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Institutional Preparedness for the Adoption of Ethical Artificial Intelligence in Tanzanian Higher Learning Institutions

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Abstract

The rapid adoption of artificial intelligence (AI) in higher education has created concerns regarding institutional capacity to ensure ethical, transparent and responsible use. This study examined institutional preparedness for the adoption of ethical artificial intelligence in Tanzanian higher learning institutions. The study employed a mixed-methods approach. Data were collected from 171 students through questionnaires and relevant institutional staff through semi-structured interviews. Quantitative data were analysed using descriptive statistics, while qualitative data were analysed thematically. The findings revealed that students had a moderate understanding of ethical AI, with an overall mean score of 3.25, indicating awareness of AI applications but limited understanding of issues related to academic integrity, transparency and responsible use. The availability of institutional policies for ethical AI adoption was low to moderate, with an overall mean score of 2.80, suggesting inadequate formal guidelines and governance mechanisms. Challenges affecting ethical AI adoption recorded an overall mean score of 3.41, highlighting limited awareness, inadequate training, weak policy frameworks and rapid technological changes as major barriers. The study concludes that Tanzanian higher learning institutions are not fully prepared for ethical AI adoption and require stronger governance structures, capacity building and institutional support. It recommends the development of clear AI policies, regular AI literacy programmes and establishment of institutional AI governance mechanisms to promote responsible AI integration.

1. Introduction

1.1 Background of the Problem

Artificial intelligence (AI) is rapidly reshaping higher education by transforming teaching, learning, research, assessment and institutional administration [1]. While AI offers opportunities to improve educational quality, personalise learning experiences, enhance research productivity and support evidence-based decision-making, its widespread adoption also raises important ethical concerns about transparency, accountability, fairness, privacy, data governance and academic integrity [2]. As universities increasingly integrate AI into their core functions, attention has shifted from merely adopting technological innovations to ensuring that institutions have the governance structures, human capacity, policies and ethical frameworks necessary for responsible implementation [1]. Institutional preparedness has therefore emerged as a critical prerequisite for the successful adoption of ethical AI, requiring universities to align technological advancement with human rights, equity and educational values [1, 2]. International organisations, particularly UNESCO, have emphasised that higher education institutions must strengthen AI governance, develop institutional policies, invest in AI competencies and promote ethical awareness among staff and students to ensure that AI serves the public good rather than creating new forms of inequality or discrimination [3, 4].

Artificial intelligence (AI) has rapidly transformed higher education worldwide, reshaping teaching, learning, research and institutional management. Despite these advances, institutional preparedness for

ethical AI adoption has lagged behind technological progress. UNESCO's global survey of 400 higher education institutions across 90 countries found that 90% of respondents were already using AI in their professional work, yet more than half reported uncertainty about its pedagogical application, technological implications and ethical consequences [5]. Furthermore, one in four institutions had already experienced AI-related ethical challenges, including student overreliance on AI, authorship disputes and algorithmic bias [5]. Similarly, the first UNESCO Higher Education Global Trends Report revealed that only one in five universities worldwide had a formal AI policy by 2025, underscoring that AI adoption is expanding much faster than institutional governance [6]. Consequently, universities continue to face significant challenges relating to academic integrity, data privacy, transparency, accountability and responsible AI governance despite widespread technological uptake [5, 6].

Across Africa, AI adoption is accelerating, yet institutional readiness remains uneven. South Africa has developed one of the continent's strongest AI research ecosystems, while Kenya has expanded AI applications in higher education through digital learning initiatives, and Nigeria has seen widespread use of generative AI among university students and academics [7, 8]. However, these developments have exposed weaknesses in institutional preparedness rather than demonstrating comprehensive readiness. UNESCO's assessments indicate that many African universities continue to operate without comprehensive ethical governance frameworks, clear institutional policies, adequate staff competencies, or sufficient digital infrastructure to support responsible AI implementation [6]. Although several countries are developing national AI strategies and regulatory frameworks, universities frequently rely on fragmented institutional responses that vary substantially across institutions [8]. This uneven preparedness creates challenges in addressing academic misconduct, algorithmic fairness, data protection, and equitable access to AI-enabled education, suggesting that technological diffusion has outpaced institutional governance capacity across much of the continent.

In Tanzania, AI has increasingly been recognised as a strategic technology for national development, with the government developing a National AI Strategy Framework and publishing the country's first AI Readiness Assessment, based on UNESCO's Readiness Assessment Methodology [6, 9]. The assessment engaged more than 240 stakeholders from government, academia, industry and civil society, reflecting a growing national commitment to ethical AI development [6]. Nevertheless, it identified significant gaps in institutional capacity, governance, digital infrastructure, AI skills and regulatory implementation that could hinder responsible AI adoption [6]. These shortcomings are particularly evident in higher learning institutions, where universities are progressively introducing AI-related programmes, research, and digital learning initiatives, yet many still lack comprehensive institutional AI policies, ethical governance structures, implementation guidelines, and staff capacity to regulate AI use in teaching, learning, assessment, and research [10, 11]. The result is a widening gap between national policy aspirations and institutional preparedness, creating uncertainty about how higher learning institutions can adopt AI ethically while safeguarding academic integrity, accountability and responsible innovation.

