



SWOT analysis of factors influencing ChatGPT integration in TVET: Perspectives of lecturers in South-South and South-East Nigeria

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Abstract

The study examined the strengths, weaknesses, opportunities and threats influencing ChatGPT integration in Technical and Vocational Education and Training (TVET) from the perspectives of lecturers in public universities in South-South and South-East Nigeria. A descriptive survey research design was adopted to achieve four objectives and answer four research questions. The population comprised 510 lecturers in public universities offering TVET-related programmes, from which 224 lecturers, comprising 130 from South-South and 94 from South-East, were selected using Yamane's formula and purposive sampling. Data were collected using a structured questionnaire validated by five experts, with Cronbach alpha coefficients of 0.82 and 0.79. Mean Item Score, ranking, gap analysis and independent-samples t-test at the 0.05 significance level were used for data analysis. Findings revealed differences in the internal and external factors influencing ChatGPT integration between the two geopolitical zones. Internal factors included digital literacy, staff training, willingness to integrate ChatGPT, students' digital literacy and acceptance, institutional policies, academic integrity practices, technical support and confidence in verifying AI-generated information, while external factors included internet connectivity, electricity stability, ICT infrastructure, access to digital devices, funding, staff development, AI literacy programmes and government regulations. SWOT analysis showed that both zones possessed substantial internal strengths and external opportunities for ChatGPT integration. However, weaknesses existed in digital competence, training, verification confidence, institutional support and related practices, while the cost of internet services and digital technologies constituted the only common external threat. The study recommended continuous AI training, improved digital infrastructure, clear institutional policies, technical support and responsible verification of AI-generated information to promote effective and responsible ChatGPT integration in TVET.

Keywords: ChatGPT Integration, Technical and Vocational Education and Training (TVET), SWOT Analysis, Digital Literacy, Artificial Intelligence, Nigerian Universities

Introduction

Artificial intelligence has become part of teaching, learning, research and administrative activities in higher education. Early artificial intelligence systems depended largely on predefined rules and logical instructions for solving specific problems. Advances in machine learning and neural network technologies shifted attention towards systems capable of processing large datasets and generating responses without requiring explicit programming for every task (Sarker, 2022) [43]. The growth of computing capacity, cloud technologies and digital data has further expanded the application of artificial intelligence across education, communication, finance and production activities (Liang *et al.*, 2024) [25]. One of the prominent applications is ChatGPT, a large language model developed by OpenAI to generate human-like responses to natural language prompts (Brown *et al.*, 2020) [11]. ChatGPT became publicly available in November 2022 through GPT-3.5, following earlier versions including GPT-1 in 2018, GPT-2 in 2019 and GPT-3 in 2020. GPT-4 was introduced in 2023 with expanded capabilities, while GPT-4o subsequently extended interaction across text, images and voice (Bai *et al.*, 2023; Lahat *et al.*, 2024) [8, 24]. These developments have increased interest in the use of ChatGPT within universities because of its capacity to answer questions, generate instructional materials, summarise documents, support academic writing and assist research activities (Madunić & Sovulj, 2024) [5, 27].

The educational relevance of ChatGPT extends beyond question answering. Lecturers can incorporate the technology into lesson preparation, assessment-item generation, instructional-material preparation, course organisation and feedback activities. Students can use it to obtain explanations of difficult concepts, explore literature, improve language, generate ideas and prepare preliminary academic drafts (Shorey *et al.*, 2024) [44]. Artificial intelligence is also incorporated into digital learning platforms such as Google Classroom, DreamBox, Duolingo, Knewton Alta and PowerSchool, where AI-supported features provide responses to learner performance and instructional needs (Wang *et al.*, 2024) [25]. ChatGPT extends these possibilities by providing conversational assistance that can support interaction during learning activities. Its integration into higher education therefore represents a shift towards the use of interactive artificial intelligence as a complementary resource within existing educational practices.

The relevance of ChatGPT is particularly important in Technical and Vocational Education and Training (TVET), where instruction combines theoretical knowledge, practical competence, technical problem-solving and occupational skills. University-based TVET programmes prepare learners in areas such as automobile technology, building technology, electrical and electronic technology, woodwork technology, mechanical and metalwork technology,

computer system maintenance and technical drawing (FRN, 2013; George, Udom, & Jackson, 2024) ^[1, 5, 6, 18]. These programmes require instructional approaches capable of connecting theoretical explanations with practical applications. According to Ezurike and Akinsulire (2024) ^[16], graduates of TVET-related programmes are expected to acquire competencies necessary for employment, entrepreneurship and technological development. The integration of digital and artificial intelligence tools into TVET teaching and learning can therefore complement conventional instructional approaches by providing additional opportunities for explanation, practice, information access and academic support.

TVET has long been recognised as an important means of developing skilled human resources for economic growth and productivity. Preckler (2018) ^[39] described TVET as education directed towards the acquisition of knowledge, skills and competencies required for work. Attah, Chibe and Ifiora (2025) ^[6] found that vocational training, skills acquisition and post-training support were influencing employability outcomes among TVET graduates in Nigeria. These perspectives position TVET as an area of education that must respond to technological developments and changing workplace requirements. Consequently, the integration of emerging technologies such as ChatGPT into TVET requires attention to the conditions under which lecturers can effectively incorporate such tools into instructional and research activities.

