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THE TWO HUNDRED AND FIFTY-EIGHTH (258TH)
INAUGURAL LECTURE

"GAME CHANGER OF ICT"

By

PROFESSOR OMENOGO VERONICA MEJABI
B. Sc. (Hons) (Ibadan); PGD, M.Sc., MBA (Aston); Ph.D. (Ilorin)

DEPARTMENT OF INFORMATION TECHNOLOGY,
FACULTY OF COMMUNICATION AND INFORMATION SCIENCES,
UNIVERSITY OF ILORIN, NIGERIA

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The Vice-Chancellor

Professor Wahab Olasupo Egbewole SAN
LL.B (Hons) (Ife); B.L (Lagos); LL.M (Ife); Ph.D. (Ilorin); FCArb; Fspsp

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PROFESSOR OMENOGO VERONICA MEJABI

B. Sc. (Hons) (Ibadan); PGD, M.Sc., MBA (Aston); Ph.D. (Ilorin)

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All other Academic, and Non-Teaching Staff,
Distinguished Invited Guests,
My Lords Spiritual and Temporal,
Students of the University of Ilorin, especially Faculty of Communication and Information Sciences,
Gentlemen of the Print and Electronic Media,
Distinguished Ladies and Gentlemen.

Preamble

I acknowledge the Lord God Almighty, the Maker of heaven and earth. The unchanging God - the Father, the Son, and the Holy Spirit, for giving me life and being my sustainer. To Him alone be all the glory. It is with gratitude that I thank the Lord God Almighty for giving me this unique opportunity to deliver the two hundred and fifty-eighth (258^{th}) Inaugural Lecture of the University of Ilorin, 4^{th} from the Faculty of Communication and Information Sciences and the 1^{st} from the Department of Information Technology, titled: "***Game Changer of ICT"***.

I was born 64 years ago, in Enugu, which is about 35 kilometres away from Nkalagu, the home of Nigercem, which is the first indigenous manufacturer of cement in Nigeria where my father, an Electrical Engineer, worked as a Plant Manager. It was a beautiful surreal environment where I attended one of the best nursery/primary schools until 1966 when the beats of the impending Nigerian Civil War became too loud. The tensions were enough for us to relocate to Kwale in the then Mid-Western Region of Nigeria (later to be known as Bendel State and now Delta State), with my mother, Sussanna Mgbonye Edem and my siblings – Kemnede, Ngozi, and Chukwuemeka. Following our relocation, my father; Josiah Odifiri Obonyano, made every effort to ensure that I could continue my schooling in the best schools the region had to offer. First at Kwale, and then at Sapele where I finished my primary school education. I attended St. Maria Goretti Girl's Grammar School in Benin City from 1971 to 1975. I was part of the set that sat for the West African School Certificate (WASC) Ordinary Level exam during the brief period when the school was renamed *Iden Grammar School* by the then military government. After St. Maria Goretti, I attended Idia College, Benin City, for my Higher School Certificate (HSC) but had to retake the HSC exams at the Institute of Continuing Education (ICE), Benin City.

By this time, I had reached the conclusion that my childhood dream of studying medicine was not realistic, as I did not like the hospital environment and the physiology components of Biology was not my favourite.

I entered the University of Ibadan by direct entry in 1978 through the offer for a B.Sc. Science, as I did not know which science to study after committing to Physics, Chemistry, and Biology for so long. In my second year, I opted to major in B.Sc. Chemistry and it was through my final year project that I first encountered computers.

My project topic for the B.Sc. was "Molecular Orbital Calculations of Phenol, Aniline and their Penta- and Tri-Halo Derivatives". The resultant molecular orbital equations needed the help of computers to solve. My project supervisor, Prof. J.A.

Faniran, facilitated access to the University of Ibadan Computer Centre where the data I supplied was 'fed' to an IBM 370/135 computer using the computer program, Quantum Chemistry Program Exchange (QCPE) 110. The Quantum Chemistry Program Exchange which was domiciled at Indiana University in Bloomington, Indiana, was a service conceived in 1962 to provide a cost-effective way for theoretical chemists and other scientists to perform research calculations in the study of molecules but the need for it diminished with the introduction of the Internet in the 1990s. The initial input parameters of coulomb and resonance integrals were refined by an iterative method until a self-consistent energy was obtained.

