Available online www.unicrossjournals.com

JOURNAL OF CONTEMPORARY RESEARCH (JOCRES)

RESEARCH ARTICLE VOL. 3 (1) ISSN:2814-2241

Date Published: March 31, 2024

Pages 166-197

EFFECT OF AUTOMATION ON THE PERFORMANCE OF TERTIARY INSTITUTIONS IN EMERGING ECONOMIES: EVIDENCE FROM CROSS RIVER UNIVERSITY OF TECHNOLOGY (CRUTECH)

Cassius Ogar, Jude U. Bassey and Lawrence Eteng
Department of Business Administration/ Entrepreneurship Studies
Faculty of Management Sciences, University of Cross River State
Correspondent e-mail: Cassiusogar@unicross.edu.ng, Cassiusogar02@gmail.com

Abstract

Tertiary education in emerging economies like Nigeria is experiencing a revolution in the application of information and communication technology (ICT). Virtually, every aspect of organizational operations is gradually migrating into automation. This research presents background knowledge and investigation into the relevance, and challenges of Automation to tertiary educational entities in emerging economies. The objectives of the study were; (i) to ascertain the extent to which automation affect tertiary institutional system growth and advancement in Nigeria. (ii) to ascertain the extent to which automation enhances competitive advantage of tertiary institutions in Nigeria. (iii) to determine the extent to which automation affect the human resource management of tertiary institution in Nigeria. (iv) to ascertain the extent to which automation affect the financial performance of tertiary institutions in Nigeria and (v) to determine the extent to which automation affect the quality of service of tertiary institutions in Nigeria. Research questions and research hypotheses were formulated in line with the study objectives. The study population of the study covered over 5000 students and staff of Cross River University of Technology, now, University of Cross River State (UNICROSS). Taro Yamane formula was applied to arrive at the sample size of the study which is 370 staff and students of UNICROSS. Simple random sampling technique was adopted and the study applied closed-ended online questionnaire in primary data collection while linear regression analysis was applied statistically to test the validity of the study hypotheses. The results revealed that automation of educational processes has significantly improved the output of both staff and students of the university. The researchers recommend that, for any tertiary institution in Nigeria to access growth and expansions in the current knowledge market, there should be both vertical and horizontal integration of automation practices in institutions. Finally, Nigerian Universities who are already automating their operational processes should put in place maintenance drivers and promote self-servicing structures that will sustain the ubiquitous nature of the digitalized system.

Key Words: Automation, Growth, Organization, Management and Tertiary education

1.0 Introduction

The demand for tertiary education innovation, in a bid for competitive

advantage, has necessitated the need for schools across regions of the world to adopt and apply learning models and strategies that will enhance their efficiency, viability and effectiveness (Odoh, Echefu, Ugiruanyi & Chukwudi, 2018). The tertiary education industry today applies Information and Communication Technology (ICT) in areas such as attendance management, grading, adaptive learning, enrollment, learning management, administrative processes, data security, admissions, personalization, scheduling, analytics, automated assessment, students' registration, intelligent tutoring, creating experiential learning, communication with faculties, managing students recording, understanding AI in education, etc. Fox, (1986) and Odoh et al. (2018) opined that Automation is rapidly changing how educational institutions are operating and it is expected to increasingly take over core functions because of cost saving and operational efficiency.

According to Soni, (2020), automation is one of the widest and popular branches of computer science today, which involves creating and building smart machines for the simplification of human operations. These smart machines are constructed with purpose that they will be able to perform the actions which can be performed by human intelligence. Soni (2020: Acemoglu & Restrepo (2019) argues that there is hardly any area or domain in the industries left unaffected by automation. We can boldly say that automation is all around us beginning from the grocery stores where we buy household consumables to the manufacturing plants where there are manufactured (Webber, Detjen, Maclean & Thomas, 2019, Setiawan, Calvaliere, Koti, Ogunmola, Talil, Chakravarthi, Rajest, Regin and Singh, 2021, Adesanya, Ojo, Osakede, Ijimakinwa & Arijeniwa, 2017) posit that in industrialized nations, inventories and supply management systems of contemporary firms are today managed by automation. They argue that there has been a major transformation of tertiary education in the last two decades owing to the application of automation in schools.

Setiawan et al. (2021) further argue that automation has come to bear in tertiary institutions, globally, especially in areas which encompass identifying, collecting, analyzing and disseminating appropriate data to measure the efficiency of decisions taken and of operations of staff. Kitsios and Kamariotou (2021) advance that in a digital age where institutions are in demand for time reduction, more awareness in market environment, etc, several tertiary institutions are adopting emerging technologies designed to attend high operational performance and competitive edge over their competitors. Thus, Kitsios and Kamariotou (2021) refer to automation as the ability of a machine to learn from experience, adjust to new inputs, and implement human-like tasks.

1.1 Statement of the problem

With the trending demand of global competition, tertiary institutions including University of Cross River State are undergoing structural modification to be able to match their competitors in both domestic and foreign markets. The increasing demand for adoption of modern technologies in educational operations as it is the case in western nations has necessitated the quest for a study of this nature. A lot of scholars across the globe have delved into researches related to automation and business performance but very abysmal attention has been paid by

scholars in the Africa region and in emerging economy like Nigeria on how automation affect tertiary educational performance. More so, it has almost been practically impossible for scholars in tertiary institutions to x-ray carefully the challenges associated with the adoption of automation in tertiary institutions in Nigeria and in Africa at large. This account for the need of this study.

1.2 Objectives of the study

The objectives of this study are:

1. To ascertain the extent to which automation affect tertiary institutional system growth and advancement in Nigeria.
2. To ascertain the extent to which automation enhances competitive advantage of tertiary institutions in Nigeria.
3. To determine the extent to which automation affect the human resource management of tertiary institution in Nigeria.
4. To ascertain the extent to which automation affect the educational financial performance of tertiary institutions in Nigeria.
5. To determine the extent to which automation affect the quality of educational service delivery of tertiary institutions in Nigeria.

1.3 Research questions of the study

The following the questions the researchers seek to address;

1. To what extent to does automation affect tertiary institutional system growth and advancement in Nigeria?
2. To what extent does automation enhance competitive advantage of tertiary institutions in Nigeria?
3. To what extent does automation affect the Human Resource Management of tertiary institution in Nigeria?
4. To what extent does automation affect the educational financial performance of tertiary institutions in Nigeria?
5. To what extent does automation affect the quality of educational service delivery of tertiary institutions in Nigeria?

1.4 Hypotheses of the study

The following hypotheses are advanced by the researchers:

H_{o1} - There is no significant effect of automation on tertiary institutional system growth and advancement in Nigeria.

H_{o2} - There is no significant effect of automation in enhancing competitive advantage in tertiary institutions in Nigeria

H_{o3} - There is no significant effect of automation on human resource management in tertiary institution in Nigeria

H_{o4} - There is no significant effect of automation in the educational financial performance of tertiary institutions in Nigeria

H_{o5} - There is no significant effect of automation on the quality of educational service delivery in tertiary institutions in Nigeria.

1.5 Research implication

The study will help to create the level of awareness required by tertiary educational administrators on the need to automate their educational services to all stakeholders in a

bid to improving the quality of educational services delivery in tertiary institutions in Nigeria.