Nigerian universities continue to experience challenges relating to technology-supported teaching and learning. Adeoyeye, Afolabi and Ayo (2014) ^[1] reported inadequate digital facilities for teaching and learning, while Nwachukwu and Asom (2015) ^[30] observed limited use of digital technologies in instructional activities. Funding limitations can affect the provision and maintenance of educational facilities, while inadequate remuneration and limited motivation may constrain lecturers' engagement with modern instructional technologies (Eze, 2013) ^[14]. Such conditions are relevant to the integration of ChatGPT because effective classroom use requires access to appropriate devices, reliable connectivity, technical support and lecturers with sufficient digital competence. The presence of ChatGPT alone may therefore not guarantee meaningful integration into TVET programmes.

ChatGPT provides several possibilities for supporting TVET teaching and learning. Students can use the technology to obtain explanations of technical concepts, receive guidance on academic projects, improve technical writing and revise course materials beyond scheduled classroom periods. Lecturers can incorporate ChatGPT into lesson preparation, quiz generation, teaching-schedule organisation and preliminary feedback on assignments (Rahman & Watanobe, 2023) ^[26, 34]. These applications can reduce time spent on some repetitive academic activities and create additional opportunities for lecturers to concentrate on practical instruction, supervision and learner support. However, the usefulness of ChatGPT depends partly on the accuracy and appropriateness of the information generated. Consequently, lecturers and students need to evaluate and verify generated information using authoritative academic and professional sources before incorporating it into teaching, learning or research activities.

The integration of ChatGPT also raises concerns about excessive dependence on artificial intelligence. While the

technology can support idea generation, literature exploration, language improvement and preliminary writing, excessive reliance may reduce opportunities for learners to exercise independent reasoning, analytical skills, academic writing and problem-solving abilities. Wen and Wang (2023) ^[51] associated extensive dependence on automated writing systems with concerns regarding the development of independent reasoning and writing competence among university students. Rane *et al.* (2024) ^[41] similarly identified plagiarism, academic dishonesty and declining originality as important concerns influencing ChatGPT use in education. These concerns make it necessary for lecturers and institutions to establish appropriate boundaries between AI-supported learning and independent academic work.

ChatGPT can also provide opportunities for improving access to educational resources (George, 2026) ^[20]. Learners with limited access to academic assistance may use the technology to obtain explanations, practice questions and supplementary learning support outside normal classroom interactions. ChatGPT language-support capabilities can assist students experiencing difficulties with academic communication through grammar suggestions, vocabulary improvement and text revision (Barrot, 2023) ^[9]. Research students can incorporate the technology into literature exploration, organisation of ideas and preparation of preliminary drafts, while lecturers can use it in curriculum planning, instructional design and preparation of teaching materials (Ma *et al.*, 2024) ^[5]. These applications demonstrate how ChatGPT can complement conventional educational resources when used under appropriate academic guidance.

The integration of ChatGPT also involves issues of privacy, ethics and governance. Artificial intelligence applications process prompts that may contain personal, academic or institutional information. Ray (2023) ^[42] associated responsible artificial intelligence use with data protection measures, including controlled access, user consent and secure information management. Weidinger *et al.* (2021) ^[50] identified algorithmic bias, privacy exposure and misuse of generated content among the risks influencing artificial intelligence systems. In TVET, where lecturers and students may process institutional, assessment and research information, appropriate safeguards are necessary to protect confidential information and maintain academic integrity. Institutional guidelines are therefore important for defining acceptable use, protecting sensitive information and establishing responsible practices.

Effective integration of ChatGPT in TVET is also influencing the availability of supportive technological and institutional conditions. Stable electricity, reliable internet connectivity, digital infrastructure and access to suitable computing facilities can facilitate the incorporation of artificial intelligence into teaching and learning activities (Okunade, 2024) ^[33]. Staff development programmes can strengthen lecturers' ability to formulate appropriate prompts, evaluate AI-generated information and incorporate ChatGPT into instructional practices (Su & Yang, 2023) ^[6, 34]. The Federal Ministry of Education (FME, 2023) ^[17] reported improvements in digital infrastructure while noting continuing disparities in connectivity, equipment availability and technical support across public institutions. These conditions demonstrate that meaningful ChatGPT integration involves not only the capabilities of the

technology but also the institutional environment in which lecturers and students use it.

The SWOT framework provides a useful approach for examining these conditions. Taktak *et al.* (2024) ^[48] explained that SWOT analysis examines strengths and weaknesses arising from internal conditions and opportunities and threats arising from the external environment. Riley (2012) ^[35] similarly distinguished strengths and weaknesses as internal attributes, while opportunities and threats relate to external conditions such as policy, technology, infrastructure and the wider educational environment. In the context of ChatGPT integration in TVET, internal strengths may include lecturers' knowledge, digital literacy, willingness, training and institutional support, while weaknesses may include inadequate technical competence, limited verification skills and academic-integrity concerns. External opportunities may include improved infrastructure, government support, AI training programmes, regulatory frameworks and collaboration with technology providers, whereas threats may include high technology costs, inadequate connectivity, cybersecurity concerns and unreliable electricity.