Vice-Chancellor, sir, I must let this audience know that I never set my eyes on that IBM computer but had faith that it was there behind the "STAFF ONLY" doors, crunching away at the data cards we had submitted while awaiting output after two weeks! Indeed, the closest I got to the computer was through the punch card machine. Nevertheless, I was the only student in a class of 66 that was exposed to the knowledge that computers had a place in the study of chemistry.

By the end of the Bachelor's programme, it was clear that my interest and prowess was best show-cased in the mathematical sciences, and I opted to branch out into Chemical Engineering. The University of Aston in Birmingham, England (now called Aston University), offered me the opportunity. I did a conversion course through the Postgraduate Diploma in Chemical Engineering and went on to take the department's Master of Science degree in Process Analysis and Development.

It was during the two sessions I spent at Aston, precisely from October 1982 to October 1984, that I experienced the full power of computers. At this time, Aston University had several computer laboratories across the campus, each with about 50 terminals running different scientific programming languages such as BASIC, FORTRAN and COBOL, and word-processing software. The second term was a busy period in those laboratories because every student in the university, undergraduate or postgraduate, had to undertake a computer

project. To prepare us for this, we were introduced to a programming language, in my case, FORTRAN 77. The lectures comprised two, 2-hour classes with the lecturer's computer terminal connected to a projector. This allowed us to learn, not only the programming language, but to see the syntax errors and understand how the lecturer corrected the errors. This was followed by two, 2-hour tutorial sessions where we worked through simple to complex problems. I am giving this detailed description in order to illustrate what the appropriate application of ICT can achieve.

Vice-Chancellor, sir, at the end of the four weeks, I was hooked. Programming even became a form of relaxation for me. I wrote to Professor Faniran excitedly informing him of my experience with this more hands-on computer environment, telling him that I could have done so much more on my undergraduate project, had there been such fast processing and easy to access computers. I went on to do a lot of coding in the FORTRAN 77 language for my Master's thesis on the topic, "Simulation of systems involving stiff and non-stiff ordinary differential equations". I used the word processor available on the university's intranet to type the 116-page report. These experiences became the game changer for me.

My first job in March 1985 as an Assistant Lecturer after I returned to Nigeria with my Master's degree was secured with the Department of Petro-chemical Engineering, Rivers State University of Science and Technology, Port-Harcourt, based on discussions around my understanding of computer programming and its place in Chemical Engineering. Later that year, the Federal University of Technology (FUT), Minna, offered me an appointment as an Assistant Lecturer, primarily impressed by my M.Sc. thesis. In fact, FUT Minna demonstrated a keen interest in appointing me to the Computer Science Department, which lacked any existing staff. However, I refused, and told the Vice-Chancellor, Professor J.O. Ndagi, that my father had spent so much money to send me overseas to study Chemical Engineering and so my address must read Department of Chemical Engineering. I resumed in FUT Minna in October, 1985, as an

Assistant Lecturer in the Department of Chemical Engineering where, in addition to Chemical Engineering courses, I taught programming in BASIC to first year and second year foundation students and programming in FORTRAN 77 to first year engineering students from 1985 to 1988. This was a delightful experience because FUT Minna had a computer laboratory with 100 brand new IBM compatible microcomputers.

It was while at FUT Minna that the Director of the Computer Centre, Mr. M. Chesnosky, a native of Poland, introduced me to business processing software for microcomputers such as LOTUS 1-2-3 spreadsheet software and dBASE III, a database management software. Mr. Chesnosky and I, regularly conducted computer appreciation training on behalf of FUT Minna, to customers in and around Minna. This proved very useful when I married in 1988 and moved to Ilorin to join my husband. The then Director of the University of Ilorin Computer Centre, Dr. M. O. Afolabi, assessed me and recommended me for employment. I was formally employed on 30th June, 1989, as a Senior Systems Analyst in the Computer Centre, University of Ilorin, and by 1995, I had risen through the ranks to the position of Chief Systems Analyst.