2.0 Literature review

2.1 Conceptual framework

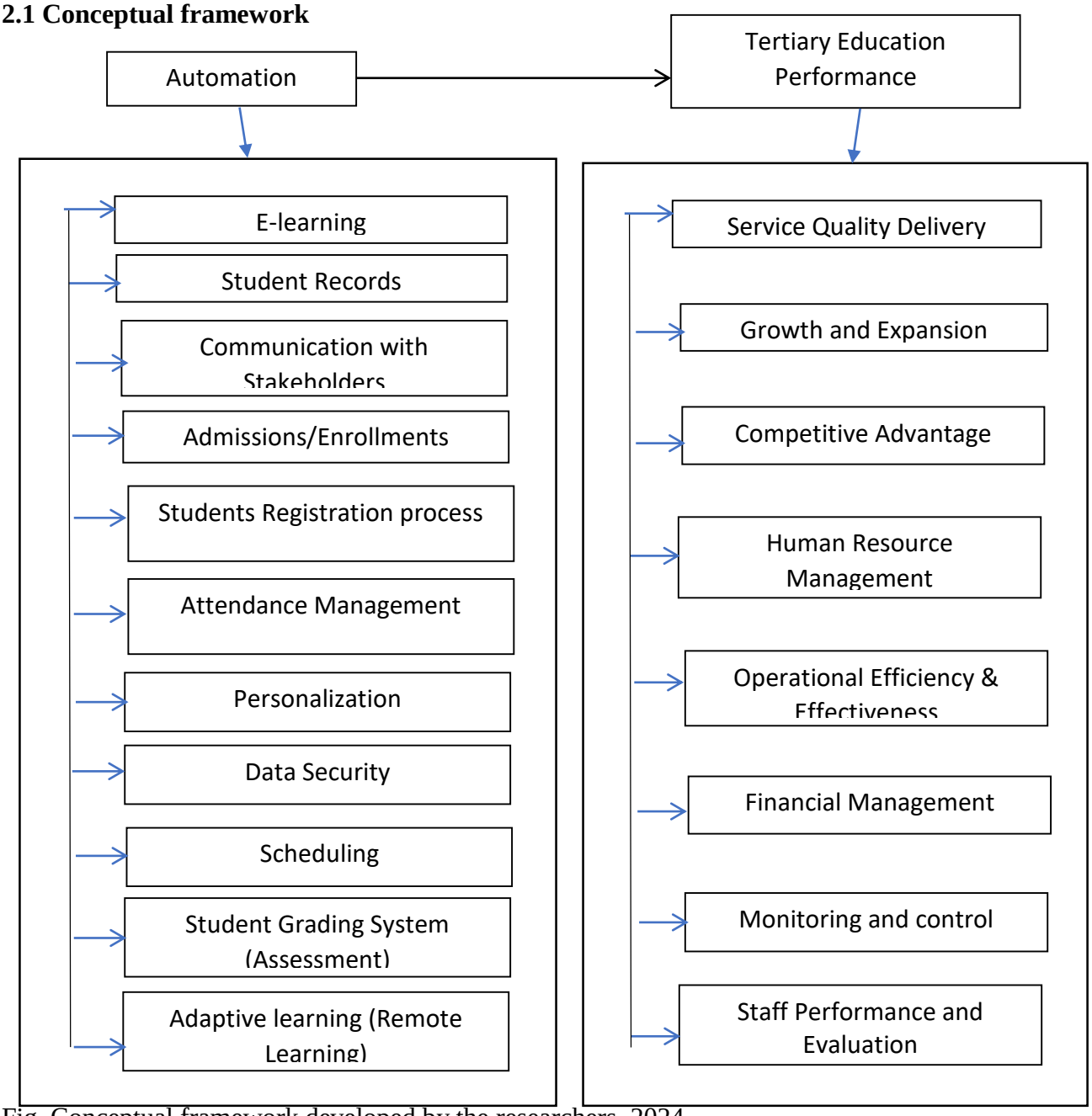


Fig. Conceptual framework developed by the researchers, 2024

2.1.1 Concept of automation

Madaevi and Batchaeva (2023) opined that automation and robotics are momentarily gaining importance in Education. This ranges from teaching children to administrative tasks. Yang and Li (2019) posited that since the development of technology and the advancement of educational innovation applications, automation has been enhanced in educational institutions globally.

According to Collins, Gloves, Myers and Watson, (2016), Ahmed, Asadullah & Shakawat (2020), automation is the use of information and communication Technology (ICT) in the advancement of education, particularly distance-learning providers for the improvement of retention, progression and effective completion of course work.

Kattan, Macdonald &Patrions, (2018), Aladi, (2019), Alenicheva, Mamaeva & Patlasov (2019), argued that automation in educational system is gradually taking the place of human resources in organizations. They stated that Automation, robotics and artificial intelligence will solve all our problems but end the human race. Parfenor &Legashev, (2020), Alsabhan, (2023), Asogwa, Ugwu & Ugwuanyi (2015) advance that modern educational technologies allow participants of educational process to move interaction from offline to online. This they argued that in the ongoing environment, there are no boundaries in access to information required in learning and development process. From the perspective of global survey, we can categorically state that automation in educational institutions in Nigeria and the world at large, has been witnessed in the following areas, e-learning, students records, communication with stakeholders, admission/enrolments, students registration processes, attendance management personalization of learning applications, data servicing, scheduling, student grading system and assessment management and adaptive learning (Autor, 2015, Bobrytska, Reva, Protska & Chkhalo, 2020)

2.1.2 Automation and tertiary education performance

The advances in educational automation have impacted educational institutions in Nigeria and the World at large in the following areas:

a. **Service Quality Delivery:** Muresan (2023), advance that the automation of educational institutions has provided access to several decision-support facilities that has improved the level of decision-making in Nigeria institutions of higher learning. This has helped in improving the quality-of-service delivery. For instance, students, today, can access real time information in the universities websites and receive real time assistance without delay. This ranges from academic records such as transcript, examination results, aptitude test, payment of fees, etc (Campa, 2017, David, Abdurachman, Bandur & Kosasih, 2023).

b. **Growth and Expansion:** Yang and Li (2019), Diachenko, Morgunov, Melnyk, Kravchenko, & Zubchenko, (2019, Dosunmu, Bukki, & Akintola (2018) posit that automation is gradually improving market reach of institution globally this can be seen in the seen in the area of equipping young people with technology skills which help them to access educational opportunities anywhere in the world, breaking down genders barriers as the automation processes are design to accommodate all genders, addressing skills and labor shortage which ordinarily would limit some tertiary institutions for global reach, encouraging new ideas and helping in developing collaborative skills which enhance expansions into new market frontiers. Thus, students today can study all kinds of programmed anywhere in the world without physical recourse (Firawi, (2024, Ginige, & Ginige (2007). This was exemplified during the pandemic where students studied different courses and acquired degree by simply taking advantages of educational automation (Truong & Diep (2023, Van Vlasselaer, Bravo, Caelen, Eliassi-Rad, Akoglu, Snoeck, & Baesens, (2015).

c. **Competitive Advantages:** Kattan, Macdonald, and Patrinos (2018: Ioannidou, & Parma, 2022, Ishii, & Tamaki, 2009) considered educational automation to be a key source of competitive advantage to evolving premier universities in Nigeria and the world at large. For instance, existing potential students of various institution of higher learning can now make practical decisions on their choices of institution through site visitations and consideration of available programmes and online facilities from a variety of offerings (Koster & Brunori, 2021, Kuola, 2022). Therefore, for Nigerian institutions that are up to date with global best practices, gain more acceptance and enrolment than others who operate the obsolete brick and mortar system (Vrontis, Christofi, Pereira, Tarba, Makrides & Trichina, 2022).

d. **Human Resource Management:** There have been prevailing arguments that the advent of artificial intelligence and automation including the educational system will as a matter of fact adversely affect the human resources of organizations (Mohamed, Mahmoud, Mahdi, & Mostafa, 2022 and Ogunsola & Aboyade, 2005). This has been substantiated as several scholars have argued that there has been increasing job loss for human resources who barely have good knowledge of information and communication technology. Nigerian university system is not left out. Since the introduction of automation, schools have been introducing IT operations, which is gradually replacing some manual functions, thus rendering some university staff redundant paving the way for their disengagement (Ossai-Ugbah, 2010 and Osuji, & Major-Jack, 2024). On the other hand, automation has also helped in several other ways. For instance, in the area of stress management automation has aided learning as academic can now take advantage of the seamless learning aides available for offline and online communication with students to manage crowd thus, reducing distraction and improving delivery (Oguzo, (2022 and Okem, 2021). As part of the human resource function automation in educational institutions in Nigeria and the world, at large, has also impacted positively in the area of staff performance management and evaluation in that, institutional management teams can now track the performance of their employees through automated activities such as learning delivery assessment, result computation efficiency, real time documentation process, file retrievals, profile management, assessment computations, etc.

e. **Financial Management Monitoring and control:** One of the advantages enjoyed through automation in the educational system is the opportunities provided for automating financial records and reporting. Tertiary institutions can now manage payments using online platforms, e-transacts, etc. Students can also make payments to institution's accounts using automated devices and platforms without physically crowding banks and institution bursary units. Furthermore, today institutional managements balances accounts without the inconveniences of going to the banking halls (Otu, 2022 and Rasli, Danjuma, Yew, & Igbal, 2011). More so, Rasli, Danjuma, Yew and Igbal (2011), Sani & Tiamiyu (2005) advanced that institutions, today, can more effectively manage and monitor their staff involved in fund administration and appropriation, thus enhancing fraud detection and control.

Through automation, payments such as school fees, hostel payments, transcript payments, etc. can be done seamlessly and proper records generated in real time without much human interface.

2.2 Theoretical framework

The study is anchored on **Diffusion of Innovation Theory** propounded by E. M Rogers in 1962. The theory is anchored on the assumption that over time, a product or an idea gain popular momentum and diffuse or spread through a social system with the socio-economic preconditions and consequences of the introduction of automation. In line with the advancement in digital technology which is, today, adopted in tertiary institutions globally, this theory has remained relevant and considered suitable for this paper. This is because the innovation of automation has diffused from one region of the world to another thus impacting on service delivery including the education sector.

2.3 Empirical review

A number of scholars have researched empirically on the effect of automation on tertiary education. This section of the study will attempt to review a few of those researches.

