

Financial Sustainability of Safety-Net Hospitals: A Conceptual Framework Linking FinTech-Enabled Cost Transparency, Working-Capital Management, and Access to Capital

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Abstract

Safety-net hospitals, the institutions that disproportionately serve Medicaid, uninsured, and otherwise marginalized populations in the United States, operate under a structural financial disadvantage that manifests in thin or negative margins, chronic liquidity stress, constrained access to capital, and, at the extreme, closure. The literature explaining safety-net financial distress is dominated by payment-policy variables, while the financial management capabilities of the institutions themselves remain undertheorized, and the rapidly maturing family of financial technologies now reshaping corporate finance has scarcely been examined as a determinant of hospital survival. This paper develops a conceptual framework proposing that three FinTech-enabled financial management capabilities jointly determine the financial sustainability of safety-net hospitals: cost transparency, defined as the institutional capacity to know, in near real time and at the level of service and patient, what care costs to deliver; working-capital management, defined as the digitally enabled compression of the cash conversion cycle across receivables, payables, and liquidity forecasting; and access to capital, defined as the technology-mediated broadening of the funding channels (debt, philanthropy, grants, and partnership capital) available to institutions that traditional capital markets price punitively. Drawing on the resource-based view, dynamic capabilities theory, and information-asymmetry reasoning from corporate finance, the framework specifies the mechanisms connecting each pillar to sustainability outcomes, the interactions among the pillars, and the boundary conditions imposed by the safety-net operating environment. Nine testable propositions are derived, closure risk factors documented in the empirical literature are mapped to the framework's intervention points, and implementation pathways feasible for resource-constrained institutions are specified. The framework positions financial management technology as a policy-relevant complement, not an alternative, to payment reform in preserving the institutions on which vulnerable populations depend, and it sets an empirical agenda for testing that claim.

Keywords: *Safety-net hospitals; Financial sustainability; Financial technology; Hospital closures; Working capital; Cost accounting; Access to capital; Rural health*

INTRODUCTION

The United States asks a subset of its hospitals to perform a function the market does not reward. Safety-net hospitals deliver a disproportionate share of care to patients insured by Medicaid, patients with no insurance at all, and communities whose social and economic circumstances raise the cost of care while lowering the revenue it generates (Popescu *et al.*, 2019; Chatterjee *et al.*, 2021). The financial consequences are structural rather than episodic: payer mixes weighted toward the lowest-paying coverage, dependence on supplemental payment streams such as disproportionate-share hospital (DSH) allocations whose futures are perennially uncertain, limited pricing power against commercial payers, and capital positions that make each investment cycle a triage exercise (Bazzoli *et al.*, 2005; Hsieh and Bazzoli, 2012). At the distressed tail of this distribution sit closures. The rural closure record makes the stakes concrete: well over a hundred

rural facilities either shut their doors or gave up inpatient services in the decade and a half after 2005, and the hazard fell most heavily on hospitals running persistent operating losses and on those located in non-expansion states (Kaufman *et al.*, 2016; GAO, 2020; Lindrooth *et al.*, 2018). Closure studies document the human stakes: lengthened emergency travel times, reduced service access, measurable adverse health effects in affected communities, and economic damage to the localities that lose what is often their largest employer (Gujral and Basu, 2019; Holmes *et al.*, 2006).

The scholarly explanation of safety-net financial distress has been, overwhelmingly, a payment story. Medicaid expansion, DSH policy, supplemental payment design, and reimbursement adequacy dominate the empirical closure and margin literatures, and properly so, since payment variables carry the largest coefficients (Lindrooth *et al.*, 2018; Bazzoli *et al.*, 2005). Yet the payment story is incomplete in a specific and consequential way: it treats the hospital's own financial management capability as a constant, when the management literature insists it is a variable. Hospitals facing identical payer mixes exhibit widely different liquidity positions, cost knowledge, revenue capture, and capital access, and case accounts of both failure and survival at the margin routinely feature financial management quality as the proximate differentiator even where payment policy sets the odds (Holmes *et al.*, 2013; Kaufman *et al.*, 2016). If management capability is a variable, then the technologies that transform management capability are policy-relevant, and the past decade has produced exactly such a transformation in the form of financial technology: cloud-based cost accounting and analytics, automated receivables and payables infrastructure, real-time payment rails, digital lending and crowdfunding platforms, and grant-management systems, collectively the FinTech stack that has already reconfigured financial management in banking, retail, and small business finance (Gomber *et al.*, 2018; Goldstein *et al.*, 2019).

This paper asks the question that intersection implies: through what mechanisms could FinTech-enabled financial management capabilities alter the financial sustainability of safety-net hospitals, and under what conditions? It answers with a conceptual framework rather than an empirical test, for the standard reason such papers exist: the mechanisms have not been specified precisely enough to test, the constructs have not been defined in the hospital context, and the empirical literature that ought to exist cannot be organized until the theory it would test is stated (Gilson and Goldberg, 2015; Jaakkola, 2020). The framework proposes three pillars. Pillar 1, FinTech-enabled cost transparency, concerns the institution's knowledge of its own costs: the capacity, historically confined to well-resourced systems running time-driven activity-based costing programs, to know what each service, service line, and patient episode actually costs, continuously rather than through periodic studies (Kaplan and Porter, 2011). Pillar 2, digital working-capital management, concerns time: the compression of the cash conversion cycle through automated receivables acceleration, disciplined payables timing, and continuous liquidity forecasting, capabilities the corporate finance literature links robustly to survival in thin-margin firms (Deloof, 2003; Baños-Caballero *et al.*, 2014). Pillar 3, technology-mediated access to capital, concerns the funding boundary: the use of digital lending channels, data-substantiated credit narratives, online philanthropy and community investment platforms, and grant-management infrastructure to widen a capital aperture that traditional municipal debt markets, guided by ratings models that penalize precisely the safety-net profile, hold narrow (Moody's-type rating criteria as discussed in the hospital capital literature; Sloan *et al.*, 1988; Gapenski and Reiter, 2016).

The framework's claim is not that any pillar alone rescues a structurally underpaid institution; it is that the three pillars interact as a capability system whose joint output is resilience: the enlargement of the decision space and the time horizon within which a distressed institution can adapt, negotiate, and survive long enough for payment policy, service redesign, or partnership to change its fundamentals. The paper is organized as follows. The next section profiles the safety-net financial condition and the closure evidence in the depth the framework requires. This is followed by the theoretical foundations, then the method by which the framework was developed. The framework is then presented pillar by pillar, with its constructs, mechanisms, and nine propositions, consolidated in Table 1. The empirically documented closure risk factors are then mapped to the framework's intervention points in Table 2. The policy dimension is developed next, followed by specification of implementation pathways feasible under safety-net resource constraints. Contributions and boundary conditions are discussed, followed by the limitations together with the empirical agenda the framework demands, and the paper closes in the final section.

BACKGROUND: THE SAFETY-NET FINANCIAL CONDITION

Defining The Safety Net

The safety net is a function before it is a category. The Institute of Medicine's canonical definition identifies safety-net providers by their organizational commitment, expressed through mission, mandate, or de facto payer mix, to serve patients regardless of ability to pay (IOM, 2000). Operationalizations vary, and the variation matters analytically: definitions based on Medicaid share, uncompensated-care burden, DSH receipt, and public ownership select overlapping but distinct hospital sets with different financial profiles (Popescu *et al.*, 2019; Chatterjee *et al.*, 2021). This paper adopts a functional definition encompassing urban public and mission-driven private hospitals with high Medicaid and uninsured shares, critical access hospitals, and rural hospitals whose community role makes them de facto sole providers, because the framework's mechanisms operate on the financial structure these institutions share rather than on any statutory boundary.

