



Fintech Failures in Emerging Markets: An Analysis of Systemic Vulnerabilities and Pathways to Sustainable Innovation

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Abstract

The recent wave of fintech failures in emerging markets, exemplified by the collapse of well-funded ventures such as Lidya and Okra in Nigeria, has exposed critical vulnerabilities in the digital financial services ecosystem. This study examines the complex causes of fintech failures across emerging markets, analyzing governance deficiencies, capital structure challenges, regulatory inadequacies, and macroeconomic pressures. Drawing from recent empirical evidence and case studies, we identify five primary failure mechanisms: premature international expansion, currency volatility exposure, leadership instability during critical periods, overdependence on continuous venture capital funding, and inadequate regulatory frameworks. Our thematic analysis of qualitative data from failed ventures reveals that despite raising substantial capital averaging \$16 million, these companies collapsed within 3 to 5 years of operation, leaving customers without access to funds and investors facing significant losses. We triangulate findings from case documentation, academic literature, industry reports, and regulatory frameworks to strengthen validity. We propose an integrated framework combining regulatory sandboxes, enhanced governance structures, and sustainable business models that prioritize unit economics over growth velocity, while addressing scalability across diverse socioeconomic contexts. The findings contribute to both theoretical understanding and practical policy development for building resilient fintech ecosystems in emerging markets. This work advances interdisciplinary dialogue on governance, economics, and regulatory spaces, with significant implications for stakeholders including marginalized communities affected by these failures.

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Glossary of Terms

- Unit economics: The direct revenues and costs associated with a particular business model expressed on a per-unit basis
- Algorithm-based decision systems: Automated decision-making systems using machine learning and artificial intelligence to assess creditworthiness, risk, and other financial parameters
- Regulatory sandbox: A controlled environment where firms can test innovative products and services without immediately complying with all regulatory requirements
- Fintech: Financial technology, encompassing innovations in financial services based on digital technology

Introduction

The financial technology sector has experienced unprecedented growth in emerging markets over the past decade, with global fintech revenue exceeding \$150 billion in 2023 and projections reaching \$400 billion by 2028. Yet this growth trajectory conceals a troubling pattern of organizational failures that threatens the sector's promise of financial inclusion and economic development. The shutdown of Nigerian digital lender Lidya in early 2025, following similar collapses including Okra, Sendy in Kenya, and 54gene, represents a systemic challenge rather than isolated incidents [1,2].

The paradox is striking. Lidya had raised over \$16 million and disbursed approximately \$150 million to more than 32,000 small businesses before its collapse. Similarly, Okra ceased operations despite securing \$16.5 million in funding and maintaining reportedly sufficient operational runway. This contradiction between adequate capitalization and operational failure demands systematic investigation, particularly given fintech's potential to address financial exclusion affecting billions globally [2,3].

While optimism about fintech's disruptive potential has pervaded both academic discourse and policy circles, emerging evidence suggests that the reality may be more nuanced. Found that fintech innovation in the Middle East and North Africa region, while promising, faces substantial regulatory, structural, and cultural obstacles that limit its disruptive impact. Their research revealed that the fintech sector remains

nascent, with bank-fintech collaboration emerging as the preferred strategy rather than complete disruption. This finding challenges conventional wisdom about fintech's revolutionary nature and raises questions about optimal development pathways for emerging market contexts [4,5].

The ethical implications of these failures extend beyond immediate financial losses. When digital lenders collapse, small businesses lose access to working capital, employees face unemployment without adequate severance, and entire communities experience disruptions in financial services that may have taken years to build trust around. The societal impact encompasses not only economic ramifications but also the erosion of confidence in digital financial innovations among populations that fintech purports to serve.

This study addresses three critical research questions:

- What are the primary mechanisms driving fintech failures in emerging markets despite substantial capital infusion?
- How do governance structures, regulatory frameworks, and macroeconomic conditions interact to exacerbate operational vulnerabilities?
- What sustainable frameworks can mitigate these risks and foster long-term viability across diverse emerging market contexts?

Literature Review

Fintech Development and Financial Stability

Recent research presents complex and often contradictory evidence on fintech's impact on financial stability in emerging markets. Conducted a comprehensive bibliometric analysis of 868 publications, revealing that while fintech enhances financial inclusion, it simultaneously introduces new systemic risks, particularly in markets with fragmented regulatory oversight [6]. Their study identified four major research directions: fintech's role in financial entrepreneurship, efficiency in banking operations, client behaviour patterns, and innovations in specialized financial services. This duality underscores the need for nuanced policy approaches that harness benefits while managing risks.

Examined Vietnamese commercial banks between 2010 and 2020, finding that fintech development

negatively affected financial stability, with market discipline serving as a mitigating factor [7]. This negative effect intensified when financial stability levels were initially low, suggesting that emerging markets face compounded vulnerabilities. The study provides empirical evidence that fintech adoption may actually increase systemic risk in contexts lacking robust regulatory infrastructure and institutional capacity.

Conversely, research from Fiji demonstrates that fintech can reduce bank risk-taking and enhance profitability when implemented with proper governance structures and regulatory support [8]. Similarly, studies from India reveal positive impacts on financial inclusion when fintech is combined with supportive digital infrastructure and financial literacy initiatives [9]. This divergence in outcomes highlights the critical role of institutional quality, regulatory capacity, and ecosystem factors in determining fintech success or failure.

Provide crucial insights into transformative fintech platforms in emerging economies, identifying organizational and ecosystem factors that drive impact [4]. Their research emphasizes that fintech platforms can address social and economic challenges by generating employment, bolstering economic growth, and enhancing digital finance access to underrepresented communities. However, they note that transformative impact depends heavily on secure internet infrastructure, financial literacy levels, and collaborative ecosystems that enable value co-creation among stakeholders. These findings suggest that technical innovation alone is insufficient without supportive ecosystem conditions.

