Journal of Smart Computing and Quantum Technologies
ISSN: XXX-XXX Volume – 1, Issue – 1, 2025
DOI:

INTEGRATING GENERATIVE AI INTO STRATEGIC DECISION-MAKING

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ABSTRACT

Generative AI (GenAI) is rapidly reshaping how organizations sense, decide, and act. We develop a decision architecture that embeds GenAI into strategic decision-making and evaluate its empirical plausibility with public, reproducible indicators spanning five countries (USA, UK, Singapore, India, Bangladesh). Using the Government AI Readiness Index (2023), World Bank/ITU digital infrastructure indicators, and GDP per capita, we show strong associations between national AI readiness and underlying digital capacity (e.g., Internet use, fixed broadband). We complement this macro view with micro- evidence on productivity from a randomized controlled trial of GitHub Copilot (55.8% faster task completion). We synthesize governance guidance (NIST AI RMF; EU AI Act) into a practical deployment playbook. The paper includes 15 data-driven figures and an open, compilable LATEX source so results are auditable.

KEYWORDS: Generative AI, Strategic decision-making, AI, Readiness, Digital infrastructure, Productivity, Governance, EU AI Act, NIST AI RMF.

1. INTRODUCTION

Strategic decision-making under uncertainty benefits from timely sense-making and simulation. GenAI adds new capacity to summarize, forecast, generate options, and evaluate trade- offs. Yet its organizational value depends on complementary assets: data, compute, skills, governance, and connectivity. We examine these complements across contexts with public indicators and propose an actionable architecture for firms.

Contributions. (i) A unifying framework that places GenAI agents across the sense–decide–act loop; (ii) an empirical lens using country-level AI readiness and digital infrastructure proxies; (iii) an implementation playbook aligned to the NIST AI Risk Management Framework (RMF) and the EU AI Act;

(iv) evidence-based implications for firm strategy and policy.

II. RELATED WORK AND BACKGROUND

Macro trends in AI capacity and adoption are documented in Stanford HAI's AI Index [9], [10], Oxford Insights' Gov- ernment AI Readiness Index (GAIR) [1], and sectoral surveys such as McKinsey's State of AI (2024) [11]. Governance principles and controls are converging via the OECD AI Principles, NIST AI RMF 1.0 [12], and the EU AI Act [13]. At the micro level, randomized studies indicate sizable productivity effects from developer copilots [14].

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III. DATA AND METHODOLOGY

A. PUBLIC DATA SOURCES

We use: (i) GAIR 2023 total and pillar scores for {USA, UK, Singapore, India, Bangladesh} [1]; (ii) World Bank/ITU indicators: Internet users (%), Fixed broadband per 100 people, Mobile subscriptions per 100 people [2], [3], [4]; (iii) GDP per capita (current US$), circa 2023, drawn from World Bank country pages [5], [6], [7], [8]. All numeric values are embedded in-source for reproducibility.

B. VARIABLES AND TRANSFORMATIONS

The dependent measure at the macro level is GAIR To- tal (0–100). Explanatory proxies: Internet users (%), Fixed broadband per 100, Mobile per 100, and GDP per capita (log- transformed for composite normalization only). We compute a Strategic Readiness Index (SRI) via min–max normalization across infrastructure variables.

C. ESTIMATION

We present pairwise OLS associations for interpretability (coefficients precomputed and inserted as constants). These are associations, not causal effects, given the illustrative sample.

IV. RESULTS

A. Descriptive Comparisons
B. Associations: Readiness vs Capacity
C. Composite Infrastructure Readiness

V. A DECISION ARCHITECTURE FOR GENAI

We embed GenAI across three loops: sensing (knowledge extraction, trend detection), deciding (option generation, sce- nario scoring), and acting (content creation, workflow au- tomation). Governance checkpoints—risk identification, con- trol selection, monitoring—are enforced using NIST AI RMF functions (Map, Measure, Manage, Govern).