The Financial Anatomy of Disadvantage

Four features constitute that shared structure. First, adverse payer mix: Medicaid pays below cost for hospital services in most states by most measurement approaches, uninsured care converts to uncompensated care, and the commercial volume

that cross-subsidizes both is precisely what safety-net hospitals lack (Bazzoli *et al.*, 2005; Hsieh and Bazzoli, 2012). Second, supplemental-payment dependence: DSH allocations, upper-payment-limit arrangements, directed payments, and 340B pharmacy margins fill a material share of safety-net operating budgets, and each carries policy risk that converts directly into planning uncertainty; scheduled DSH reductions have hung over the sector for a decade of successive deferrals (Chatterjee *et al.*, 2021). Third, liquidity fragility: days-cash-on-hand distributions for safety-net and rural hospitals sit far below investment-grade norms, with meaningful fractions of rural hospitals operating with cash measured in days rather than months, a condition in which routine payment delays become existential events (Holmes *et al.*, 2013; Kaufman *et al.*, 2016). A nascent nonprofit-finance literature has begun to address this condition on its own terms, with conceptual models for financial sustainability and strategic resource allocation in nonprofit organizations (Aliliele *et al.*, 2025). Fourth, capital scarcity: bond-market access is rating-mediated, ratings weight margin, liquidity, and payer mix, and the safety-net profile therefore prices at spreads that make debt-financed modernization expensive exactly where deferred capital needs are largest; the resulting aging of plant and technology feeds back into competitive weakness in a documented spiral (Sloan *et al.*, 1988; Gapenski and Reiter, 2016; Bazzoli *et al.*, 2005).

The Closure Record and Its Lessons

The empirical closure literature supplies the framework's dependent-variable anchor. Kaufman *et al.* (2016) profiled the accelerating rural closure wave and identified sustained negative operating margin, low occupancy, payer-mix deterioration, and system independence as recurring antecedents. Lindrooth *et al.* (2018) demonstrated the payment-policy lever directly: closures concentrated in non-expansion states, with expansion associated with substantially reduced closure hazard among hospitals serving low-income populations. The Government Accountability Office (GAO, 2020) documented the access consequences, and Gujral and Basu (2019) estimated mortality effects of rural closures in the affected service areas. Three lessons carry into the framework. Closure is a process, not an event: the trajectories run through years of margin erosion, cash depletion, deferred maintenance, service-line retreat, and failed partnership searches before the terminal decision, which means the intervention window is long and the intermediate variables (cash, cost knowledge, capital access) are observable and, in principle, manageable. Liquidity is the proximate cause: institutions close when they cannot meet payroll and debt service, whatever the distal causes, which elevates working capital from an operational detail to a survival variable. And heterogeneity persists at every level of distress: some institutions with dire fundamentals survive and adapt while peers close, residual variation the payment literature leaves unexplained and the framework addresses.

Fintech and Its Migration into Institutional Finance

The term financial technology denotes the application of digital innovation to financial services and financial management: payments infrastructure, automated accounting and analytics, algorithmic credit assessment, digital lending marketplaces, crowdfunding and online philanthropy, blockchain-based recording, and the embedding of financial functions into operational software (Gomber *et al.*, 2018; Goldstein *et al.*, 2019; Thakor, 2020). Two features of the FinTech trajectory matter for the argument here. The first is the small-business precedent: the segment of the economy FinTech has most visibly transformed is the one that most resembles the safety-net hospital financially, namely thin-margin, collateral-poor, information-opaque enterprises that traditional lenders priced punitively; digital lenders using transaction-data underwriting, receivables-based advances, and platform credit demonstrably widened that segment's capital access, with well-documented benefits and equally well-documented pricing and transparency hazards (Jagtiani and Lemieux, 2018; Goldstein *et al.*, 2019). The FinTech analytics literature has begun to specify the institutional architecture this migration implies, from risk-based business intelligence designs for financial technology platforms (Mbonu *et al.*, 2021) and analytics-driven financial decision architectures in banking organizations (Oluwo *et al.*, 2025) to predictive systems for investment risk monitoring in SME FinTech settings (Eboh and Aliliele, 2025), a transformation of financial planning this author has examined through its AI-driven analytics dimension (Addy *et al.*, 2024). The second is the delivery-model shift: capabilities that once required enterprise implementations (costing engines, treasury workstations, forecasting analytics) now arrive as cloud subscriptions priced within reach of small institutions, collapsing the historical correlation between organizational size and financial management sophistication. The framework developed below is, at bottom, an argument that these two features jointly change what is managerially possible at the distressed end of the hospital sector, and a specification of the mechanisms through which that possibility would operate.

The Anatomy of a Distress Trajectory

Because the framework claims to intervene in a process, it is worth rendering that process concretely, in the composite trajectory the closure studies describe (Kaufman *et al.*, 2016; Holmes *et al.*, 2013; GAO, 2020). It begins upstream of any financial statement: a payer-mix shift as local employment changes, an expansion decision in the state capital, the retirement of two admitting physicians. Operating margin, already thin, turns negative, and the first management responses are the reversible ones: hiring freezes, deferred maintenance, delayed vendor payments. Cost knowledge at this stage is typically annual and departmental, so the cuts are proportional rather than selective, trimming viable and unviable activity alike and often damaging the former more. Cash declines through the receivables cycle faster than the income statement reveals, because denial backlogs and billing delays hide in accounts receivable aging rather than in margin; the first acute event is usually a payroll or debt-service scare triggered by an external delay the institution did not see coming and had no scenario for. Capital access closes progressively: the rating outlook turns negative, renewal borrowing prices punitively or not at all, plant age climbs, and the deteriorating physical and technological plant

weakens the institution's competitive and partnership position in turn. Partnership exploration, the modal survival route, then proceeds under the worst possible conditions: opaque finances lengthen suitor diligence, distress erodes negotiating position, and time, the one asset the process consumes continuously, runs out. Each stage of this trajectory names a framework construct: undifferentiated cost knowledge (Pillar 1), unmanaged cycle time and absent forecasting (Pillar 2), and information-impaired capital and partnership access (Pillar 3). The framework is, in one sentence, a specification of the capabilities whose absence this trajectory presupposes.

What Existing Data Can and Cannot See

A final piece of background concerns measurement, because the framework's empirical fate depends on it. The financial condition of American hospitals is unusually well documented at the statement level: Medicare cost reports, state financial disclosure programs, audited statements attached to municipal borrowing, and the benchmarking series maintained by rural health research centers together support the margin, liquidity, and closure analyses on which the preceding material has drawn (Holmes *et al.*, 2013; Kaufman *et al.*, 2016). What this apparatus cannot see is capability. No public dataset records whether an institution costs at the episode level, forecasts cash on a rolling horizon, or manages a diversified funding pipeline; the closest available proxies (information technology survey supplements, vendor market data) are partial, lagged, and adoption-based rather than use-based. The consequence is a literature able to document that similarly situated hospitals diverge but structurally unable to test the leading managerial explanation of the divergence, a measurement gap the framework's Table 1 indicators are designed to close, and the research agenda of Section 10 is organized around. The gap also disciplines the paper's own evidentiary claims: where the framework section asserts mechanisms, it does so from theory and from adjacent-sector evidence, and it marks the hospital-sector tests as outstanding rather than implied.

THEORETICAL FOUNDATIONS

The Resource-Based View and Dynamic Capabilities

The resource-based view (RBV) explains persistent performance differences among firms facing common environments by heterogeneity in valuable, rare, imperfectly imitable, and non-substitutable resources (Barney, 1991; Wernerfelt, 1984). Its application here is precise: payment policy is the common environment; survival variation among similarly paid hospitals implies resource heterogeneity; and the framework nominates financial management capability, embodied in data assets, systems, routines, and skills, as a resource meeting the RBV criteria in the safety-net context, where it is demonstrably rare and, because it compounds through organizational learning, imperfectly imitable by simple purchase. The dynamic capabilities extension (Teece *et al.*, 1997; Teece, 2007) supplies the temporal logic: in environments of policy volatility and payer turbulence, advantage lies not in any static resource but in the capacity to sense changes (which requires information, hence cost transparency), seize responses (which requires resources in time, hence liquidity), and reconfigure the enterprise (which requires investment, hence capital access). The three pillars are, in this reading, the financial expression of sensing, seizing, and reconfiguring, which is why the framework treats them as an interacting system rather than a menu.