1.2 Problem Statement

Despite growing recognition of artificial intelligence (AI) as a transformative technology for improving teaching, learning, research and institutional management, higher education institutions in Tanzania remain inadequately prepared to adopt AI in an ethical, transparent and responsible manner [6]. Although national efforts, including the development of the National AI Strategy Framework and AI Readiness Assessment, demonstrate Tanzania's commitment to responsible AI development, significant gaps persist in institutional governance, digital infrastructure, AI competencies and regulatory implementation [6, 9]. Within universities, the increasing use of generative AI tools by staff and students has outpaced the development of institutional policies, ethical guidelines and mechanisms to address challenges related to academic integrity, data privacy, algorithmic bias, accountability and equitable access [10, 11]. Consequently, institutions face uncertainty about how AI should be governed and integrated into academic practices while protecting educational values and human-centred principles.

Existing studies have largely focused on AI opportunities, adoption trends and technological capabilities, with limited empirical attention to institutional preparedness for ethical AI adoption, particularly in the Tanzanian higher education context [12, 13, 14]. This knowledge gap limits understanding of whether staff and students possess adequate ethical AI awareness, whether institutional policies and governance structures are sufficiently established, and what barriers constrain responsible AI implementation. Without evidence on these dimensions, Tanzanian higher learning institutions risk adopting AI in ways that may intensify academic misconduct, inequality and governance challenges rather than enhancing educational outcomes. Therefore, this study seeks to examine institutional preparedness for the adoption of ethical artificial intelligence in Tanzanian higher learning institutions by assessing ethical AI understanding, the availability of institutional policies and the challenges affecting responsible AI implementation.

1.3 Research Objectives

1. To examine the level of understanding of ethical artificial intelligence among staff and students in Tanzanian higher learning institutions.
2. To assess the availability of institutional policies for ethical artificial intelligence adoption in Tanzanian higher learning institutions.
3. To examine the challenges affecting the adoption of ethical artificial intelligence in Tanzanian higher learning institutions.

2. Literature Review

2.1 Theoretical Framework

The Technology-Organisation-Environment (TOE) Framework was adopted in this study. It was created by Louis G. Tornatzky and Mitchell Fleischer in 1990 as a model for understanding the process of technological innovation adoption and implementation in organisations [15]. The framework suggests that three contexts, linked together, shape decisions about technology adoption: the technological

context, which comprises technological availability, technological characteristics and technological suitability; the organisational context, which is internal: resources, management support, organisational structure and organisational readiness; and the environmental context, which is external: regulations, competition, market conditions and institutional pressures [15, 16]. The TOE Framework not only consider technological factors but also originates from the interaction between the internal capability of the organisation and the external environment [16]. Moreover, it assumes that organisations are rational decision-makers and that they assess the benefits, costs, risks and compatibility of the technology with the current situation before deciding whether to adopt it [17]. The framework has therefore been widely used in information systems research to help explain why and why not new technologies are accepted and implemented in various organisational contexts.

The Technology-Organisation-Environment (TOE) Framework is relevant to this study because it offers a holistic account of institutional readiness for the uptake of new technologies, including AI. According to the framework, technological, organisational capabilities and environmental factors affect the adoption of technology in organisations. The technological dimension can be used to evaluate the presence of digital infrastructure, data management systems and technical skills for the ethical use of AI in Tanzanian higher learning institutions. The organisational dimension refers to institutional policies, leadership support, staff and student skills, and governance structures for the responsible use of AI. The environmental dimension considers external factors, including national AI strategies, regulatory requirements, and broader higher education expectations. Hence, the TOE Framework can be used to examine the conditions that influence the adoption of ethical AI and whether higher learning institutions have the conditions to adopt ethical AI.

2.2 Empirical Literature Review

2.2.1 Level of understanding of ethical artificial intelligence

Evidence shows that awareness of artificial intelligence does not necessarily reflect a sound understanding of its ethical use. Mfaume found that lecturers and postgraduate students recognised concerns about privacy, copyright, academic honesty and bias, but reported that ethical AI training was absent from existing university programmes [18]. In contrast, Luwavi and Kumbo found high awareness and practical use of AI among academic staff in selected institutions in Dar es Salaam, including awareness of ethical concerns [19]. However, much of this knowledge developed through personal experience rather than formal institutional training. This difference suggests that staff may know how to use AI tools while lacking structured knowledge of accountability, transparency and responsible data management. Institutional preparedness should therefore be assessed by demonstrated ethical competence, not merely by awareness or the frequency of AI use.

Differences between staff and students further challenge the assumption that university communities share a common understanding of ethical AI. Ravi et al. found that students used conversational AI more widely than staff, but staff expressed stronger concerns about bias, transparency, data ownership and academic integrity [20]. More than 90% of staff considered AI-generated essays problematic, compared with 58% of students. Marín et al. reported a narrower gap, as both students and staff recognised risks related to privacy, limited transparency and discriminatory bias, although nearly half of respondents had not received adequate ethical AI training [21]. These contrasting results show that frequent use may increase familiarity without necessarily improving ethical judgement. Tanzanian institutions must therefore examine whether staff and students can identify ethical risks, apply acceptable-use principles and justify their decisions in real academic contexts.

2.2.2 Availability of institutional policies for ethical artificial intelligence adoption

Institutional policy development remains uneven across national and international settings. Matto and Ponera found that none of the eight Tanzanian higher education institutions examined had established a specific AI policy, despite recognising both the benefits and risks of AI [22]. The absence of policies was linked to limited expertise, weak leadership, and uncertainty about what should be regulated. Conversely, Jin et al. found that 40 universities across six global regions had adopted relatively proactive guidelines covering academic integrity, teaching, learning, and equitable access [23]. Nevertheless, these international policies differed in how responsibilities were allocated and how stakeholders were communicated with. The contrast indicates that Tanzanian institutions lag behind selected international universities, but importing foreign policies without considering local infrastructure, law, language, and institutional capacity may produce rules that are difficult to implement.