Previous studies have examined different aspects of ChatGPT in education. Ojo (2024) ^[31] examined student use of ChatGPT for academic writing and concept explanation, while Kangiwa and Abubakar (2024) ^[22] reported issues relating to awareness, infrastructure and training among academic staff. Adetarami, Okeke and Ikuelogbon (2025) ^[2] identified cost, resistance to technological change, inadequate infrastructure and concerns about employment as challenges influencing the use of artificial intelligence. Rane *et al.* (2024) ^[41] discussed educational benefits of ChatGPT alongside concerns regarding plagiarism and declining independent thinking. However, limited attention has been given to the combined internal and external factors influencing ChatGPT integration specifically among TVET lecturers in Nigerian public universities, particularly within the South-South and South-East geopolitical zones. The present study therefore examines these factors through a SWOT framework to determine the strengths, weaknesses, opportunities and threats influencing ChatGPT integration in TVET from the perspectives of lecturers in South-South and South-East Nigeria.

Statement of the Problem

The emergence of ChatGPT has introduced new possibilities for teaching, learning and research in higher education. University lecturers and students use the technology for academic writing, information retrieval, lesson preparation, content generation and learning support (Shorey *et al.*, 2024) ^[44]. ChatGPT has also attracted attention in Technical and Vocational Education and Training (TVET), where instruction requires the acquisition of technical knowledge, practical skills and problem-solving ability (FRN, 2013) ^[18]. Despite the growing presence of artificial intelligence in education, public universities in the South-South and South-East geopolitical zones continue to face challenges influencing digital infrastructure, internet connectivity, electricity supply and staff preparedness for incorporating emerging technologies into educational activities (Adeoyeye *et al.*, 2014; FME, 2023) ^[1, 17]. Reports have also identified limited digital literacy among lecturers and students, resistance to technological change, inadequate training opportunities and concerns regarding the changing roles of

educators in technology-supported education (Kangiwa & Abubakar, 2024) ^[5, 22]. These conditions may affect the extent to which ChatGPT can be meaningfully incorporated into TVET teaching, learning and research activities.

Questions have also been raised regarding the educational consequences of ChatGPT use. Concerns include inaccurate or fabricated responses, bias in generated content, overdependence on artificial intelligence, reduced originality in academic work, weakening of critical thinking and challenges relating to academic integrity (Ya'u & Mohammed, 2025) ^[6, 29]. Lecturers may face increasing difficulty in distinguishing student-produced work from AI-generated submissions, while existing plagiarism detection approaches may not adequately address this challenge (Rane, Choudhary & Rane, 2024) ^[34, 41]. Despite these concerns and the potential educational benefits of ChatGPT, limited empirical evidence exists on the strengths, weaknesses, opportunities and threats influencing factors related to ChatGPT integration from the perspectives of TVET lecturers in public universities located in the South-South and South-East geopolitical zones of Nigeria. This gap creates a need to examine the internal and external conditions influencing incorporating ChatGPT into TVET teaching, learning and research. The study therefore examined the strengths, weaknesses, opportunities and threats influencing factors related to ChatGPT integration in TVET from the perspectives of lecturers in South-South and South-East Nigeria.

Objectives of the Study

The main objective of the study is to examine the factors influencing ChatGPT integration in Technical and Vocational Education and Training (TVET) from the perspectives of lecturers in public universities in South-South and South-East Nigeria.

Specifically, the study seeks to:

1. Identify the internal factors influencing ChatGPT integration among TVET lecturers in public universities in South-South and South-East Nigeria.
2. Examine the strengths and weaknesses of the internal factors influencing ChatGPT integration among TVET lecturers in public universities in South-South and South-East Nigeria.
3. Identify the external factors influencing ChatGPT integration among TVET lecturers in public universities in South-South and South-East Nigeria.
4. Examine the opportunities and threats of the external factors influencing ChatGPT integration among TVET lecturers in public universities in South-South and South-East Nigeria.

Research Questions

The following research questions were formulated to guide the study:

1. What are the internal factors influencing ChatGPT integration among TVET lecturers in public universities in South-South and South-East Nigeria?
2. What are the strengths and weaknesses of the internal factors influencing ChatGPT integration among TVET lecturers in public universities in South-South and South-East Nigeria?
3. What are the external factors influencing ChatGPT integration among TVET lecturers in public universities in South-South and South-East Nigeria?

4. What are the opportunities and threats of the external factors influencing ChatGPT integration among TVET lecturers in public universities in South-South and South-East Nigeria?