Romania, Muresan (2023) conducted a study titled, impact of artificial intelligence on education aimed at investigating the impact of AI on education. It was unraveled that AI application in education is increasing relevance of skills, encouraging critical thinking, and innovation, improving flexibility and continuous learning, development multidisciplinary approach and developing unique human skills. The paper was a theoretical paper which failed to statistically demonstrate the validity of their assertion as there were no quantitative data to support the study.

Similarly, Pargman, Lindberge and Buch (2022) in Sweden in their work titled, Automation is coming. Exploring future(s) – oriented methods in education aimed at investigating the emerging Automated – Decision Making (ADM) technologies with future point in time and context. Being a theoretical study, they applied qualitative approach in examining clusters of teachers discussing relevant questions related to (ADM). They discovered that there shall be additional educational system shape by the decisions made in time span 2022-2023 regarding ADM in Education. They recommended full adoption of automation to aid ADM in the foreseeable future. The work again fell short of statistical operations and technologies.

Also in Russia, Parfenor and Legashev (2020) in their study titled, complex system of automation of the educational process, implemented with the application of distance educational technologies in the system of higher education aimed at investigating the development of modern digital in the field of education is the main direction of modernization of higher educational institutions. They applied structural modeling and graphical presentations in their survey. The result demonstrated that despite a difficult epidemiological situation and a rapid shift of distance educational technologies, the level of students' performance remains was unaffected, but there was a slight increase in exam relative to the 2018/2019 academic year. The study failed to advance any significant recommendations and there were no critical statistical operations in the study, either.

In a nutshell, Collins, Gloves Myers and Watson (2016) in their study titled,

'Automation in distance learning: An empirical study of unlearning and academic identity change linked to automation of students messaging within distance learning in the United Kingdom (UK)', exposed the unlearning and leaning undertaken by Adjuncts (Associate Lecturers) during the introduction of automated messaging by the university as part of replacement of adjunct pastoral support for students. Being a theoretical paper, they applied qualitative approach on adjuncts perceptions of potential impact and changes to both their role and identity. This method involved working with automated interventions, mentoring on adjunct staff development events and networking. It was discovered that, due to diversity of the adjuncts' background, their views on the impact of increased managerialism of their professional/ commercial traditional academic self was varied. They recommended a further longitudinal study to be conducted. The paper failed to clearly show depth in terms of theoretical background and there was no clear evidence on the statistical techniques used to investigate the assumptions of the study.

3.0 Methodology

3.1 Design of the study

The study adopted a descriptive research design with an interpretivism research philosophy. A blend of both qualitative and a quantitative strategy was deployed in a subjective reasoning approach. The study was conducted in Cross River University of Technology (CRUTECH) across the four campuses. This institution is chosen among other premier universities in Nigeria as a case study because it is considered an emerging university in technology which suits the expectation of the researchers in terms of data collection and analysis. Furthermore, the institution is practically integrating ICT in almost all her interface activities with both students and other stakeholders of the university. The researchers deployed structured qualitative closed-ended online questionnaire in gathering primary data used in the study. The simple random sampling technique was used in administering the research instruments to respondents of the study which included staff and students. The sample population was 5000 staff and students of the institution The Taro Yamane formula was used to arrive at a sample size of 370 respondents in the study. Simple percentages, tables and graphs are used to present the primary data gathered in the study. While regression analysis technique was used to test the hypotheses of the study at 95% degree of accuracy.

4.0 Results

4.1 Frequency tables

Table 1: Automation and service quality delivery in tertiary institutions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	7	4.4	4.6	4.6
	D	14	8.8	9.2	13.7
	N	1	.6	.7	14.4
	A	61	38.4	39.9	54.2
	SA	70	44.0	45.8	100.0
	Total	153	96.2	100.0	
Missing	System	6	3.8		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 2: Access to students results online

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	6	3.8	3.9	3.9
	D	20	12.6	13.0	16.9
	N	10	6.3	6.5	23.4
	A	79	49.7	51.3	74.7
	SA	39	24.5	25.3	100.0
	Total	154	96.9	100.0	
Missing	System	5	3.1		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 3: Improve examination processes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	4	2.5	2.6	2.6
	D	21	13.2	13.7	16.3
	N	21	13.2	13.7	30.1
	A	74	46.5	48.4	78.4
	SA	33	20.8	21.6	100.0
	Total	153	96.2	100.0	
Missing	System	6	3.8		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 4: Improve academic feedback

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	6	3.8	3.9	3.9
	D	18	11.3	11.8	15.8
	N	11	6.9	7.2	23.0
	D	69	43.4	45.4	68.4
	SD	48	30.2	31.6	100.0
	Total	152	95.6	100.0	
Missing	System	7	4.4		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 5: Improve students records

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	2	1.3	1.3	1.3
	D	14	8.8	9.2	10.5
	N	5	3.1	3.3	13.7
	A	66	41.5	43.1	56.9
	SA	66	41.5	43.1	100.0
	Total	153	96.2	100.0	
Missing	System	6	3.8		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 6: Improve online payment platform system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	3	1.9	1.9	1.9
	D	17	10.7	11.0	13.0
	N	8	5.0	5.2	18.2
	A	74	46.5	48.1	66.2
	SD	52	32.7	33.8	100.0
	Total	154	96.9	100.0	
Missing	System	5	3.1		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 7: Improve enrollment processes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	4	2.5	2.6	2.6
	D	18	11.3	11.7	14.3
	N	11	6.9	7.1	21.4
	A	79	49.7	51.3	72.7
	SA	42	26.4	27.3	100.0
	Total	154	96.9	100.0	
Missing	System	5	3.1		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 8: Easy access to students transcripts and other records

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	4	2.5	2.6	2.6
	D	23	14.5	15.0	17.6
	N	18	11.3	11.8	29.4
	A	66	41.5	43.1	72.5
	SA	42	26.4	27.5	100.0
	Total	153	96.2	100.0	
Missing	System	6	3.8		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 9: Easy of remote learning experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	6	3.8	3.9	3.9
	D	29	18.2	19.0	22.9
	N	13	8.2	8.5	31.4
	A	72	45.3	47.1	78.4
	SA	33	20.8	21.6	100.0
	Total	153	96.2	100.0	
Missing	System	6	3.8		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 10: Improve stakeholders participation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	4	2.5	2.6	2.6
	D	14	8.8	9.1	11.7
	N	9	5.7	5.8	17.5
	A	72	45.3	46.8	64.3
	SA	55	34.6	35.7	100.0
	Total	154	96.9	100.0	
Missing	System	5	3.1		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 11: Growth and expansion opportunity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	5	3.1	3.3	3.3
	D	16	10.1	10.5	13.7
	N	8	5.0	5.2	19.0
	A	66	41.5	43.1	62.1
	SA	58	36.5	37.9	100.0
	Total	153	96.2	100.0	
Missing	System	6	3.8		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 12: Improve service coverage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	6	3.8	3.9	3.9
	D	14	8.8	9.1	13.0
	N	6	3.8	3.9	16.9
	A	85	53.5	55.2	72.1
	SA	43	27.0	27.9	100.0
	Total	154	96.9	100.0	
Missing	System	5	3.1		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 13: creation of virtual campuses

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	3	1.9	2.0	2.0
	D	18	11.3	11.8	13.7
	N	10	6.3	6.5	20.3
	A	73	45.9	47.7	68.0
	SA	49	30.8	32.0	100.0
	Total	153	96.2	100.0	
Missing	System	6	3.8		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 14: systematic control mechanism

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	4	2.5	2.6	2.6
	D	13	8.2	8.5	11.1
	N	7	4.4	4.6	15.7
	A	70	44.0	45.8	61.4
	SA	59	37.1	38.6	100.0
	Total	153	96.2	100.0	
Missing	System	6	3.8		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 15: Access to new market

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	4	2.5	2.6	2.6
	D	18	11.3	11.8	14.4
	N	11	6.9	7.2	21.6
	A	64	40.3	41.8	63.4
	SA	56	35.2	36.6	100.0
	Total	153	96.2	100.0	
Missing	System	6	3.8		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 16: Automation and human resource management

		Freqency	Percent	Valid Percent	Cumulative Percent
Valid	SD	4	2.5	2.6	2.6
	D	21	13.2	13.8	16.4
	N	12	7.5	7.9	24.3
	A	73	45.9	48.0	72.4
	SA	42	26.4	27.6	100.0
	Total	152	95.6	100.0	
Missing	System	7	4.4		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 17: Improve teaching, mentoring and coaching aides

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	5	3.1	3.3	3.3
	D	21	13.2	13.8	17.1
	N	6	3.8	3.9	21.1
	A	65	40.9	42.8	63.8
	SA	55	34.6	36.2	100.0
	Total	152	95.6	100.0	
Missing	System	7	4.4		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 18: improve tutoring aides