The Reality of Fintech Disruption in Emerging Markets

The promise of fintech as a disruptive force requires careful examination. Conducted exploratory research with stakeholders from the Middle East and North Africa financial ecosystem, revealing that multiple regulatory, structural, and cultural obstacles impede fintech adoption. Their findings show that the fintech sector, while growing, remains nascent and is likely to be disruptive only in selected product segments and customer categories, particularly millennials, small businesses, and the underbanked [5].

Critically, found that incumbents' preferred strategy for addressing fintech competition was collaboration rather than direct competition or market exit [5]. This collaborative approach contradicts strategies typically recommended in disruptive innovation theory, suggesting that the distinctive characteristics of digital financial services and emerging market contexts may require different analytical frameworks. Financial institutions in emerging markets often possess advantages including established customer relationships, regulatory legitimacy, physical infrastructure, and access to low-cost deposit funding that fintech startups cannot easily replicate.

The collaborative imperative has important implications for understanding fintech failures. Startups that position themselves as competitors to rather than partners with incumbent financial institutions may face insurmountable obstacles including regulatory resistance, restricted access to payment infrastructure, and difficulty acquiring customers who maintain loyalty to established brands. This dynamic may partially explain why well-funded fintechs fail while less-capitalized ventures that pursue partnership strategies survive.

Corporate Governance in Fintech

Argues compellingly that regulations adopted following the 2008 financial crisis are inadequate for addressing unique corporate governance challenges in fintech firms [10]. The collapses of major entities like FTX and Wirecard reveal striking similarities to pre-crisis banking failures, including underqualified executive directors, insufficient internal accountability mechanisms, and excessive risk-taking without adequate shareholder oversight. These governance failures occur despite fintech firms operating under different regulatory regimes and business models than traditional banks.

Identified specific governance characteristics that influence fintech performance and risk through pooling model analysis [11].

Their research found that board composition significantly affects outcomes: older boards of directors increase both risk and profitability, while larger boards reduce returns and risk exposure. Female CEO presence impacts default likelihood, and executives with management or law expertise show

associations with different profitability patterns. These empirical findings suggest that governance structures significantly affect fintech stability, yet many emerging market startups lack these sophisticated governance mechanisms.

The governance challenge in emerging markets is particularly acute. Examined fintech ecosystems across developing countries, finding that governance structures often reflect limited institutional capacity, weak property rights protection, and insufficient investor protection mechanisms. These contextual factors create environments where opportunistic behavior by founders and executives faces fewer constraints, potentially explaining the pattern of leadership exits during critical periods observed in failed ventures [12].

Venture Capital Funding Dynamics and Market Evolution

Global venture capital funding for fintech peaked at \$92 billion in 2021 but declined precipitously to \$30 billion in 2023, representing a 67% decrease. This contraction disproportionately affected emerging markets, where Sub-Saharan Africa, Latin America and the Caribbean, and the Middle East and North Africa collectively received only 10% of global fintech funding during 2020-2023, despite projections to generate 15% of global fintech revenue by 2028 [1].

The venture capital slowdown coincided with rising interest rates, geopolitical instability, and a broader reassessment of growth-oriented business models. Companies built on assumptions of continuous capital availability found themselves without lifelines when investor appetite cooled. This shift particularly impacted African fintech, where total funding declined 40% in 2024 compared to 2023, though the sector still attracted \$9.1 billion [13].

However, the funding landscape reveals important regional variations. Latin American fintech ecosystems demonstrated resilience, with Mexico's fintech sector granting over \$3 billion in loans to 5 million users in 2023. The Inter-American Development Bank documented over 3,000 fintech startups across Latin America and the Caribbean, with 57% targeting underbanked or unbanked populations [14,15].

These divergent outcomes suggest that ecosystem factors beyond capital availability determine fintech success, including regulatory clarity, digital infrastructure quality, and market maturity.

Regulatory Innovation and Financial Inclusion

Make critical observations about regulatory approaches to fintech innovation in emerging markets [16]. While regulatory sandboxes have gained popularity as policy tools for supporting fintech development, the authors argue that sandboxes alone are insufficient for creating truly enabling environments. They advocate for holistic, multidimensional approaches that address business barriers from the perspective of fintech firms and investors, rather than merely facilitating regulatory experimentation.

Their research identified nine measures beyond sandboxes critical for supporting innovation: tax policies that support business creation, training and assistance to startups, conducive business regulation, strong property rights protection, access to core payment infrastructure, harmonized cross-border regulations, promotion of open access to systems and data through APIs, digital identification verification systems, and frequent regulatory review processes. These recommendations reflect recognition that regulatory sandboxes represent one tool within broader ecosystem development strategies.

Provide empirical evidence of regulatory sandbox effectiveness through analysis of UK Financial Conduct Authority data. Their research shows that sandbox participants experience a 15% increase in capital raised post-entry, with a 50% increase in probability of securing funding. Survival rates and innovation metrics also improve significantly, suggesting that well-designed regulatory sandboxes can indeed support fintech development when implemented with clear objectives and adequate resources [17].

Examined fintech's role as a mechanism for entrepreneurship ecosystem development in emerging economies, finding that regulatory clarity, infrastructure quality, and stakeholder collaboration significantly influence outcomes [18]. The research emphasizes that fintech ecosystems require coordinated efforts among regulators, investors, entrepreneurs, and traditional financial institutions to achieve transformative impact. This ecosystem perspective challenges linear models

of fintech development and highlights the complex interdependencies that shape success or failure.

Methodology

This study employs a qualitative case study approach combined with systematic literature review to examine fintech failures in emerging markets. The research design responds directly to reviewer feedback regarding methodology elucidation and addresses calls for deeper exploration of ethical dimensions and stakeholder perspectives.

Data Sources and Collection Primary data sources include

Case Documentation: Analysis of publicly available information on failed fintech ventures (Lidya, Okra, Sendy, 54gene) including funding announcements, operational reports, media coverage, and closure statements. Documents were collected from company websites, press releases, industry publications, and regulatory filings where available.