Mr. Vice-Chancellor, my quest for knowledge and thirst for academics never waned and in 2007, I obtained a Ph.D. in Management Science from the University of Ilorin, supervised by Professor J. O. Olujide. I was interviewed and employed as a Senior Research Fellow in the Department of Information and Communication Science (now Department of Information Technology), Faculty of Communication and Information Sciences, and I was the first staff to resume in the newly created Faculty (and Department) on 26th June, 2008, where I rose after converting to Senior Lecturer, to the rank of Professor.

Keeping in touch by snail mail and then by e-mail when that technology became available, my alma mater, Aston University, continued to communicate with me after my graduation in 1984. It was through this channel that I received an e-mail from them informing me that Aston University was offering scholarships to 50 alumni, on a competitive basis, to

return to Aston to study for an MBA in 2017, in commemoration of its 50th anniversary. I applied and was successful, and had the opportunity to return to Aston University for the MBA in the 2017/2018 academic session with the tuition fee of £25,000 fully covered. To God be the glory, I was studying in the MBA Base Room (a fancy name for Common Room), when I received the phone call that the University of Ilorin had promoted me to the rank of Professor effective from 1st October, 2017.

My early years at the University of Ilorin coincided with the emergence of electronic networking and Internet technologies and their application by organisations and society at large. Both in practice and research, I have been fascinated by the game changing power of appropriately responding to the technological developments associated with ICT and I have strived to do so at every opportunity.

ICT in Context

ICT is a field that changes rapidly in response to technological innovations. A term commonly used interchangeably with ICT is "Information Technology" (IT), although there are attempts to distinguish them. The term, IT, as a descriptor for the technology associated with newly emerging office systems was first used in 1958, while ICT first appeared in a 1997 report by Dennis Stevenson. In that document, Stevenson (1997) referred to ICT as an expansion from IT in order to take into account the use of the Internet and email, the combination of computing with telecommunications and broadcasting, and the inclusion of products that can deal with information in an electronic form such as calculators, television, telephones and computers. While ICT has been used to represent "Information and Communications Technology", "Information and Communication Technologies", "Information Communication Technology" and "Information and Communication Technology", as a practitioner and researcher in the field, I stick to ICT as an acronym for Information and Communication Technology.

According to the Association for Computing Machinery (ACM, 2008), information technology (IT) in its broadest sense,

encompasses all aspects of computing technology and as an academic discipline, it is concerned with issues related to advocating for users and meeting their needs within an organisational and societal context through the selection, creation, application, integration and administration of computing technologies. On the other hand, the UNESCO Institute for Statistics (UIS, 2009), defines Information and Communication Technologies (ICT) as a diverse set of technological tools and resources that are used to transmit, store, create, share or exchange information. Further elaborating that the technological tools and resources include computers, the Internet (websites, blogs and emails), live broadcasting technologies (radio, television and webcasting), recorded broadcasting technologies (podcasting, audio and video players, and storage devices) and telephony (fixed or mobile, satellite, video-conferencing, etc.).

Vice-Chancellor, sir, the coexistence in the terms, IT and ICT, can be attributed to the evolving nature of the innovations. However, I lean towards the term, ICT, because it provides a broader umbrella to explore issues of data/information processing and sharing, as well as formal and informal communication on different scales. A range of infrastructure that ICT covers and the summary of associated technologies are as shown in Table 1 and Figure 1 (Rouse, 2023), respectively.