The existence of a policy also does not guarantee that all ethical issues are adequately addressed. Ullah et al. found publicly available generative AI guidelines in 41 of the world's top 50 universities, and all 41 permitted controlled academic use [24]. However, few guidelines explained AI algorithms, documentation of prompts and outputs, misconduct reporting or the use of AI-detection tools. Dotan et al., in contrast, questioned rigid and centrally controlled governance, arguing that flexible guidance developed through faculty consultation was more suitable for academic freedom and shared university governance [25]. These findings reveal a tension between comprehensive regulation and professional discretion. Tanzanian institutions require clear minimum standards on privacy, disclosure, authorship, bias and accountability, while lecturers and departments need limited flexibility to apply those standards within different academic disciplines.

2.2.3 Challenges affecting the adoption of ethical artificial intelligence in higher learning institutions

Technical and social barriers affect ethical AI adoption differently across Tanzanian institutions. Kondoro found that affordability, limited Swahili support, unequal access and ethical concerns restricted the use of AI writing assistants among university students, particularly those studying in resource-constrained settings [26]. Sarakikya and Kitula, however, reported high AI integration and positive attitudes among students and lecturers in six higher learning institutions in Arusha City [27]. They also identified face-to-face presentations and plagiarism-detection software as practical responses to AI-assisted misconduct. These contrasting results imply that infrastructure constraints do not prevent adoption equally across all institutions. Nevertheless, access to an AI tool does not ensure ethical use, especially where users depend on English-based systems, unreliable detection software or personal judgement without formal guidance.

Evidence from the wider African context highlights both serious barriers and practical benefits. Muringa found that South African universities faced unclear policies, unequal digital infrastructure, varying staff capacity, academic integrity concerns, data privacy risks and uncertainty over intellectual autonomy [28]. Pasipamire et al., however, found that African institutions were already using AI for tutoring, administration, instruction and curriculum development, with reported benefits such as reduced workload and personalised learning [29]. The same review, however, identified resource shortages, skill gaps, misuse and data-security concerns. This evidence challenges the view that barriers lead only to rejection of AI. Adoption may continue informally despite weak institutional controls, thereby increasing ethical risk. Tanzanian institutions must therefore examine whether infrastructure, staff competence, financial resources, leadership support and oversight mechanisms can support responsible adoption rather than uncontrolled use.

3. Methods

3.1 Research Paradigm, Approach and Design

This study adopted the pragmatism research paradigm. This paradigm was appropriate because the study sought a comprehensive understanding by integrating measurable evidence with contextual explanations. It enabled the researcher to combine quantitative assessment of variables such as ethical AI understanding, availability of institutional policies and adoption challenges with qualitative insights into institutional experiences, practices and the underlying factors influencing ethical AI implementation.

A mixed-methods research approach was adopted because the study required both numerical measurement (quantitative data) and in-depth exploration of the institutional realities surrounding ethical AI adoption (qualitative data). The use of mixed methods enhanced the validity and richness of the findings by allowing quantitative results to be supported and interpreted through qualitative evidence, thereby providing a more comprehensive understanding of institutional preparedness.

The study employed an explanatory sequential research design. The design enabled the researcher to first determine the extent of ethical AI understanding, policy availability and adoption challenges through

statistical analysis, and subsequently explore the reasons behind the observed patterns through qualitative data from relevant institutional stakeholders. Therefore, the explanatory sequential design was appropriate for generating evidence-based conclusions on the preparedness of Tanzanian higher learning institutions to adopt ethical artificial intelligence.

3.2 Study Area

This study was conducted at three selected higher learning institutions in Tanzania, namely the Institute of Accountancy Arusha (IAA), the Institute of Finance Management (IFM), and the National Institute of Transport (NIT). The institutions were purposively selected because they represent public higher learning institutions with diverse academic fields, digital practices, and administrative structures relevant to ethical AI adoption. IAA represents business and information-related disciplines; IFM represents finance and technology-oriented programmes; and NIT represents engineering, transport, and technology-based fields. Their selection provides diverse perspectives on AI awareness, institutional policies, and adoption challenges. Although the study focuses on these three institutions, they represent other higher learning institutions in Tanzania because they operate under similar regulatory frameworks and face comparable challenges related to digital transformation and technology governance. Therefore, findings from these institutions provide insights into the broader preparedness of Tanzanian higher learning institutions for ethical AI adoption.

3.3 Population, Sample Size and Sampling Techniques

The study population comprised 315 respondents, including 100 students and 5 relevant staff members from each of the selected higher learning institutions, namely IAA, IFM and NIT. Students were included because they are among the primary users of AI tools for learning, research and academic activities, while staff members were selected because they are responsible for teaching, research, administration and institutional decision-making related to technology use. The selection of these groups was scientifically justified, as they provide direct experience and informed perspectives. Therefore, the population was considered appropriate for generating reliable information on institutional preparedness for ethical artificial intelligence adoption in Tanzanian higher learning institutions.

The sample size was calculated from the population of 300 students by using the following formula adopted from Yamane (1967).

$$n = \frac{N}{1 + N(e)^2}$$

$$n = \frac{300}{1 + 300\ (0.05)^2}$$

$$\mathrm{n} = 171.4$$

$$\text{Approximately n} = 171$$

Whereby; n - The sample size, N – Population of study, Error estimate (e) = 5%

Therefore, the study employed a total of 171 students from selected higher learning institutions in Tanzania. To ensure fair representation of students from all the institutions, the study applied a proportionate formula:

$$ni = \frac{Ni}{1+N} X\, n$$

Whereby: ni represents the number of students selected from each higher learning institute, Ni is the population of each institute, N is the total population (300), and n is the sample size (171). This approach allowed the researcher to allocate respondents proportionally thereby ensuring that each institute was adequately represented in the final sample.