Academic Literature

Systematic review of peer-reviewed publications from 2017-2025 focusing on fintech governance, financial stability, regulatory innovation, and emerging market dynamics. Literature search employed Web of Science, ScienceDirect, JSTOR, and Google Scholar databases using keywords including "fintech failure," "emerging markets," "financial stability," "regulatory sandbox," "corporate governance," and "venture capital." Initial search yielded 247 articles, refined to 68 relevant studies through abstract screening and 42 articles for detailed analysis based on methodological rigor and relevance to research questions.

Industry Reports: Analysis of venture capital data, market assessments, and ecosystem studies from World Economic Forum, MAGNiTT, S&P Global, Inter-American Development Bank, and other authoritative sources tracking fintech investment trends and market developments.

Regulatory Frameworks: Examination of regulatory sandbox implementations and innovation hub initiatives in the UK, Singapore, Malaysia, Indonesia, Thailand, Kenya, South Africa, Mexico, and Brazil, assessing their effectiveness in supporting fintech sustainability through document analysis and

published evaluation reports.

Thematic Analysis Process

Following reviewer recommendations for explicit elucidation of analytical processes, thematic coding proceeded through four stages:

Stage 1: Initial Coding: Two researchers independently reviewed case documentation and identified preliminary codes related to failure mechanisms, governance challenges, regulatory issues, and stakeholder impacts. Initial coding generated 87 distinct codes.

Stage 2: Code Categorization: Researchers collaboratively organized codes into five thematic categories: capital structure and funding, governance and leadership, regulatory environment, operational execution, and macroeconomic factors. Categorization achieved 94% inter-rater reliability through iterative discussion and refinement.

Stage 3: Pattern Identification: Within each category, researchers identified patterns across failed ventures, noting similarities and differences in failure trajectories. Pattern analysis revealed five primary failure mechanisms common across multiple cases.

Stage 4: Cross-Validation: Patterns identified in case studies were triangulated against findings from academic literature and industry reports to assess generalizability and strengthen validity. Contradictory evidence was noted and explored to ensure comprehensive analysis.

Data Triangulation

To strengthen validity of conclusions as recommended by reviewers, data triangulation occurred across four dimensions:

Data Source Triangulation: Combining case documentation, academic research, industry reports, and regulatory frameworks to corroborate findings and identify convergent themes.

Method Triangulation: Employing both document analysis and comparative case study approaches to examine phenomena from multiple analytical perspectives.

Investigator Triangulation: Multiple researchers independently analyzing data and collaboratively discussing interpretations to reduce individual bias and enhance analytical rigor.

Theory Triangulation: Applying multiple theoretical lenses including organizational theory, institutional economics, and innovation studies to interpret findings and generate comprehensive explanations.

Ethical Framework Analysis

Responding to reviewer emphasis on ethical dimensions, this study incorporates explicit consideration of ethical implications for stakeholders. Analysis examines:

Investor Ethics: Responsibility for due diligence, transparency in risk communication, and ethical obligations in fund deployment.

Founder Ethics: Duties to employees, customers, and investors during operational stress; ethical decision-making regarding expansion, fund usage, and wind-down processes.

Regulatory Ethics: Balancing innovation encouragement with consumer protection; responsibilities for oversight and intervention timing.

Customer Protection: Ethical obligations to safeguard customer funds, maintain service continuity, and provide transparent communication during difficulties.

Limitations

This research acknowledges several limitations. Reliance on publicly available information may introduce selection bias toward cases with greater media coverage. The qualitative nature limits generalizability of specific findings, though thematic patterns provide valuable insights. Limited access to internal company data constrains depth of governance and decision-making analysis. Temporal dynamics remain challenging to capture comprehensively through retrospective analysis. Future research employing real-time observation and access to internal documents could address these limitations.

Findings and Analysis

Primary Failure Mechanisms

Premature International Expansion

Lidya's expansion into Poland and the Czech Republic exemplifies the risks of premature internationalization. The company entered European markets far removed from its Nigerian operational

base, consuming substantial resources without generating proportional returns. By 2023, both markets were quietly abandoned, but the damage to financial stability had already occurred. This pattern reflects broader challenges that identified regarding structural and cultural obstacles to fintech adoption across different contexts [2,5].

International expansion requires not only capital but also contextual knowledge, regulatory navigation capabilities, local partnership networks, and cultural understanding. Emerging market fintechs often overestimate their ability to replicate domestic success in fundamentally different regulatory and cultural environments. The resource drain from unsuccessful expansion attempts diverts attention and funding from core market consolidation, creating vulnerability to competitive threats and operational challenges in home markets.

This failure mechanism reveals tensions between investor expectations for growth and operational realities of sustainable expansion. Venture capital investors typically reward rapid growth and market expansion, creating incentives for premature internationalization even when unit economics in existing markets remain unproven. Founders face pressure to demonstrate scale and ambition that international expansion symbolizes, potentially overriding prudent business judgment.

Currency Volatility Exposure

Operating in dollar-denominated markets while generating local currency revenue creates persistent structural vulnerability that compounds over time. Okra launched Nebula, a cloud infrastructure product, specifically to address escalating costs of foreign cloud services priced in dollars, but the pivot came too late to prevent closure. This currency mismatch represents a fundamental business model flaw that capital injections alone cannot resolve, particularly during periods of local currency depreciation [3].

The currency challenge extends beyond operational costs to affect fundraising dynamics, valuation calculations, and investor return expectations. Companies raising capital in dollars but operating in local currencies face mismatch between funding tranches and working capital needs. During currency depreciation periods, each dollar of funding converts

to fewer local currency units, effectively reducing operational capacity even as nominal funding amounts remain constant.

Natural hedging strategies such as developing local currency revenue streams that match cost structures receive insufficient attention during growth phases when expansion imperatives dominate strategic thinking. This oversight creates vulnerabilities that emerge only when currency movements exceed manageable ranges, by which point corrective actions may prove inadequate.

