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The Silicon Savannah's Academic Frontier: Drivers and Barriers of Generative AI Adoption among Researchers in Kenyan Universities

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Abstract: As Kenya solidifies its position as Africa's "Silicon Savannah," its higher education sector faces a transformative shift driven by Generative Artificial Intelligence (Gen AI). This study utilizes an integrated Technology Acceptance Model (TAM) and Technology-Organization-Environment (TOE) framework to investigate the factors influencing Gen AI adoption among researchers in Kenyan universities. While institutional investments (TOE) and perceived usefulness (TAM) drive initial interest, significant barriers including high cognitive load, ethical "black-box" skepticism, and infrastructure deficits hinder deep integration. Using a mixed-methods approach, the paper identifies "Identity Protection" and "Digital Sovereignty" as unique local drivers. The findings suggest that for Kenya to lead the academic AI frontier, policy must move beyond procurement toward human-centric trust calibration.

Keywords: *Generative AI, Silicon Savannah, Higher Education, TAM-TOE Framework, Kenya, Research Innovation.*

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I. INTRODUCTION

Kenya has emerged as a global leader in digital innovation, with the "Silicon Savannah" contributing significantly to the regional GDP through mobile money and fintech. However, the academic frontier specifically the adoption of Generative AI (GenAI) in research remains in a state of flux. While the *Kenya National AI Strategy 2025–2030* (Government of Kenya, 2025) outlines a bold vision for AI-driven R&D, the actual adoption at the researcher level is uneven. This paper explores the tension between top-down institutional mandates and bottom-up researcher acceptance.

II. LITERATURE REVIEW & THEORETICAL FRAMEWORK

➢ *The Silicon Savannah Context*

Research in the Global South often faces a "Digital Divide" (Bervell et al., 2025). In Kenya, this is characterized by high mobile connectivity but limited access to high-performance computing (HPC) required for large-scale AI simulations.

➢ *The TAM-TOE Integration*

Current literature suggests that the Technology Acceptance Model (TAM) (Davis, 1989) is insufficient for complex AI because it ignores the organizational environment. Conversely, the Technology-Organization-Environment (TOE) framework (Tornatzky & Fleisher, 1990) overlooks the individual psychological "trust gap." This study bridges these by introducing Cognitive Load and Professional Identity as moderating variables (Mweru Chege & Kihara, 2025).

III. METHODOLOGY

➢ *This Study Employed a Sequential Explanatory Mixed-Methods Design*

- Quantitative: A survey of 450 researchers across five major Kenyan universities (e.g., University of Nairobi,

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JKUAT, USIU-A) measuring variables of Trust, Perceived Usefulness, and Organizational Readiness.
- Qualitative**:** Semi-structured interviews with 20 Principal Investigators to understand the "Human Gap."

IV. DISCUSSION

➢ *Key Drivers (The "Silicon" Catalyst)*

- Performance Expectancy**:** Researchers cite GenAI's ability to "leapfrog" traditional literature review timelines by 40% (Bervell et al., 2025).
- Mobile-First Integration**:** Unlike the Global North, Kenyan researchers utilize mobile-optimized AI agents to overcome desktop hardware limitations.

➢ *Barriers (The "Savannah" Hurdles)*

- Institutional Readiness (TOE): Many universities lack clear "AI Governance" policies, leading to a fear of being accused of academic dishonesty (APHRC, 2025).
- Cognitive Load (TAM): The "Verification Burden" (the time taken to check AI hallucinations) often exceeds the time saved, leading to a "rejection of efficiency."
- Digital Sovereignty**:** Concerns regarding the extraction of local indigenous knowledge by foreign-owned AI models (Muchiri, 2025).

V. ANALYSIS OF DATA

The analysis was conducted to examine the interaction between institutional factors (TOE) and individual psychological drivers (TAM) among Kenyan researchers.

➢ *Quantitative Descriptive Analysis*

The survey results (N=450) indicate that while 78% of researchers perceive GenAI as "Highly Useful" for literature synthesis, only 15% have integrated it into formal data analysis. This discrepancy points to a "Validation Bottleneck."

Table 1 Descriptive Statistics for TAM and TOE Variables

Variable	Dimension	Mean (μ)	Std. Dev (σ)	Key Insight
TAM	Perceived Usefulness	6.12	0.85	High belief in AI's potential for speed.
TAM	Perceived Ease of Use	4.45	1.10	Moderate difficulty in prompt engineering.
TOE	Infrastructure Readiness	3.20	1.45	Significant gap in HPC and local server access.
TOE	Policy Clarity	2.85	1.30	Lack of institutional guidelines causes hesitation.
Gap	**Cognitive Trust**	3.50	1.25	Low trust in "untraceable" AI citations.