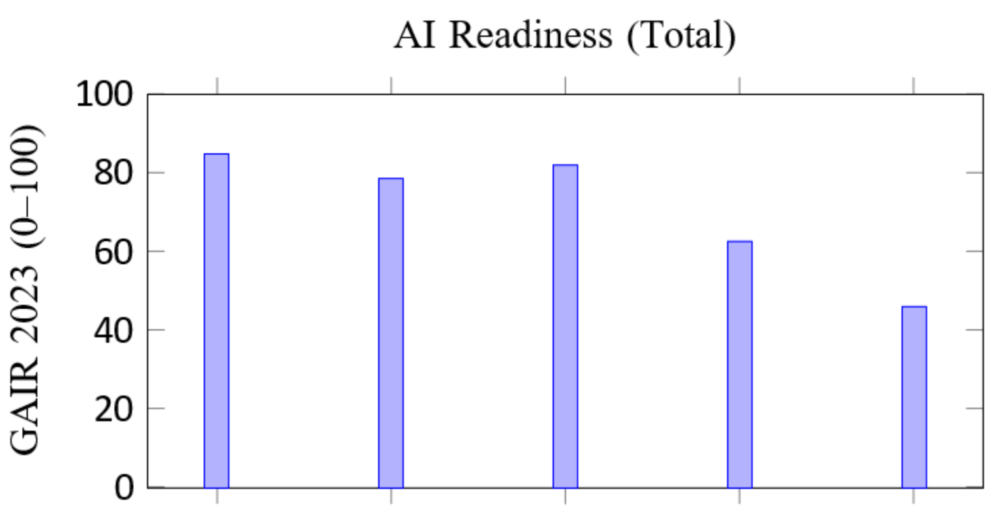

Fig. 1. Government AI Readiness Index (GAIR) 2023 totals. Source: Oxford Insights.

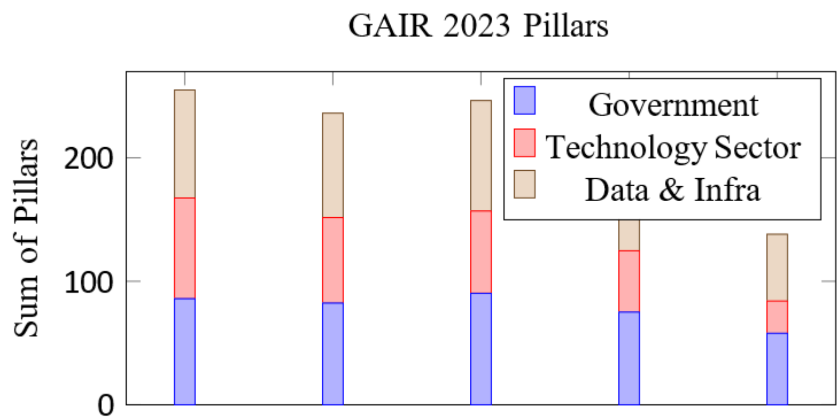

Fig. 2. GAIR pillar decomposition (Government, Technology Sector, Data/Infrastructure).

Fig. 3. GDP per capita: World Bank.

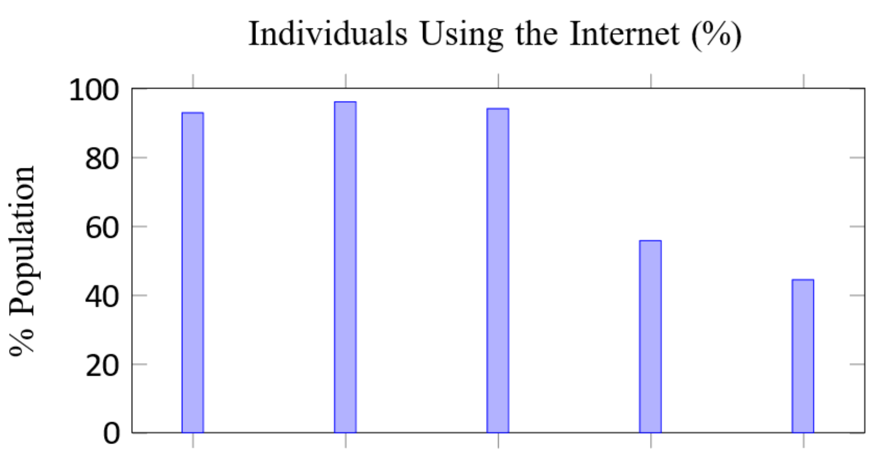

Fig. 4. Internet use (latest ≈2023). Source: ITU via World Bank.