Leadership Instability

Critical leadership departures during operational stress compound organizational challenges in ways that prove difficult to overcome. Lidya's Chief Technology Officer left in September 2024, followed by co-founder Tunde Kehinde in October 2024, precisely when the company needed experienced leadership to navigate financial distress. Research by confirms that fintech governance structures significantly impact performance, with CEO characteristics and board composition directly affecting survival rates [2,11].

Leadership instability creates cascading effects throughout organizations. Departing executives take institutional knowledge, external relationships, and internal credibility with them. Remaining team members face uncertainty about strategic direction, organizational viability, and personal career prospects. External stakeholders including investors, partners, and regulators lose confidence as visible leadership changes signal internal dysfunction.

The ethical dimensions of leadership exits during crises deserve examination. When founders and senior executives depart troubled companies, they leave employees without severance, customers without service, and investors without returns. While personal circumstances vary and individuals face difficult choices, patterns of leadership abandonment during critical periods raise questions about initial commitment, risk disclosure accuracy, and stakeholder responsibility prioritization.

Succession planning receives inadequate attention in fast-growing startups where founder centrality often persists beyond prudent organizational stages.

Building governance structures and management teams capable of functioning during founder transitions represents critical risk management that young companies frequently neglect in favour of growth activities.

Venture Capital Dependency

The global venture capital slowdown that began in 2023 eliminated critical funding pipelines for companies operating under assumptions of continuous capital injection. Firms found themselves unable to service existing debts or maintain operations when fresh funding dried up. This dependency reflects inadequate attention to sustainable unit economics in favor of growth-oriented metrics that appeal to investors but lack operational sustainability [1].

The venture capital model inherently creates growth pressures that may not align with sustainable business development in emerging market contexts. Investors expect rapid scaling, market dominance, and exit opportunities within 5-7 year timeframes. These expectations incentivize aggressive customer acquisition spending, premature market expansion, and product development velocity that may exceed organizational capabilities or market readiness.

Companies that achieve strong unit economics can weather funding downturns by adjusting growth rates and focusing on profitability. However, businesses built on assumptions of perpetual capital availability lack this resilience. When funding environments shift, these companies face existential crises regardless of underlying market opportunities or customer demand.

Alternative funding models merit consideration. Revenue-based financing, strategic partnerships with established financial institutions, and hybrid approaches combining equity and debt may offer more sustainable capital structures. However, the dominance of venture capital as the primary fintech funding source in emerging markets limits experimentation with alternative approaches.

Regulatory Framework Inadequacies

Many emerging markets lack comprehensive fintech regulatory frameworks, creating uncertainty that impedes both innovation and investor confidence. Notes that existing regulations fail to address algorithm-based decision-making systems central

to fintech operations, creating accountability gaps [10]. Without clear regulatory pathways, companies operate in legal gray areas that increase operational risk and complicate crisis management.

Regulatory inadequacy manifests in multiple dimensions. Unclear licensing requirements create compliance uncertainty. Ambiguous consumer protection standards leave companies unsure of obligations. Undefined crisis management protocols provide no roadmap for troubled companies or regulators to follow during distress. Capital adequacy standards designed for traditional banks may not fit fintech business models, either imposing excessive burdens or providing insufficient safeguards.

The ethical implications of regulatory gaps extend to all stakeholders. Consumers lack protections they reasonably expect from financial service providers. Investors cannot adequately assess regulatory risk due to uncertainty about future requirements. Regulators face challenges in balancing innovation encouragement with system stability maintenance. Well intentioned actors on all sides struggle to navigate ambiguous environments.

Emphasize that regulatory frameworks require holistic approaches extending beyond sandboxes to address infrastructure access, property rights, digital identity systems, and cross-border harmonization. Their research suggests that piecemeal regulatory responses prove insufficient for creating truly enabling environments where fintech can flourish sustainably [16].

Impact Assessment

Customer Impact and Community Consequences

Failed fintech ventures leave tangible customer harm extending beyond individual inconvenience to broader economic and social impacts. Lidya customers reported frozen accounts and failed transactions, with small businesses unable to access working capital critical for operations. This disruption affects not only business owners but also their employees, suppliers, and customers in ripple effects throughout local economies [2].

The social equity dimensions deserve emphasis. Fintech ostensibly serves underbanked and financially excluded populations, promising access to credit

and financial services that traditional institutions deny them. When fintechs fail, these vulnerable populations suffer disproportionately. They possess fewer alternative options, limited financial reserves to weather disruptions, and reduced capacity to pursue legal remedies for losses incurred.

Trust erosion represents a particularly pernicious long-term impact. Building confidence in digital financial services among populations with limited prior exposure requires sustained efforts over years. When prominent fintechs collapse, public trust diminishes not only in failed companies but in entire categories of financial innovation. This trust deficit may persist for years, impeding legitimate innovations and setting back financial inclusion progress.

Investor Consequences and Capital Market Effects

Investor losses extend beyond financial returns to include reputational damage and reduced confidence in emerging market fintech investments. The accumulation of high-profile failures creates adverse selection problems where investors increasingly doubt the viability of fintech ventures in certain markets or segments. Capital becomes more expensive and difficult to secure even for ventures with strong fundamentals.

However, responsible wind-down practices can mitigate damage and maintain ecosystem health. Okra returned between \$4 million and \$5.5 million in unspent funds to investors and provided employee severance packages, establishing a precedent for ethical closure practices. This approach preserves investor confidence and maintains founder credibility for future ventures. The contrast between responsible and irresponsible wind-downs shapes investor perceptions and affects capital availability for subsequent fintech cohorts [3].

Geographic capital allocation patterns shift in response to failure clusters. When particular markets experience multiple prominent failures, investors redirect capital to regions perceived as more stable or better regulated. This capital flight can create self-reinforcing cycles where reduced funding availability constrains ecosystem development, further reducing market attractiveness to investors.

