Health Economics and Sustainability Model of Digital Transformation of Public Health

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INTRODUCTION

India's healthcare serves 1.4 billion across 12 lakh facilities. Government expenditure on health rose by 110% between 2017 and 2025 (₹47,353 to ₹99,859 crore). India lags its National Health Policy target of 2.5% of GDP[3] by 2025[1]. Despite this scale, the ecosystem is marked by fragmented systems, poor EHR interoperability and prevalence. Higher out of pocket expenditure, less efficient patient care and limited evidence for public health action is the result[2]. Ayushman Bharat Digital Mission (ABDM), launched nationwide in 2021, seeks to create a federated digital health architecture. National adoption at the point of care remains inconsistent, private sector reluctance, and frontline resistance (workload and training). This reseacrh aims to identify gaps and suggest a unified, evidence-based mechanism to measure economic value, long-term sustainability, and health impact.

METHODOLOGY

Secondary research: Reviewed global & national policies (WHO Digital Health Strategy 2020–25, OECD HSPA, NHP 2017, NDHB, ABDM) to develop an evaluation framework[3,4].

Figure 1: 5-Pillar WHO foundation for Digital Health

STRATEGY GOVERNANCE | INFRASTRUCTURE INTEROPERABILITI | EQUITY & ACCESS | SERVICE DELIVERY & INNOVATION | MONITORING & IMPACT

Overall Enabling Environment
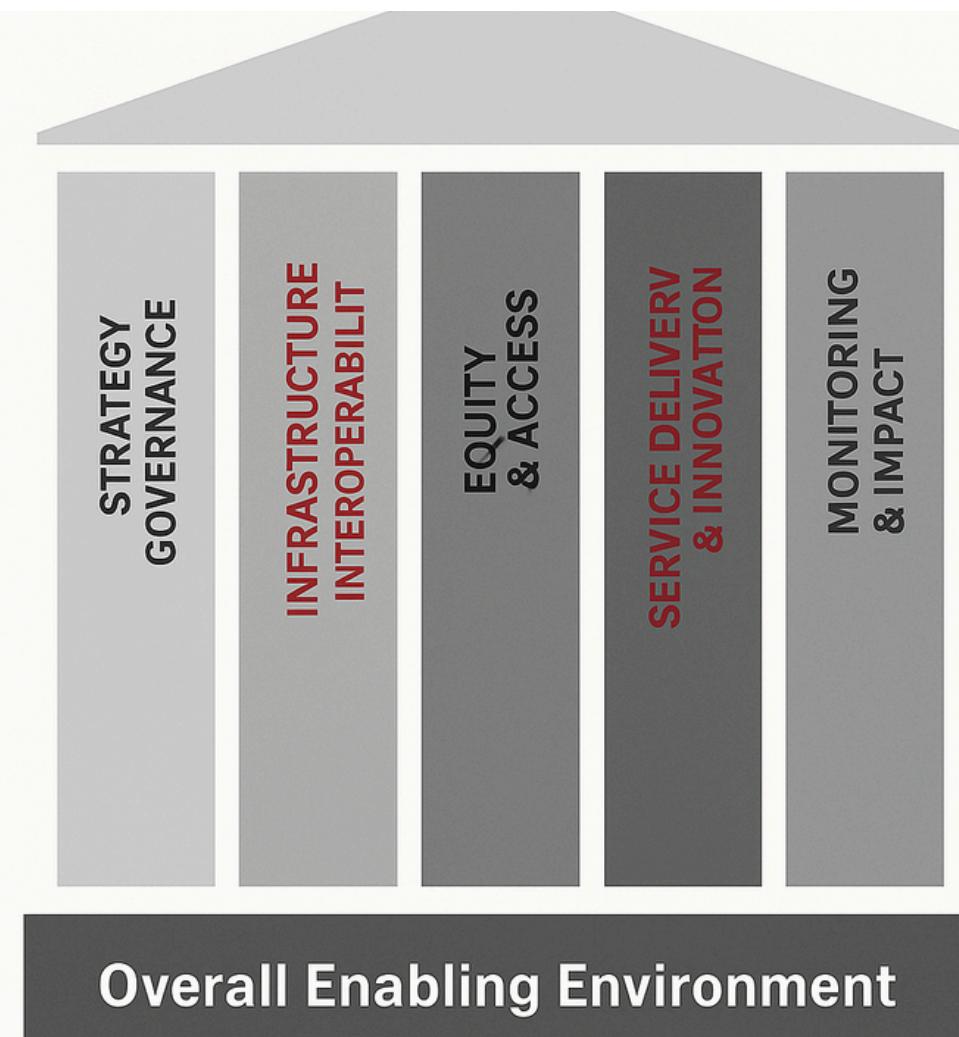
Economic metrics: Assessed standard global models like ICER, NPV, BCR, and SROI for cost-benefit suitability[5].

