change the system's architecture but corrects its calibration. Germany (the G-DRG system, revised annually based on cost data from approximately 280 hospitals), France (the GHM system - Groupes Homogènes de Malades - with updates based on national cost studies) and Poland (JGP - Jednorodne Grupy Pacjentów, with updates through the Health Technology Assessment Agency database) demonstrate that a periodically revised and transparent DRG system generates tariffs closer to real costs, reducing the documented structural gap [10, 11].

Performance-based financing (Pay for Performance - P4P) - England's Commissioning for Quality and Innovation (CQUIN) system, active since 2009, conditioned 1–2.5% of hospital financing on the achievement of specific quality indicators (reduction of nosocomial infections, patient satisfaction). The Netherlands integrated value-based health principles in hospital contracts for selected pathologies, with documented reductions in readmission rates [12].

Energy Performance Contracts (EPC/Energy Service Company - ESCO) are particularly relevant for Romania, given that public hospitals operate, in their majority, in buildings with energy consumption 2–3 times higher than current European standards. Under the EPC model, the ESCO company invests in energy rehabilitation (thermal insulation, air conditioning systems, photovoltaic panels) and recovers the investment from the savings generated over 7–15 years - without the hospital's own capital. Austria, the Czech Republic, and Slovakia report reductions of 30–50% in energy expenditure [13]. The legal framework is clarified in Romania through Law no. 121/2014 on energy efficiency, as subsequently amended.

European funds (National Recovery and Resilience Plan - NRRP, Health Programme 2021–2027, National Investment Programme in Hospital Unit Infrastructure - NIPI) represent the most advantageous alternative capital source for Romania - non-reimbursable grants with total allocations of over 20 billion lei for healthcare. The main constraint is not fund availability, but the institutional capacity to prepare, launch, and implement projects [3]. (Table 5)

Reading the matrix allows identification of three strategic groups: (1) the priority group - DRG tariff reform and European funds (impact 5/5, feasibility 4/5, fiscal risk 1–2/5); (2) the medium-term group - P4P, EPC contracts, and PPPs for support services; and (3) the long-term group - episode-of-care payment and value-based health, which require substantial institutional prerequisites currently unavailable in the Romanian public system.

5. OPERATIONAL EFFICIENCY MECHANISMS AND THE PRIORITISATION MATRIX

Operational cost efficiency represents the immediate manoeuvring margin of hospital management

Table 5. Comparative matrix of alternative financing models - multidimensional evaluation for the Romanian context

Financing model	Sustain. impact (1–5)	Feasibility Romania (1–5)	Admin. capacity (1=low)	Implementation horizon	Fiscal risk (1=low)	European example
WCT reform through analytical cost accounting	5	4	3	1–3 years	2	Germany (G-DRG), France (GHM), Poland (JGP)
European funds (NRRP, Health Programme 2021–2027, NIPI)	5	4	4	1–5 years	1	All EU member states
EPC/ESCO contracts for energy rehabilitation	3	3	2	1–3 years	1	Austria, Czech Rep., Slovakia (30–50% savings)
P4P / quality bonus-malus	4	3	4	3–5 years	2	England (CQUIN), Netherlands (Value-Based)
PPP for non-clinical services	3	3	3	2–5 years	2	Portugal (Loures), Italy (Lombardy)
Bundled Payments (episode-of-care)	4	2	5	5–8 years	3	USA (BPCI Advanced), Netherlands (DOT)
Complementary health insurance	3	3	3	4–7 years	2	France, Germany, Netherlands

WCT = weighted case tariff; P4P = Pay for Performance; BPCI = Bundled Payments for Care Improvement. Scores reflect evaluation based on synthesis of international literature and Romania-specific constraints.

and the necessary condition for maximising the effect of any additional resources generated by financing reform. The following sub-chapters synthesise the main efficiency levers with robust empirical support in international literature, evaluated in relation to the specific context of Romanian public hospitals.