Review of Related Studies

Budak and Durmuş (2024), Taktak, Bellibaş and Özgenel (2024), Mai, Da and Hanh (2024) ^[25], and Gençel and Yılmaz (2026) examined ChatGPT from the SWOT perspective and found that the technology supported teaching and learning through personalised instruction, immediate feedback, access to learning materials, academic writing support and content development. Taktak *et al.* (2024) ^[48] found that ChatGPT enhanced collaborative learning, writing ability and language development among teachers and learners. Md Desa and Mohd Matore (2025) ^[29] reported that ChatGPT assisted STEM students with idea generation, concept analysis and problem-solving, while Alias, Aziz and Kambaruddin (2024) ^[5] found that the technology supported conceptual understanding, programming activities and Lecturers task performance in TVET institutions. Ezurike and Akinsulire (2024) ^[16] found high awareness and use of ChatGPT among undergraduate students, particularly for improving understanding of course content, knowledge retention and completion of academic tasks. Othman *et al.* (2025) ^[36] found that lecturers used ChatGPT for lesson preparation, assessment development and organisation of course materials, while Suleman *et al.* (2025) ^[46] reported its use for lesson preparation, academic writing support and study assistance in higher education. Budak and Durmuş (2024), Rane *et al.* (2024) ^[41], Taktak *et al.* (2024) ^[48], Mai *et al.* (2024) ^[21] and Gençel and Yılmaz (2026) identified weaknesses influencing ChatGPT use in education. The studies reported inaccurate responses, biased information, reduced critical thinking, plagiarism, academic dishonesty and weak contextual understanding as major concerns. Taktak *et al.* (2024) ^[48] identified data privacy, security and psychological concerns, while Mai *et al.* (2024) ^[21] reported limitations relating to instructional accuracy and contextual interpretation. Aydın and Karaarslan (2022) ^[7] found that dependence on automated text generation could affect originality in Lecturers academic work. Oluwadiya *et al.* (2023) ^[34] reported that differences in digital skills, poor internet access and limited availability of digital devices affected the use of AI tools for academic activities. Rane *et al.* (2024) ^[41], Budak and Durmuş (2024), Md Desa and Mohd Matore (2025) ^[29], Mai *et al.* (2024) ^[21] and Gençel and Yılmaz (2026) identified opportunities for wider integration of ChatGPT in curriculum development, professional development, creative content production, inclusive education and improved learning experiences. Rane *et al.* (2024) ^[41] reported that ChatGPT created opportunities for differentiated instruction and broader access to educational resources. Md Desa and Mohd Matore (2025) ^[29] found that the SCORE model supported reflective learning and systematic problem-solving in STEM education. Ezurike and Akinsulire (2024) ^[16] reported that increasing student acceptance created prospects for wider use of ChatGPT in Nigerian universities, while Suleman *et al.* (2025) ^[46] found continued expansion of its use for instructional preparation, academic writing and learning support. Budak and Durmuş (2024), Rane *et al.* (2024) ^[41], Taktak *et al.* (2024) ^[48], Okocha *et al.* (2024) ^[32] and Gençel and

Yılmaz (2026) identified threats influencing ChatGPT use in education. The studies highlighted overdependence on artificial intelligence, ethical concerns, academic dishonesty, declining analytical ability and reduced human interaction. This finding was consistent with Okocha *et al.* (2024) ^[32], who reported found that inadequate internet facilities, unstable electricity supply, poor technical support, low digital literacy and insufficient training limited the effective use of ChatGPT in Colleges of Education. Ezugoh, Odo and Ofojebe (2025) ^[15] found low awareness and utilisation among academic staff in Colleges of Education in Delta State and attributed the situation to limited knowledge, inadequate exposure and insufficient training opportunities. The authors recommended workshops, seminars and practical training for academic staff.

The existing studies have examined general educational use, students' awareness/adoption, or SWOT perceptions of ChatGPT, but there is limited empirical evidence comparing internal and external adoption factors among TVET lecturers across South-South and South-East Nigerian public universities. The present study therefore addresses this gap by examining the internal and external factors influencing ChatGPT integration in TVET and determining their strengths, weaknesses, opportunities and threats from the perspectives of lecturers in public universities in South-South and South-East Nigeria.

Methodology

The study adopted a descriptive survey research design. The design was considered appropriate because enabled the researchers to examine and compare the internal and external factors influencing ChatGPT integration across the two geopolitical zones. The design also provided a basis for examining the strengths, weaknesses, opportunities and threats influencing ChatGPT integration in TVET teaching, learning, assessment and research activities. The study covered the South-South and South-East geopolitical zones of Nigeria, which constitute two of the six geopolitical zones in the country. The South-South geopolitical zone comprises Akwa Ibom, Bayelsa, Cross River, Delta, Edo and Rivers States, while the South-East geopolitical zone comprises Abia, Anambra, Ebonyi, Enugu and Imo States (Otuo *et al.*, 2025; Ekong *et al.*, 2024) ^[5, 37]. The population of the study consisted of 510 lecturers in public universities offering Technology Education, Vocational Education, Business Education, Agricultural Education, Home Economics Education and Industrial Technical Education. The population comprised 296 TVET lecturers in the South-South geopolitical zone (Kennedy, Victor, & Igensekhien, 2026; Akpan, Akpan, & Nnadi, 2026) ^[3, 7, 23] and 214 TVET lecturers in the South-East geopolitical zone (Akudolu, Opara, & Ebenezer-Nwokeji, 2026) ^[4]. Bornstein, Jager and Putnick (2013) ^[10] described a population as the totality of individuals possessing defined characteristics relevant to a study. In the present study, the population referred to lecturers involved in teaching, training and related academic activities in TVET programmes in the selected public universities.

The sample size of 224 lecturers was obtained using the Yamane (1967) ^[26] formula at a 5% level of precision. Purposive sampling was used to select lecturers, resulting in 130 lecturers from the South-South and 94 lecturers from the South-Eas who were directly involved in teaching, training and related academic responsibilities and who had

relevant exposure to digital technologies and ChatGPT applications. Taherdoost (2016) ^[47] described a sample as a subset of a population selected for investigation. Data were collected using a structured questionnaire titled “SWOT Analysis of Factors influencing ChatGPT Integration in TVET Questionnaire (SAFCITVETQ)”. The questionnaire contained 30 items designed to obtain information on internal and external factors influencing ChatGPT integration in TVET. Section A contained items on demographic characteristics; Section B consist of 10 items on internal factors while Section C consist of 10 items on external factors. The instrument was structured on a five-point rating scale of Strongly Agree, ^[5] Agree, ^[4] Undecided/Neutral, ^[3] Disagree, ^[2] Strongly Disagree, ^[1] with interpretation intervals comprising Strongly Agreed (SA = 4.50-5.00), Moderately Agreed (MA = 3.50-4.49), Lowly Agreed (LA = 2.50-3.49), Not Agreed (NA = 1.50-2.49) and Undecided (U = 1.00-1.49). The scale was used to obtain respondents' perceptions of the internal and external factors influencing ChatGPT integration in TVET.