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	D	20	12.6	13.2	13.2
	N	15	9.4	9.9	23.2
	A	73	45.9	48.3	71.5
	SA	43	27.0	28.5	100.0
	Total	151	95.0	100.0	
Missing	System	8	5.0		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 19: Time management and service delivery improvement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	4	2.5	2.7	2.7
	D	16	10.1	10.8	13.5
	N	5	3.1	3.4	16.9
	A	58	36.5	39.2	56.1
	SA	65	40.9	43.9	100.0
	Total	148	93.1	100.0	
Missing	System	11	6.9		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 20: Stress management, work-life-balance and improve life expectancy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	5	3.1	3.3	3.3
	D	19	11.9	12.5	15.8
	N	10	6.3	6.6	22.4
	A	65	40.9	42.8	65.1
	SA	53	33.3	34.9	100.0
	Total	152	95.6	100.0	
Missing	System	7	4.4		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 21: Improve HR monitoring and evaluation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	4	2.5	2.6	2.6
	D	18	11.3	11.8	14.5
	N	12	7.5	7.9	22.4
	A	63	39.6	41.4	63.8
	SA	55	34.6	36.2	100.0
	Total	152	95.6	100.0	
Missing	System	7	4.4		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 22: Automation and financial management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	4	2.5	2.6	2.6
	D	21	13.2	13.8	16.4
	N	11	6.9	7.2	23.7
	A	60	37.7	39.5	63.2
	SA	56	35.2	36.8	100.0
	Total	152	95.6	100.0	
Missing	System	7	4.4		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 23: Regulation of payment platform

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	2	1.3	1.3	1.3
	D	17	10.7	11.3	12.6
	N	9	5.7	6.0	18.5
	A	83	52.2	55.0	73.5
	SA	40	25.2	26.5	100.0
	Total	151	95.0	100.0	
Missing	System	8	5.0		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 24: Track fraudulent practices

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	4	2.5	2.6	2.6
	D	14	8.8	9.3	11.9
	N	6	3.8	4.0	15.9
	A	66	41.5	43.7	59.6
	SA	61	38.4	40.4	100.0
	Total	151	95.0	100.0	
Missing	System	8	5.0		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 25: Prudence in financial appropriation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	5	3.1	3.3	3.3
	D	15	9.4	9.9	13.2
	N	3	1.9	2.0	15.1
	A	76	47.8	50.0	65.1
	SA	53	33.3	34.9	100.0
	Total	152	95.6	100.0	
Missing	System	7	4.4		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 26: Automation and competitive advantages

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	5	3.1	3.3	3.3
	D	15	9.4	9.9	13.2
	N	11	6.9	7.2	20.4
	A	73	45.9	48.0	68.4
	SA	48	30.2	31.6	100.0
	Total	152	95.6	100.0	
Missing	System	7	4.4		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 27: Improve ranking metrics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	4	2.5	2.6	2.6
	D	17	10.7	11.2	13.8
	N	13	8.2	8.6	22.4
	A	73	45.9	48.0	70.4
	SA	45	28.3	29.6	100.0
	Total	152	95.6	100.0	
Missing	System	7	4.4		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 28: Global visibility and networking

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	2	1.3	1.3	1.3
	D	20	12.6	13.2	14.5
	N	8	5.0	5.3	19.7
	A	73	45.9	48.0	67.8
	SA	49	30.8	32.2	100.0
	Total	152	95.6	100.0	
Missing	System	7	4.4		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

Table 29: Global access for collaboration

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	2	1.3	1.3	1.3
	D	15	9.4	9.9	11.3
	N	9	5.7	6.0	17.2
	A	74	46.5	49.0	66.2
	SA	51	32.1	33.8	100.0
	Total	151	95.0	100.0	
Missing	System	8	5.0		
Total		159	100.0		

Source: Ogar, Bassey & Eteng (2024)

4.2 Test of Hypotheses

4.2.1 Hypothesis one

H_{o1} - There is no significant effect of automation on tertiary institutional system growth and advancement in Nigeria.

Descriptive Statistics

	Mean	Std. Deviation	N
Growth_and_Expansion	3.9985	.84079	154
Automation_of_Tertiary_Institution	10.8020	2.76289	154

Correlations

		Growth_and_Expansion	Automation_of_Tertiary_Institution
Pearson Correlation	Growth_and_Expansion	1.000	.616
	Automation_of_Tertiary_Institution	.616	1.000
Sig. (1-tailed)	Growth_and_Expansion	.	.000
	Automation_of_Tertiary_Institution	.000	.
N	Growth_and_Expansion	154	154
	Automation_of_Tertiary_Institution	154	154

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Automation_of_Tertiary_Institution[b]	.	Enter

a. Dependent Variable: Growth_and_Expansion

b. All requested variables entered.

Model Summary[b]

					Change Statistics					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	Df2	Sig. F Change	Durbin-Watson
1	.616[a]	.380	.376	.66427	.380	93.123	1	152	.000	1.835

a. Predictors: (Constant), Automation_of_Tertiary_Institution

b. Dependent Variable: Growth_and_Expansion

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	41.091	1	41.091	93.123	.000[b]
	Residual	67.070	152	.441		
	Total	108.161	153			

a. Dependent Variable: Growth_and_Expansion

b. Predictors: (Constant), Automation_of_Tertiary_Institution

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	1.972	.217		9.103	.000	1.544	2.400					
	Automation Tertiary_Institution	.188	.019	.616	9.650	.000	.149	.226	.616	.616	.616	1.000	1.000

a. Dependent Variable: Growth_and_Expansion

Coefficient Correlations[a]

Model			Automation_of_Tertiary_Institution
1	Correlations	Automation_of_Tertiary_Institution	1.000
	Covariances	Automation_of_Tertiary_Institution	.000

a. Dependent Variable: Growth_and_Expansion

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	Automation_of_Tertiary_Institution
1	1	1.969	1.000	.02	.02
	2	.031	7.970	.98	.98

a. Dependent Variable: Growth_and_Expansion

Casewise Diagnostics[a]

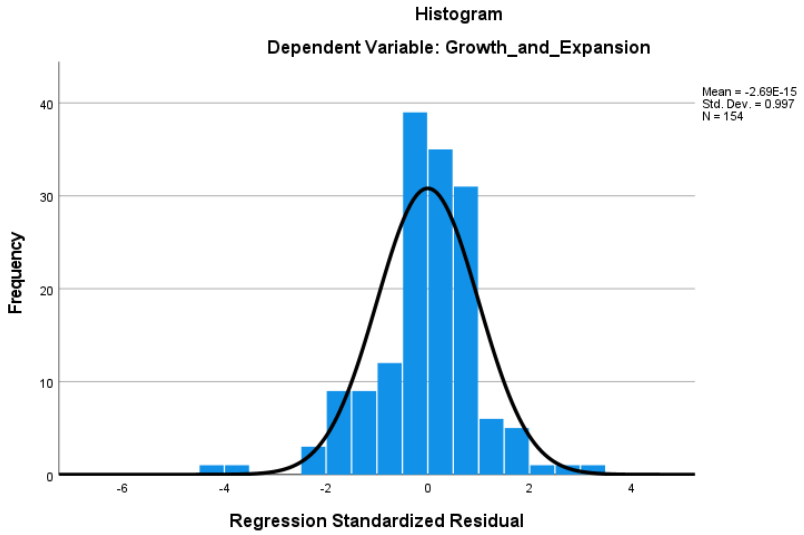
Case Number	Std. Residual	Growth_and_Expansion	Predicted Value	Residual
36	-4.038	3.67	6.3490	-2.68231
50	3.164	5.00	2.8985	2.10151
153	-3.504	1.20	3.5273	-2.32732

a. Dependent Variable: Growth_and_Expansion

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.3475	6.3490	3.9985	.51823	154
Std. Predicted Value	-3.186	4.536	.000	1.000	154
Standard Error of Predicted Value	.054	.249	.070	.028	154
Adjusted Predicted Value	2.3748	6.7891	4.0009	.53322	154
Residual	-2.68231	2.10151	.00000	.66209	154
Std. Residual	-4.038	3.164	.000	.997	154
Stud. Residual	-4.357	3.222	-.002	1.015	154
Deleted Residual	-3.12241	2.17985	-.00246	.68721	154
Stud. Deleted Residual	-4.642	3.327	-.004	1.033	154
Mahal. Distance	.000	20.572	.994	2.260	154
Cook's Distance	.000	1.557	.020	.127	154
Centered Leverage Value	.000	.134	.006	.015	154

a. Dependent Variable: Growth_and_Expansion



4.2.2 Hypothesis two

H_{o2} - There is no significant effect of automation in enhancing competitive advantage of tertiary institutions in Nigeria

Descriptive Statistics

	Mean	Std. Deviation	N
Automation_and_Competitive_Advantages	3.9638	.87478	152
Automation_of_Tertiary_Institution	10.6809	2.54012	152