Primary research: 20 stakeholder interviews, thematically coded with sentiment analysis to capture implementation challenges, awareness, and suggestions.

Synthesis: Integrated findings from secondary and primary research to evaluate ABDM deployment and utilization across states and make recommendations.

RESULTS

Table 1: Evaluation of ABDM Microsite Pilot Maharashtra PATH Project [6,7]

| PILLAR	INDICATORS	CASE DATA	SCORE (0–5)
Strategy & Governance	Local strategy & execution capacity	Pilot endorsed by NHA & state; replicated in 100+ microsites. Suits the target scale	3.5
Infrastructure & Interop.	Registry & HMIS adoption	91% facility registration; 86% HMIS adoption; 5,000+ EHRs	4
Equity & Access	Private sector inclusion	Urban clinics onboarded; limited rural/low-income outreach	2.5
Service Delivery & Innovation	Digital workflow utilization	HMIS implemented, ABHA-linked records generated. Unsure ongoing performance.	3
Monitoring & Impact	Adoption data & feedback loops	Metrics tracked; feedback captured but not institutionalized	3
Overall	Positive indicator Grade B	Ready for replication and scale	16 /25

Figure 2: Potential Cost-Benefit Assessment Metrics[5]

ICER: Incremental Cost-Effectiveness Ratio
NPV: Net Present Value
BCR: Benefit-Cost Ratio
SROI: Social Return on Investment
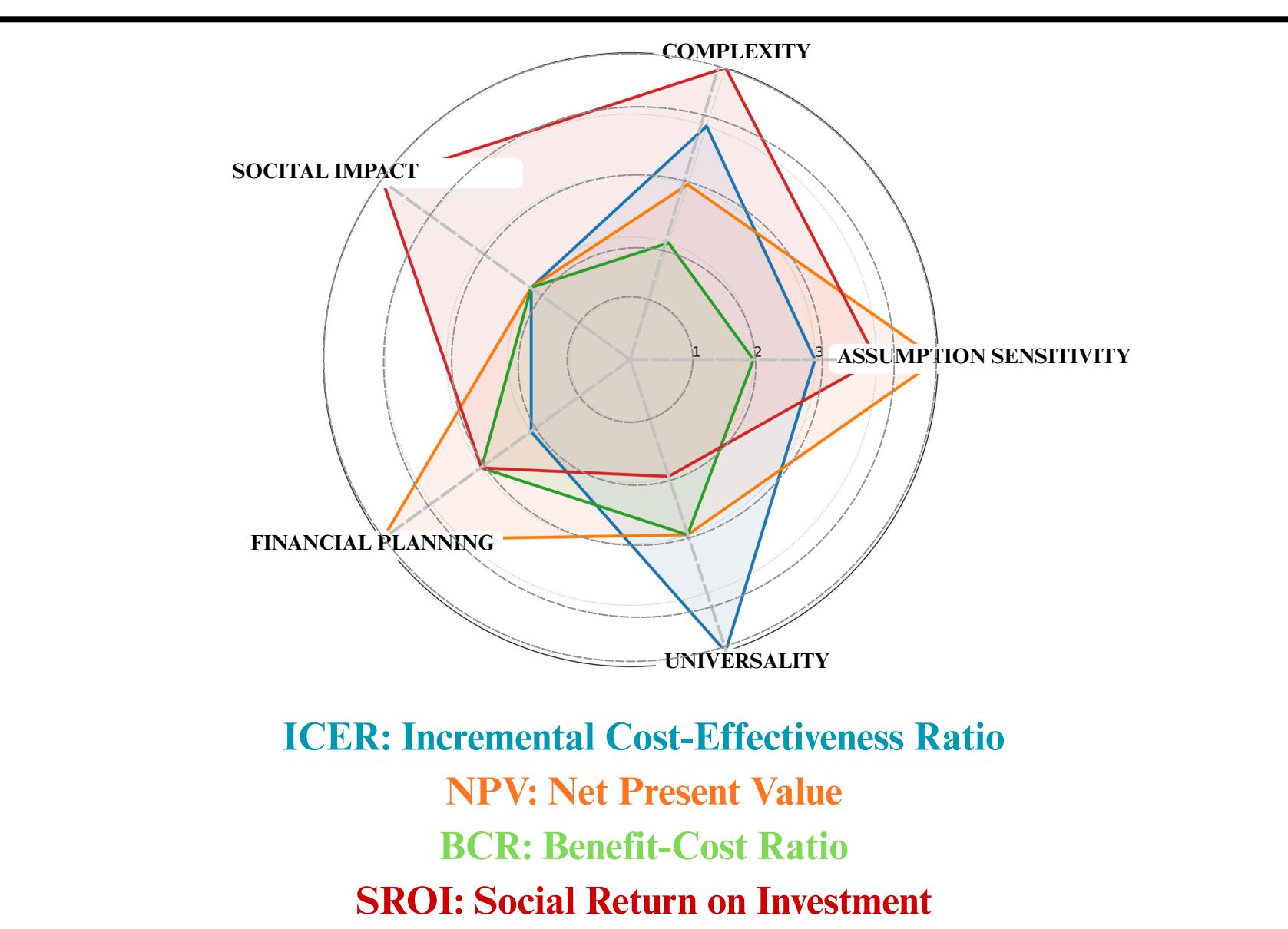
Table 3: Stakeholder Distribution Summary