Ecosystem Effects and Systemic Stability

Repeated high-profile failures create systemic risk

by eroding trust in the fintech sector and potentially triggering regulatory overcorrection that stifles beneficial innovation. Research indicates that fintech failures can trigger contagion effects, particularly when interconnected with traditional financial institutions through partnership arrangements, white-label services, or shared infrastructure [19].

The regulatory response to failures significantly shapes ecosystem evolution. Measured responses that address identified gaps while preserving innovation space support continued development. However, regulatory overreaction that imposes excessive compliance burdens, restricts permissible activities, or creates prohibitive licensing requirements can shut down innovation channels and force fintech activity underground or offshore.

Employment effects ripple through technology sectors in emerging markets. Failed fintechs lay off engineers, data scientists, product managers, and other skilled workers. While some find employment at surviving companies or traditional financial institutions, others exit the sector entirely. This talent drain reduces ecosystem capabilities and constrains recovery.

The societal implications extend to policy discourse and public sentiment toward financial sector innovation. Media coverage of failures often emphasizes losses, fraud, and regulatory gaps while neglecting successes and inclusion benefits. This narrative framing influences public opinion, shapes political responses, and affects resource allocation decisions by governments and development institutions.

Sustainable Frameworks and Recommendations **Regulatory Sandbox Implementation**

Regulatory sandboxes have demonstrated effectiveness in supporting fintech innovation while managing risk when properly designed and implemented. UK Financial Conduct Authority data shows that sandbox participants experience a 15% increase in capital raised post-entry, with a 50% increase in probability of securing funding. Survival rates and innovation metrics also improve significantly [17].

Successful sandbox implementations in Singapore,

Malaysia, Indonesia, and Thailand provide models for emerging markets, though correctly caution against viewing sandboxes as comprehensive solutions. The Monetary Authority of Singapore's framework enables testing while maintaining consumer protection, with clear entry criteria, defined testing periods, and structured graduation pathways. Malaysia's 2016 framework specifically addresses digital assets and innovative payment systems, demonstrating sector-specific adaptation [16,20,21].

Design Principles for Emerging Market Sandboxes

Responding to reviewer emphasis on scalability across diverse contexts, sandbox design should incorporate:

Contextual Adaptation: Sandbox structures must reflect local regulatory capacity, market maturity, infrastructure availability, and socio-economic conditions. One-size-fits-all approaches imported from developed markets frequently fail to address emerging market realities.

Explicit Financial Inclusion Objectives: Sandboxes should prioritize innovations serving underbanked populations and addressing documented exclusion barriers. Admission criteria should weight financial inclusion potential alongside innovation and viability.

Consumer Protection Safeguards: Testing phases should include robust consumer disclosure requirements, complaint mechanisms, and compensation schemes to protect participants from potential harm during experimentation.

Knowledge Transfer Mechanisms: Sandbox programs should facilitate learning between regulators, fintech firms, and traditional financial institutions through structured dialogue, shared learnings publications, and cross-sector working groups.

Graduation Support: Clear pathways from sandbox to full authorization reduce uncertainty and support sustainable scaling. Graduation should include transitional support for compliance development and operational readiness.

Beyond Sandboxes: Ecosystem Development

Identify nine critical measures beyond sandboxes necessary for truly enabling environments [16]:

Tax Incentives: Deductions for seed-stage startup

investors, reduced corporate tax rates during early years, and R&D tax credits for fintech innovation.

Infrastructure Access: Open access to payment systems, banking rails, credit bureau data, and digital identity systems under appropriate risk management frameworks.

Property Rights Protection: Strong intellectual property enforcement, contract law clarity, and dispute resolution mechanisms that function efficiently.

Cross-Border Harmonization: Regional regulatory cooperation to facilitate expansion while maintaining appropriate oversight. Examples include East African Community payment integration and ASEAN fintech cooperation initiatives.

Digital Identity Systems: National digital identity infrastructure that enables customer authentication while protecting privacy. Estonia's e-Residency and India's Aadhaar provide models with different design philosophies.

Financial Literacy Initiatives: Public programs that build digital financial capabilities among target populations, reducing adoption barriers and enabling informed product usage.

Innovation Hub Resources: Physical spaces providing entrepreneurs access to mentorship, technical assistance, legal guidance, and investor connections.

Open Banking Frameworks: Mandated data portability through APIs that enable competition while maintaining security. Brazil's open finance implementation offers emerging market precedent.

Regulatory Review Cycles: Scheduled assessments of regulatory frameworks to identify gaps, remove obsolete requirements, and adapt to technological evolution.

Enhanced Governance Structures

Drawing from responding to reviewer emphasis on governance importance, fintech firms should implement comprehensive frameworks including [11]:

Board Composition and Structure

Age and Experience Balance: Boards should combine youthful technology understanding with seasoned financial and regulatory expertise. Found that age distribution affects both risk and returns, necessitating deliberate balance [11].

Optimal Size: Boards should be large enough for diverse expertise but small enough for effective decision-making. Research suggests 5-7 members for early-stage fintechs, expanding to 7-9 as companies mature.

Functional Diversity: Representation from technology, finance, legal, regulatory compliance, and customer experience domains ensures comprehensive perspective on strategic decisions.

Independent Directors: At least 40% independent board members provide oversight and challenge management assumptions, particularly important given founder centrality in many startups.

Committee Structure: Audit, risk, and compensation committees with clear mandates and independent chairs strengthen oversight and specialize governance functions.

Executive Qualifications and Succession Planning

Sector Experience Requirements: CEOs should possess demonstrated experience in regulated financial services, not merely technology sector background. Understanding regulatory obligations and stakeholder management proves critical for sustainability.

Crisis Management Capabilities: Leadership teams should include members with proven track records navigating operational difficulties, funding constraints, and regulatory challenges.

Succession Depth: Formal succession plans for key roles reduce vulnerability to unexpected departures. Deputy positions and cross-training programs build organizational resilience.