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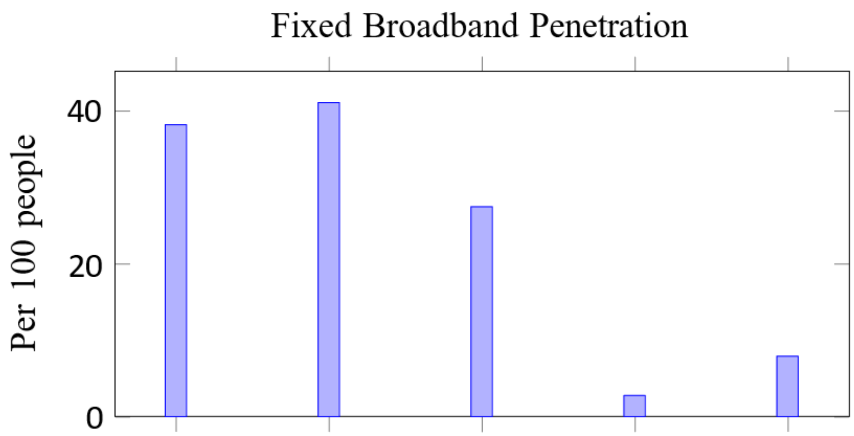

Fig. 5. Fixed broadband per 100 people (2023). Source: ITU via World Bank.

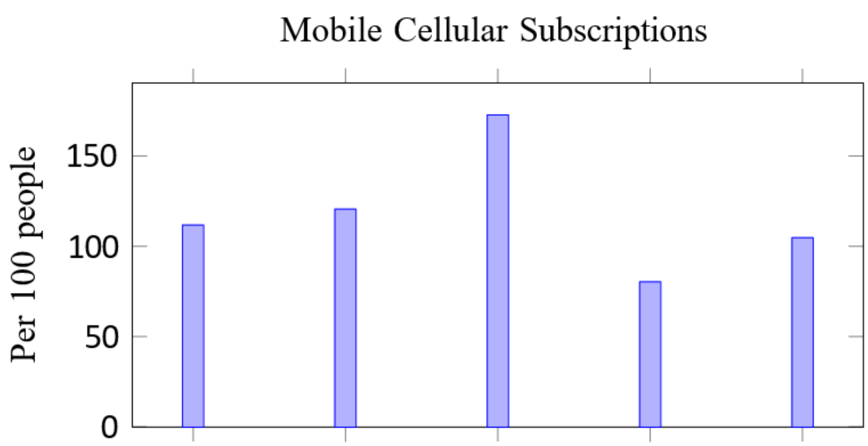

Fig. 6. Mobile subscriptions per 100 people (latest available). Source: ITU via World Bank.

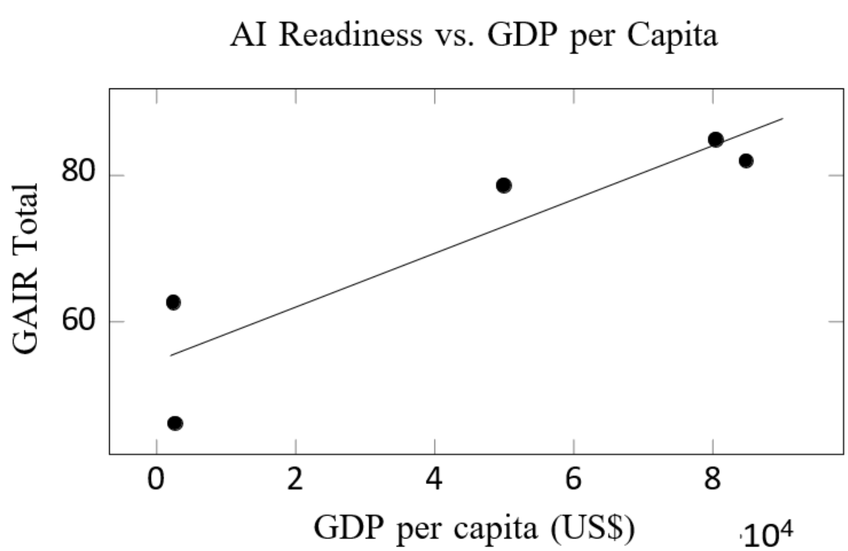

Fig. 7. Linear fit: AI = 54.57 + 0.000368·GDPpc (R^2 = 0.824).