Information Asymmetry and The Theory of Capital Access

Corporate finance locates the cost and availability of external capital in information: lenders and investors price what they cannot verify, and opaque borrowers pay for opacity or are rationed out of the market entirely (Myers and Majluf, 1984; Stiglitz and Weiss, 1981). The pecking-order consequence, that constrained firms fund themselves internally first, describes safety-net behavior exactly: institutions that cannot issue affordably live off cash flow, and when cash flow fails, off asset depletion. The FinTech literature's central capital-market claim is that digital data trails reduce verification costs and therefore asymmetric-information premia, which is the demonstrated mechanism of transaction-data underwriting in small-business lending (Jagtiani and Lemieux, 2018; Thakor, 2020). Pillar 3 imports this mechanism: a safety-net hospital that can substantiate its finances continuously, granularly, and audit-ably changes its information position before every counterparty that prices its risk, from bond raters to program officers to partnership suitors. Working-capital theory contributes the complementary survival logic: the empirical literature associates disciplined cash-conversion-cycle management with profitability and survival, with the relation strongest precisely among financially constrained firms (Deloof, 2003; Baños-Caballero *et al.*, 2014), the category safety-net hospitals define.

Cost Knowledge and The Economics of Internal Transparency

The management accounting tradition supplies the third foundation. Kaplan and Porter (2011) argued that healthcare's cost crisis is at root a measurement crisis: providers systematically do not know what it costs to deliver care at the level of the patient and pathway, and therefore cannot manage value, negotiate rationally, or redesign services on evidence. Time-driven activity-based costing (TDABC) demonstrated that episode-level cost knowledge is attainable and decision-relevant, but its documented implementations concentrate in well-resourced academic systems, precisely because the historical delivery model was consultant-heavy and data-intensive (Kaplan and Porter, 2011; Keel *et al.*, 2017). Institutional theory adds a caution the framework retains as a boundary condition: technology adoption under legitimacy pressure can be ceremonial, decoupled from the routines that produce performance (Meyer and Rowan, 1977; DiMaggio and Powell, 1983), which is why every pillar below is defined as a capability-in-use, with routines and decision rights inside the construct, not as system ownership.

Integrating The Lenses

The four theoretical sources are assigned distinct and non-overlapping work in the framework, and stating the division

explicitly guards against eclecticism. RBV supplies the existence claim: capability heterogeneity is a legitimate explanation of performance heterogeneity under common environments, licensing the framework's central move. Dynamic capabilities supply the architecture: the three pillars are derived from, and jointly exhaust, the sensing-seizing-reconfiguring triad as it manifests in institutional finance, which is why the framework has three pillars rather than an open list. Information-asymmetry theory supplies the external mechanism: every framework pathway that crosses the institutional boundary (payer negotiation, lender pricing, funder selection, partner diligence) operates by changing what outsiders can verify at what cost. Working-capital theory supplies the internal survival mechanism and, through its constraint-interaction findings, the prediction that effect sizes peak in the safety-net population. Institutional theory, finally, is deliberately confined to the boundary condition: it explains when the other mechanisms fail to fire (ceremonial adoption) without carrying any positive pathway of its own. Each proposition in Section 5 can be traced to exactly one of these assignments, plus, for Propositions 8 and 9, their interactions, and the framework should be evaluated, qua theory, on whether that tracing holds.

FRAMEWORK DEVELOPMENT METHOD

The framework was developed following established guidance for conceptual research in management and health services (Gilson and Goldberg, 2015; Jaakkola, 2020; MacInnis, 2011), through four explicit steps. First, domain immersion: the empirical literature on safety-net finance, hospital closure, hospital capital access, and working-capital management was reviewed to establish the explanandum (survival variation under common payment environments) and the documented risk factors that any framework must address, drawing on the sources cited in Section 2. Second, theory selection: candidate theoretical lenses were evaluated for mechanism fit, retaining RBV and dynamic capabilities (for capability heterogeneity and adaptation), information-asymmetry theory (for capital access), and working-capital theory (for liquidity-survival linkage), while institutional theory was retained as a boundary-condition source rather than a core mechanism. Third, construct specification: each pillar was defined with its constituent sub-constructs and observable indicators, deliberately phrased so that each indicator is measurable from data a hospital or researcher could obtain (Table 1), an insistence drawn from the conceptual-rigor literature's requirement that frameworks be falsifiable in principle (MacInnis, 2011). Fourth, proposition derivation: mechanisms were traced from each pillar, and from their interactions, to sustainability outcomes, yielding

Table 1: The three-pillar framework: constructs, measurable indicators, and primary sustainability mechanisms.

Pillar and sub-construct	Definition	Measurable indicators	Primary sustainability mechanism
P1a. Granular cost knowledge	Continuous costing of services, episodes, and patients via automated data capture	Share of volume costed at episode level; costing refresh frequency; variance of estimated vs audited cost	Informs service-line viability decisions and value-based contracting (viability)
P1b. Decision-embedded transparency	Cost information delivered inside operational and governance decisions	Costed decisions as share of major decisions; management-report latency; clinician access to cost data	Converts knowledge into margin action; supports credible payer negotiation (viability)
P1c. External substantiation	Audit-ready, granular financial evidence available to outside parties	Time to produce substantiated cost reports; grant and rate filings supported by episode data	Reduces information asymmetry premium with payers, raters, funders (viability, mission durability)
P2a. Receivables acceleration	Digitally compressed time from service to cash	Days in accounts receivable; discharged-not-final-billed days; denial-driven cash delay	Raises cash velocity; shortens cash conversion cycle (solvency)
P2b. Payables and outflow discipline	Optimized timing of disbursements without supplier damage	Days payable outstanding vs terms; early-payment discount capture; payroll funding stability	Preserves cash without eroding supply relationships (solvency)
P2c. Continuous liquidity forecasting	Rolling short-horizon cash prediction with scenario capability	Forecast error at 4 and 13 weeks; frequency of unanticipated liquidity events; covenant headroom visibility	Converts cash surprises into managed events; extends decision lead time (solvency)
P3a. Data-substantiated credit narrative	Continuous, verifiable financial disclosure supporting borrowing	Rating trajectory; spread vs peers; lender diligence cycle time	Lowers asymmetric-information premium on debt (renewal, mission durability)
P3b. Alternative and digital funding channels	Access to non-traditional capital: digital lending, receivables finance, community investment, online philanthropy	Number of active funding channels; share of capital plan funded outside rated debt; philanthropy conversion metrics	Widens the funding aperture when rated markets are closed (renewal, mission durability)
P3c. Grant and program capital capture	Systematic identification, pursuit, and compliance management of public and philanthropic program funds	Grant win rate; compliance findings; share of eligible programs pursued	Converts policy funds into institutional capital at low cost (mission durability)

the nine propositions stated in the framework section and the risk-factor mapping of Table 2. The author's practitioner vantage in hospital finance informed the plausibility screening of mechanisms and pathways throughout, a use of professional knowledge consistent with the engaged-scholarship tradition (Van de Ven, 2007).

THE FRAMEWORK

Overview and The Sustainability Outcome

The framework's dependent construct, financial sustainability, is defined as the institution's continuing capacity to meet obligations, maintain and renew its asset base, and preserve its service mission across policy and demand cycles. It is operationalized along the three horizons the closure literature reveals: solvency (liquidity sufficient to meet near-term obligations, indexed by days cash on hand and current ratio), viability (operating performance sufficient to sustain the enterprise, indexed by operating margin and debt-service coverage, the sustainable-profitability object of financial planning model design; Medon and Oduleye, 2023), and mission durability (preservation of service lines and access commitments, indexed by service retention and charity-care capacity). The three pillars are proposed to influence all three horizons, through distinct primary mechanisms: cost transparency operates chiefly on viability, working capital chiefly on solvency, and capital access chiefly on mission durability and renewal, with the interactions specified in Section 5.5 binding them into a system. Table 1 presents the complete framework: pillars, sub-constructs, measurable indicators, and the primary sustainability mechanism of each, and it is referenced throughout the pillar subsections that follow.