- Scale: 1 (Strongly Disagree) to 7 (Strongly Agree)

➢ *Correlation Analysis: The Impact of Cognitive Load*

To test the "Human element," a Pearson correlation was performed between Cognitive Load (the effort to verify AI) and Intention to Use**.**

Table 2 Correlation Matrix for AI Adoption Barriers

Variable	(1)	(2)	(3)	(4)
(1) Intention to Use	1.00			
(2) Institutional Support	0.45	1.00		
(3) Cognitive Load	-0.58	-0.12	1.00	
(4) Technical Self-Efficacy	0.38	0.25	-0.30	1.00

**p < .05, **p < .01*

- Analysis: The strong negative correlation (r = -0.58) between Cognitive Load and Intention to Use suggests that even if a university provides the tools (TOE), researchers will reject them if the "verification burden" remains too high. This is particularly prevalent in Kenyan STEM departments where peer-review standards are increasingly rigorous.

➢ *Qualitative Thematic Mapping*

From the semi-structured interviews, three distinct "Researcher Personas" emerged, reflecting the socio-technical landscape of the Silicon Savannah.

Table 3 Thematic Mapping of Researcher Personas in Kenya

Persona	Primary Driver	Primary Barrier	Institutional Strategy
The Pragmatist	Efficiency & Speed	Data Privacy/Cost	Provide subsidized, secure API access.
The Traditionalist	Academic Integrity	High Cognitive Load	Focus on "Human-in-the-Loop" training.
The Innovator	Global Collaboration	Compute Infrastructure	Develop "Digital Twins" & local HPC hubs.

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VI. FINDINGS

The data suggests that the "Silicon Savannah" effect a culture of rapid digital adaptation is currently hindered by "Institutional Lag." While individual researchers are ready (High TAM scores), the lack of specialized African datasets and local "Sovereign AI" infrastructure (Low TOE scores) creates a dependency on Western models that often hallucinate local contexts (e.g., Kenyan legal precedents or indigenous botanical data).

As noted by Muchiri (2025), a significant emerging barrier is the fear of "Knowledge Extraction," where Kenyan intellectual property is used to train global models without local benefit. This adds a unique "Environmental" (E) dimension to the TOE framework that is absent in Western studies.

VII. CONCLUSION

The "Silicon Savannah" represents a unique paradox in the global AI landscape: a region with high digital agility but significant institutional and infrastructural lag. This study has demonstrated that while Kenyan researchers possess high Perceived Usefulness (TAM), their actual adoption is stifled by a Trust-Cognitive Load bottleneck and an under-developed TOE (Technological, Organizational, Environmental) framework.

For Kenya to transition from a consumer of AI to a creator of academic AI solutions, the focus must shift from merely providing "access" to fostering Human-AI Symbiosis. This requires a move toward Explainable AI (XAI) and localized data strategies that respect digital sovereignty.

The evolution of AI in Kenya's academic sector depends on moving from Technology Readiness to Trust Readiness.

VIII. RECOMMENDATIONS

- Policy**:** Universities should implement "Sandboxed AI Environments" that protect data privacy.
- Training**:** Focus on "Prompt Engineering for Scientists" to reduce the cognitive load of interaction.
- Local Context**:** Invest in LLMs trained on Kenyan datasets to ensure linguistic and cultural accuracy.

➢ *Actionable Policy Recommendations*

Based on the integrated TAM-TOE analysis, the following three policy points are recommended for the Kenyan Ministry of Education and Commission for University Education (CUE):

- Mandate "Human-in-the-Loop" Governance**:** Establish national guidelines that require human oversight for all AI-assisted research outputs to mitigate "Black-Box" skepticism and protect academic integrity.
- Establish Regional "Digital Innovation Hubs" (DigiKen): To overcome the TOE barrier of "Resource Scarcity," the Ministry should centralize high-performance computing (HPC) resources into shared university hubs, reducing the individual cost for researchers.
- Incentivize "Localized LLM" Development**:** Launch a grant program for researchers developing Large Language Models trained on Kenyan datasets (e.g., Swahili-based models or local legal/agricultural archives) to ensure cultural and scientific relevance.

IX. LIMITATIONS OF THE STUDY

While this study provides a comprehensive look at the Kenyan frontier, several limitations must be acknowledged: Geographic Bias**:** The sample was primarily drawn from "Tier 1" universities in Nairobi and its environs. Future research should include rural-based technical universities to assess the urban-rural digital divide. Temporal Constraints**:** Given the rapid evolution of agentic AI (2025–2026), the technological variables measured today may shift as AI becomes more autonomous. Self-Reporting Bias**:** Data on "Intention to Use" may be subject to social desirability bias, as researchers may feel pressured to report a positive outlook on AI to appear modern.

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