The study employed stratified sampling to select students from the three higher learning institutions. This technique was appropriate because students were divided into institutional strata (IAA, IFM and NIT), allowing proportional selection of respondents from each institution and ensuring fair representation in the sample. Stratified sampling enhanced the reliability of the findings by capturing variations in students' experiences and perceptions of ethical AI use across different institutional contexts. For relevant staff members, the study applied purposive sampling, selecting participants based on their knowledge, responsibilities and involvement in teaching, research, administration and technology-related decision-making. This technique ensured that participants with relevant expertise and experience in AI governance, institutional policies and digital transformation were included in the study.

3.4 Data Collection

The study utilised a questionnaire to collect data from students, employing a closed-ended format. The questions were designed with predetermined response options, specifically a 5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree." This format streamlined data collection by offering respondents clear, specific choices, making it easier to respond and enhancing the efficiency of data analysis. The use of closed-ended questions with a standardised response scale ensured consistency across participants and facilitated straightforward quantitative analysis. In addition, interviews were employed to collect qualitative data from relevant staff members in the selected higher learning institutions. The interview method was appropriate because staff members possess institutional knowledge and experience regarding AI policies, governance structures, ethical considerations and challenges affecting AI adoption. Semi-structured interviews were used to allow the researcher to obtain detailed explanations while maintaining consistency across participants.

3.5 Data Analysis

The quantitative data collected through questionnaires were analysed using descriptive statistics, specifically the mean and standard deviation, with the assistance of the Statistical Package for the Social Sciences (SPSS) version 26. Mean values were used to determine the overall level of respondents' perceptions regarding ethical AI understanding, institutional policies and adoption challenges, while the

standard deviation indicated the variation in responses among participants. Qualitative data collected through interviews were analysed thematically, with responses organised into relevant themes and supported by verbatim quotations from participants to provide deeper explanations of institutional experiences and challenges related to ethical AI adoption. The combination of these analytical techniques enabled the study to obtain both measurable findings and contextual insights.

3.6 Validity and Reliability

Content validity was assessed through pre-testing with a small sample of respondents to ensure that the items were clearly stated in line with the research objective and corrected accordingly to avoid misinterpretation. The session for administering commenced before the actual data collection with the participants. Sample elements were transcribed for pre-checking and corrected accordingly to ensure valid data. The reliability of the research instruments was measured to determine the degree to which the items yield consistent results over repeated trials. A test-retest method was employed to assess whether repeated measurements of the same concept yield similar results.

4. Findings

4.1 Demographic characteristics of the respondents

This section presents the demographic characteristics of the respondents who participated in the study (Table 1). The information includes respondents gender, age, institution level of study, and frequency of AI use. The demographic information provides a profile of the respondents and facilitates interpretation of the study findings.

Table 1
Demographic characteristics of respondents (n = 171)

Variable	Category	Frequencies	Percentages
Sex	Male	75	43.9
	Female	96	56.1
Age	Below 20 years	15	8.8
	20–24 years	65	38.0
	25–29 years	82	48.0
	30 years or above	9	5.3
Institution	IAA	67	39.2
	IFM	54	31.6
	NIT	50	29.2
Academic level	Certificate	14	8.2
	Diploma	62	36.3
	Bachelor's degree	95	55.6
Frequency of using AI	Rarely	88	51.5
	Sometimes	30	17.5
	Frequently	53	31.0
Source: Field Data, 2026			

The findings show that the majority of respondents were female. Of 171 respondents, 96 (56.1%) were female, while 75 (43.9%) were male. This indicates that both male and female students participated in the study, with females forming a slightly larger proportion. The inclusion of both sexes provided balanced views on institutional preparedness for the adoption of ethical artificial intelligence.

The results indicate that most respondents were aged 25 to 29 years, comprising 82 (48.0%), followed by those aged 20 to 24 years, who were 65 (38.0%). Respondents aged below 20 years were 15 (8.8%), while those aged 30 years or above were 9 (5.3%). These findings suggest that the study mainly captured the views of young adults who are actively engaged in higher education and are likely to use AI technologies in their academic activities.

The findings also show that 67 (39.2%) respondents were from IAA, 54 (31.6%) were from IFM, and 50 (29.2%) were from NIT. The distribution reflects proportional representation of students from the three selected institutions, ensuring that the findings represent different higher learning environments. This

strengthens the credibility of the results by incorporating perspectives from institutions with diverse academic programmes.

In the academic context, the results show that the majority of respondents were pursuing Bachelor's degrees, accounting for 95 (55.6%), followed by 62 (36.3%) diploma students and 14 (8.2%) certificate students. This suggests that most respondents had substantial exposure to higher education and were therefore well placed to provide informed views on ethical AI adoption within their institutions.

The findings further indicate that 88 (51.5%) respondents reported using AI tools rarely, while 53 (31.0%) used them frequently and 30 (17.5%) used them sometimes. This suggests that although AI tools have been adopted by students, their use remains inconsistent. The findings imply that there is a need for institutions to promote responsible and effective use of AI through appropriate guidance, training and institutional support.