Correlations

		Automation_and_Competitive_Advantages	Automation_of_Tertiary_Institution
Pearson Correlation	Automation_and_Competitive_Advantages	1.000	.694
	Automation_of_Tertiary_Institution	.694	1.000
Sig. (1-tailed)	Automation_and_Competitive_Advantages	.	.000
	Automation_of_Tertiary_Institution	.000	.
N	Automation_and_Competitive_Advantages	152	152
	Automation_of_Tertiary_Institution	152	152

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Automation_of_Tertiary_Institution[b]	.	Enter

a. Dependent Variable: Automation_and_Competitive_Advantages
b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.694[a]	.482	.478	.63197	.482	139.322	1	150	.000	1.762

a. Predictors: (Constant), Automation_of_Tertiary_Institution
b. Dependent Variable: Automation_and_Competitive_Advantages

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	55.643	1	55.643	139.322	.000[b]
	Residual	59.908	150	.399		
	Total	115.551	151			

a. Dependent Variable: Automation_and_Competitive_Advantages
b. Predictors: (Constant), Automation_of_Tertiary_Institution

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	1.411	.222		6.350	.000	.972	1.850					
	Automation_of_Tertiary_Institution	.239	.020	.694	11.803	.000	.199	.279	.694	.694	.694	1.000	1.000

a. Dependent Variable: Automation_and_Competitive_Advantages

Coefficient Correlations[a]

Model		Automation_of_Tertiary_Institution
Correlations	Automation_of_Tertiary_Institution	1.000
Covariances	Automation_of_Tertiary_Institution	.000

a. Dependent Variable: Automation_and_Competitive_Advantages

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	Automation_of_Tertiary_Institution
1	1	1.973	1.000	.01	.01
	2	.027	8.554	.99	.99

a. Dependent Variable: Automation_and_Competitive_Advantages

Casewise Diagnostics[a]

Case Number	Std. Residual	Automation_and_Competitive_Advantages	Predicted Value	Residual
50	3.812	5.00	2.5912	2.40876

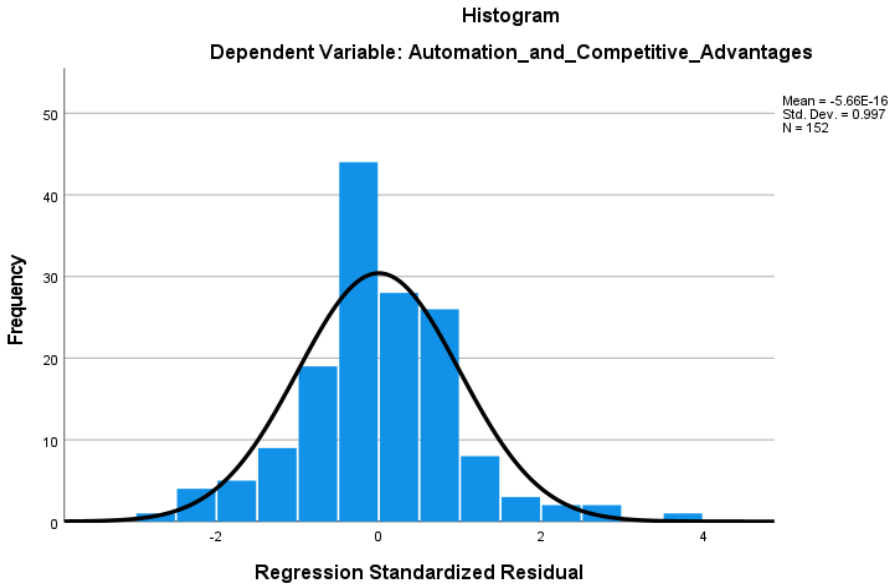
a. Dependent Variable: Automation_and_Competitive_Advantages

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.8892	4.7570	3.9638	.60704	152
Std. Predicted Value	-3.418	1.307	.000	1.000	152
Standard Error of Predicted Value	.051	.183	.068	.025	152
Adjusted Predicted Value	1.8791	4.7526	3.9622	.61166	152

Residual	-1.80108	2.40876	.00000	.62987	152
Std. Residual	-2.850	3.812	.000	.997	152
Stud. Residual	-2.860	3.891	.001	1.009	152
Deleted Residual	-1.81388	2.51027	.00162	.64547	152
Stud. Deleted Residual	-2.932	4.090	.002	1.022	152
Mahal. Distance	.000	11.680	.993	1.812	152
Cook's Distance	.000	.319	.013	.041	152
Centered Leverage Value	.000	.077	.007	.012	152

a. Dependent Variable: Automation_and_Competitive_Advantages



4.2.3 Hypothesis three

H_{o3} . There is no significant effect of automation on Human Resource Management of tertiary institution in Nigeria

Descriptive Statistics

	Mean	Std. Deviation	N
Automation_HRM	3.9564	.88575	153
Automation_of_Tertiary_Institution	10.7201	2.57758	153

Correlations

		Automation_HRM	Automation_of_Tertiary_Institution
Pearson Correlation	Automation_HRM	1.000	.648
	Automation_of_Tertiary_Institution	.648	1.000
Sig. (1-tailed)	Automation_HRM	.	.000
	Automation_of_Tertiary_Institution	.000	.
N	Automation_HRM	153	153
	Automation_of_Tertiary_Institution	153	153

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Automation_of_Tertiary_Institution[b]	.	Enter

a. Dependent Variable: Automation_HRM
b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.648[a]	.420	.416	.67688	.420	109.277	1	151	.000	1.777

a. Predictors: (Constant), Automation_of_Tertiary_Institution
b. Dependent Variable: Automation_HRM

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	50.068	1	50.068	109.277	.000[b]
	Residual	69.184	151	.458		
	Total	119.252	152			

a. Dependent Variable: Automation_HRM
b. Predictors: (Constant), Automation_of_Tertiary_Institution

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	1.569	.235		6.684	.000	1.106	2.033					
	Automation_of_Tertiary_Institution	.223	.021	.648	10.454	.000	.181	.265	.648	.648	.648	1.000	1.000

a. Dependent Variable: Automation_HRM

Coefficient Correlations[a]

Model			Automation_of_Tertiary_Institution
1	Correlations	Automation_of_Tertiary_Institution	1.000
	Covariances	Automation_of_Tertiary_Institution	.000

a. Dependent Variable: Automation_HRM

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	Automation_of_Tertiary_Institution
1	1	1.972	1.000	.01	.01
	2	.028	8.463	.99	.99

a. Dependent Variable: Automation_HRM

Casewise Diagnostics[a]

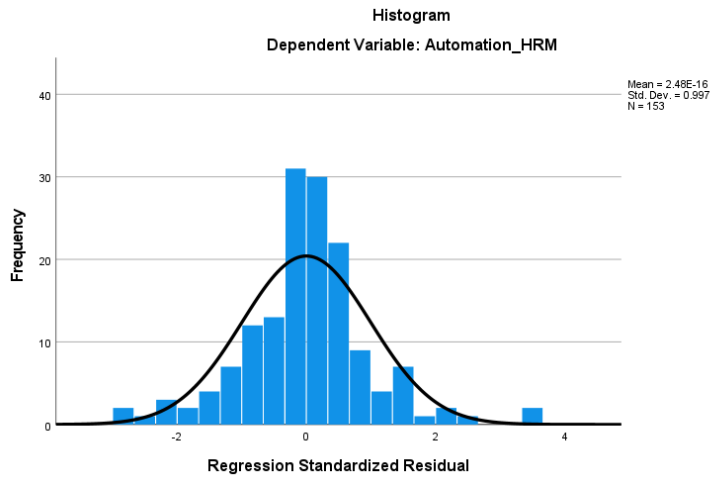
Case Number	Std. Residual	Automation_HRM	Predicted Value	Residual
50	3.444	5.00	2.6689	2.33112
95	3.538	5.00	2.6049	2.39514

a. Dependent Variable: Automation_HRM

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.0148	5.2805	3.9564	.57393	153
Std. Predicted Value	-3.383	2.307	.000	1.000	153
Standard Error of Predicted Value	.055	.194	.073	.026	153
Adjusted Predicted Value	2.0161	5.3360	3.9552	.57837	153
Residual	-1.98981	2.39514	.00000	.67465	153
Std. Residual	-2.940	3.538	.000	.997	153
Stud. Residual	-2.949	3.617	.001	1.008	153
Deleted Residual	-2.00295	2.50281	.00123	.69021	153
Stud. Deleted Residual	-3.028	3.772	.001	1.023	153
Mahal. Distance	.000	11.445	.993	1.810	153
Cook's Distance	.000	.294	.012	.038	153
Centered Leverage Value	.000	.075	.007	.012	153

a. Dependent Variable: Automation_HRM



4.2.4 Hypothesis four

H_{o4} . There is no significant effect of automation affect the educational financial performance of tertiary institutions in Nigeria

Descriptive Statistics

	Mean	Std. Deviation	N
Automation_and_Financial_Management	4.0055	.85392	152
Automation_of_Tertiary_Institution	10.6809	2.54012	152