5.1. Centralised procurement - the quick win with the highest impact

Pooling the procurement of multiple hospitals in the same county or region allows negotiation of better prices through consolidated volume. The National Centralised Procurement Office (NCPO) pilot in Romania demonstrated savings of 20–35% compared to individual hospital procurement for selected pharmaceutical categories (Ministry of Health, 2023). France reports savings of 15–20% through Unité Générale des Achats Publics (UGAP); Poland - 12–18% through the National Procurement Agency. Systematic extension of this mechanism to medical supplies, reagents, and laboratory services represents the intervention with the highest impact/effort ratio in the short term, feasible without major legislative changes [14].

5.2. Pharmaceutical management - formularies and inventory control

Pharmaceuticals account for 14–17% of total expenditure at the analysed CECHs. Adopting and monitoring compliance with the hospital therapeutic formulary - the list of approved medicines for internal use, with equivalent generics and biosimilars - is the most effective control instrument. Increasing the generic utilisation rate from 60% to 80% reduces pharmaceutical expenditure by 8–15%, with no demonstrated impact on clinical outcomes (Farrar et al., 2010). Implementing a Warehouse Management System (WMS) integrated with real-time ward consumption allows reduction of average inventory by 20–30% and expiry losses by 40–60% [15].

5.3. Reducing average length of stay

The national average length of stay (ALOS) of 6.9 days (NIS, 2024) compared to the European average of 5.5 days (OECD, 2024) indicates a reduction potential of 1–1.4 days per case. At CECH Bihor, ALOS decreased from →

5.83 days (2023) to 5.67 days (2024). Each day reduced from ALOS at CECH Bihor - with 74,122 cases/year - equals approximately 74,000 hospital-days saved. At an estimated cost of 400–600 lei/day, the potential saving is 30–45 million lei/year. Necessary conditions: evidence-based clinical protocols, discharge planning from the moment of admission, rapid access to investigations, and the existence of ambulatory alternatives [16].

5.4. Energy performance contracts

Energy and utility expenditure increased dramatically in the context of the 2021–2023 energy crisis. With energy expenditure estimated at 5–8% of total (40–70 million lei/year at a CECH of the size of those in the sample), a 40% reduction through EPC generates savings of 16–28 million lei/year per hospital - without own capital investment, the energy performance risk being transferred to the ESCO company by contract.

5.5. Digitalisation and the hospital information system

Romania allocates through the NRRP 100 million euros for the digitalisation of 60 public health institutions. A fully integrated Hospital Information System (HIS) - connecting admission, prescription, pharmacy, laboratory, DRG billing, and reporting - reduces administrative costs by 8–12%, eliminates DRG coding errors, and creates the data infrastructure needed for any other efficiency programme [3]. (Table 6)

6. THE TRIFOCAL FINANCIAL SUSTAINABILITY MODEL (TFSM) AND THE INTEGRATED IMPLEMENTATION FRAMEWORK

Based on the empirical analysis and scoping review, the paper proposes the Trifocal Financial Sustainability Model (TFSM), articulated on three simultaneous and interdependent components, corresponding to the three action levels identified in the analytical framework.

Component 1 - Adequate Financing (AF). The primary independent variable: the ratio between the real WCT and the verified average cost per weighted case. AF ≥ 1 (WCT covers real cost) is the necessary condition for the functioning of the other components. AF < 1 creates a structural deficit that neutralises any operational efficiency gains in the medium term. Vectors of action: DRG tariff reform through analytical cost accounting, non-reimbursable European funds, PPP for non-clinical services.

Component 2 - Operational Efficiency (OE). The mediating variable: the set of managerial practices that optimise the use of available resources. OE is measured by: ALOS relative to the national DRG reference, the share of personnel expenditure relative to the critical threshold of 70%, the rate of centralised procurement, the generic utilisation rate, specific energy consumption. Vectors of action: interventions from Groups A and B of the decision matrix (Table 6).

Component 3 - Quality and Accessibility (QA). The outcome and feedback variable: the quality of care and accessibility of services. QA is measured by the mortality rate, the rate of healthcare-associated infections, patient satisfaction, and ALOS adjusted for CMI. QA exerts a positive feedback on AF through the Return on Quality mechanism - better quality generates fewer complications and readmissions, reducing costs - and on OE, by attracting a larger volume of complex cases and performance funding.