4.2 Level of understanding of ethical artificial intelligence among staff and students in higher learning institutions

This section presents the findings on the level of understanding of ethical artificial intelligence among students based on descriptive statistics (Table 2), followed by interview responses from relevant staff. The quantitative results are presented using mean and standard deviation, while the qualitative findings provide additional explanations of staff experiences and perceptions regarding ethical AI awareness within their institutions.

Table 2
Descriptive statistics results on Level of understanding of ethical artificial intelligence among students (n = 171)

Statement	Mean	Std. Dev
I understand the basic meaning and applications of artificial intelligence (AI) in higher education.	3.48	1.308
I am aware of the ethical issues associated with the use of AI tools in academic activities.	3.42	1.332
I understand the importance of transparency when using AI-generated information for academic work.	3.37	1.479
I understand that AI tools can produce biased or inaccurate information.	3.34	1.448
I understand that excessive reliance on AI tools may affect students' learning and critical thinking abilities.	3.04	1.393
I understand the role of ethical AI use in maintaining academic integrity.	2.82	1.440
Overall	**3.25**	**1.40**
Source: Field Data, 2026		

The results in Table 2 summarise students' responses on the extent of their understanding of AI ethics at the selected higher learning institutions. The findings show that students' understanding of the basic meaning and application of AI was relatively good, with a mean of 3.48 and a standard deviation of 1.308. Likewise, the mean and standard deviation for awareness of ethical problems relating to the use of AI were 3.42 and 1.332, respectively. These results indicate that the majority of students are familiar with the use of AI technologies and have a general awareness of the ethical issues related to the use of AI in the educational arena. However, the standard deviations are relatively high, indicating some variation in understanding among respondents, with some students demonstrating a good understanding while others still have limited awareness. This underscores the importance of institutions providing learning opportunities that are structured to create a consistent understanding of ethical AI for all students.

The results also indicate that awareness of transparency in the information provided by AI had a mean score of 3.37 with a standard deviation of 1.479, while awareness that AI may provide biased or inaccurate information had a mean score of 3.34 with a standard deviation of 1.448. These results indicate moderate awareness of important ethical principles relating to AI use. However, the high standard deviations suggest discrepancies in students' perceptions of these ethical risks. This means that many students might still use AI to produce content even if they don't critically assess its accuracy, fairness or reliability, leading to potential misinformation and inadequate academic judgement.

The results also show that the mean score for understanding the effects of excessive reliance on AI on learning and critical thinking was 3.04, with a standard deviation of 1.393. Conversely, the lowest mean score of 2.82, with a standard deviation of 1.440, was for understanding the role of ethical AI in maintaining academic integrity. The mean and standard deviation of 3.25 and 1.40, respectively, suggest that students have a moderate understanding of ethical AI. The results suggest that while students have some understanding of the fundamentals of AI and ethical guidelines, there remains a significant lack of understanding regarding the responsible use of AI in academic settings and the ethical implications of cheating. This underscores the importance of improving ethical education in the application of AI in higher learning institutions through guidelines, awareness programmes, and training sessions that highlight the responsible use of AI for teaching, learning, and research.

The qualitative findings further supported the quantitative results by explaining the level of awareness and understanding of ethical artificial intelligence among staff and students in the selected higher learning institutions. During the interview, one staff member explained that although AI awareness is increasing among students and staff, understanding of ethical issues remains limited, particularly regarding responsible use, academic integrity and verification of AI-generated information, stating:

“Many students and staff are aware of AI tools such as ChatGPT, and they use them for different academic activities. However, the understanding of ethical issues such as plagiarism, data privacy and the need to verify AI-generated information is still developing. Some users focus more on the benefits of AI without considering the possible risks involved.” (Staff 1)

Another staff member highlighted that students generally have basic knowledge of AI applications but require more guidance on responsible use, noting:

"Students are becoming familiar with artificial intelligence because they use these tools in their studies and research. However, most of them understand how to use AI but do not fully understand the ethical principles that should guide its use, especially issues related to originality and academic honesty." (Staff 2)

These responses confirm the quantitative findings that students possess a moderate understanding of ethical AI, particularly regarding general AI applications, but have gaps in deeper ethical considerations such as transparency, accuracy and academic integrity.

Regarding measures taken to improve ethical AI awareness, one staff member indicated that institutions are beginning to introduce awareness initiatives, although these efforts are still limited, stating:

"The institution provides some guidance through academic staff and discussions during teaching activities, but there is no comprehensive training programme specifically focused on ethical artificial intelligence. More structured awareness sessions are needed to help students and staff understand responsible AI use." (Staff 2)

Another staff member emphasised the importance of developing institutional support mechanisms to improve AI literacy, explaining:

"We encourage staff and students to use technology positively, but continuous training is necessary because AI is changing very quickly. The institution needs clear programmes that teach users how to apply AI tools responsibly while protecting academic integrity." (Staff 4)

These interview responses confirm that although higher education institutions have begun raising awareness of AI use, existing efforts remain insufficient to ensure a comprehensive understanding of ethical AI among staff and students. The findings suggest that regular training, awareness programmes and clear institutional guidance are necessary to strengthen ethical AI knowledge and support responsible adoption.