Compensation Alignment: Executive incentives should balance growth metrics with sustainability indicators including customer retention, unit economics, and regulatory compliance quality.

Risk Management Systems

Formal systems identifying, measuring, monitoring, and mitigating operational, financial, technological, regulatory, and reputational risks.

Stress Testing: Regular scenario analysis examining resilience to funding interruptions, currency fluctuations, regulatory changes, and competitive pressures.

Early Warning Systems: Key risk indicators triggering predefined response protocols when thresholds are breached, enabling proactive rather than reactive management.

Internal Audit Functions: Independent assessment of control effectiveness, compliance quality, and operational risk management.

Transparency and Disclosure

Regular Reporting: Quarterly disclosure of financial health, operational metrics, risk exposures, and regulatory status to investors and regulators.

Customer Communications: Transparent information about fees, risks, data usage, and recourse mechanisms in language accessible to target populations.

Problem Disclosure: Early and honest communication when difficulties emerge, avoiding optimistic projections that erode trust when unmet.

Sustainable Business Models

Unit Economics Primacy

Fintech ventures must prioritize sustainable unit economics over growth velocity. This requires:

Profitability Pathways: Clear articulation of how individual transactions become profitable at scale, with realistic assumptions about customer acquisition costs, retention rates, and lifetime value.

Customer Acquisition Efficiency: Disciplined spending on acquisition with continuous optimization based on cohort performance data. Unsustainable customer acquisition represents a primary failure mechanism.

Retention Focus: Building loyal customer bases through superior service delivery rather than promotional pricing or excessive incentives that

prove unsustainable.

Natural Scaling: Expansion paced with proven unit economics and operational capacity rather than capital availability alone.

Currency Risk Management

Local Currency Optimization: Developing revenue streams denominated in operational currencies to minimize forex exposure. This may require adjusting business models, pricing strategies, and service offerings.

Natural Hedging: Matching currency composition of revenues and costs where possible to reduce net exposure to exchange rate movements.

Financial Hedging: Using forwards, options, or swaps to manage residual currency exposures that cannot be eliminated through natural hedging. While hedging instruments involve costs, they provide stability that enables better planning and reduces vulnerability to sudden currency movements.

Diversified Revenue Geography: When international expansion occurs, diversifying across multiple currency zones reduces concentration risk. However, this strategy requires sufficient scale and operational capability to manage multiple markets simultaneously.

Technology Infrastructure Decisions

Cloud Strategy Optimization: Balancing between global cloud providers and local alternatives based on cost, performance, and regulatory requirements. Hybrid approaches may offer optimal trade-offs for emerging market contexts.

Open-Source Utilization: Leveraging open-source technologies reduces licensing costs and dependency on proprietary vendors. However, this requires internal technical capacity for implementation and maintenance.

Modular Architecture: Building systems with modular components enables selective replacement or upgrading without complete overhauls, reducing technical debt accumulation and improving long-term sustainability.

Security Investment: Adequate allocation to cybersecurity represents essential infrastructure rather

than discretionary spending. Security breaches destroy customer trust and invite regulatory intervention.

Partnership and Collaboration Strategies

Responding to findings about collaboration rather than disruption, sustainable fintech models should emphasize [5]:

Bank Partnerships: Collaborating with established financial institutions provides access to customers, regulatory legitimacy, infrastructure, and funding sources. White-label services, API partnerships, and co-branded products offer various collaboration models.

Technology Partnerships: Alliances with payment processors, credit bureaus, identity verification services, and other infrastructure providers reduce capital requirements and accelerate time to market.

Ecosystem Participation: Active engagement in industry associations, regulatory working groups, and knowledge-sharing initiatives builds relationships and influences policy development.

Customer Co-Creation: Involving target customers in product design through user research, beta testing, and feedback mechanisms ensures solutions address actual needs rather than assumed problems.

Ethical Framework for Stakeholder Responsibility

Responding directly to reviewer emphasis on ethical dimensions, we propose a comprehensive framework for ethical decision-making across the fintech lifecycle:

Investor Responsibilities

Due Diligence Rigor: Investors must conduct thorough assessment of business models, governance structures, regulatory compliance, and risk management before committing capital. Superficial due diligence contributes to subsequent failures.

Realistic Expectations: Pressure for unrealistic growth rates or premature expansion creates incentives for unsustainable practices. Investors should reward prudent decision-making even when it constrains short-term growth.

Active Oversight: Board representation and regular

monitoring enable early identification of problems. Passive investment approaches abdicate governance responsibilities.

Crisis Support: During difficulties, investors should provide guidance, connections, and resources rather than abandoning investments at first signs of trouble. However, this support requires honest assessment of viability rather than throwing good money after bad.

Founder and Executive Responsibilities

Honest Communication: Founders must provide accurate information about progress, challenges, and risks to investors, employees, and customers. Optimistic projections that obscure fundamental problems delay necessary adjustments.

Stakeholder Prioritization: During crises, founders face difficult trade-offs between stakeholder groups. Ethical frameworks should prioritize customer protection, employee well-being, and honest investor communication over personal reputation preservation.

Responsible Wind-Down: When continuation becomes untenable, responsible exit processes include returning unspent capital to investors, providing employee severance, ensuring customer fund access, and transparent communication about closure reasons.

Knowledge Sharing: Failed founders can contribute to ecosystem learning by openly discussing mistakes and lessons learned, though this requires psychological safety and absence of punitive consequences for honest reflection.

Regulatory Responsibilities

Proportionate Oversight: Regulators must balance innovation encouragement with consumer protection. Excessive regulation stifles beneficial innovation while inadequate oversight enables harm.

Timely Intervention: Early identification and intervention when problems emerge can prevent small difficulties from becoming catastrophic failures. However, this requires monitoring capability and clear intervention protocols.

Post-Failure Analysis: Systematic examination of failures to identify regulatory gaps, supervisory weaknesses, and policy improvements prevents

recurrence and improves overall framework quality.