Table 1: Summary of some technologies associated with ICT

Information	**Technologies**
Creation	Personal Computers (PC), Digital camera, Scanner, Smartphone
Processing	Calculator, PC, Smartphone
Storage	CD, DVD, Pen drive, Microchip, Cloud
Display	PC, TV, Projector, Smartphone
Transmission	Internet, VSAT, Teleconference, Video conferencing, Mobile technology, Radio
Exchange	E-mail, Cell phone

Figure 1: ICT infrastructure

Key milestones in the emergence of ICTs are as follows ("The History of ICT", 2016; Vrontis, 2022; Jones, 2024):

- 1837: Charles Babbage conceptualises the Analytical Engine, considered to be the precursor to modern computers.
- 1837: Morse code and telegraph.
- 1876: Telephone.
- 1895: Wireless telegraphy.
- 1927: Television.
- 1936-1938: Alan Turing develops concepts of computation and theory of computing.
- 1940s: First electronic digital computers are built, such as Colossus and ENIAC.
- 1950s: Mainframe computers become commercially available.
- 1950s-1960s: The satellite era.
- 1969: ARPANET, foundation of the Internet, is established by the U.S. Department of Defense.

- 1970s: Personal computers begin to emerge with popular models like the Apple II and Commodore PET.
- 1971: First e-mail is sent.
- 1981: IBM introduces its first personal computer (PC) running MS-DOS operating system.
- Late 1980s - Early 1990s: The World Wide Web is invented by Tim Berners-Lee (1989) and becomes publicly accessible (1991).
- 1990s - Early 2000s: Very Small Aperture Terminals (VSAT) goes mainstream.
- Late 1990s - Early 2000s: Mobile phones evolve into smartphones with Internet connectivity and advanced features, such as BlackBerry and Nokia Communicator.
- 1991: GSM (Global System for Mobile Communication).
- 1998: Google.
- Mid-late 2000s: Cloud computing gains popularity with companies like Amazon Web Services (AWS) providing cloud-based infrastructure services.
- 2001: Commercial 3G networks.
- 2004: Facebook.
- 2007: iPhone.
- 2008: Bitcoin (First block chain-based crypto currency).
- 2009: Whatsapp.
- 2010: 4G networks.
- 2013: Zoom.
- 2016: AlphaGo (AI system defeating world champion Go player).
- 2020: 5G networks.
- 2022: ChatGPT- a form of generative Artificial Intelligence (AI), launched on November 30, 2022.
- 2023: Zoom (achieves 350 million daily meeting attendees).

Overall, ICT as the backbone of the digital age, improves access to information and makes human-to-human, human-to-machine, and machine-to-machine communication

easier and more efficient. Impact areas of ICT where transformative change has occurred include how we communicate, learn and acquire knowledge, conduct business, and in how society interacts with the world around it. According to Babatunde and **Mejabi** (2009), the transformation has resulted in terms such as 'online', 'e-commerce', 'cyber marketing', 'cybercafé' and 'e-business'. However, the pervasive presence of ICT is not without its challenges. According to Dirubasn (2023), some of the challenges are that:

1. not everyone has equal access to ICT tools and resources. The digital divide exacerbates existing inequalities, leaving some communities and individuals without the same opportunities for growth and development;
2. as ICT proliferates, so does the risk of cyber threats such as cybersecurity breaches, data theft, and privacy violations; and
3. the rapid advancement of ICT has led to concerns about its environmental footprint. Energy consumption, electronic waste, and the need for responsible disposal pose sustainability challenges.

For a sense of ICT-related context in Africa and beyond, some indicators from the Sustainable Development Report 2023, are presented in Table 2.

From the Table 2, some things are glaring of the eight countries shown. Nigeria has the lowest median age, ranks lowest on the overall SDG index rank, and has the lowest mobile broadband subscriptions (per 100 population). Nigeria also has the lowest proportion of the population aged 15 or over with an account at a bank or other financial institution or with a mobile money service provider; the United Kingdom (UK) has the highest. Nigeria also has the lowest timeliness of administrative proceedings ratio, the worst corruption perception index, and the lowest expenditure on research and development as a percent of GDP.