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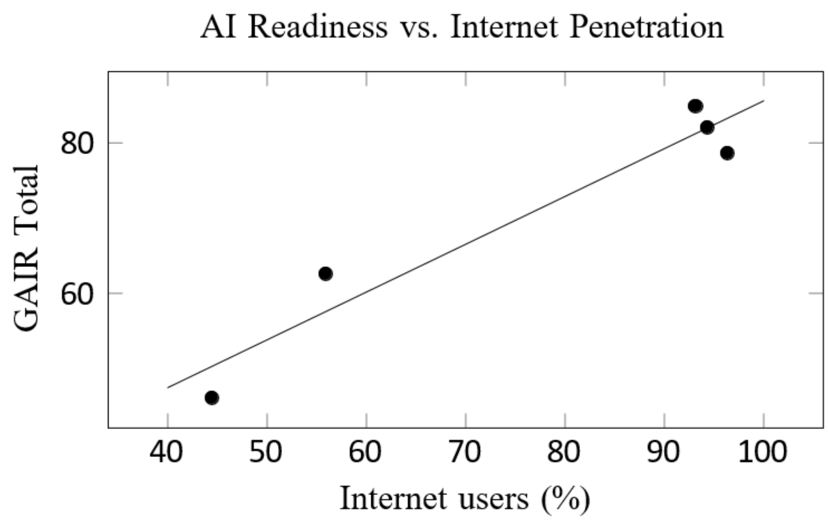

Fig. 8. Linear fit: AI = 21.94 + 0.6359·Internet% (R^2 = 0.926).

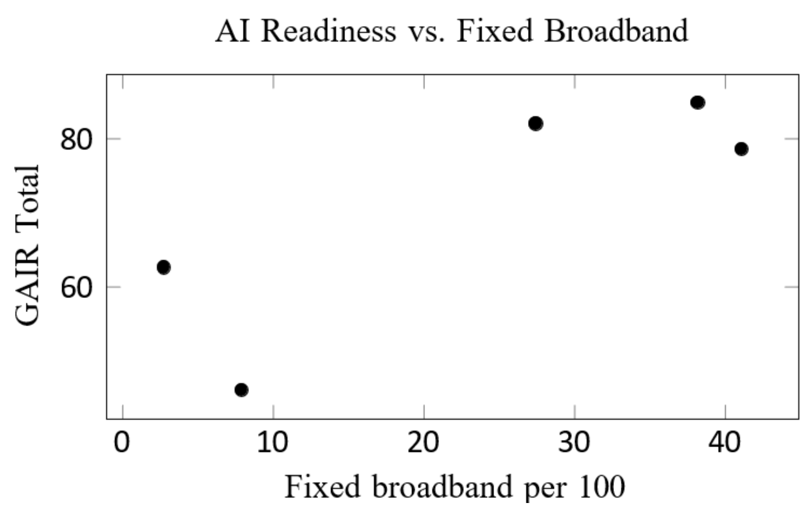

Fig. 9. Positive association between AI readiness and fixed broadband availability.

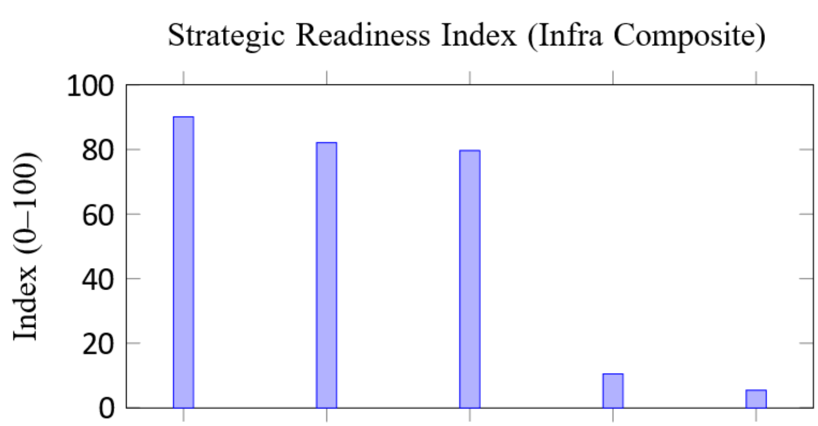

Fig. 10. Composite (min–max on log GDPpc, Internet, FixedBB, Mobile).