STAKEHOLDER SUB-GROUP	DISTRIBUTION (N=20)	COMPOSITION	PRIMARY UNIQUE INSIGHTS
Stewards	8	Policy makers, regulators, administrators	Strong on governance, accountability; demand long-term strategy
Risk Managers	4	Insurers, TPAs, payors	Interested in fraud reduction, affordability, data sharing
Frontline Enablers	3	Clinicians, PHOs	Highlight workload burden, need for training, workflow integration
Knowledge Builders	5	Academics, think tanks	Critical of equity gaps, stress evidence-driven evaluation

Figure 3A: Aggregate Stakeholder Sentiment Heatmap

SENTIMENT KEYWORD (N=20)				
SENTIMENT	POSITVE SCORE	NEGATIVE PRESENCESE SCORE	NET SENTIMENT SCORE	TOTAL MENTIONS
Friction Adoption	11	-78	-67	89
Hope Transform	80	0	80	80
Trust Infra	59	-4	55	63
Equity Gap	7	-36	-29	43
Apathy Disengaged	1	-8	-7	9
Risk Privacy	0	-9	-9	9
TOTAL	158	-135	23	293

≤ -100   -50   0   50   ≥ +100
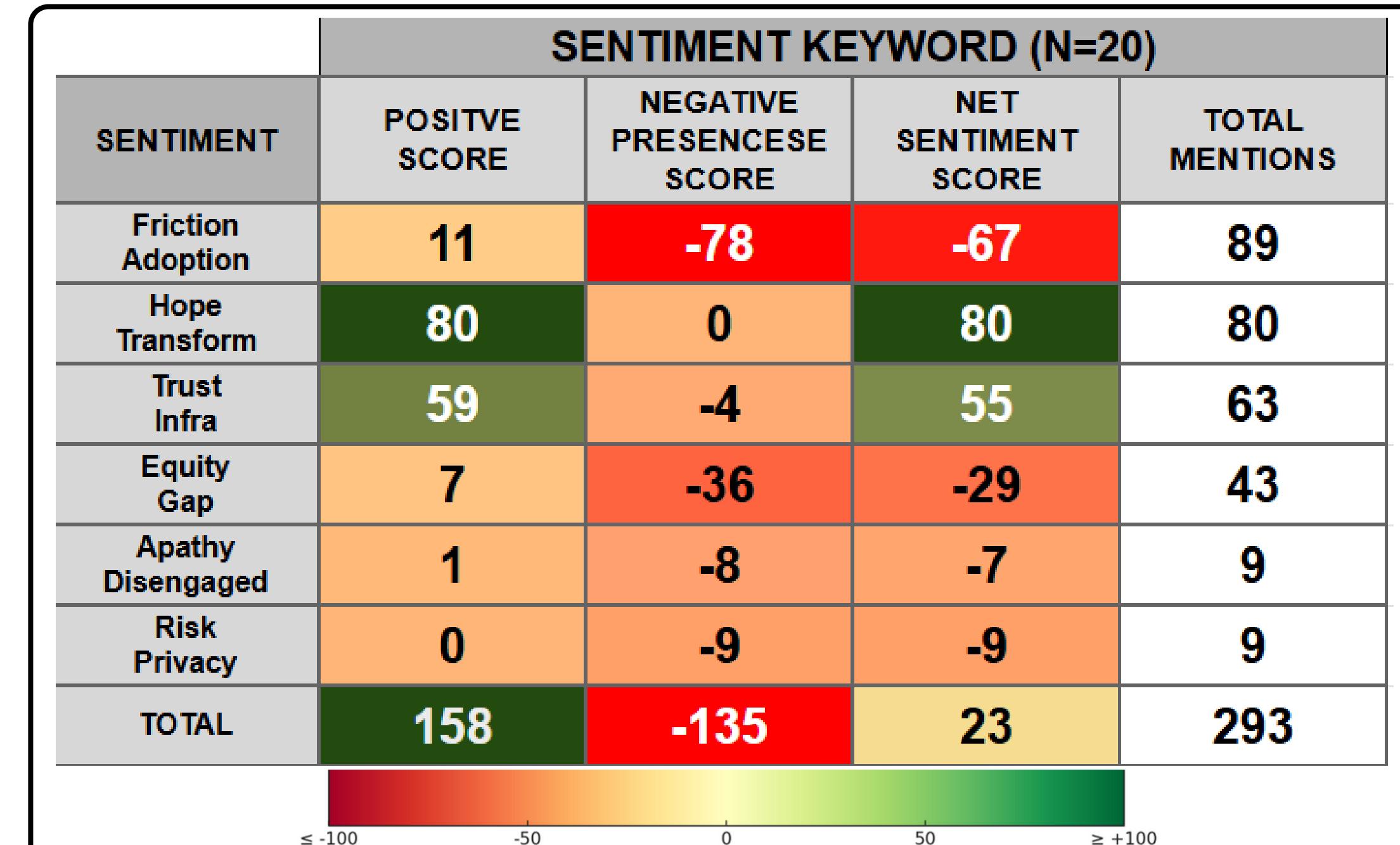
Figure 3B: Sentiment Heatmap by Stakeholder Category