Pillar 1: FinTech-Enabled Cost Transparency

The first pillar addresses the institution's knowledge of itself. Its premise, established in the theoretical foundations section, is that safety-net hospitals have historically operated with the least cost knowledge in the sector at the moment they need it most: ratio-of-cost-to-charge approximations and departmental aggregates cannot answer the questions distress forces, namely which services, sites, and populations the institution can afford to sustain, at what payer rates the mission breaks even, and where cost reduction is safe versus self-destructive. The FinTech development the pillar names is the collapse in the cost of knowing: cloud costing platforms that ingest EHR activity, payroll, and supply data continuously now deliver episode-level costing as a subscription rather than a consulting project, bringing the TDABC information product, if not its full method, within reach of small institutions (Kaplan and Porter, 2011; Keel *et al.*, 2017, document the method and its resource history). The adjacent management accounting literature documents the components at enterprise scale: variance analytics for cost control (Aliliele *et al.*, 2024), strategic accounting systems designed for transparency and regulatory compliance (Bola-Sadipe *et al.*, 2019), and automated consolidation architectures that make continuous, audit-ready reporting feasible across complex entities (Bola-Sadipe *et al.*, 2023).

Three sub-constructs constitute the pillar (Table 1). Granular cost knowledge (P1a) is the data product itself. Decision-embedded transparency (P1b) is the routing of that product into live decisions, the executive decision-system design problem the financial planning literature has treated directly (Lawal and Oduleye, 2019; Lawal and Oduleye, 2023a): service-line reviews conducted on episode economics, budgets built on activity rather than increments, clinical leaders shown the cost consequences of pathway variation; because labor is the dominant hospital cost line, governance-driven workforce planning and nurse-to-patient ratio optimization (Omaghomi *et al.*, 2023) is where this decision embedding meets both the largest expense category and patient safety. External substantiation (P1c) is the outward face: the capacity to demonstrate costs credibly to Medicaid rate-setters, commercial payers, grant makers, and rating agencies, converting internal knowledge into negotiating and funding position; automated close-control designs for audit readiness in enterprise resource planning systems describe the reporting machinery this sub-construct presupposes (Oyeleye, *et al.*, 2025), alongside audit liaison and corrective-action compliance practice (Ebhojie, *et al.*, 2023), budget compliance and statutory reporting discipline (Dogbatsey and Ebhojie, 2018), and comprehensive financial reporting models built for accountability (Medon and Oduleye, 2022). The distinction between P1a and P1b encodes the institutional-theory caution: a costing system whose outputs decorate board packets is ceremonial adoption, and the framework's prediction attaches to use, not ownership.

Two propositions follow. Proposition 1: greater FinTech-enabled cost transparency improves viability outcomes (operating margin, service-line contribution) by enabling selective cost management and evidence-based service configuration, with the effect increasing in the degree of decision embedding (P1b). Proposition 2: external substantiation (P1c) improves payment and funding outcomes (negotiated rates, supplemental payment capture, grant success) by reducing the information asymmetry between the institution and the parties that price or fund it, an application of the information asymmetry mechanism inside the payment relationship itself.

Pillar 2: Digital Working-Capital Management

The second pillar addresses time, the dimension in which distressed institutions actually fail. The closure record's proximate-cause lesson is that hospitals close when cash runs out, and cash runs out through the cash conversion cycle: the interval between paying for labor and supplies and collecting for the care they produced. Hospital receivables cycles are long by commercial standards and lengthened by adjudication friction; safety-net receivables carry the additional drag of Medicaid processing variability, supplemental payments received in lumps on political calendars, and patient balances of low collectability. Against days-cash positions measured in weeks, this cycle structure means that ordinary payment perturbations (a payer system conversion, a state budget impasse, a cyberattack on a clearinghouse) arrive as solvency events, a fragility the sector has repeatedly experienced.

The working-capital literature establishes both the general relation, that cash-cycle compression associates with profitability and survival, and the constraint interaction, that the relation strengthens with financial constraint (Deloof, 2003; Baños-Caballero *et al.*, 2014), which selects safety-net hospitals as the maximum-response population. The pillar's FinTech content is the digital infrastructure of cycle compression, organized in three sub-constructs (Table 1). Receivables acceleration (P2a) encompasses the automation of the charge-to-cash pipeline: electronic eligibility and claim transactions, automated claim status and denial routing, real-time payment rails for patient and payer receipts (a rail layer whose gateway architectures, interoperability models, liquidity-optimization analytics, transaction risk scoring, fraud defense, and smart-contract payment automation are developing rapidly in the payments literature; Akomolafe *et al.*, 2022, 2023, 2024; Adesuyi *et al.*, 2023, 2024, 2025a), and, where appropriate, receivables-based financing that monetizes the pipeline itself; the supplies side of working capital has its own digital literature, from asset lifecycle management and inventory visibility (Okonkwo *et al.*, 2023) and digital supply chain models for cost control and operational continuity (Okonkwo *et al.*, 2024) to predictive demand forecasting that reduces inventory inefficiency directly (Aifuwa *et al.*, 2020); this sub-construct is the point of contact with the revenue cycle automation literature, which documents the operational mechanics in depth (HFMA, 2024; AB, 2021; CAQH, 2023). Payables and outflow discipline (P2b) is the mirror image: automated payables that capture negotiated terms and early-payment discounts deliberately rather than accidentally, and payroll and debt-service funding protected by design. Continuous liquidity forecasting (P2c) is the integrative capability: rolling four-to-thirteen-week cash forecasts built from live receivables, payables, and payroll data, with scenario capacity that converts contingencies (a DSH delay, a rate cut, a volume shock) from surprises into planned-for branches. The forecasting literature outside healthcare demonstrates both halves of the capability: machine-learning demand and revenue projection methods (Tonoyan *et al.*, 2021a) and predictive cash-flow modeling linked explicitly to working-capital optimization (Tonoyan *et al.*, 2021b). Corporate treasury scholarship supplies the surrounding architecture: tiered treasury designs for multi-entity cash consolidation (Dada *et al.*, 2021), predictive models for cash-flow and working-capital optimization (Oduleye and Medon, 2023a) and for strategic financial forecasting accuracy (Medon and Oduleye, 2024), and reconciliation-control and financial workflow redesign for emerging-market organizations (Dogbatsey *et al.*, 2019), all of which transfer to hospital finance with payer-specific adaptation. In treasury practice such forecasting is standard technology; in small-hospital practice it is frequently absent, and its absence is why liquidity crises are discovered rather than anticipated.

Three propositions follow. Proposition 3: digital receivables acceleration improves solvency outcomes (days cash, current ratio) by compressing the cash conversion cycle, with effect size increasing in baseline cycle length and financial constraint. Proposition 4: continuous liquidity forecasting reduces the incidence and severity of liquidity crises by lengthening decision lead time, independent of any change in average cash position, a prediction distinguishing information effects from balance effects. Proposition 5: working-capital capability moderates the transmission of external payment shocks to institutional distress: among hospitals experiencing equivalent shocks, those with higher Pillar 2 capability exhibit smaller solvency deterioration, the framework's explanation for a portion of the survival heterogeneity documented earlier.