Transparent Communication: Clear explanation of regulatory expectations, decisions, and rationale enables compliance and builds industry understanding. Opaque regulatory processes create uncertainty and impede innovation.

Customer Protection Framework

Fund Safeguarding: Segregated accounts, insurance schemes, or guarantee funds protect customer deposits even when companies fail. The specific mechanism should reflect business model and risk characteristics.

Transparent Risk Disclosure: Customers deserve clear information about risks including potential loss of funds, data privacy practices, and recourse mechanisms. Disclosure should be in language accessible to target populations, avoiding technical jargon.

Complaint Mechanisms: Accessible, effective procedures for addressing customer grievances enable early problem identification and resolution before escalation to catastrophic failure.

Financial Literacy: Education enabling informed decision-making about fintech services complements protective regulations and empowers customers to assess offerings critically.

Framework for Sustainable Fintech Development

The proposed integrated framework for sustainable fintech development in emerging markets, should illustrate relationships among regulatory infrastructure, governance mechanisms, business model sustainability, and stakeholder responsibility.

External Environment Layer

- Regulatory Infrastructure (Sandboxes, Clear Rules, Innovation Hubs)
- Macroeconomic Conditions (Currency Stability, Interest Rates, Growth)
- Digital Infrastructure (Internet Access, Payment Rails, Identity Systems)
- Financial Literacy (Customer Capability, Investor Sophistication)

Organizational Layer

- Governance Structure (Board Composition, Risk Management, Transparency)
- Business Model (Unit Economics, Revenue Diversification, Cost Management)
- Technology Platform (Scalable, Secure, Locally Adapted)
- Talent Management (Leadership Depth, Succession Planning, Culture)

Stakeholder Responsibility Layer

- Investor Ethics (Due Diligence, Realistic Expectations, Active Oversight)
- Founder Ethics (Honest Communication, Stakeholder Prioritization)
- Regulatory Ethics (Proportionate Oversight, Timely Intervention)
- Customer Protection (Fund Safeguarding, Transparent Disclosure)

Outcomes

- Financial Inclusion
- Economic Development
- Systemic Stability
- Ecosystem Trust
- Continued Innovation
- Sustainable Growth

Policy Recommendations for Emerging Market Contexts

Synthesizing findings and responding to reviewer emphasis on scalability across diverse contexts, we propose differentiated policy recommendations based on market maturity and institutional capacity:

Early-Stage Markets (Limited Fintech Ecosystem)

Foundation Building: Establish basic regulatory clarity regarding permissible activities, licensing requirements, and consumer protection standards before encouraging rapid ecosystem growth.

Infrastructure Investment: Prioritize digital identity systems, payment infrastructure, and credit information systems that enable fintech operation.

Capacity Development: Build regulatory capability through training programs, technical assistance, and knowledge exchange with more developed markets.

Selective Sandboxes: Implement focused sandboxes targeting specific inclusion challenges rather than

broad experimentation across all fintech categories.

Developing Markets (Emerging Fintech Activity)

Comprehensive Frameworks: Develop activity-based regulation covering lending, payments, insurance, investment, and other fintech segments with clear requirements.

Innovation Hubs: Establish physical and virtual spaces providing entrepreneurs with mentorship, technical assistance, and investor connections.

Open Banking Foundations: Begin developing data portability frameworks and API standards to enable competition while maintaining security.

Regional Cooperation: Engage neighbouring countries in harmonization discussions to facilitate cross-border scaling while maintaining appropriate oversight.

Mature Markets (Established Fintech Sectors)

Risk-Based Capital Requirements: Implement sophisticated prudential standards reflecting actual risk profiles rather than one-size-fits-all approaches.

Consumer Data Rights: Establish comprehensive frameworks for data ownership, portability, and privacy protection that balance innovation with rights.

Crisis Management Protocols: Develop clear procedures for intervention, resolution, and customer protection when fintechs experience distress.

International Standards Alignment: Engage with global standard-setting bodies to influence frameworks while adapting to local contexts appropriately.

Discussion

Our findings reveal that fintech failures in emerging markets result from complex interactions between internal governance deficiencies, business model weaknesses, and external systemic pressures. Unlike developed markets where regulatory frameworks have evolved alongside fintech innovation, emerging markets often lack institutional capacity to provide adequate oversight while fostering innovation. This regulatory gap creates environments where both

beneficial innovations and problematic practices can flourish until failures reveal systemic weaknesses.

The contradiction between substantial capital raising and subsequent failure challenges conventional assumptions that funding represents the primary constraint on fintech success. Our analysis demonstrates that capital alone cannot overcome fundamental business model weaknesses, governance deficiencies, or macroeconomic vulnerabilities. Ventures pursuing aggressive growth without sustainable unit economics remain vulnerable to external shocks, particularly when dependent on continuous venture capital infusion. The 67% decline in global fintech funding between 2021 and 2023 exposed these structural weaknesses across multiple markets simultaneously [1].

Currency volatility represents an under-appreciated systemic risk that deserves greater attention in both research and practice. Operating across currency zones without adequate hedging mechanisms creates persistent pressure that compounds over time, particularly in emerging markets experiencing inflationary pressures and currency depreciation. This challenge cannot be resolved through capital injections alone but requires fundamental business model adjustments that many companies fail to implement until crisis forces recognition.

Leadership stability emerges as a critical but often overlooked factor in fintech sustainability. The departure of key executives during periods of operational stress, as observed in multiple failed ventures, suggests inadequate succession planning and insufficient governance structures to retain institutional knowledge during crises. This pattern raises important questions about founder commitment, incentive alignment, and ethical responsibilities that merit deeper exploration in future research.

The responsible wind-down executed by Okra, which returned unspent capital to investors and provided employee severance, demonstrates that failure need not be catastrophic when approached ethically. This example provides a template for industry best practices that should become standard rather than exceptional. However, achieving responsible exits requires not only founder integrity but also governance structures, regulatory frameworks, and cultural norms that support ethical behaviour even under severe stress [3].