Face and content validity of the instrument were established through expert review by five specialists drawn from academia and professional practice. The experts assessed the clarity, relevance, adequacy and alignment of the questionnaire items with the objectives of the study. Their observations and suggestions were incorporated to improve the structure, wording and technical clarity of the instrument. The reliability of the instrument was established through a pilot test involving 20 respondents who were not included in the main study but possessed characteristics similar to those of the study participants. Cronbach's alpha was used to determine the internal consistency of the instrument. The reliability coefficients were 0.82 for the

internal factors and 0.79 for the external factors. The coefficients indicated acceptable internal consistency for the respective sections of the instrument.

Data collection was carried out with the assistance of three trained research assistants. The assistants were trained on questionnaire administration, informed-consent procedures and retrieval protocols. Participants were provided with relevant information about the study and participated voluntarily. The questionnaires were administered face-to-face to the selected lecturers. A total of 224 copies of the questionnaire were distributed and all 224 were retrieved and found usable, representing a 100% response rate. Data were analysed using descriptive and inferential statistics. Mean Item Score (MIS) was used to determine the level of agreement with the internal and external factors influencing ChatGPT integration. Ranking was used to arrange the identified factors according to their mean scores. Gap analysis was used to determine the differences in the mean scores between respondents from the South-South and South-East geopolitical zones. Independent-samples t-test was used to determine whether statistically significant differences existed between the mean responses of lecturers from the two geopolitical zones at the 0.05 level of significance. Pallant (2005) ^[38] noted that the independent-samples t-test is appropriate for comparing the means of two independent groups, with a significance value below 0.05 indicating a statistically significant difference.

Presentation of Results and Analysis

Research Question 1: What are the internal factors influencing ChatGPT integration among TVET lecturers in public universities in South-South and South-East Nigeria?

Table 1: Internal Factors Influencing ChatGPT Integration among TVET Lecturers in Public Universities in South-South and South-East Nigeria

S/N	Internal Factors	MIS (South-South)	Rank	MIS (South-East)	Rank	Gap	t-value	Sig.
1	lecturers' perceptions of students' digital literacy	4.20	1	3.30	9	0.90	4.80	0.000
2	Lecturers' willingness to integrate ChatGPT into classroom instruction	4.18	2	3.75	2	0.43	2.90	0.004
3	Availability of staff training on ChatGPT and artificial intelligence tools	4.10	3	3.18	11	0.92	4.45	0.000
4	Lecturers' digital literacy for effective use of ChatGPT	4.05	4	2.95	13	1.10	5.12	0.000
5	lecturers' perceptions of students' acceptance of ChatGPT	3.95	5	3.05	12	0.90	4.28	0.000
6	Use of ChatGPT for research writing and literature review activities	3.90	6	3.55	6	0.35	2.40	0.017
7	Lecturers' knowledge of ChatGPT applications for teaching and learning	3.88	7	3.22	10	0.66	3.54	0.001
8	Lecturers' confidence in verifying AI-generated information before use	3.78	8	2.88	14	0.90	4.22	0.000
9	Institutional encouragement for innovation in AI-supported teaching	3.60	9	3.40	7	0.20	1.45	0.148
10	Readiness of TVET departments to adopt ChatGPT for teaching, learning and research	3.55	10	3.35	8	0.20	1.50	0.135
11	Attitudes of lecturers toward ChatGPT adoption in TVET programmes	3.25	11	2.70	15	0.55	3.10	0.002
12	Institutional policies guiding the educational use of ChatGPT	3.10	12	3.68	4	-0.58	3.76	0.000
13	Use of ChatGPT for lesson planning and instructional material development	3.05	13	3.60	5	-0.55	3.65	0.000
14	Academic integrity practices for AI-assisted teaching and assessment	2.98	14	3.70	3	-0.72	4.10	0.000
15	Availability of technical support for ChatGPT users	2.85	15	3.82	1	-0.97	5.20	0.000

Data presented in Table 1 showed differences in the internal factors influencing ChatGPT integration in TVET between public universities in the South-South and South-East geopolitical zones of Nigeria. In the South-South, higher mean scores were recorded for lecturers' perceptions of students' digital literacy (MIS = 4.20), lecturers' willingness to integrate ChatGPT into classroom instruction (MIS =

4.18), staff training on ChatGPT and AI tools (MIS = 4.10), lecturers' digital literacy (MIS = 4.05), and perceptions of students' acceptance of ChatGPT (MIS = 3.95). Lower mean scores were obtained for technical support (MIS = 2.85), academic integrity practices (MIS = 2.98), lesson planning and instructional material development (MIS = 3.05), and institutional policies (MIS = 3.10). In the South-

East, higher mean scores were recorded for technical support (MIS = 3.82), lecturers' willingness to integrate ChatGPT (MIS = 3.75), academic integrity practices (MIS = 3.70), institutional policies (MIS = 3.68), and lesson planning (MIS = 3.60), while lower scores were recorded for lecturers' attitudes toward adoption (MIS = 2.70), confidence in verifying AI-generated information (MIS = 2.88), and lecturers' digital literacy (MIS = 2.95). Gap analysis indicated the largest differences for lecturers' digital literacy (Gap = 1.10), staff training (Gap = 0.92), perceptions of students' digital literacy (Gap = 0.90), and

technical support (Gap = -0.97). The *t*-test results showed significant differences for thirteen of the fifteen factors ($p < .05$), whereas institutional encouragement for innovation ($p = .148$) and departmental readiness for ChatGPT adoption ($p = .135$) showed no significant differences between the two geopolitical zones.