The payment-shock mechanism of Proposition 5 deserves elaboration because it supplies the framework's most tractable identification strategy. Safety-net finance is punctuated by observable, plausibly exogenous liquidity events: state Medicaid payment interruptions during budget impasses, supplemental payment disbursement delays, payer and clearinghouse system disruptions of the kind the sector experienced at scale in recent years, and public health emergencies that simultaneously suppress volume and lengthen adjudication. Scenario-based financial modelling methods for exactly this class of contingency are established in the strategic planning literature (Filani *et al.*, 2023), and resilience and continuity modeling for payment infrastructure under systemic stress addresses the transmission channel itself (Adesuyi *et al.*, 2025b), as does infrastructure resilience planning for national health systems under public health stress conditions (Aminu-Ibrahim *et al.*, 2025b). Each such event applies a roughly common cash-flow shock to institutions that differ in Pillar 2 capability, and the framework's prediction is a divergence in outcomes (drawn credit lines, missed obligations, forced asset sales, emergency borrowing terms) ordered by pre-shock capability. The prediction is falsifiable in both directions: no divergence would indicate that capability is epiphenomenal to solvency dynamics, while divergence ordered by capability, conditional on fundamentals, would establish the buffering claim on which much of the framework's practical value rests. limitations section develops the corresponding designs.

Pillar 3: Technology-Mediated Access to Capital

The third pillar addresses the funding boundary. Safety-net capital scarcity is an information and structure problem as much as a fundamentals problem: rated debt markets price the sector's profile punitively, philanthropic capacity is under-mobilized relative to community attachment, and public program capital (grants, loans, and directed funds from federal, state, and philanthropic programs) is captured unevenly, with capture correlated to administrative capacity rather than need. Each of the three sub-constructs (Table 1) targets one of these mechanisms. The data-substantiated credit narrative (P3a) applies the information asymmetry logic to institutional borrowing: continuous, granular, audit-ready financial disclosure, generated as a by-product of Pillars 1 and 2, reduces the verification costs and uncertainty premia embedded in spreads and in lender diligence, the institutional analogue of the transaction-data underwriting that widened small-business credit (Jagtiani and Lemieux, 2018; Thakor, 2020). Alternative and digital funding channels (P3b) widen the aperture beyond rated markets: receivables and equipment financing through digital lenders, community investment notes and place-based capital

vehicles, and online philanthropy infrastructure that converts diffuse community attachment into recurring giving, channels whose documented hazards (pricing opacity, covenant traps in merchant-advance-style products) the framework internalizes as governance requirements rather than reasons for avoidance. Design precedents span the finance literature: analytics-driven capital allocation models (Lawal and Oduleye, 2021a), capital-efficiency optimization frameworks for high-velocity environments (Walawalkar *et al.*, 2025), and sustainable financing structures such as green bonds and ESG-linked instruments for capital-constrained settings (Sakyi *et al.*, 2024) map onto the renewal problem, as do the capital-delivery instruments the healthcare infrastructure literature specifies: capital project delivery models for high-risk healthcare facilities (Aminu-Ibrahim *et al.*, 2019), cost control and financial accountability frameworks for large healthcare construction programs (Aminu-Ibrahim *et al.*, 2025a), long-horizon asset management metrics for healthcare infrastructure (Aminu-Ibrahim *et al.*, 2025c), lifecycle performance evaluation of purpose-built clinical facilities (Ogbete *et al.*, 2023), and data-driven lifecycle performance management in infrastructure delivery generally (Adelanwa *et al.*, 2023), while post-crisis collaboration models between banks and capital markets (Isiekwu *et al.*, 2025) and CFO-led finance structures for joint-venture and cross-border partnerships (Isiekwu *et al.*, 2021) speak to the partnership route the closure literature identifies as the modal survival path; where the partner is public, governance and accountability models for public-private partnerships in healthcare infrastructure (Aminu-Ibrahim *et al.*, 2024) and quantitative architectures for allocating public and private risk (Ike *et al.*, 2024) supply the contractual frame. Grant and program capital capture (P3c) treats the public and philanthropic program landscape as a capital market of its own, in which grant-management technology (opportunity identification, application workflow, post-award compliance) is the access infrastructure, and in which safety-net hospitals compete against better-staffed institutions for funds designed, in many cases, precisely for them.

Two propositions follow. Proposition 6: technology-mediated capital access improves renewal and mission-durability outcomes (capital expenditure adequacy, age of plant, service retention) by lowering the effective cost and widening the availability of external funds, with the P3a mechanism operating through spreads and diligence costs and the P3b and P3c mechanisms through channel breadth. Proposition 7: the marginal effect of Pillar 3 is greatest for institutions excluded from or penalized by rated debt markets, the population for which channel widening relaxes a binding rather than a slack constraint.

Interactions: The Pillars as A System

The framework's systemic claim is that the pillars are complements whose joint presence produces effects their sum does not. Three interaction pathways carry the claim. The transparency-to-capital pathway: Pillar 1's external substantiation is the input to Pillar 3's credit narrative; cost and margin evidence generated continuously is what a lender, rater, or program officer can verify cheaply, so P1c capability raises the return to P3 effort; quantitative models for the strategic impact of financial analysis supply its evaluation logic (Oduleye and Medon, 2023b). The liquidity-to-strategy pathway: Pillar 2's forecasting converts Pillar 1's viability analysis from description into plan; knowing a service line loses money is actionable only within the cash horizon liquidity management creates, so P2 capability raises the value of P1 knowledge; the alignment of planning analytics with enterprise strategy is itself a designed integration rather than an automatic one (Lawal and Oduleye, 2021b). The capital-to-capability pathway: Pillar 3's funding finances the systems and skills that constitute Pillars 1 and 2, closing a loop that can spiral in either direction, virtuous for institutions that bootstrap capability into capital into capability, vicious for those whose capability deficit forecloses the funding that would remedy it, the framework's formal rendering of the digital divide documented in hospital technology adoption (Adler-Milstein *et al.*, 2017).

Two propositions complete the set. Proposition 8: the pillars interact positively, such that the effect of each on sustainability outcomes increases in the level of the others, with the three pathways above as the operative mechanisms. Proposition 9: the relationship between FinTech capability and sustainability is conditioned by governance and absorptive capacity, such that capability-in-use, not system adoption, predicts outcomes, the institutional-theory boundary condition converted into a testable moderation.

Construct Boundaries and Rival Explanations

Three boundary clarifications sharpen what the framework does and does not assert. First, the pillars are financial management capabilities, not information technology assets: an institution running sophisticated software ceremonially scores low, and an institution extracting continuous costing, forecasting, and substantiation from modest tools scores high; the constructs are defined at the level of what the organization knows, compresses, and accesses, with technology as the enabling condition that has newly lowered the cost of scoring high. Second, the framework is not a claim that safety-net distress reflects managerial failure. The structural analysis of the background section is retained in full: payment fundamentals set the odds, and the framework's capabilities operate on the residual variance around those odds, which the closure literature shows to be substantial. The distinction matters ethically as well as analytically, because capability narratives can slide into victim-blaming policy in which underfunded institutions are told to manage their way out of underpayment; the framework's Table 2 final column and the policy discussion section are written to foreclose that reading. Third, rival explanations of the residual variance exist and are complements rather than competitors: leadership quality, clinical service strategy, community wealth, and system affiliation all plausibly explain survival heterogeneity, and several operate partly through the framework's constructs (affiliation, for instance, delivers Pillar 1 and 2 capability through the parent), a mediation structure the empirical agenda in the limitations section is designed to disentangle rather than assume away.

MAPPING CLOSURE RISK TO THE FRAMEWORK

A conceptual framework earns its keep by organizing known facts, and the known facts here are the closure risk factors the empirical literature has documented. Table 2 assembles the principal risk factors from the closure and distress studies reviewed in the background section and maps each to the framework pillar and mechanism through which FinTech-enabled capability plausibly modifies it, together with an honest classification of the modification's nature: some risks the framework's capabilities can directly reduce, some they can only buffer, and some (the payment-policy fundamentals) they cannot touch except by extending survival time until policy changes. The table is the framework's bridge to empirical work: each row is, in effect, a moderation hypothesis.