Table 2: Selected Sustainable Development Goal (SDG) Indicators from the 2023 Report

SDG Indicator	NIGERIA	GHANA	KENYA	SOUTH AFRICA	CHINA	UK	USA	U
Population (2023) *	**223,804,632**	**34,121,985**	**55,100,586**	**60,414,495**	**1,425,671,352**	**67,736,802**	**339,996,563**	**9,516,871**
Median age (2023) *	17	21	20	28	39	40	38	34
SDG Index Rank (/166)	146	122	123	110	63	11	39	79
Population using the internet (%)	55.4 2021	68.2 2021	28.8 2021	72.3 2021	73.1 2021	96.7 2021	91.8 2021	100.0 2021
Mobile broadband subscriptions (per 100 population)	36.6 2021	71.5 2021	53.5 2021	115.7 2021	101.6 2021	113.3 2021	165.8 2021	241.2 2021
Electronic waste (kg/capita)	2.3 2019	1.8 2019	1.0 2019	7.1 2019	7.2 2019	23.9 2019	21.0 2019	15.0 2019
Adults with an account at a bank or other financial institution or with a mobile-money-service provider (% of population aged 15 or over)	45.3 2021	68.2 2021	79.2 2021	85.4 2021	88.7 2021	99.8 2021	95.0 2021	85.7 2021
Timeliness of administrative proceedings (worst 0–1 best)	0.3 2021	0.4 2021	0.4 2021	0.5 2021	0.6 2021	0.7 2021	0.6 2021	0.7 2021
Corruption Perceptions Index (worst 0–100 best)	24 2022	43 2022	32 2022	43 2022	45 2022	73 2022	69 2022	67 2022
The Times Higher Education Universities Ranking: Average score of top 3 universities (worst 0–100 best)	39.0 2022	32.2 2022	39.5 2022	51.1 2022	81.6 2022	93.2 2022	95.0 2022	44.2 2022
Expenditure on research and development (% of GDP)	0.1 2007	0.4 2010	0.7 2010	0.6 2019	2.4 2020	1.7 2019	3.5 2020	1.4 2020

* Worldometer (July 16, 2023). https://www.worldometers.info/world-population/population-by-country/ accessed 4th February, 2024).
Source: Sustainable Development Report 2023: Implementing the SDG stimulus (https://dashboards.sdgindex.org/ accessed 17th January, 2024).

My Contributions to Information and Communication Technology

Mr. Vice-Chancellor, the timeline of developments in different areas of ICT presented earlier, reflects in my contributions as well. I will group the presentation of my contributions into seven broad game changing areas, namely, access to the global village, web-based solutions, organisational change, adoption, empowerment, open data practice, and impact on the environment.

1. **Access to the global village**

The first electronic mail (e-mail) sent in 1971 emerged as a way to send messages and files between computers, but it was mostly limited to communications within specific networks in the more developed countries (Plonus, 2020). While these countries were taking advantage of the capabilities for increased, faster, and wider access to information, most parts of Africa, including Nigeria still had to rely on snail mail. **Mejabi** (1992a) showed that this changed in 1990 when the then Faculty of Health Sciences, University of Ilorin, in conjunction with McMaster University, Ontario, Canada, operated a semi-automated data communication system that greatly improved the flow of information between Faculty members and their colleagues all over the world who could be reached by electronic mail, telex, or FAX. The system relied on operators at both ends, as shown by the Figure 2 depicting the Unilorin-McMaster e-mail link. According to **Mejabi** (1992b), this was an ingenious way of providing the university community with access to the global village and the University of Ilorin became the first public institution in Nigeria to have electronic communication with the outside world. Mr. Vice-Chancellor, this was a game changer as the development made the University of Ilorin a hub for people who wanted to communicate using e-mail. Furthermore, **Mejabi** (1995) identified other institutions in Nigeria that became active e-mail operational hubs after the University of Ilorin as the

Obafemi Awolowo University (1992) and the Yaba College of Technology (1993).