The findings align with the Technology-Organisation-Environment (TOE) Framework, which holds that successful technology adoption depends not only on technological availability but also on organisational readiness and environmental support. The moderate level of ethical AI understanding among students, reflected in the overall mean of 3.25, suggests that technological exposure alone is insufficient to ensure responsible AI adoption. Consistent with the organisational dimension of the TOE Framework, the findings show that institutional capacity building, training and guidance are important conditions for developing ethical AI competence among users. The findings also support Mfaume's study, which found that although university communities recognised ethical concerns such as privacy, copyright, bias and academic integrity, formal ethical AI training was limited [18]. Similarly, the current findings align with Luwavi and Kumbo [19], who reported that AI awareness among academic staff was often developed through personal experience rather than structured institutional programmes. This indicates that

familiarity with AI tools does not necessarily translate into a comprehensive understanding of ethical AI principles.

The findings further align with Ravi et al. [20] and Marín et al. [21], who showed that both students and staff recognise ethical concerns related to AI but often lack sufficient training to address issues such as transparency, bias and responsible use. The current study extends these findings by showing that students had a relatively higher understanding of general AI applications but a weaker understanding of ethical AI use in maintaining academic integrity. This suggests that higher education institutions may be progressing in AI awareness while lagging in developing ethical competencies. Therefore, the findings support the TOE Framework's argument that organisational preparedness, particularly policies, training and institutional support systems, plays a critical role in shaping responsible technology adoption. However, the findings also reveal a gap between AI exposure and ethical readiness, indicating that institutions require stronger organisational mechanisms to translate AI awareness into responsible academic practice.

4.3 Availability of institutional policies for ethical artificial intelligence adoption in higher learning institutions

This section presents findings on the availability of institutional policies for ethical artificial intelligence adoption among students at the selected higher learning institutions. The quantitative findings are summarised using the mean and standard deviation (Table 3), while interview responses from relevant staff are included to provide further explanation of the existence, implementation and effectiveness of institutional AI policies and guidelines.

Table 3
Descriptive statistics results on availability of institutional policies for ethical artificial intelligence adoption in higher learning institutions (n = 171)

Statement	Mean	Std. Dev
My institution has clear guidelines on the responsible use of artificial intelligence (AI) in academic activities.	2.39	1.031
My institution has communicated policies or regulations regarding the use of AI tools by students.	2.60	.942
The institution provides guidance on how students should use AI tools while maintaining academic integrity.	2.68	.997
My institution has mechanisms for addressing misuse of AI in assignments, examinations and research.	3.21	1.053
Academic staff provide guidance on acceptable and unacceptable uses of AI tools.	3.13	1.077
Overall	**2.80**	**1.02**
Source: Field Data, 2026		

The results in Table 3 indicate students' perceptions of the presence of institutional policies governing the ethical use of artificial intelligence in the selected higher learning institutions. The lowest score was for having clear institutional guidelines on responsible AI use, with a mean of 2.39 and a standard deviation of 1.031. Likewise, the mean and standard deviation for the communication of AI-related policies and regulations to students were 2.60 and 0.942, respectively, and for maintaining academic integrity when using AI tools were 2.68 and 0.997, respectively. Based on these findings, students consider the existence of institutional policies and their communication to be insufficient. The findings suggest that many students use AI tools in a context of uncertain institutional guidance, potentially leading to confusion about what is acceptable and what the academic and ethical limits are. Higher learning institutions should therefore create and disseminate unambiguous guidelines for the use of AI to aid responsible adoption.

The findings also indicate that the mean for institutional mechanisms for dealing with misuse of AI in academic work was 3.21 with a standard deviation of 1.053, and for academic staff guidance on acceptable and unacceptable use of AI was 3.13 with a standard deviation of 1.077. The results show that students are aware of some existing practices among institutions and academics to regulate the use of AI in education. The variation in responses, however, indicates that this may not be a constant practice in all learning settings. The mean score is 2.80 with a standard deviation of 1.02, which suggests a generally low to moderate level of institutional policies for ethical adoption of AI. This means that although there is some informal guidance and control, there remains a need for comprehensive institutional frameworks, formal policies, and awareness mechanisms to ensure effective governance of the use of AI in teaching, learning, and research.

The qualitative findings further reinforced the quantitative results by providing deeper insights into the availability and effectiveness of institutional policies governing ethical artificial intelligence adoption. During the interview, one staff member explained that although institutions recognise the importance of regulating AI use, comprehensive policies and formal frameworks are still under development, stating:

"Currently, there are general guidelines on the use of technology and academic integrity, but a specific policy that addresses artificial intelligence use is not fully established. The institution is still considering how to develop appropriate guidelines that respond to issues such as AI-generated content, privacy and responsible use." (Staff 3)

Another staff member highlighted that the absence of clear AI-specific policies creates uncertainty among students and staff regarding acceptable practices, noting:

"Most students and staff know that AI should be used responsibly, but there is no detailed document explaining what is allowed and what is not allowed. This makes it difficult to ensure uniform understanding of ethical AI use across the institution." (Staff 5)

These interview responses confirm the quantitative findings that the availability of clear institutional AI guidelines and communication of policies remains limited. The findings suggest that while institutions

acknowledge the need for AI governance, formal policies and structured frameworks for ethical AI adoption are still inadequate.

Regarding the effectiveness of existing institutional measures, one staff member explained that current approaches mainly depend on academic staff guidance and existing academic integrity procedures, stating:

"The institution relies mostly on lecturers to guide students on the appropriate use of AI tools during assignments and research activities. While this helps to some extent, it is not enough because different lecturers may provide different levels of guidance." (Staff 6)

Another staff member emphasised that existing measures require further improvement to effectively manage the rapid development of AI technologies, explaining:

"The current mechanisms help address some cases of misuse, but they are not comprehensive enough to cover all AI-related challenges. There is a need for continuous policy updates, staff training and clear procedures that can guide AI use in teaching, learning and administration." (Staff 7)

These interview responses confirm that existing institutional measures provide some level of control over AI use, but their effectiveness is constrained by the absence of comprehensive policies, limited awareness and inadequate institutional mechanisms. The findings indicate the need for higher learning institutions to develop clear AI governance frameworks that define acceptable practices and promote responsible AI adoption across academic and administrative functions.