The relationships between components are non-linear and mutually conditioning: insufficient AF blocks OE improvements in the long term; weak OE wastes resources generated by adequate AF; weak QA erodes both AF (loss of patients and financing) and OE (avoidable complications generate additional costs). The optimal intervention must act simultaneously on at least two components - hence the need for an integrated approach, not isolated reforms on a single dimension. The CECH Cluj-Napoca case empirically validates the TFSM: it is the only hospital in the sample acting simultaneously on OE (optimised ALOS, high productivity) and QA (mortality 1.78%, satisfaction 97.96%), achieving superior results despite insufficient systemic AF.

6.1. Phased implementation roadmap

The roadmap in Table 7 translates the decision matrix into an implementation plan structured over four phases, corresponding to a horizon of 7+ years. The phases are designed so that each creates prerequisites for the next - respecting the principle of correct reform sequencing, identified as a critical governance risk.

7. DISCUSSION

The results confirm the paper's main hypothesis: structural underfunding - not managerial inefficiency - is the primary cause of the sustainability crisis of public hospitals in Romania. The structural gap between the WCT and the real cost of services, legislative salary increases uncorrelated with tariff reform, and chronic underinvestment in infrastructure are systemic phenomena, not individual organisational accidents [4, 17].

Compared to international literature, Romania falls into the category of countries with suboptimally calibrated DRG systems. Unlike Germany or France - where tariffs are revised annually based on real cost data collected from hundreds of hospitals - Romania does not have a periodically updated national cost database, making the WCT a crude approximation rather than a reflection of the real cost of medical care [10, 11]. A 10% increase in WCT at CECH Bihor (from 1,854 lei to ~2,040 lei) would generate additional revenues of ~13.9 million lei/year for this hospital alone - and at national level, with approximately 3.5 million DRG cases per year, a 10% increase in WCT equates to 7–8 billion lei of additional annual budgetary effort, confirming that tariff reform requires a progressive approach based on verified cost data.

CMI variability (1.57–2.25) without corresponding tariff adjustment generates a structural inequity:

Table 6. Prioritisation matrix of efficiency interventions - composite impact–speed–feasibility score

Intervention	Financial impact (1–5)	Speed of effects (1–5)	Org. feasibility (1–5)	Composite score	Expenditure category impacted
— GROUP A: HIGH PRIORITY (score ≥ 9) —					
WCT update through analytical cost accounting (national pilot)	5	3	4	**12.0**	All categories — systemic effect
Centralised procurement — pharmaceuticals & medical supplies (NCPO/CC)	4	4	4	**12.8**	Pharmaceuticals: 20–35% savings
Therapeutic formularies and prescribing protocols (generics)	4	4	3	**9.6**	Pharmaceuticals: 8–15% savings
EPC/ESCO contracts for energy rehabilitation	3	4	4	**9.6**	Energy & utilities: 30–50% savings
Mandatory transparency — standardised annual reports	4	4	5	**12.8**	Governance — conditions all others
— GROUP B: MEDIUM PRIORITY (score 5–8.9) —					
ALOS reduction through clinical protocols and discharge planning	4	3	3	**7.2**	Cost per case: 0.5–1.5%/day reduced
Skills mix optimisation and intelligent shift scheduling	3	3	3	**5.4**	Personnel: 5–10% overtime
Integrated HIS implementation (NRRP-funded)	4	2	3	**4.8**	Administrative: 8–12%; DRG coding
Increasing day hospitalisation share (conversion of eligible cases)	4	2	2	**3.2**	Cost per case: −30–50% vs. inpatient
— GROUP C: LONG TERM (conditional feasibility) —					
PPP for non-clinical support services (imaging, laboratory)	3	2	2	**2.4**	Support services: 15–20% savings
P4P component in the NHIH framework contract	4	2	2	**3.2**	Indirect systemic effect (incentives)

Composite score = (Impact × Speed × Feasibility) / 5. Impact: 1 = minimal, 5 = transformative. Speed: 1 = slow (>5 years), 5 = rapid (<12 months). Feasibility: 1 = major barriers, 5 = existing regulatory framework.

hospitals with more complex case mixes provide more costly services at tariffs similar to hospitals with simpler profiles. This discourages specialisation and investment in high-complexity treatments - an effect contrary to the stated objectives of health policy [12].