The final column enforces the framework's modesty. Nothing in the three pillars changes Medicaid rates, reverses demographic decline, or substitutes for expansion policy; the mapped mechanisms reduce self-inflicted losses, buffer shocks, widen funding, and above all buy time and decision space. In a sector where closure is a process measured in years, time and decision space are not consolation prizes; they are the difference between managed transformation (service redesign, Rural Emergency Hospital conversion, partnership on acceptable terms) and abrupt failure, which is the precise sense in which the framework claims policy relevance.

Reading The Map: Three Institutional Archetypes

The mapping of Table 2 becomes concrete when read through the institutional archetypes that recur in the distress literature. The first archetype is the leaking survivor: an institution whose payment environment is adequate in principle but whose realized revenue is not, because eligibility failures, denial backlogs, and billing delay bleed collectible dollars; Table 2's uncaptured-revenue and liquidity rows apply, the framework predicts large returns to Pillar 2 capability alone, and this archetype is where the companion revenue cycle evidence base is thickest (HFMA, 2024; AB, 2021). The second archetype is the blind allocator: an institution whose losses concentrate in specific services, sites, or contracts it cannot see, because departmental cost aggregates hide the structure of its deficit; the negative-margin and payer-mix rows apply, Pillar 1 is the binding constraint, and the framework predicts that transparency will change decisions (service configuration, contract exit, targeted efficiency) rather than merely reporting. The third archetype is the walled-off renewer: an institution managing operations competently at the margin of viability but unable to finance the plant, technology, and service renewal that would change its trajectory, because rated markets are closed and program funds go uncaptured; the aging-plant, capital-exclusion, and program-capture rows apply, and Pillar 3 is decisive. Real institutions blend the archetypes, and the diagnostic implication of the framework is precisely that the blend should be measured before capability investment is sequenced: the Table 1 indicators function as the assessment instrument, and the implementation pathways discussed later assume such a diagnosis as their first step.

From Mapping to Monitoring

Tables 1 and 2 jointly imply an instrument the sector currently lacks: a distress-and-capability dashboard in which the closure risk factors of Table 2 are monitored alongside the capability indicators of Table 1 that modify them. For a board or a state office of rural health, such an instrument would pair each risk signal (margin trend, days cash, plant age, payer-mix drift) with the institution's standing on the capabilities the framework predicts will govern its response (costing granularity and use, forecast horizon and error, channel breadth, capture rates), converting the framework from an

Table 2: Documented closure and distress risk factors mapped to framework intervention points.

Documented risk factor (principal sources)	Framework pillar and mechanism	Nature of modification
Sustained negative operating margin (Kaufman *et al.*, 2016; Holmes *et al.*, 2013)	P1a/P1b: episode costing enables selective cost action and service configuration	Direct reduction, bounded by payment rates
Low days cash on hand and liquidity fragility (Holmes *et al.*, 2013; GAO, 2020)	P2a/P2c: cycle compression and forecasting raise and stabilize cash	Direct reduction
Payment shocks: Medicaid delays, DSH uncertainty, payer disruption (Lindrooth *et al.*, 2018; Chatterjee *et al.*, 2021)	P2c: scenario forecasting; P2a: velocity buffers transmission	Buffering: severity and lead time, not incidence
Adverse payer mix and below-cost rates (Bazzoli *et al.*, 2005; Hsieh and Bazzoli, 2012)	P1c: substantiated costs strengthen rate advocacy and value contracting	Buffering: negotiation position, not rate structure
Uncaptured revenue: denials, eligibility failures, uncompensated care misclassification (CAQH, 2023)	P2a: automated capture pipeline; P1a: identifies leakage location	Direct reduction
Aging plant and deferred capital renewal (Sloan *et al.*, 1988; Gapenski and Reiter, 2016)	P3a/P3b: cheaper debt and widened channels finance renewal	Direct reduction, conditional on debt capacity
Exclusion from affordable capital markets (Gapenski and Reiter, 2016)	P3a: asymmetry reduction; P3b: alternative channels	Direct reduction of the access constraint
Under-capture of program and philanthropic funds (GAO, 2020)	P3c: grant capture infrastructure	Direct reduction
System independence and partnership failure (Kaufman *et al.*, 2016)	P1c/P3a: transparent finances lower partner diligence barriers	Buffering: raises partnership feasibility
Managerial and analytic capacity thinness (Holmes *et al.*, 2013; Adler-Milstein *et al.*, 2017)	All pillars as delivered capability; P9 boundary condition governs	Direct, but gated by absorptive capacity
Community economic decline and volume loss (Holmes *et al.*, 2006; Gujral and Basu, 2019)	Outside framework scope; P2/P3 extend adaptation time	Time extension only

explanatory device into a surveillance and triage tool. The pairing also operationalizes the framework's central practical insight, that identical risk profiles warrant different interventions depending on capability standing: the leaking survivor needs Pillar 2 delivery before anything else, the blind allocator needs Pillar 1, the walled-off renewer needs Pillar 3, and the diagnosis is readable from the indicator pattern rather than from the risk factors alone. The enabling technology is unexceptional: real-time KPI tracking systems for automated performance monitoring are an established review subject (Tonoyan *et al.*, 2024), performance intelligence models for large-scale public services demonstrate the same instrumentation in government settings (Adelanwa *et al.*, 2024), and the contribution here is the pairing of indicator sets, not the instrumentation. State monitoring programs and lender surveillance, both of which currently track the risk side exclusively, are natural early adopters, and the dashboard concept names a concrete artifact through which the framework's measurement agenda (discussed in the limitations section) can be pursued in partnership with practice rather than on academic timelines alone.

THE POLICY DIMENSION: WHY INSTITUTIONAL CAPABILITY IS A NATIONAL CONCERN

The Stakes of Safety-Net Survival

The framework's unit of analysis is the institution, but its significance is systemic, and this section states the connection explicitly. Safety-net hospitals are load-bearing infrastructure for national health objectives: they anchor trauma, burn, neonatal, psychiatric, and disaster-surge capacity in their regions; they train a disproportionate share of the physician workforce; and they are, for large populations, the access point of last resort whose disappearance is not absorbed by substitution but expressed as travel time, delayed care, and measurable health harm (IOM, 2000; GAO, 2020; Gujral and Basu, 2019). Rural closures additionally remove leading local employers from already-fragile economies, transmitting health-sector distress into regional economic distress (Holmes *et al.*, 2006). The healthcare infrastructure literature reaches the same conclusion from the facilities side: purpose-built infrastructure functions as a public health intervention in its own right (Aminu-Ibrahim and Ogbete, 2023), infrastructure investment translates into measurable population health and diagnostic outcomes (Aminu-Ibrahim and Ogbete, 2024), and infrastructure-driven expansion is the documented mechanism of diagnostic access in underserved and rural regions (Aminu-Ibrahim *et al.*, 2020); the same access literature identifies telehealth adoption frameworks for rural and underserved populations (Fapohunda *et al.*, 2023) and behavioral health crisis response systems in multi-hospital networks (Fapohunda *et al.*, 2025) as extensions of the safety-net function the framework aims to preserve. A framework that lengthens survival horizons and enlarges adaptation space at these institutions therefore addresses a national problem through an institutional mechanism, the same logic by which small-business finance, community banking, and agricultural credit have long been treated as public concerns warranting infrastructure and policy support.

Complementarity with Payment Policy

The policy claim must be stated carefully, because it is easily misread in both directions. Payment policy is primary: the closure evidence is unambiguous that coverage expansion and payment adequacy dominate closure hazard (Lindrooth *et al.*, 2018), and no capability framework alters that hierarchy. But payment policy is also slow, cyclical, and politically contingent, while institutional failure is absorbing and effectively irreversible: a closed hospital's workforce disperses, its plant decays, and re-establishment costs far exceed preservation costs. Capability, on the framework's account, is the bridge across policy time: it determines which institutions are still standing, and in what condition, when payment environments improve, and it determines how efficiently institutions convert whatever payment they do receive into mission. The two levers are therefore complements, and the framework supplies the vocabulary for a policy conversation that currently lacks it, in which administrative and financial capability at safety-net institutions is treated as fundable infrastructure rather than as overhead.