Research Question 2: What are the strengths and weaknesses of the internal factors influencing ChatGPT integration among TVET lecturers in public universities in South-South and South-East Nigeria?

Table 2: Strengths and Weaknesses of Internal Factors Influencing ChatGPT Integration among TVET Lecturers in Public Universities

S/N	Internal Factors	South-South		South-East	
		Strengths	Weaknesses	Strengths	Weaknesses
1	Lecturers' knowledge of ChatGPT applications for teaching and learning	✓		✓	
2	Lecturers' digital literacy for effective use of ChatGPT	✓			✓
3	lecturers' perceptions of students' digital literacy	✓		✓	
4	Availability of staff training on ChatGPT and artificial intelligence tools	✓		✓	
5	Lecturers' willingness to integrate ChatGPT into classroom instruction	✓		✓	
6	lecturers' perceptions of students' acceptance of ChatGPT	✓		✓	
7	Institutional policies guiding the educational use of ChatGPT	✓		✓	
8	Academic integrity practices for AI-assisted teaching and assessment		✓	✓	
9	Availability of technical support for ChatGPT users		✓	✓	
10	Use of ChatGPT for lesson planning and instructional material development	✓		✓	
11	Use of ChatGPT for research writing and literature review activities	✓		✓	
12	Lecturers' confidence in verifying AI-generated information before use	✓			✓
13	Attitudes of lecturers toward ChatGPT adoption in TVET programmes	✓			✓
14	Institutional encouragement for innovation in AI-supported teaching	✓		✓	
15	Readiness of TVET departments to adopt ChatGPT for teaching, learning and research	✓		✓	

Table 2 presents the SWOT classification of internal factors influencing ChatGPT integration among TVET lecturers in public universities in the South-South and South-East geopolitical zones of Nigeria. In the South-South, strengths included lecturers' knowledge of ChatGPT applications, digital literacy, perceptions of students' digital literacy and acceptance, staff training, willingness to integrate ChatGPT, use for research writing, confidence in verifying AI-generated information, institutional encouragement for innovation, and departmental readiness. Weaknesses were institutional policies guiding ChatGPT use, academic integrity practices, technical support, lesson planning and instructional material development, and lecturers' attitudes toward ChatGPT adoption. In the South-East, strengths

comprised lecturers' willingness to integrate ChatGPT, institutional policies, academic integrity practices, technical support, lesson planning and instructional material development, and research writing and literature review activities. Weaknesses included lecturers' knowledge of ChatGPT applications, digital literacy, perceptions of students' digital literacy and acceptance, staff training, confidence in verifying AI-generated information, lecturers' attitudes, institutional encouragement for innovation, and departmental readiness.

Research Question 3: What are the external factors influencing ChatGPT integration among TVET lecturers in public universities in South-South and South-East Nigeria?

Table 3: External Factors Influencing ChatGPT Integration among TVET Lecturers in Public Universities in South-South and South-East Nigeria

S/N	External Factors	MIS (South-South)	Rank	MIS (South-East)	Rank	Gap	t-value	Sig.
1.	Access to computers, laptops and smart devices for ChatGPT use	4.10	1	3.85	1	0.25	2.10	0.036
2.	Availability of reliable internet connectivity	3.95	2	3.60	5	0.35	2.85	0.005
3.	Availability of staff development programmes on artificial intelligence	3.85	3	3.30	8	0.55	3.95	0.000
4.	Stability of electricity supply for digital learning	3.80	4	3.55	6	0.25	2.40	0.017
5.	Availability of ICT infrastructure in public universities	3.70	5	3.40	7	0.30	2.90	0.004
6.	Availability of technical support services for AI applications	3.70	5	3.30	8	0.40	3.25	0.001
7.	Availability of funding for AI-related technologies and digital learning facilities	3.65	7	3.20	10	0.45	3.40	0.001
8.	National regulations guiding ethical use of artificial intelligence in education	3.60	8	3.15	12	0.45	3.10	0.002
9.	Public acceptance of artificial intelligence in higher education	3.55	9	3.25	9	0.30	2.60	0.009
10.	Availability of AI literacy programmes for students	3.50	10	3.75	3	-0.25	2.20	0.029
11.	Collaboration between universities and AI technology providers	3.45	11	3.20	10	0.25	2.05	0.041
12.	Government policies supporting artificial intelligence in higher education	3.40	12	3.10	13	0.30	2.75	0.006

13.	Government investment in digital infrastructure for university education	3.35	13	3.70	4	-0.35	3.60	0.000
14.	Data privacy and cybersecurity regulations affecting ChatGPT use	3.25	14	3.80	2	-0.55	4.20	0.000
15.	Cost of internet services and digital technologies	2.90	15	3.10	13	-0.20	1.95	0.051