The CECH Cluj-Napoca case empirically validates the QA component of the TFSM: a mortality rate of 1.78%, satisfaction of 97.96%, and a rising CMI demonstrate that investment in quality generates a financial dividend in the medium term through reduction of complications, readmissions, and litigation risks - confirming the Return on Quality mechanism [18]. The lesson for public policy is not that money does not matter, but that efficient use of available resources is a real managerial variable, not a theoretical desideratum.

The asymmetry of public transparency - only one hospital in five publishing complete data - has direct consequences beyond the academic limitations of this study: it makes effective monitoring by the NHIH (which contracts services without knowing the real cost), by supervisory authorities, and by citizens impossible. Financing reforms without simultaneous reform of reporting transparency risk reproducing the same inefficiencies in the new institutional framework [9].

Unlike the optimistic literature on public-private partnership (PPP) as the reference solution for modernising hospital infrastructure (Preker and Harding, 2003), the present paper adopts a more cautious position, grounded in the negative experience of some PPPs in the United Kingdom and Portugal. The institutional capacity for contracting and monitoring complex PPPs is insufficiently developed in Romania, and the risk of reform capture is documented in public procurement in the health sector. PPP is not excluded as an instrument, but is positioned in Group C (long term, conditioned on capacity prerequisites).

8. CONCLUSIONS AND RECOMMENDATIONS

The present article (like the scientific work on which it is based) demonstrates that the financial sustainability of public hospitals in Romania is threatened primarily by structural factors - a chronically undersized DRG tariff, legislative salary increases not covered by →

Table 7. Implementation roadmap - four phases, priority actions, and deliverables

Phase / Year	Priority Actions	Measurable Deliverables	Responsibility & Resources
Phase 1 Year 1	1. Complete financial and operational audit (expenditure structure, baseline indicators) 2. Launch centralised procurement procedure (CC or NCPO) 3. Energy audit and identification of eligible EPC projects 4. Publication of first disaggregated annual report (all indicators per Joint Order 3626/2022)	• Functional KPI database • Signed centralised procurement framework contract • Finalised energy audit report • Published annual public report	Manager + Financial Director Sources: own budget (audit) + NRRP (digitalisation) Partner: National Centre for Statistics and Informatics in Public Health for indicator validation
Phase 2 Years 2–3	5. Integrated HIS implementation (admission, pharmacy, laboratory, DRG billing) 6. Signing EPC/ESCO contracts and commencement of energy rehabilitation 7. Adoption of therapeutic formulary and prescribing protocols 8. ALOS reduction pilot: accelerated discharge protocols for 3–5 specialties	• HIS operational in ≥80% of wards • Energy consumption reduced 15–25% • Generic utilisation rate increased ≥15 pp • ALOS reduced 0.3–0.5 days from baseline	Medical Director + IT Sources: NRRP (100M EUR digitalisation) + EPC (no own capital) Partner: contracted ESCO, HIS supplier
Phase 3 Years 4–6	9. Extension of day hospitalisation to ≥45% of total episodes (from ~30% current) 10. Negotiation of P4P component in NHIH contract (with MH and NHIH) 11. PPP pilot for a support service (imaging or laboratory) 12. Telemedicine for monitoring chronic patients (cardiovascular, diabetes)	• Day hospitalisation share ≥45% • P4P contract signed and operational • Functional PPP pilot, documented savings • ≥20% chronic follow-up via telemedicine	Manager + Board of Directors Sources: P4P bonuses (NHIH) + private investment (PPP) Partner: NHIH, supervisory authority, private operator
Phase 4 Years 7+	13. Episode-of-care payment pilot (arthroplasty, interventional cardiology) 14. Financial sustainability assessment and PPP model extension decision 15. Publication of impact report compared to baseline 16. Cyclical refinancing from European funds 2028–2034	• Expenditure coverage ratio ≥1.05 (vs. <1.00 at start) • % personnel expenditure ≤62% (vs. ~66% at start) • ALOS ≤5.3 days (national DRG average) • Patient satisfaction ≥90%	Manager + MH + NHIH Sources: consolidated own funds + European funds 2028–2034 Evaluation: annual independent external audit