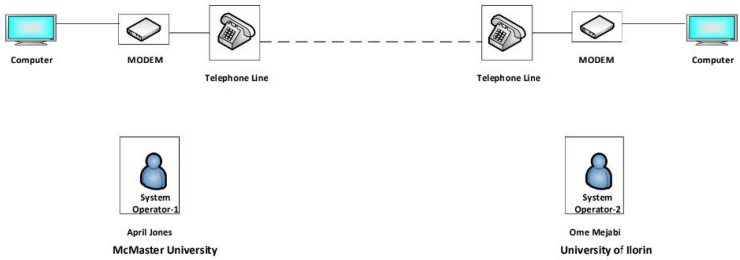

Figure 2: The Unilorin – McMaster e-mail link

Mejabi (1992a) demonstrated the basics of data communication using concepts such as local area network (LAN), and indirect connections with modems and telephones to provide different types of data communication services such as electronic mail, bulletin board services (BBS), voice mail, bibliographic services, teleconferencing, electronic banking, and electronic bank transfer. In this regard, **Mejabi** (1992a) identified the international direct dialling (IDD) line installed by the Nigerian Telecommunications Limited (NITEL), a modem to convert the analogue signal from the telephone to the digital signal that the computer understands (and vice-versa), a personal computer, and the e-mail communication software, Crosstalk, as the technologies that made the Unilorin-McMaster connection possible.

However, **Mejabi** (1992b) noted that the prohibitive cost of telephone calls initiated from the Nigeria end, meant that Unilorin had to rely on McMaster to call in, and also identified a major weakness of CrossTalk as its inability to reset and wait for a repeat call after an aborted attempt. Furthermore, CrossTalk could only carry ASCII data and could not transmit binary files such as dBASE files. **Mejabi** (1992b) examined the

effectiveness of Seadog as an alternative to CrossTalk and confirmed that Seadog automatically reset itself in preparation for another call, and could transmit both ASCII and binary files but that because the automation depended on the machine in the USA calling the machine at the Nigeria end, any problems with the computer CMOS affected successful handshake.

The Unilorin-McMaster e-mail link became a gateway of sorts into and out of Nigeria, providing information exchange to researchers in Ibadan, Ile-Ife and Lagos. The interest was such that I was invited to contribute an article to the 1995 special issue of the FID News Bulletin on the theme "Africa in Cyberspace", in commemoration of 100 years (1895 – 1995) of publishing by the publisher; the International Federation of Documentation. My contribution was on the topic, "Community Involvement in Electronic Networking" (**Mejabi**, 1995). **Mejabi** (1995) identified other institutions in Nigeria that became active e-mail operational hubs after the University of Ilorin and discussed issues of sustainability and the possibility of introducing a billing scheme as long as it did not violate the non-commercial conditions of the communication software in use, which was Front Door at the time of writing the paper.

Vice-Chancellor, sir, the big breakthrough in providing Africa with access to the global village occurred when the Very Small Aperture Terminals (VSAT) technology became economically viable as VSAT transitioned from a niche technology to mainstream adoption when the costs associated with satellite communication began to decrease. A typical VSAT installation ("What is VSAT?", 2023), is shown in Figure 3 and should remind some of us of the days when we used it for television services and Internet service provision as well as for institutions.

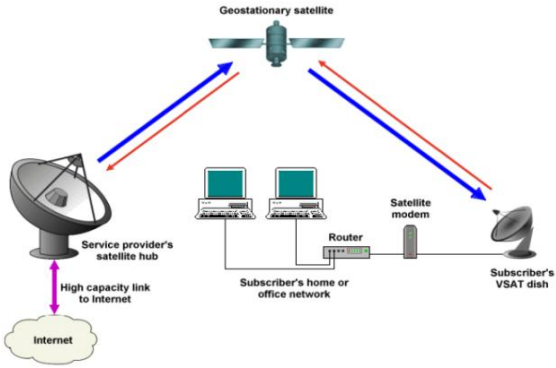

Figure 3: A typical VSAT installation of the 1990s

2. Web-based solutions

Alongside efforts to open up global communication and provide more people with access through e-mail, Tim Berners-Lee developed technologies for the foundation of the web between 1989 and 1990, and opted to not patent his work so that anyone could use it without paying a fee or having to ask for permission (World Wide Web Foundation, 2020). Vice-Chancellor, sir, the web has been a game changer to the world.