Data presented in Table 3 showed that several external factors were influencing ChatGPT integration in TVET in public universities in the South-South and South-East geopolitical zones of Nigeria. In the South-South, the highest mean scores were recorded for access to computers, laptops and smart devices (MIS = 4.10), reliable internet connectivity (MIS = 3.95), staff development programmes on artificial intelligence (MIS = 3.85), and electricity stability (MIS = 3.80). Lower mean scores were recorded for data privacy and cybersecurity regulations (MIS = 3.25) and cost of internet services and digital technologies (MIS = 2.90). In the South-East, the highest mean scores were obtained for access to computers, laptops and smart devices (MIS = 3.85), data privacy and cybersecurity regulations (MIS = 3.80), AI literacy programmes for students (MIS = 3.75), and government investment in digital infrastructure (MIS = 3.70), while lower scores were recorded for

government policies supporting AI in higher education (MIS = 3.10), national AI regulations (MIS = 3.15), and funding for AI-related technologies (MIS = 3.20). Gap analysis showed notable differences in data privacy and cybersecurity regulations (Gap = -0.55), staff development programmes (Gap = 0.55), funding for AI technologies (Gap = 0.45), and national AI regulations (Gap = 0.45). The *t*-test results showed significant differences for fourteen of the fifteen factors ($p < .05$), while the cost of internet services and digital technologies did not differ significantly between the zones ($p = .051$).

Research Question 4: What are the opportunities and threats of the external factors influencing ChatGPT integration among TVET lecturers in public universities in South-South and South-East Nigeria?

Table 4: Opportunities and Threats of External Factors Influencing ChatGPT Integration among TVET Lecturers in Public Universities

S/N	External Factors	South-South		South-East	
		Opportunities	Threats	Opportunities	Threats
1	Availability of reliable internet connectivity	✓		✓	
2	Stability of electricity supply for digital learning	✓		✓	
3	Availability of ICT infrastructure in public universities	✓		✓	
4	Access to computers, laptops and smart devices for ChatGPT use	✓		✓	
5	Government policies supporting artificial intelligence in higher education	✓		✓	
6	Availability of funding for AI-related technologies and digital learning facilities	✓		✓	
7	Availability of staff development programmes on artificial intelligence	✓		✓	
8	Availability of AI literacy programmes for students	✓		✓	
9	National regulations guiding ethical use of artificial intelligence in education	✓		✓	
10	Data privacy and cybersecurity regulations affecting ChatGPT use	✓		✓	
11	Collaboration between universities and AI technology providers	✓		✓	
12	Public acceptance of artificial intelligence in higher education	✓		✓	
13	Availability of technical support services for AI applications	✓		✓	
14	Cost of internet services and digital technologies		✓		✓
15	Government investment in digital infrastructure for university education	✓		✓	

Data presented in Table 4 showed that most of the external factors influencing ChatGPT integration in TVET represented opportunities in both the South-South and South-East geopolitical zones. In the South-South, opportunities included reliable internet connectivity, stable electricity supply, ICT infrastructure, access to computers and smart devices, supportive government policies, funding for AI-related technologies, staff development programmes, student AI literacy programmes, ethical AI regulations, data privacy and cybersecurity regulations, university-AI provider collaboration, public acceptance of AI, technical support services, and government investment in digital infrastructure. The cost of internet services and digital technologies was identified as the only threat. Similarly, in the South-East, the same fourteen factors were classified as opportunities, while the cost of internet services and digital technologies constituted the only threat.

Discussion of Findings

Findings from Research Question 1 showed that internal factors influencing ChatGPT integration differed between TVET lecturers in public universities in the South-South and South-East geopolitical zones of Nigeria. South-South

recorded higher scores for students' digital literacy (MIS = 4.20), lecturers' willingness (4.18), staff training (4.10), lecturers' digital literacy (4.05), students' acceptance (3.95), knowledge of ChatGPT (3.88), and confidence in verifying AI-generated information (3.78). South-East recorded higher scores for technical support (3.82), willingness (3.75), academic integrity practices (3.70), institutional policies (3.68), and lesson planning (3.60). The higher South-South scores for staff training and lecturers' digital literacy supported Taktak *et al.* (2024) ^[48], who identified training and preparedness as important conditions for effective ChatGPT use. The finding also agreed with Kangiwa and Abubakar (2024) ^[22], who identified awareness and training as relevant to academic staff engagement with emerging technologies. The higher scores for students' digital literacy and acceptance supported Ezurike and Akinsulire (2024) ^[16], who reported considerable ChatGPT awareness and use among Nigerian undergraduates. Conversely, stronger institutional policies, academic integrity practices and technical support in the South-East supported Taktak *et al.* (2024) ^[48], who emphasised responsible-use guidance and institutional support. The lower South-East scores for lecturers' digital

literacy (2.95), verification confidence (2.88) and attitudes (2.70) indicated capacity areas requiring improvement.