ALOS = average length of stay; EPC = Energy Performance Contract; ESCO = Energy Service Company; HIS = Hospital Information System; MH = Ministry of Health; NCPO = National Centralised Procurement Office; P4P = Pay for Performance; PPP = public-private partnership.

corresponding tariff adjustments, and chronic underinvestment in infrastructure - not by the individual inefficiency of hospital management. The empirical diagnosis on the panel of five CECHs confirms that public policy variables (the level of WCT, the degree of adjustment for CMI, investment policy) explain more of the variation in financial performance than internal organisational variables.

The novel contributions of the paper include: (1) the first comparative panel database for CECHs in Romania (2022–2024); (2) empirical demonstration of the structural WCT–real cost gap through centralised official data (Joint Order MH/NHIH no. 1018/528/2025); (3) the Trifocal Financial Sustainability Model (TFSM); (4) the comparative evaluation matrix of nine alternative financing models; (5) the prioritisation instrument for 13 efficiency interventions through composite score; and (6) the identification of public transparency as an independent management variable with direct impact on sustainability.

Table 8. Synthesis of recommendations structured by level of responsibility

No.	National decision-makers (MH, NHIH, Ministry of Public Finance)	Supervisory authorities (county councils, municipalities)	Hospital management
R1–R4 Financing	R1. Systematic WCT update via analytical cost accounting (pilot 10–15 hospitals, national extension in 3 years) R2. Reform of CMI adjustment mechanism - differentiated tariffs per complexity group R3. P4P component (2–3% of NHIH contract) for verifiable quality indicators R4. Any legislative salary increase to be simultaneously accompanied by WCT update	R5. Co-financing of hospital infrastructure investments from county budgets (minimum 5% of hospital expenditure) R6. County guarantee fund for EPC/ESCO contracts in subordinate hospitals	R7. Diversification of own revenue sources (fee-based services, donations, research contracts) R8. Systematic access to NRRP and Health Programme 2021–2027 funds for capital investment
R9–R11 Op. Efficiency	R9. Mandatory extension of centralised procurement through NCPO to all CECH-type hospitals R10. Mandatory development and monitoring of national prescribing protocols and therapeutic formularies	R11. Centralisation of pharmaceutical and medical supply procurement at county level for subordinate hospitals	R12. ALOS reduction programme of 0.5 days/year through active patient flow management and increase of day hospitalisation share to ≥45%
R13 Governance	R13a. Legal obligation: annual publication of disaggregated activity reports (all indicators per Joint Order 3626/2022) as a condition for contracting with NHIH	R13b. Annual monitoring and evaluation of managers based on key performance indicators from the management contract	R13c. Integrated management dashboard (all financial and operational indicators) with monthly updates

CMI = case mix index; MH = Ministry of Health; NCPO = National Centralised Procurement Office; P4P = Pay for Performance; WCT = weighted case tariff.

Thirteen recommendations are formulated, structured on three levels of responsibility: (Table 8)

The main limitations of the paper are: the critical asymmetry of public data transparency (only one hospital in five with complete reports), the absence of disaggregated balance sheet data, and the predominantly descriptive character of the quantitative analysis (n=5 does not allow panel econometrics with fixed effects). Future research should extend the sample to all CECHs in Romania, employ panel econometric models - if reporting transparency is structurally improved - and prospectively validate the impact of the interventions prioritised in the decision matrix.

The central message of the paper can be stated concisely: Romania will not resolve the sustainability crisis of public hospitals through operational efficiency alone, however rigorous. It simultaneously requires a reform of the financing model - in particular the DRG tariff mechanism - and an investment in institutional management capacity, transparency, and monitoring. The TFSM and the practical instruments proposed provide an operationalisable framework for both dimensions of reform.

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