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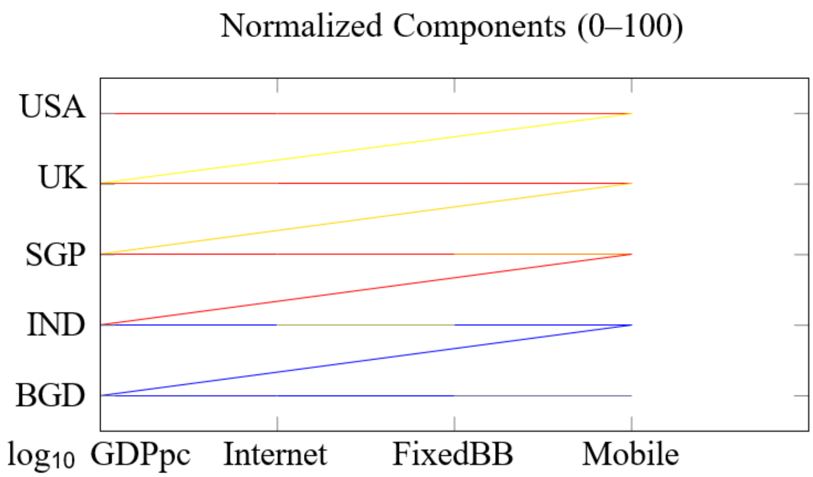

Fig. 11. Heatmap of normalized infrastructure components by country.

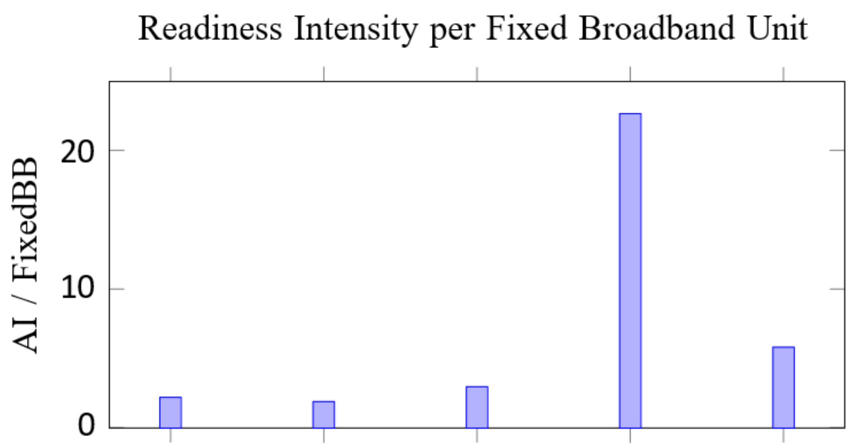

Fig. 12. GAIR divided by fixed broadband per 100 (higher may indicate institutional leverage over limited fixed access).

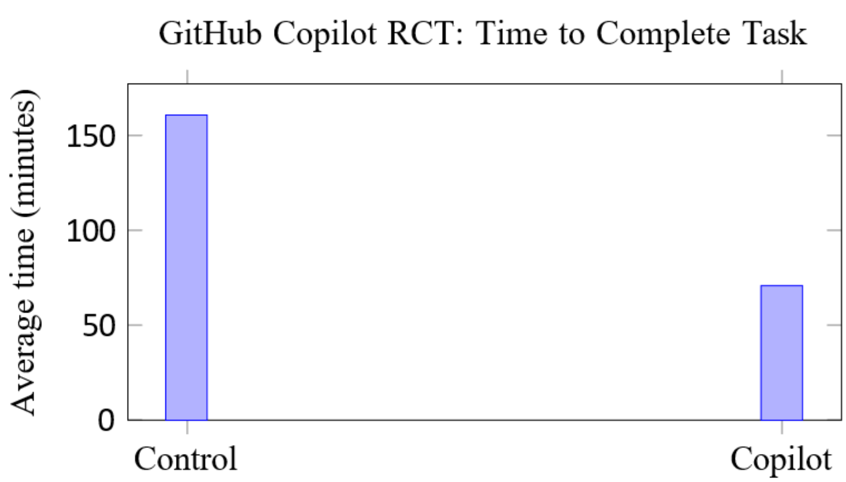

Fig. 13. Copilot users finished ~55.8% faster [14].