SENTIMENT	STAKEHOLDER SUB-GROUP NET SCORE (N=20)			
	STEWARD INTERVIEWEES	ENABLER INTERVIEWEES	BUILDER INTERVIEWEES	RISK-MANAGER INTERVIEWEES
Friction Adoption	-30	-1	-14	-22
Hope Transform	31	15	23	11
Trust Infra	23	6	15	11
Equity Gap	-10	-3	-6	-10
Apathy Disengaged	-4	0	-1	-2
Risk Privacy	-8	0	0	-1
NET SENTIMENT	2	17	17	-13

≤ -30   -20   -10   0   10   20   ≥ +30
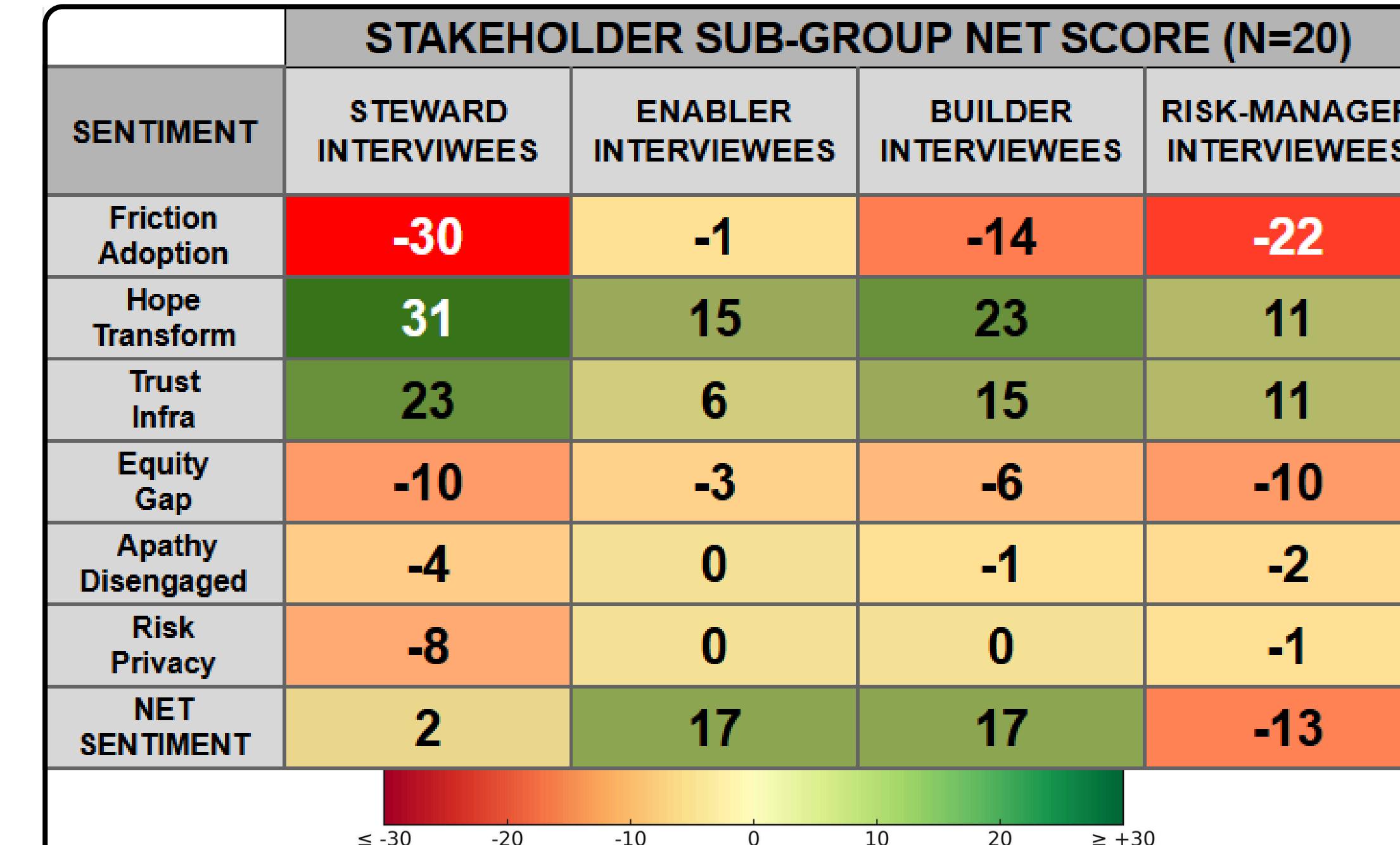
DISCUSSION

Table 1: Maharashtra ABDM microsite pilot scored 16/25 (a "B" rating on a five-point scale), performing well in Strategy & Governance and Infrastructure but weaker in Equity & Access and Monitoring & Impact- affordability, inclusion, and systematic evaluation remain limited. Demonstrative as a benchmarking tool, supporting cross-state comparisons and consistent monitoring over time.

Figure 2: Different lenses for assessing digital health investments: ICER and BCR- efficiency estimates but understate wider system effects; NPV- long-term fiscal planning yet highly sensitive to discounting assumptions; SROI- social and equity value but methodologically complex. In the Indian context, a combined approach is most appropriate to balance comparability, sustainability, and inclusivity.

Table 3: Distribution of 20 stakeholders (10–40 years' experience) across four categories chosen for their central roles in shaping digital health- governance, financing, frontline delivery, and knowledge building.

Figure 3: Spread was mixed: friction in adoption (–67, 89 mentions) and the equity gap (–29, 43) were the strongest negatives, reflecting resistance and disparities. In contrast, hope for transformation (+80, 80) and trust in infrastructure (+55, 63) drove optimism. Less frequent but notable were privacy risks (–9, 9) and apathy/disengagement (–9, 9). Overall, positives (158) slightly outweighed negatives (135).
Across stakeholders, optimism was strong, driven by hope for transformation and trust in infrastructure (+135 net), especially among Knowledge Builders, while even Risk Managers acknowledged potential. Yet this was consistently undercut by friction in adoption (–75) and equity gaps (–31), the most persistent barriers across all groups. Stewards balanced optimism with privacy concerns, Risk Managers leaned cautious, and Frontline Enablers voiced moderate signals. Stakeholders believe incentives drive participation, but weak enforcement limits adoption. As seen with Aadhaar and CDSCO, voluntary uptake is insufficient without mandates.

Reccomendations
- Standardization: a unified framework for selecting and evaluating digital health initiatives, enabling comparability across states and over time.
- Human resources: training, workflow integration, and support to reduce adoption friction and build frontline capacity.
- Accountability: balance incentives with clear mandates and enforcement to ensure sustained participation and compliance.
- Advocacy & awareness: communicate the value proposition of digital health, fostering trust, buy-in, and equitable adoption.

CONCLUSION

ABDM provides a robust blueprint for digital health transformation, but fragmented implementation and limited stakeholder communication constrain its impact. Further pilot applications of the framework and research is needed.

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