It was in this era that **Mejabi** and Babatunde (2010a) explored the extent to which research works at a typical Nigerian university were available on the web. The study attempted to identify the gap, if any, between the number of publications owned by academic staff and the number of publications listed on the university website. The study also sought to determine the number of such publications that were visible on the Internet using a Google search of the staff's name. The study revealed a significant gap between the number of publications owned by respondents and the number listed on the university website; and between the number of such publications listed on the university website and the number that was visible with an online search. Summary of the data collected by **Mejabi** and Babatunde, (2010a) are as presented in Figure 4. This might no longer be the case today, as institutions like the University of Ilorin have

implemented various strategies to encourage academics to make their outputs more visible on the Internet. Today, researchers can disseminate their work through Google Scholar, SCOPUS, Research Gate, ORCID, and the like.

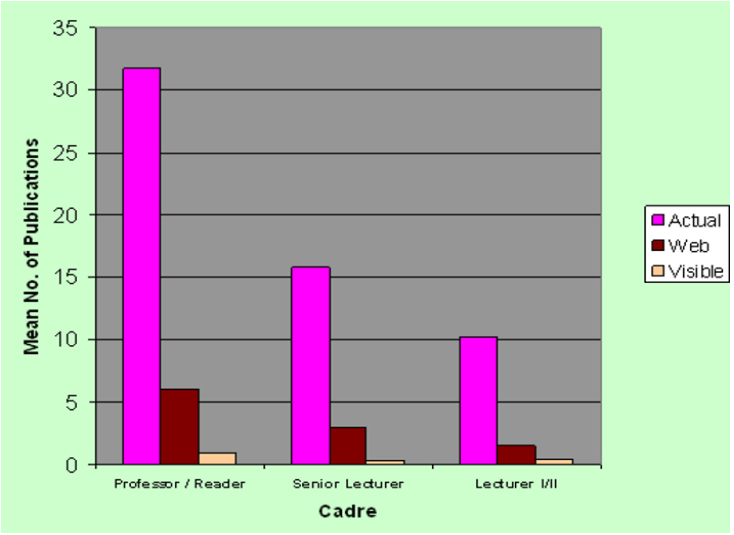

Figure 4: Journal publications (actual, portal, website)

The University of Ilorin was a good case study in the mid-2000s because it was at the forefront in Nigeria of adopting ICT in its operations. During this period, the university was pushing many of its activities through its website, and **Mejabi** and Babatunde (2010b) investigated the impact of the web-based solutions on student related services. The sample for the study included administrators, lecturers, and students. The study revealed the major reasons for visiting the website as shown in Table 3.

Table 3: Reason for visiting the website as percent of category sample

Reason for visiting the website	**Adminis-trators %**	**Lecturers %**	**Students %**
To check for announcements such as resumption date, deadlines, etc.	50	38	80
To check for general news	48	70	71
To use the student portal	26	42	77
To look for academic publications/research works on the site	36	66	64
To read publications such as the Unilorin bulletin, Senate digest, Centre Point, etc.	44	74	67

At the time of carrying out this study, news items were placed conspicuously on the Home page of the Unilorin website. Obviously, this brought in a lot of traffic to the site, especially from students.

The discovery of the web as a means of interacting with university stakeholders, the public at large, and the rest of the world, was a game changer. Suddenly, universities in Africa started showing up in various international ranking systems for universities, and the University of Ilorin began tracking its placement on these rankings. As at 2011, there were eight (8) ranking systems of note. **Mejabi**, Oyekunle and Oyebode (2011) identified them as:

a. Shanghai Jiaotong Academic Ranking of World Universities
b. Times Higher Education Supplement (THES)
c. Professional Ranking of World Universities
d. Newsweek Ranking
e. Performance Ranking of Scientific Papers for World Universities
f. Webometrics Ranking of World Universities
g. For International Colleges & Universities (4ICU)
h. The G-Factor International University Ranking.

The study examined the methodologies used by each of the eight ranking systems and identified Webometrics, 4ICU and the G-Factor, as the ranking systems that depended solely on web verifiable metrics. Such metrics included the number of pages calculated using search engines, rich files associated with the university domain, number of papers and citations for each academic domain as retrieved from search engines (Webometrics); popularity of the website using Google page rank, Yahoo inbound links, Alexa traffic rank (4ICU); number of links from other university websites (The G-Factor).