Findings from Research Question 2 showed that the internal factors produced different patterns of strengths and weaknesses across the two geopolitical zones. The South-South demonstrated broader strengths in lecturers' knowledge of ChatGPT, digital literacy, perceptions of students' digital literacy and acceptance, staff training, willingness, research writing, verification confidence, institutional encouragement and departmental readiness. Its weaknesses included institutional policies, academic integrity practices, technical support, lesson planning and instructional-material development, and lecturers' attitudes. The stronger South-South human-capacity factors supported Taktak *et al.* (2024) ^[48], who emphasised training and lecturer preparedness for effective ChatGPT use. The finding also agreed with Alias *et al.* (2024) ^[5], who reported that ChatGPT supported conceptual understanding, programming activities and lecturers' task performance in TVET. The strength influencing research writing was consistent with Ma *et al.* (2024) ^[5], who identified literature exploration and preliminary academic drafting as applications of ChatGPT. In contrast, the South-East demonstrated strengths in willingness, institutional policies, academic integrity practices, technical support, lesson planning and research writing. These findings supported Othman *et al.* (2025) ^[36], who reported ChatGPT use for lesson preparation and assessment development. However, weaknesses in South-East lecturers' digital literacy, knowledge, training and verification confidence supported Oluwadiya *et al.* (2023) ^[34] and Kangiwa and Abubakar (2024) ^[22], who identified digital-skill and training limitations.

Findings from Research Question 3 showed that external factors influencing ChatGPT integration differed in magnitude between the two geopolitical zones. In the South-South, the highest scores were recorded for access to computers and smart devices (MIS = 4.10), reliable internet connectivity (3.95), staff development programmes (3.85), electricity stability (3.80), ICT infrastructure (3.70), and technical support (3.70). In the South-East, the highest scores were access to computers and smart devices (3.85), data privacy and cybersecurity regulations (3.80), student AI literacy programmes (3.75), government investment in digital infrastructure (3.70), and reliable internet connectivity (3.60). The high importance attached to digital devices and internet connectivity supported Oluwadiya *et al.* (2023) ^[34], who found that digital skills, internet access and device availability affected AI use for academic activities. The South-South emphasis on staff development also supported Okocha *et al.* (2024) ^[32] and Ezugoh *et al.* (2025) ^[15], who identified inadequate training as a constraint on effective ChatGPT use among academic staff. The higher South-East score for data privacy and cybersecurity regulations supported Taktak *et al.* (2024) ^[48] and Ray (2023) ^[42], who emphasised privacy, security and responsible AI use. Gap analysis showed notable differences in staff development (0.55), data privacy and cybersecurity (−0.55), funding (0.45), and national AI regulations (0.45). The *t*-test showed significant differences for 14 of the 15 factors.

Findings from Research Question 4 showed that 14 of the 15 external factors were classified as opportunities in both geopolitical zones, while cost of internet services and digital

technologies was classified as the only threat. The opportunities included internet connectivity, electricity stability, ICT infrastructure, access to digital devices, government policies, funding, staff development, AI literacy programmes, ethical regulations, cybersecurity regulations, university-AI provider collaboration, public acceptance, technical support and government investment in digital infrastructure. The broad classification of these factors as opportunities supported Rane *et al.* (2024) ^[41], who identified differentiated instruction and broader access to educational resources as opportunities influencing ChatGPT. It also agreed with Md Desa and Mohd Matore (2025) ^[29], who reported opportunities for reflective learning and systematic problem-solving through ChatGPT. The classification of staff development as an opportunity was consistent with Taktak *et al.* (2024) ^[48] and Ezugoh *et al.* (2025) ^[15], who emphasised training and professional development for effective AI use. Conversely, the identification of technology and internet cost as the only threat supported Adetarami *et al.* (2025) ^[2], who identified cost as a challenge to AI adoption, and Okocha *et al.* (2024) ^[32], who reported infrastructure-related constraints. The same classification in both zones indicated that although the magnitude of external factors differed, their broader SWOT direction was similar.

Conclusion

This study examined the strengths, weaknesses, opportunities and threats influencing ChatGPT integration in Technical and Vocational Education and Training (TVET) from the perspectives of lecturers in public universities in South-South and South-East Nigeria. The findings established that both internal and external factors were influencing ChatGPT integration, although their relative importance varied between the two geopolitical zones. Internal factors included lecturers' knowledge and digital literacy, perceptions of students' digital literacy and acceptance, staff training, willingness to integrate ChatGPT, confidence in verifying AI-generated information, institutional policies, academic integrity practices, technical support, research use and lesson planning. External factors included access to digital devices, internet connectivity, electricity stability, ICT infrastructure, funding, staff development, AI literacy programmes, government policies, ethical regulations, data privacy and cybersecurity, technical support, and government investment in digital infrastructure. The SWOT analysis revealed that South-South possessed stronger human-capacity factors, while South-East demonstrated stronger institutional and operational factors. Both zones also had substantial external opportunities for ChatGPT integration. However, weaknesses remained in areas such as digital competence, training, verification confidence, institutional support and related practices, while the cost of internet services and digital technologies constituted the only common external threat.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. University management should provide regular ChatGPT and AI training, digital literacy programmes and adequate technical support to strengthen lecturers' and students' capacity for effective TVET integration.

2. The Federal Ministry of Education, National Universities Commission (NUC) and university authorities should improve internet connectivity, electricity supply, ICT infrastructure and access to digital devices through sustained funding and investment.
3. University management should establish clear institutional policies, academic-integrity measures and ethical guidelines to promote responsible ChatGPT integration in TVET teaching, learning, assessment and research.
4. TVET lecturers and students should critically verify ChatGPT-generated information against credible academic and professional sources and promote responsible, independent and academically honest use of the technology

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