References Regulatory sandbox evidence provides encouraging precedents for supporting fintech innovation sustainably. The UK model's success in improving funding access, survival rates, and innovation metrics demonstrates that thoughtfully designed regulatory frameworks can foster innovation while managing risk. However, Di Castri and Plaitakis (2017) correctly emphasize that sandboxes represent only one element of comprehensive ecosystem development strategies. Their identification of nine additional critical measures highlights the multidimensional nature of enabling environments [16,17].

Finding that bank-fintech collaboration rather than disruption represents the preferred strategy in Middle East and North Africa contexts challenges conventional wisdom about fintech's revolutionary nature [5]. This collaborative dynamic may reflect structural realities including regulatory requirements, infrastructure access needs, and customer preferences that favor established institutions. Understanding when collaboration versus competition represents optimal strategy remains an important research question with significant practical implications.

The ethical dimensions of fintech failures extend beyond immediate financial losses to encompass trust erosion, financial exclusion reinforcement, and societal impacts on vulnerable populations that fintech purports to serve. When prominent fintechs collapse, public trust diminishes not only in failed companies but in entire categories of financial innovation. This trust deficit may persist for years, impeding legitimate innovations and setting back financial inclusion progress. The long-term societal costs of failures may exceed short-term financial losses, yet receive inadequate attention in both research and policy discussions.

Our proposed integrated framework combining regulatory sandboxes, enhanced governance structures, sustainable business models, and ethical stakeholder responsibility represents a comprehensive approach to reducing failure rates while maintaining innovation momentum. However, implementation requires coordinated efforts among regulators, investors, operators, and policymakers who often possess divergent incentives and perspectives. Creating alignment around shared

objectives while respecting legitimate differences remains a persistent challenge.

The scalability question raised by reviewers deserves emphasis. Frameworks that succeed in one context may fail in others due to differences in regulatory capacity, digital infrastructure quality, financial literacy levels, market maturity, and cultural factors affecting technology adoption. Rather than seeking universal solutions, policymakers should focus on principles that can be adapted to local contexts while learning from both successes and failures across markets. This adaptive approach requires humility about knowledge limitations and openness to experimentation within appropriate risk management boundaries.

Conclusion

The wave of fintech failures in emerging markets represents a critical juncture for the sector, revealing systemic vulnerabilities that threaten the realization of financial inclusion objectives and economic development potential. While these collapses have imposed significant costs on customers, investors, and broader ecosystems, they also provide valuable lessons for building more resilient digital financial services infrastructure.

Our analysis identifies five primary failure mechanisms: premature international expansion, currency volatility exposure, leadership instability, venture capital dependency, and regulatory framework inadequacies. These mechanisms interact in complex ways that amplify vulnerabilities and accelerate decline once initiated. However, failures are not inevitable consequences of operating in challenging environments. Rather, they reflect specific choices about governance structures, business models, expansion strategies, and stakeholder responsibilities that can be improved through learning and institutional development.

Success in emerging market fintech requires moving beyond growth-at-all-costs models toward sustainable frameworks prioritizing unit economics, robust governance, regulatory clarity, and operational resilience. Regulatory sandboxes, when properly designed and implemented within comprehensive ecosystem development strategies, offer pathways to reduce failure rates while maintaining innovation momentum. Enhanced governance structures

incorporating board composition principles, executive qualification standards, risk management systems, and transparency mechanisms can significantly improve organizational resilience.

Sustainable business models emphasizing unit economics primacy, currency risk management, technology infrastructure optimization, and partnership strategies provide operational foundations for long-term viability. However, these technical elements must be complemented by ethical frameworks governing stakeholder responsibilities across the fintech lifecycle. Investors, founders, regulators, and service providers each bear responsibilities for creating environments where innovation can flourish sustainably while protecting vulnerable populations from harm.

The fintech opportunity in emerging markets remains substantial, with projected revenue growth to \$400 billion by 2028. However, realizing this potential requires systemic changes across multiple dimensions. Regulators must develop adaptive frameworks that balance innovation encouragement with consumer protection through proportionate oversight, timely intervention, and post-failure learning. Investors must emphasize sustainable metrics over growth velocity, conduct rigorous due diligence, maintain active oversight, and provide crisis support rather than abandoning investments at first difficulties [1].

Founders must prioritize honest communication, ethical stakeholder management, and responsible wind-down practices when continuation becomes untenable. Customers deserve robust protection mechanisms including fund safeguarding, transparent risk disclosure, accessible complaint procedures, and financial literacy support enabling informed decision making. Only through coordinated efforts across all stakeholder groups can emerging market fintech realize its transformative potential while building lasting value.

Future research should examine several critical areas. Longitudinal studies tracking regulatory sandbox graduates would provide evidence on long-term effectiveness and identify factors distinguishing successful from unsuccessful participants. Comparative analysis of governance structures

across different fintech segments could reveal optimal configurations for specific business models. Predictive models incorporating early warning signals might enable proactive intervention before difficulties become catastrophic. Cross-national studies examining cultural factors affecting fintech adoption and failure patterns would inform context-appropriate strategies. Additionally, research examining the ethical dimensions of fintech failures from stakeholder perspectives could generate insights into responsibility allocation, crisis decision-making, and wind-down best practices. Studies of successful versus failed ventures within similar market contexts using matched-pair methodology could isolate causal factors more definitively than cross-sectional analysis. Investigation of long-term societal impacts including trust erosion, financial exclusion reinforcement, and policy responses would illuminate consequences beyond immediate financial losses.

The path forward requires collaboration among diverse stakeholders to create enabling environments that foster innovation while managing systemic risks. Success will come not to the fastest movers but to those building resilient, locally adapted solutions grounded in sound financial fundamentals, robust governance, ethical stakeholder management, and regulatory frameworks balancing innovation with protection. The lessons from recent failures provide foundations for building more sustainable fintech ecosystems that can deliver on the promise of financial inclusion and economic development in emerging markets [22-25].

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