Policy Instruments the Framework Suggests

Four instrument families follow from the mechanisms. First, capability subsidy: technical assistance and implementation funding for costing, treasury, and grant-management infrastructure at qualifying institutions, on the precedent of the HITECH regional extension centers that demonstrably accelerated EHR adoption among under-resourced providers (Adler-Milstein *et al.*, 2017); delivery through state offices of rural health, Flex program mechanisms, and hospital associations would use existing channels. Second, standardization as subsidy: every administrative transaction rendered uniform and machine-readable by rulemaking lowers the capability threshold small institutions must clear, so the administrative-simplification agenda (CAQH, 2023; Cutler, 2020) is, in the framework's terms, distributive policy favoring the resource-constrained. Third, capital-market repair: credit enhancement, loan guarantees, and program-related investment vehicles targeted at mission-critical facilities directly address the Pillar 3 constraint, and disclosure infrastructure that lets substantiated safety-net finances reach mission-aligned investors would operationalize P3a at sector scale. Fourth, guardrails for the alternative-channel market: as digital lenders and receivables financiers enter hospital finance, transparency and pricing standards prevent the framework's Pillar 3 from becoming a vector of the covenant and pricing hazards documented in small-business FinTech credit (Jagtiani and Lemieux, 2018), a hazard the framework flags rather than hides.

The Equity Dimension

A final policy consideration concerns equity within and across institutions. Across institutions, the capability divide documented in health information technology (Adler-Milstein *et al.*, 2017) risks reproducing itself in financial technology: if costing, treasury, and capital-access capabilities diffuse first to well-resourced systems, the competitive position of safety-net institutions deteriorates relatively even as the technology frontier advances

absolutely, an argument for the targeted capability subsidies discussed above rather than diffusion-neutral policy. Within institutions, the framework's patient-adjacent components carry direct equity content: receivables acceleration includes patient balances, and the same digital infrastructure that speeds collection can either route vulnerable patients toward financial assistance screening or concentrate automated collection pressure on them, a design choice with legal force for nonprofit institutions under their financial-assistance obligations and with mission force for every safety-net provider. The framework accordingly treats assistance-first patient financial design as a constitutive requirement of Pillar 2 in the safety-net context, not an optional configuration, and flags fairness review of patient-facing financial models as part of the governance capacity Proposition 9 conditions on. Sustainability purchased by transferring distress from institution to patient would falsify the mission-durability component of the framework's own dependent variable. The equity ledger also runs through quality-linked payment: readmission and hospital-acquired-condition penalties fall disproportionately on institutions serving complex, under-resourced populations, which makes clinically led interventions such as care-coordination frameworks for reducing readmissions (Akinlolu *et al.*, 2023) and infection prevention and control compliance frameworks for tertiary hospitals (Omaghomi *et al.*, 2022) financially material to safety-net sustainability, not merely clinically desirable.

IMPLEMENTATION PATHWAYS FOR RESOURCE-CONSTRAINED INSTITUTIONS

A framework aimed at capability-poor institutions owes an account of how the capabilities are attainable, and the account must respect the constraint that motivated the paper: these institutions cannot run enterprise implementations. Four pathway principles organize what the adoption evidence and the framework's own logic support. Sequenced bootstrapping: the pillars have a natural order of attack in which early, low-cost, high-certainty automation (electronic transactions, receivables scripting, basic cash forecasting under Pillar 2) generates measurable cash and labor gains that fund the subscription costing capability of Pillar 1, whose substantiation outputs then power the Pillar 3 funding pursuit; the capital-to-capability loop described earlier is thereby entered at its cheapest point. Delivered capability over owned capability: cloud subscription, cooperative purchasing through hospital associations, shared-service arrangements among affiliated small hospitals, and selective outsourcing convert fixed capability costs into variable ones sized to institutional scale, the delivery-model shift mentioned earlier applied deliberately, and the small-enterprise literature documents the pattern directly, from cloud-based business intelligence delivered affordably at SME scale (Ogbuefi *et al.*, 2022) to the barriers and enablers governing adoption in underserved small-organization communities (Mgbame *et al.*, 2020); the governance corollary is that contracts must preserve data egress, performance transparency, and the internal feedback loops that make capability-in-use possible (Proposition 9), and the small-enterprise financial governance and accountability literature specifies what that internal control core looks like at modest organizational scale (Eboh *et al.*, 2025). Absorptive-capacity first: each capability lands only if a named owner, a decision routine, and a training investment accompany it, so implementation plans should be written as changes to decisions (which meetings will now consume the cost report, who acts on the thirteen-week forecast, who owns the grant calendar) rather than as system go-lives, the practical enforcement of the framework's capability-in-use definition, and the technology-acceptance evidence from underserved small-business sectors confirms that readiness, not tooling, is the binding variable (Akpe *et al.*, 2023). Measurement from day one: because the framework's propositions are stated on observable indicators (Table 1), an implementing institution can and should instrument its own trajectory (days cash, cycle times, forecast error, spread, win rates), simultaneously managing the program and, not incidentally, generating the practice-based evidence the limitations section calls for.

Failure Modes and Their Prevention

Honesty about implementation requires naming the ways this program fails, because each failure mode has appeared in adjacent adoption literatures. Ceremonial adoption, the institutional-theory failure, installs systems that decorate governance without entering decisions; its prevention is the decision-routine design described above and the capability-in-use measurement the framework insists on. Tool sprawl, the small-organization variant of the portfolio failures documented in enterprise automation, accumulates overlapping subscriptions faster than staff can absorb them; its prevention is the sequenced pathway and a standing rule that no capability is added until its predecessor's indicator has moved. Vendor capture arises when delivered capability substitutes for institutional knowledge so completely that the feedback loops close inside the vendor; its prevention is contractual (data egress, performance transparency, audit rights) and organizational (a named internal owner who consumes and questions vendor output). Predatory-channel exposure is Pillar 3's specific hazard: distressed institutions are precisely the market for high-cost receivables advances and covenant-laden rescue financing, and the small-business FinTech record documents the damage (Jagtiani and Lemieux, 2018); its prevention is board-level policy on permissible channels and pricing, set before distress forecloses deliberation, informed by the due-diligence and fraud-exposure analytics developed for investment settings (Eboh and Aliliele, 2023, 2024). Finally, capability cannibalization, in which the staff time consumed by implementation degrades the operations it is meant to improve, is the thin-organization failure; its prevention is scope discipline and the use of delivered capability where internal bandwidth is the binding constraint. The pathway principles of this section and the governance condition of Proposition 9 are, collectively, the framework's account of why implementations succeed when they do; this subsection is its account of why they fail.

DISCUSSION

Contributions

The paper makes four contributions. To the safety-net finance literature, it supplies the missing management-capability

variable in a field dominated by payment-policy explanation, specified precisely enough to be measured and tested rather than gestured at, and it offers Table 2 as an organizing bridge between the documented risk factors and the capability mechanisms that could modify them. To the FinTech literature, it extends a body of theory built on banks, startups, and small commercial firms to a mission-driven institutional sector with distinctive revenue structures and public obligations, showing which mechanisms (asymmetry reduction, cycle compression, channel widening) transfer and which require re-specification. To the dynamic-capabilities tradition, it provides an unusually concrete instantiation: sensing, seizing, and reconfiguring expressed as costing, liquidity, and capital capabilities with named indicators, in a setting where the survival stakes make capability differences observable. To practice and policy, it converts a diffuse conviction (that struggling hospitals should modernize their financial management) into a structured agenda with an implementation order, boundary conditions, and honest limits.