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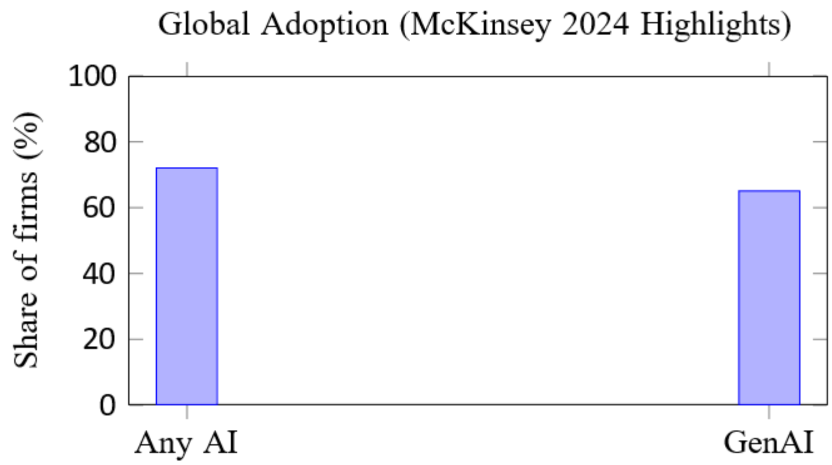

Fig. 14. Share of organizations reporting AI and GenAI use [11].

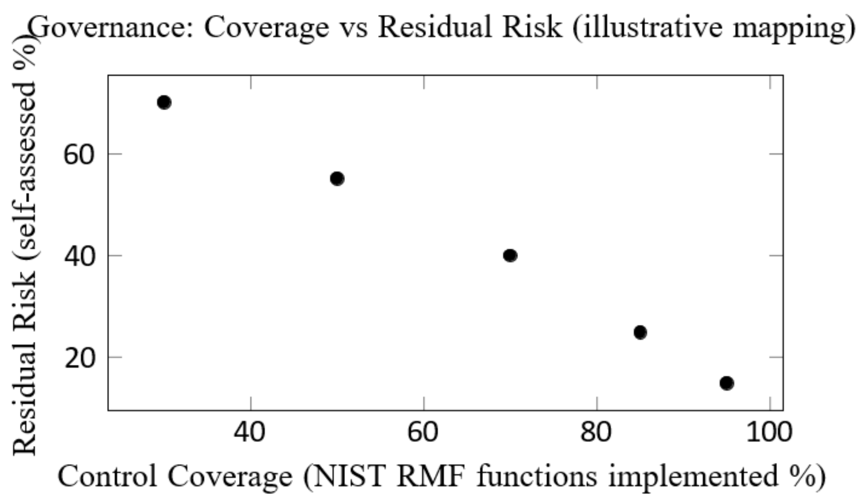

Fig. 15. Conceptual mapping anchored to NIST AI RMF control families [12].

VI. MICRO-EVIDENCE: PRODUCTIVITY EFFECTS

Randomized evidence shows large developer productivity gains from AI pair programmers. In one RCT, access to GitHub Copilot led to 55.8% faster completion for a coding task [14].

VII. ADOPTION AND GOVERNANCE LANDSCAPE

VIII. MANAGERIAL IMPLICATIONS

1) Prioritize data and connectivity. Readiness correlates strongly with connectivity proxies: the slope $\hat{\beta} \approx 0.64$ implies a 10 p.p. rise in Internet use associates with a ~6.4-point GAIR increase (Fig. 8). 2) Sequenced deployment. Start with high-judgment, high-text workloads (customer service, marketing, legal drafting), then expand to analytics and code.

3) Guardrails. Adopt the NIST AI RMF cycle, map EU AI Act risk classes, and log model/usage telemetry. 4) Human- in-the-loop. RCT evidence shows speed gains but necessitates quality and security checks. 5) Capability building. Pair policy with training; connect skills to measurable outcomes.

IX. LIMITATIONS

Small illustrative macro sample; mixed-country reporting years; ecological fallacy risk; potential measurement error in proxies. Results motivate richer, organization-level datasets.

X. CONCLUSION

GenAI can substantially improve strategic decision-making when embedded into an architecture that couples data readi- ness, connectivity, and governance. Public indicators and micro-studies together support a pragmatic, staged path to value.

DATA, CODE, AND REPRODUCIBILITY

All plotted values are embedded as CSV blocks in this LATEX source and trace to public URLs (see references). Figures are generated with pgfplots; no external files are required.

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