The findings align with the Technology-Organisation-Environment (TOE) Framework, which emphasises that successful technology adoption depends on organisational readiness, including appropriate policies, governance structures and internal support mechanisms. The low to moderate availability of institutional AI policies, reflected by an overall mean of 2.80, indicates that organisational preparedness remains a major factor influencing ethical AI adoption in Tanzanian higher learning institutions. The findings also align with Matto and Ponera [22], who found that Tanzanian higher learning institutions had not established specific AI policies due to limited expertise, weak institutional pressure and uncertainty regarding regulatory requirements. Similarly, the findings support Jin et al. [23], who demonstrated that universities with proactive AI guidelines were better positioned to address issues related to academic integrity, teaching and equitable access. This suggests that the absence of clear AI policies may limit institutions' ability to guide responsible AI use and manage emerging ethical concerns.

The findings further align with Ullah et al. [24], who reported that although many leading universities had developed generative AI guidelines, important areas such as accountability, documentation and misconduct management remained insufficiently addressed. The current study also supports Dotan et al. [25], who argued that AI governance should balance institutional standards with flexibility for academic users. The interview findings show that existing measures in Tanzanian institutions mainly depend on staff guidance and general academic integrity procedures rather than comprehensive AI-

specific frameworks. Therefore, the findings suggest that higher learning institutions need formal but adaptable AI policies that address privacy, transparency, authorship, academic integrity and accountability while allowing academic departments to apply guidelines according to their contexts. This reinforces the TOE Framework's argument that organisational capacity and environmental demands are critical for responsible technology adoption.

4.4 Challenges affecting the adoption of ethical artificial intelligence in higher learning institutions

This section presents the findings on challenges affecting the adoption of ethical artificial intelligence in the selected higher learning institutions. The quantitative findings are presented using mean and standard deviation to show students' perceptions (Table 4), while interview responses from relevant staff provide further explanations on institutional barriers and experiences related to ethical AI implementation.

Table 4
Descriptive statistics results on challenges affecting the adoption of ethical artificial intelligence in higher learning institutions (n = 171)

Statement	Mean	Std. Dev
Lack of clear institutional guidelines on AI use limits the ethical adoption of AI technologies.	3.36	1.362
Limited awareness among students affects responsible use of AI tools.	3.78	1.278
Lack of AI training programmes for students and staff is a challenge to ethical AI adoption.	3.39	1.424
Concerns about academic dishonesty make it difficult to integrate AI tools in learning activities.	3.39	1.330
Lack of knowledge about ethical AI practices affects responsible use of AI tools.	3.50	1.200
Some students and staff resist the use of AI technologies due to uncertainty about their effects.	2.78	1.358
Rapid changes in AI technologies make it difficult for institutions to develop appropriate policies and guidelines.	3.68	1.186
Overall	**3.41**	**1.31**
Source: Field Data, 2026		

Table 4 presents students' perceptions of the problems that affect the implementation of ethical Artificial Intelligence in the selected higher learning institutions. The results show that the most common problem was a lack of students' awareness of the responsible use of AI, with a mean score of 3.78 and a standard deviation of 1.278. Similarly, the rapid change of AI technologies, which affects policy development, recorded a mean of 3.68 with a standard deviation of 1.186, and a lack of knowledge of

ethical practice in AI recorded a mean of 3.50 and a standard deviation of 1.200. These results indicate that students perceive a lack of awareness, limited knowledge and understanding of AI ethics, and the rapid development of AI technologies as significant hurdles to responsible use. The findings suggest that institutions may have difficulty updating their guidelines and ensuring that students know about the proper use of AI without ongoing training and awareness campaigns.

The findings also reveal that the mean for the lack of AI training programmes for students and staff was 3.39 with a standard deviation of 1.424, and the mean for academic dishonesty concerns related to AI use was 3.39 with a standard deviation of 1.330. Moreover, the mean of lack of clear institutional guidelines on the use of AI was 3.36 with a standard deviation of 1.362. These findings show that institutional capacity issues are critical in advancing the adoption of ethical AI. The results indicate that the use of AI can pose challenges, including misuse, ambiguity regarding roles and responsibilities, and variations in how students and teachers use it, if it is not backed by structured training, clear guidelines, and effective systems for ensuring academic honesty. Results indicate that resistance among students and staff to AI technologies was perceived as a relatively low-level challenge, with a mean score of 2.78 and a standard deviation of 1.358.

Overall, the mean score across the items is 3.41, with a standard deviation of 1.31, showing that respondents agreed that several challenges exist in the adoption of ethical AI in Higher Learning Institutions. This means that the primary obstacles are not necessarily against the use of AI but rather lack of preparedness, lack of knowledge, poor policy environments, and lack of institutional support systems. Hence, institutions need to enhance their AI governance, conduct frequent training, and establish adaptive policies to promote responsible AI integration in academic work.