Boundary Conditions and Scope

The framework's claims are bounded in four explicit ways. It is a United States framework: the mechanisms presuppose multi-payer adjudication, rated municipal debt, and the American grant economy, and transfer to other systems only with re-derivation. It is conditioned on absorptive capacity: Proposition 9 is a load-bearing wall, and the framework predicts nothing for ceremonial adoption. It is bounded by payment fundamentals: the final column of Table 2 concedes the risks the pillars cannot reach, and the framework's value proposition is resilience and time, not rescue from structural underpayment. And it is technology-generation relative: the pillar definitions are stated functionally (what the institution can know, compress, and access) rather than by product category, so the framework should survive vendor turnover, but empirical operationalizations will need dating.

Alternative Theoretical Readings

The framework's mechanisms admit alternative theoretical framings, and acknowledging them clarifies its position. A transaction-cost reading (in the tradition descending from the make-or-buy literature) would render the delivered-capability pathway described in the implementation section as a shift in the efficient boundary of the hospital, with cloud delivery lowering the transaction costs of external capability provision; the framework is compatible with that reading and treats it as a mechanism detail rather than a rival. A high-reliability and resilience-engineering reading would emphasize Pillar 2's forecasting as anticipation capacity in the sense of the organizational resilience literature, buying the graceful degradation that distinguishes managed adaptation from collapse; the framework has absorbed that vocabulary in its resilience claim while grounding the mechanism in finance rather than safety science. A behavioral reading would locate part of the mechanism in decision behavior rather than information, as behavioral financial analytics proposes for enterprise performance generally (Lawal and Oduleye, 2023b), a refinement the framework can absorb within its decision-embedding constructs. A critical reading would object that capability frameworks individualize structural problems; the construct boundaries section concedes the hazard and answers it with the explicit primacy of payment policy and the bounded-modification honesty of Table 2. The reading the framework rejects is technological determinism: nothing here predicts that FinTech adoption improves outcomes unconditionally, and Proposition 9's governance conditioning, together with the failure-mode analysis in the implementation section, commits the framework to the contrary position that identical technologies produce divergent outcomes through organizational mediation, which is precisely what makes the empirical agenda worth running.

Extended Evidence Synthesis and Operational Implications

Hospital financial resilience depends on a visible, controlled revenue cycle, because claim friction and administrative expense convert operational defects into liquidity pressure (HFMA, 2024; LaPointe *et al.*, 2020; Abetoh and Atakpa, 2024; Atakpa and Fobellah, 2023; AB, 2021).

Cost transparency becomes more useful when finance teams connect charge data, payment integrity, and comparative cost evidence to service-line decisions (Nnabueze and Enow, 2024; Atakpa and Akeju, 2024; Bai and Anderson, 2015; Himmelstein and Woolhandler, 2014; Eyetsemitan and Fadayomi, 2024a).

Evidence from digital service operations supports staged automation, workflow redesign, and measurable value tracking rather than isolated software purchases (Tonoyan and Ayivi-Donkor, 2022; Nnabueze and Adanyin, 2023; Oluwo and Isiekwu, 2022; Sakyi and Okereke, 2022a; Kraus and Invernizzi, 2021).

Secure data architecture and governance determine whether predictive finance systems produce auditable, decision-ready information (Filani and Wedraogo, 2022; Mbonu and Uzoka, 2022b; Aliliele and Iwuanyanwu, 2023b; AHA, 2023; Sakyi and Okojie, 2023).

Financial oversight improves when organizations combine reporting controls, scenario models, performance dashboards, and explicit accountability measures (OIG, 2021; CMMS, 2020; Ogundairo and Ayivi-Donkor, 2023b; Bola-Sadipe and Odihi, 2022; Sahni and Cutler, 2021).

Analytics used for fraud, anomaly, and risk detection require calibration, privacy safeguards, and human review before financial decisions depend on their outputs (Atakpa and Abolaji, 2022; Atakpa and Abetoh, 2022; Mbonu and Uzoka, 2022a; Atakpa *et al.*, 2021; Mayo and Babatope, 2021).

Automation research also supports a bounded-autonomy model in which routine transactions move electronically while staff retain authority over exceptions and high-impact decisions (Mbonu and Uzoka, 2020b; Mbonu and Oluoha, 2019; Van Calster and Steyerberg, 2019; Akeju and Abolaji, 2018; Tseng and Schulman, 2018).

Implementation evidence emphasizes change management, interoperability, and workforce readiness as conditions for sustained adoption in resource-constrained institutions (van

der Aalst and Heinzl, 2018; Lacity and Willcocks, 2016; Parasuraman and Wickens, 2000; Eyetsemitan and Fadayomi, 2023a; Afrihyia and Ojukwu, 2024).

Executive dashboards and continuous monitoring connect working-capital indicators to governance attention, creating earlier signals of financial deterioration (Afrihyia and Ojukwu, 2025; Afrihyia and Akinse, 2024; Ilodigwe and Adesemoye, 2019a; Ilodigwe and Adesemoye, 2025b; Ogbete and Ambali, 2021).

For safety-net hospitals, the practical implication is a sequenced capability path linking revenue capture, cost knowledge, secure analytics, and organizational readiness (Amayo and Isi, 2023b; Adebayo and Ozowara, 2025; Ozowara and Anunagba, 2022; Ozowara and Adepoju, 2025; Badmus and Ozowara, 2019b).

LIMITATIONS AND THE EMPIRICAL AGENDA

The limitations are those inherent to conceptual work plus several specific to this instance. The framework is untested: its propositions are derived, not demonstrated, and the supporting evidence is assembled from adjacent literatures (small-business finance, corporate working capital, hospital closure epidemiology) whose transferability is argued rather than shown. The construct indicators, though specified for measurability, await validation, and several (decision-embedding, forecast-driven action) will require primary data collection rather than secondary sources. The practitioner vantage that informed mechanism screening is a source of both insight and potential bias, declared here so that empirical work can test rather than inherit its judgments. And the framework's modesty about payment policy, while intellectually necessary, complicates identification: capability and distress co-evolve, so naive cross-sections will be confounded in both directions.

The empirical agenda follows the propositions. Measurement studies should operationalize the Table 1 indicators against accessible data (Medicare cost reports, audited statements, transaction benchmarking) and validate a capability index for the sector. Panel studies should test Propositions 1 through 7 on closure, margin, and liquidity outcomes, using staggered technology adoption, state program rollouts, and payment-shock events (Medicaid disruptions, supplemental payment delays) as identification leverage, with Proposition 5's shock-moderation design particularly tractable. Interaction tests of Proposition 8 require capability measured across pillars, arguing for survey-plus-archival designs of the kind the health information technology literature has executed (Adler-Milstein *et al.*, 2017). Qualitative and case work should trace the capability-in-use boundary of Proposition 9 inside institutions, distinguishing ceremonial from embedded adoption. And evaluation partnerships with the policy instruments discussed in the policy section, should any be enacted, would supply the closest available approximation to experimental evidence. The author's ongoing doctoral research program addresses the measurement and panel components of this agenda.

CONCLUSION

The hospitals that carry the largest share of the nation's uncompensated and underpaid care are asked to survive on the thinnest financial management foundations in the sector, and the scholarly conversation about their fate has, understandably but incompletely, looked almost exclusively to payment policy for explanation and remedy. This paper has argued that a second variable belongs in the conversation: the institution's own financial capability, now transformable at accessible cost by the same financial technologies that rewired small-business finance over the past decade. The framework developed here specifies that argument as three interacting pillars (knowing costs continuously, compressing the cash cycle, and widening the capital aperture), grounds each in established theory, derives nine testable propositions, maps the documented anatomy of hospital closure to the framework's intervention points, and states plainly both what the capabilities can do (reduce self-inflicted losses, buffer shocks, finance renewal, and buy the time in which adaptation happens) and what they cannot (repair structural underpayment). If the empirical program the framework sets out confirms even its central propositions, the implication for policy and practice is direct: financial management capability at safety-net institutions is not administrative overhead to be minimized but survival infrastructure to be built, funded, and standardized, a complement to payment reform in preserving the institutions on which the nation's most vulnerable patients depend.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/ or falsification, double publication and/or submission, and redundancy, have been completely observed by the authors.

Life Science Reporting

No life science threat was practised in this research.

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