Correlations

		Automation_and_Financial_Management	Automation_of_Tertiary_Institution
Pearson Correlation	Automation_and_Financial_Management	1.000	.662
	Automation_of_Tertiary_Institution	.662	1.000
Sig. (1-tailed)	Automation_and_Financial_Management	.	.000
	Automation_of_Tertiary_Institution	.000	.
N	Automation_and_Financial_Management	152	152
	Automation_of_Tertiary_Institution	152	152

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Automation_of_Tertiary_Institution[b]	.	Enter

a. Dependent Variable: Automation_and_Financial_Management
b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.662[a]	.439	.435	.64178	.439	117.329	1	150	.000	1.818

a. Predictors: (Constant), Automation_of_Tertiary_Institution
b. Dependent Variable: Automation_and_Financial_Management

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	48.325	1	48.325	117.329	.000[b]
	Residual	61.781	150	.412		
	Total	110.107	151			

a. Dependent Variable: Automation_and_Financial_Management
b. Predictors: (Constant), Automation_of_Tertiary_Institution

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	1.627	.226		7.208	.000	1.181	2.073					
	Automation_of_Tertiary_Institution	.223	.021	.662	10.832	.000	.182	.263	.662	.662	.662	1.000	1.000

a. Dependent Variable: Automation_and_Financial_Management

Coefficient Correlations[a]

Model			Automation_of_Tertiary_Institution
1	Correlations	Automation_of_Tertiary_Institution	1.000
	Covariances	Automation_of_Tertiary_Institution	.000

a. Dependent Variable: Automation_and_Financial_Management

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	Automation_of_Tertiary_Institution
1	1	1.973	1.000	.01	.01
	2	.027	8.554	.99	.99

a. Dependent Variable: Automation_and_Financial_Management

Casewise Diagnostics[a]

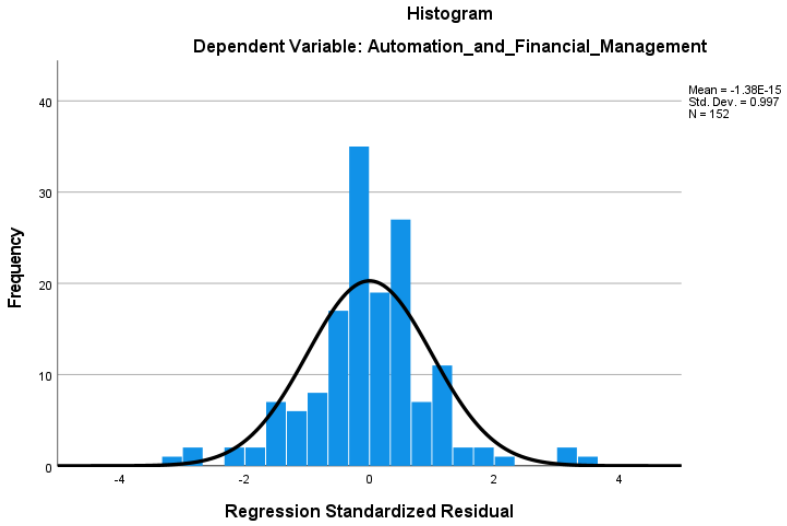
Case Number	Std. Residual	Automation_and_Financial_Management	Predicted Value	Residual
32	3.014	4.50	2.5658	1.93419
50	3.153	4.75	2.7263	2.02365
95	3.643	5.00	2.6623	2.33768
128	-3.191	2.00	4.0476	-2.04759

a. Dependent Variable: Automation_and_Financial_Management

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.0721	4.7447	4.0055	.56572	152
Std. Predicted Value	-3.418	1.307	.000	1.000	152
Standard Error of Predicted Value	.052	.186	.069	.025	152
Adjusted Predicted Value	2.0787	4.7400	4.0040	.56954	152
Residual	-2.04759	2.33768	.00000	.63965	152
Std. Residual	-3.191	3.643	.000	.997	152
Stud. Residual	-3.201	3.725	.001	1.009	152
Deleted Residual	-2.06123	2.44505	.00144	.65506	152
Stud. Deleted Residual	-3.305	3.897	.002	1.024	152
Mahal. Distance	.000	11.680	.993	1.812	152
Cook's Distance	.000	.319	.012	.041	152
Centered Leverage Value	.000	.077	.007	.012	152

a. Dependent Variable: Automation_and_Financial_Management



4.2.5 Hypothesis five

H_{o5} . There is no significant effect of automation on the quality of educational service delivery of tertiary institutions in Nigeria.

Descriptive Statistics

	Mean	Std. Deviation	N
Automation_Service_Quality_Delivery	39.1497	7.71349	147
Automation_of_Tertiary_Institution	11.1344	2.34798	147

Correlations

		Automation_Service_Quality_Delivery	Automation_of_Tertiary_Institution
Pearson Correlation	Automation_Service_Quality_Delivery	1.000	.884
	Automation_of_Tertiary_Institution	.884	1.000
Sig. (1-tailed)	Automation_Service_Quality_Delivery	.	.000
	Automation_of_Tertiary_Institution	.000	.
N	Automation_Service_Quality_Delivery	147	147
	Automation_of_Tertiary_Institution	147	147

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Automation_of_Tertiary_Institution[b]	.	Enter

a. Dependent Variable: Automation_Service_Quality_Delivery
b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.884[a]	.781	.780	3.61916	.781	518.193	1	145	.000	2.137

a. Predictors: (Constant), Automation_of_Tertiary_Institution
b. Dependent Variable: Automation_Service_Quality_Delivery

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6787.452	1	6787.452	518.193	.000[b]
	Residual	1899.256	145	13.098		
	Total	8686.707	146			

a. Dependent Variable: Automation_Service_Quality_Delivery
b. Predictors: (Constant), Automation_of_Tertiary_Institution

Coefficientsa

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
	B	Std. Error	zBeta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
	(Constant)	6.816	1.451			4.696	.000	3.948	9.685					
	Automation_of_Tertiary_Institution	2.904	.128	.884	22.764	.000	2.652	3.156	.884	.884	.884	1.000	1.000

a. Dependent Variable: Automation_Service_Quality_Delivery

Coefficient Correlations[a]

Model			Automation_of_Tertiary_Institution
1	Correlations	Automation_of_Tertiary_Institution	1.000
	Covariances	Automation_of_Tertiary_Institution	.016

a. Dependent Variable: Automation_Service_Quality_Delivery

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	Automation_of_Tertiary_Institution
1	1	1.979	1.000	.01	.01
	2	.021	9.621	.99	.99

a. Dependent Variable: Automation_Service_Quality_Delivery

Casewise Diagnostics[a]

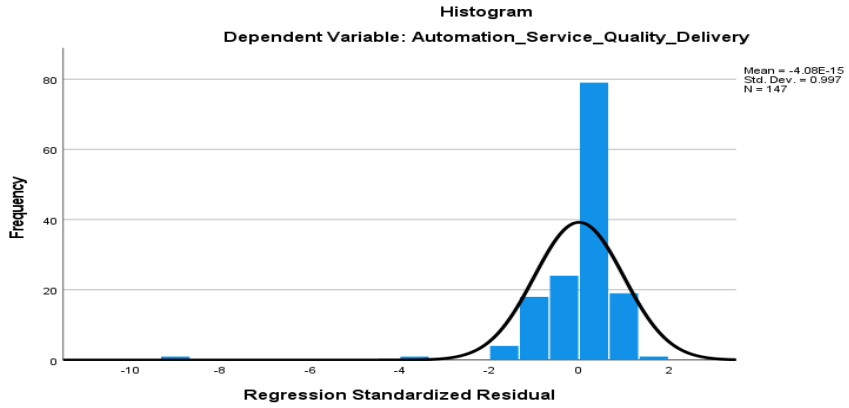
Case Number	Std. Residual	Automation_Service_Quality_Delivery	Predicted Value	Residual
36	-8.724	43.00	74.5742	-31.57416
77	-3.651	42.00	55.2148	-13.21482

a. Dependent Variable: Automation_Service_Quality_Delivery

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	20.2615	74.5742	39.1497	6.81831	147
Std. Predicted Value	-2.770	5.195	.000	1.000	147
Standard Error of Predicted Value	.299	1.585	.390	.161	147
Adjusted Predicted Value	20.4043	82.0618	39.2108	7.08114	147
Residual	-31.57416	6.61813	.00000	3.60674	147
Std. Residual	-8.724	1.829	.000	.997	147
Stud. Residual	-9.704	1.835	-.008	1.062	147
Deleted Residual	-39.06181	6.66404	-.06115	4.11323	147
Stud. Deleted Residual	-16.331	1.850	-.055	1.522	147
Mahal. Distance	.001	26.993	.993	2.631	147
Cook's Distance	.000	11.165	.082	.921	147
Centered Leverage Value	.000	.185	.007	.018	147

a. Dependent Variable: Automation_Service_Quality_Delivery



5.0 Discussion

From the statistical interpolation of data in the study as demonstrated in all the tables presented, it is clear that automation of tertiary institutions in Nigeria will significantly improve the quality of educational services in Nigeria as it is in Western Nations. For instance, in table 1-10, the various percentage responses as depicted summarily showed that tertiary institutional automation is gradually improving the overall standard of service quality delivery in the area of students access to online results, improve examination processes, improvement of academic feedback, processes between learners and tutors, improvement in students' academic records retrieval, such as, transcript, receipts/evidence of payments, etc., improvement in students enrolment opportunities through automated processes, facilitation of remote learning opportunities as students can comfortably access leaning facilities at convenient locations, improvement of other stakeholders access and participation in university wide system and operations such as parents, vendors, contractors, government intermediaries, host communities and even external assessors.