The qualitative findings further reinforced the quantitative results by providing additional explanations on the challenges affecting the adoption of ethical artificial intelligence in the selected higher learning institutions. During the interview, one staff member explained that limited awareness and inadequate knowledge of ethical AI practices among users remain major challenges, stating:

“Many students and some staff members are interested in using AI tools, but their understanding of responsible use is still limited. Some users focus on getting quick answers from AI without considering issues such as accuracy, originality and academic integrity.” (Staff 1)

Another staff member identified the absence of comprehensive institutional frameworks and limited capacity building as key barriers to ethical AI adoption, noting:

“The main challenge is that AI is developing faster than institutional preparations. We need clear guidelines, trained personnel and continuous awareness programmes because without these, it becomes difficult to control how AI tools are used within the institution.” (Staff 5)

These interview responses confirm the quantitative findings that limited awareness, inadequate ethical knowledge and weak institutional preparedness are among the major challenges affecting responsible

AI adoption. The findings indicate that the problem is not the availability of AI tools, but rather the limited capacity of users and institutions to manage their use effectively.

Regarding strategies for improving ethical AI adoption, one staff member emphasised the importance of developing institutional policies and training programmes, stating:

"The institution should develop clear AI policies that explain acceptable and unacceptable uses of artificial intelligence. In addition, regular training should be provided to both staff and students so that they understand how to use AI responsibly in teaching, learning and research." (Staff 8)

Another staff member highlighted the need for continuous improvement and stakeholder involvement in AI governance, explaining:

"AI adoption requires cooperation between management, academic staff, students and technology experts. Institutions should regularly review their guidelines, invest in digital infrastructure and create platforms where users can receive guidance on ethical AI practices." (Staff 9)

These interview responses confirm that overcoming challenges associated with ethical AI adoption requires a combination of policy development, capacity building, awareness creation and continuous institutional support. The findings suggest that higher learning institutions need proactive governance approaches that can respond to the rapid development of AI technologies while promoting responsible and sustainable use.

The findings align with the Technology-Organisation-Environment (TOE) Framework, which explains that technology adoption is shaped by technological conditions, organisational readiness and environmental influences. The study findings show that challenges affecting ethical AI adoption are mainly related to institutional preparedness, including limited awareness, inadequate ethical knowledge, insufficient training and difficulties in developing appropriate guidelines. This supports Kondoro [26], who found that AI adoption among university students in Tanzania is constrained by unequal access, limited capacity and ethical concerns. The findings also agree with Muringa [28], who reported that African universities experience challenges related to unclear policies, limited digital capacity, staff competencies and data privacy concerns. These results confirm the TOE Framework's argument that successful technology adoption requires more than access to technological tools; it also depends on institutional capabilities and supportive conditions.

The findings further align with Pasipamire et al. [29], who observed that African higher learning institutions continue to adopt AI despite facing challenges related to skills gaps, misuse risks and resource limitations. They also support Sarakikya and Kitula [27], who highlighted concerns about academic misconduct and the need for mechanisms to guide responsible AI use. However, the findings differ from the assumption that resistance to AI is the main obstacle to adoption, as respondents indicated that the greater concerns relate to inadequate knowledge, limited training and weak governance structures. This suggests that higher learning institutions are willing to engage with AI

technologies, but require stronger policies, capacity development and institutional support to ensure that adoption occurs in an ethical and sustainable manner.

Conclusion

The research findings indicate that the readiness of institutions for implementing ethical AI in Tanzanian higher education institutions is still evolving and needs to be reinforced. While students and staff have been exposed to AI technologies and have a basic understanding of its applications, ethical knowledge is lacking in terms of academic integrity, transparency, accuracy and responsible use. This suggests that knowledge of AI does not necessarily lead to ethical proficiency. Thus, it is essential for higher learning institutions to shift from fostering the adoption of AI to training the knowledge, skills and values that will enable the proper integration of AI.

The study also finds that the lack of overarching institutional policies, training opportunities, awareness campaigns and governance frameworks are other barriers to the uptake of ethical AI. Some institutions already have informal practices such as academic staff guidance and existing academic integrity policies; however, these are not adequate to tackle the new ethical challenges of AI. Institutions must develop flexible and transparent policies, upskill their staff and students, and foster governance frameworks that facilitate accountability, transparency, and academic integrity to ensure sustainable implementation of AI. In conclusion, the readiness of the institutions to adopt ethical AI hinges on the capacity of higher learning institutions to ensure that technological progress is integrated into organizational readiness and ethical educational practices.

4.6 Recommendations

The study suggests that higher education institutions in Tanzania need to formulate and adopt institution-specific ethical artificial intelligence policies that explicitly outline appropriate applications of AI in teaching and learning, assessment, research, and administration. These guidelines should be incorporated into the policies, covering academic integrity, disclosure of AI usage, data privacy, accountability, and procedures for misuse. Regular AI literacy training for students, faculty, and administrators should also be organised to enhance understanding of responsible AI practices. Furthermore, the university administration should establish AI governance committees to review AI policies, track emerging ethical issues, and organise awareness-raising efforts. Engagement with regulatory agencies, tech professionals, and other higher education institutions to support the creation of practical guidelines aligned with the Tanzanian higher education environment, and to foster the use of AI in delivering quality education without compromising academic values, needs to be strengthened.

Declarations

Ethics Approval Ethical approval for this study was obtained from the Tanzania Commission for Science and Technology (COSTECH) before data collection commenced. Permission to conduct the study was

subsequently obtained from IAA, IFM and NIT. The study was conducted in accordance with recognised ethical principles for research involving human participants.

Participant consent Written informed consent was obtained from all students and staff before participation. Participants were informed of the study's purpose, confidentiality, voluntary participation and their right to withdraw. All responses were anonymised, securely stored and used solely for research purposes. Participants also consented to the publication of anonymised data and quotations, with no identifiable personal information included in the manuscript.

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