Similarly, from table 11-15, the statistical results also show that through automations of tertiary institution in Nigeria, tertiary institutions like University of Cross River

State, (UNICROSS) now have more growth and expansion opportunities such as access to new markets as potential students all over the world can now assess all programmes remotely without any inconveniences, there is also a significant access to improve service coverage, this has been achieved through creation of virtual campuses offered by automation services, thus providing access to systematic control mechanism.

In the same vein, table 16-21 show that automation of tertiary institutions in Nigeria has significantly improved human resource management operations. For instance, the statistical percentage show that automation has enhanced lecturers teaching, mentoring and coaching aides which has tremendously improved the quality of service offerings of academics in Nigerian tertiary institutions. It has also boosted stress management, work-life balance and life expectancy ratio as academic adoption of automation has leverage on the provisions of automation siren projectors, online classes medians such as aid wider audience and limited effort thus replacing the absolute face-to-face interactions characterized by several challenges such as space, character attributes from students, etc. Furthermore, automation has also help to facilitate human resource monitoring and evaluation as it has become easier to assess the performance indexes of academic and none academic staff in Nigerian institutions that have already integrated automations in their operational systems. This is visible through assessing the number of online classes, number of students assessment covered, number of attendances maintained in a week, quality of feedback provided by academic and none academic staff, within a defined period, results delivery in online platforms as stipulated by management, etc.

Still looking at the positive side of automation of tertiary educational institutions in Nigeria, from table 22-25 the percentage outputs gathered from respondent show that institutions that have integrated automation in their operations witness some improvements in their financial management systems. For instance, it showed that there has been an upward review of about 95% improvement in financial regulation in Nigerian universities using automation. This has helped in fraud detection, prudence in financial appropriation, improve payment system, staff monitoring and evaluation, students' payment management system and record keeping operations. This has also helped to check student's manipulations, embezzlement and fund institutional diversion. Institutions have also benefited from automation in the area of interaction with vendors, contractors and other stake holders through proper statements of accounts generated through automation in real time.

Furthermore, in table 26-29, the statistical results show that the integration of automation in some tertiary institutions in Nigeria, as it is in western countries, has improved the competitive advantage of tertiary institutions in Nigeria. For instance, there have been improvements in universities visibility through their various online platforms which has resulted in standardized ranking metrics, improved networking and institutional collaborations, global access to grants and other privileges, all as a result of institutional automation. For instance, Universities assessment and performance indexes are now more easily measurable among institution which has adopted automation in their operations. The summary of the tested hypothesis in the study revealed that:

1. There is a significant effect of automation on tertiary institutional system growth and expansion in Nigeria.
2. There is significant effect of automation in enhancing competitive advantage of tertiary institutions in Nigeria.
3. There is a significant effect of automation on human resource management of Tertiary institution in Nigeria.
4. There is a significant effect of automation on educational financial performance of tertiary institution in Nigeria and
5. There is a significant effect of automation on the quality of educational service delivery of Tertiary Institution in Nigeria.

6.0 Conclusion

The growing complexities in globalization and the need for transition from colonial educational background to the transverse modernization of educational tertiary institutions in Africa and the world at large has necessitated the need for the digitalization of tertiary education globally. This approach will foster a closer reach to clients globally. The Automation of education has witnessed an unprecedented growth and development to a point that it has become almost impossible for any tertiary institution in Nigeria as it is world over to stay competitive in a very multifaceted knowledge economy. It has become crystal clear than to stay average in the knowledge market, tertiary institutions must as a matter of urgency integrate their staff, students, systems etc to a digitalize culture of learning and delivery.

7.0 Recommendation

The researchers hereby proposed the following recommendations:

1. For any tertiary institution in Nigeria to access growth and expansions in the current knowledge market, there should be both vertical and horizontal integration of automation practices in institutions. This can be archived through strengthening the digital network system of schools through digitalization of services in the area of students' enrolment, virtual lecture aide, blackboard system, personalization of user interfaces and investment in Information and Communication Technologies (ICT).

2. For Nigeria tertiary institution to gain competitive advantage in the current digitalized economy and globalization, schools should deploy more strategic approaches in the area of institutional collaboration, with key stakeholders such as educational digital consultants that will effectively manage their online presence and help them navigate through the turbulent waters of institutional automation.

3. For a sustainable approach to automation of institutional human resources, tertiary educational managements should be ready to integrate automation in all administrative and operational processes and embark on corporate staff training and development strategies. This can be achieved through sending key personnel to under-study institutions abroad, where automation has practically been domesticated effectively. Similarly, all categories of staff should also be given hands on practical ICT training that will help them domesticate automation in their daily work routines.

4. For sustainable financial management of the gains of automation, institutions should put in place corporate financial monitoring policies that will check fraudulent operations of personnel in the system. This can be archived through recruitment of technocrat in financial technologies that will critically install digital

financial ICT structural operations to help facilitate online payment and monitoring fraud detection and mitigation, thus improving financial management decisions.

5. Finally, for sustainable service quality delivery from automation of tertiary institutions, Nigerian universities already automating their operations should put in place maintenance drivers and promote self-servicing structures that will sustain the ubiquitous nature of the system. This can be achieved through periodic system maintenance, training and retraining of back-end-operators, periodic reviews of services of gaps and server protection and back-ups.

Acknowledgement

We wish to use this medium to express our heartfelt gratitude to the management of TETFUND and the University of Cross River State (UNICROSS) for considering and sponsoring our research under the Institution Based Research platform. Reference number TETF/DR&D/CE/CRUTECH/IBR/2023/VOL.1. We also wish to thank the Vice Chancellor of University of Cross River State, Professor Augustine Oko Angba for providing the entire staff of the university a conducive research environment that has led to the actualization of our vision in this research. We also wish to acknowledge Dr. Joseph Ukpata, the Director of the Directorate of Research and Development in University of Cross River State for all his kind assistance during the build-up of this research. We also extend our warmest gratitude to all our esteem colleagues, staff and students of UNICROSS who voluntarily contributed to this research especially all those who participated in our field work during data collection.

References

Acemoglu, D., & Restrepo, P. (2019). Automation and new tasks: How technology displaces and reinstates labor. *Journal of economic perspectives*, *33*(2), 3-30.

Adesanya, T. O., Ojo, A. D., Osakede, K. O., Ijimakinwa, S. O., & Arijeniwa, W. (2017). The Impact of E-Administration on Service Delivery in Adekunle Ajasin University Akungba-Akoko,(AAUA) Ondo State, Nigeria. *Management Studies and Economic Systems*, *54*(5305), 1-10.

Ahmed, A. A. A., Asadullah, A. B. M., & ShakawatHossain, M. (2020). Impact of artificial intelligence and automation technologies on financial management. *PalArch's Journal of Archaeology of Egypt/Egyptology*, *17*(6), 10311-10329.

Aladi, C. (2019). Automating school fees transactions in Nigerian Universities and tertiary Institutions: a systems engineering and system management approach.

Alenicheva, T. S., Mamaeva, N. A., & Patlasov, O. Y. (2019, October). Economic efficiency of management automation in educational organizations. In *Journal of Physics: Conference Series* (Vol. 1333, No. 7, p. 072018). IOP Publishing.

Alsabhan, W. (2023). Student cheating detection in higher education by implementing machine learning and LSTM techniques. *Sensors*, *23*(8), 4149.

Altbach, P. G., Reisberg, L., & Rumbley, L. E. (2019). *Trends in global higher education: Tracking an academic revolution* (Vol. 22). Brill.

Asogwa, B. E., Ugwu, C. I., & Ugwuanyi, F. C. (2015). Evaluation of electronic service infrastructures and quality of e-services in Nigerian academic libraries. *The Electronic Library*, *33*(6), 1133-1149.

Atkinson, D., & Lim, S. L. (2013). Improving assessment processes in Higher Education: Student and teacher perceptions of the effectiveness of a rubric embedded in a LMS. *Australasian Journal of Educational Technology*, *29*(5).

Autor, D. H. (2015). Why are there still so many jobs? The history and future of workplace automation. *Journal of economic perspectives*, *29*(3), 3-30.

Baiden, B., Nimako-Kodua, J., Anyanful, V. K., & Oppong, D. (2023). Management Information Systems and its Impact on Productivity in Higher Education: A Case of Colleges of Education in Ghana. *International Journal of Computer (IJC)*, *45*(1), 136-150.

Bessen, J., Goos, M., Salomons, A., & Van den Berge, W. (2023). What happens to workers at firms that automate? *The Review of Economics and Statistics*, 1-45.

Bhuiyan, T., Khan, S., & Nahar, A. (2014). Evaluation of the Effectiveness of a Web-Based e-Learning System for Tertiary Educational Institution. *Lecture Notes on Software Engineering*, *2*(1), 6.

Bobrytska, V. I., Reva, T. D., Protska, S. M., & Chkhalo, O. M. (2020). Effectiveness and stakeholders' perceptions of the integration of automated e-learning courses into vocational education programmes in universities in Ukraine. *International Journal of Learning, Teaching and Educational Research*, *19*(5), 27-46.

Campa, R. (2017). Automation, education, unemployment: a scenario analysis. *Studia Paedagogica Ignatiana*, *20*(1), 23-39.

Cerratto Pargman, T., Lindberg, Y., & Buch, A. (2023). Automation is coming! Exploring future (s)-oriented methods in education. *Postdigital Science and Education*, *5*(1), 171-194.

David, D., Abdurachman, E., Bandur, A., & Kosasih, W. (2023). Improving competitive advantages of higher education institutions through IT governance, IT excellence, and IT innovation: A case study in School of Informatics Management & Computing in Indonesia. *CommIT (Communication and Information Technology) Journal*, *17*(1), 103-119.

Diachenko, A. V., Morgunov, B. P., Melnyk, T. P., Kravchenko, O. I., & Zubchenko, L. V. (2019). The Use of Innovative Pedagogical Technologies for Automation of the Specialists' Professional Training. *International Journal of Higher Education*, *8*(6), 288-295.

Dosunmu, M. M., Bukki, A. O., & Akintola, O. A. (2018). Influence of Office Automation on Secretarial Administratorsâ€™ Effectiveness in Ogun State-Owned Universities. *KIU Journal of Social Sciences*, *4*(3), 57-64.

Firawi, A. M. (2024). The Impact of Automation on Human Resource Management Practices. *International Journal of Business Analytics and Security (IJBAS)*, *4*(1), 65-75.

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The internet and higher education*, *7*(2), 95-105.

Gaus, A., & Hoxtell, W. (2015). *Automation and the future of work in Sub-Saharan Africa*. Konrad Adenauer Stiftung.

Genzen, J. R., Burnham, C. A. D., Felder, R. A., Hawker, C. D., Lippi, G., & Peck Palmer, O. M. (2018). Challenges and opportunities in implementing total laboratory automation. *Clinical chemistry*, *64*(2), 259-264.

Ginige, J. A., & Ginige, A. (2007, July). Challenges and solutions in process automation in tertiary education institutes: an Australian case study. In *6th IEEE/ACIS International Conference on Computer and Information Science (ICIS 2007)* (pp. 1074-1079). IEEE.

Ginige, J. A., & Ginige, A. (2007, July). Challenges and solutions in process automation in tertiary education institutes: An Australian case study. In *6th IEEE/ACIS International Conference on Computer and Information Science (ICIS 2007)* (pp. 1074-1079). IEEE.

Ioannidou, A., & Parma, A. (2022). Risk of job automation and participation in adult education and training: do welfare regimes matter? *Adult Education Quarterly*, *72*(1), 84-109.

Ishii, K., & Tamaki, K. (2009). Automation in education/learning systems. *Springer Handbook of Automation*, 1503-1527.

Ishii, K., & Tamaki, K. (2009). Automation in education/learning systems. *Springer Handbook of Automation*, 1503-1527.

Islam, M. S., & Grönlund, Å. (2016). An international literature review of 1: 1 computing in schools. *Journal of educational change*, *17*, 191-222.

Kargbo, J. A. A. (2009). Automation: Whither academic libraries?.

Koster, S., & Brunori, C. (2021). What to do when the robots come? Non-formal education in jobs affected by automation. *International Journal of Manpower*, *42*(8), 1397-1419.

Krubu, D. E., & Osawaru, K. E. (2011). The impact of information and communication technology (ICT) in Nigerian university libraries. *Library philosophy and Practice*, *2011*(583), 1-19.

Kuola, A. (2022). AUTOMATION AS A PANACEA TO MANUAL ADMINISTRATION OF POLYTECHNICS IN OGUN STATE, NIGERIA. *Fane-Fane International Multi-Disciplinary Journal*, *6*(2, DEC.), 54-66.

Matthew, U. O., Kazaure, J. S., & Okafor, N. U. (2021). Contemporary development in E-Learning education, cloud computing technology & internet of things. *EAI Endorsed Transactions on Cloud Systems*, *7*(20), e3-e3.

Mohamed, S. A., Mahmoud, M. A., Mahdi, M. N., & Mostafa, S. A. (2022). Improving efficiency and effectiveness of robotic process automation in human resource management. *Sustainability*, *14*(7), 3920.

Mowshowitz, A. (1986). Social dimensions of office automation. In *Advances in computers* (Vol. 25, pp. 335-404). Elsevier.

Ogunsola, L. A., & Aboyade, W. A. (2005). Information and communication technology in Nigeria: Revolution or evolution. *Journal of Social Sciences*, *11*(1), 7-14.

Oguzo, N. (2022). Workplace Automation And Employee Performance. *BW Academic Journal*, 9-9.

Okem, C. I. (2021). Influence of modern office automation on secretaries'information processing and communication skills in tertiary institutions in anambra state. *Multidisciplinary Journal Of Vocational Education & Research*, *1*(4).

Osakede, K. O., Ijimakinwa, S. O., Arijeniwa, W., Adesanya, T. O., & Ojo, A. D. (2017). The Impact of E-Administration on Service Delivery in Adekunle Ajasin University Akungba-Akoko,(AAUA) Ondo State, Nigeria. *Management Studies and Economic Systems*, *54*(5305), 1-10.

Ossai-Ugbah, N. B. (2010). The impact of automated library services and usage on student's academic performance in Nigerian Universities. *International Journal of Library and Information Science*, *2*(9), 169-176.

Osuji, C. U., & Major-Jack, B. (2024). Administrators' Financial Management Strategies for Enhanced Quality Service Delivery in Rivers State Universities. *International Journal of Advanced Research and Learning*, *3*(1).

Otu, J. A. (2022). Educational e-services and student satisfaction in Nigerian public universities. *Editorial Board*, 279.

Özkiziltan, D., & Hassel, A. (2020). Humans versus machines: an overview of research on the effects of automation of work. *Available at SSRN 3789992*.

Pillai, K. R., Upadhyaya, P., Prakash, A. V., Ramaprasad, B. S., Mukesh, H. V., & Pai, Y. (2021). End-user satisfaction of technology-enabled assessment in higher education: A coping theory perspective. *Education and Information Technologies*, *26*(4), 3677-3698.

Rasli, A., Danjuma, I., Yew, L. K., & Igbal, M. J. (2011). Service quality, customer satisfaction in technology-based universities. *African Journal of Business Management*, *5*(15), 6541.

Rasli, A., Danjuma, I., Yew, L. K., & Igbal, M. J. (2011). Service quality, customer satisfaction in technology-based universities. *African Journal of Business Management*, *5*(15), 6541.

Sani, A., & Tiamiyu, M. (2005). Evaluation of automated services in Nigerian universities. *The Electronic Library*, *23*(3), 274-288.

Thompson, E. S., & Pwadura, J. (2014). Library automation at the University for Development Studies: Challenges and prospects. *New Review of Academic Librarianship*, *20*(1), 66-77.

Truong, T. C., & Diep, Q. B. (2023). Technological spotlights of digital transformation in tertiary education. *IEEE Access*.

Van Vlasselaer, V., Bravo, C., Caelen, O., Eliassi-Rad, T., Akoglu, L., Snoeck, M., & Baesens, B. (2015). APATE: A novel approach for automated credit card transaction fraud detection using network-based extensions. *Decision support systems*, *75*, 38-48.

Vogeser, M., & Kirchhoff, F. (2011). Progress in automation of LC-MS in laboratory medicine. *Clinical biochemistry*, *44*(1), 4-13.

Vrontis, D., Christofi, M., Pereira, V., Tarba, S., Makrides, A., & Trichina, E. (2022). Artificial intelligence, robotics, advanced technologies and human resource management: a systematic review. *The international journal of human resource management*, *33*(6), 1237-1266.

Weaver, D., Spratt, C., & Nair, C. S. (2008). Academic and student use of a learning management system: Implications for quality. *Australasian journal of educational technology*, *24*(1).