Subsequently, Oyekunle and **Mejabi** (2013) undertook an evaluation of the websites of Nigerian universities, and based the evaluation on usability, services offered, and design perspective. At the time of the study, there were 104 universities in Nigeria with 85 of them having fully functional websites. We found that at least 80% of the university websites had a Home page, an About Us page, and pages on Admissions, News, and Contact Us. For information on faculties operated by the university, only 62% had them, and 28% had a page that offered frequently asked questions (FAQ). On services offered through the websites, 78% offered an online student portal, 57% offered student online registration, 42% had email services available from the Home page of the websites and 25% offered online payments. About 70% of the websites did not have any downloadable files, and the media content was text and pictures only. There were no video or audio content on any of the websites.

Vice-Chancellor, sir, the changes brought about by the improved web technologies meant that we could take advantage to develop applications that are relevant to our needs. **Mejabi** and Gimba (2014) developed an interactive web-based raw materials information system that incorporated user participation in content creation. The system allowed users to upload their content on raw materials and to edit content on the site. Browse and Upload buttons were included to enable users upload user created documents in various formats to the database.

Crowdsourcing is the practice of obtaining information or input, into a task or project, by enlisting the services of a large

number of people, typically via the Internet (DeWalt, 2021). At a time when vehicle theft was very rampant, **Mejabi,** Abdulrahaman, *et al.* (2017), used web technologies with crowdsourcing capabilities to develop an online system for vehicle ownership tracking and theft alert. The system provided a platform for community participation where vehicle owners could register their personal and vehicle profiles and maintain an electronic account on the system. It also provided access to a discussion forum and dissemination of vehicle theft alerts on the system, social networking sites (Facebook and Twitter), and SMS and e-mail alerts for quick location and recovery of a stolen vehicle.

Similarly, **Mejabi,** Okai, *et al.* (2017) took the notion of e-commerce, which is web-driven, and developed an e-marketplace for a closed system such as a university community. The application had features that allowed sellers to register, create their store, and upload products for sale to his or her store. The seller could edit a particular product's details or delete a product entirely from their store. The Home page of the e-marketplace displayed a catalogue of the available products on the site including product images, prices and the seller. From the Home page, a potential buyer could click on a product that redirects to the product page. Clicking on the "Message Seller" button, takes the buyer to the mailing application to send an email to the seller. Evaluation of the platform confirmed it to be suitable for members of a closed community to expand their customer base, by advertising business goods or services or through providing a channel for individuals who need to sell new or used products or advertise personal services.

Adedokun-Shittu, **Mejabi**, *et al.* (2023a) carried out a study designed to look into how to teach scientific theories using local adages among the Nigerian populace, in order to such indigenous knowledge available for use by teachers and learners. Using web-based solution, the study opted for a web repository. In order to overcome the challenge of identifying the indigenous knowledge from different parts of Nigeria and across the world, Adedokun-Shittu, **Mejabi**, *et al.* (2023b) opted for crowdsourcing.

3. **Organisational change**

As computer systems became more powerful to run applications, the National Universities Commission (NUC), embarked on a project to develop a computer system application for management information systems (MIS) for Nigerian universities between 1989 to 1990. Four (4) of the 37 universities in Nigeria at the time were chosen as pilots for initial implementation and the University of Ilorin was one of them. **Mejabi** (1994) described the setup wherein the NUC developed software NUMIS operated on stand-alone PCs, and operations centred on entering the data from various forms (Students information form, Course registration form, Fees form, and Staff data form). The assessment revealed that the data capture was very slow because it had to be done on one stand-alone computer (because at this time, local area network (LAN) technology was just emerging on the scene, and the skill set for local area networking was not readily available). Also identified, was that the application was developed with dBASE IV which was not network-aware, and a data merge program was not included. Needless, to say, that universities moved on from the software, to take advantage of web-based technologies that transferred much of the data entry demand from the institution to the client.

Mejabi and Raji (2010) chronicled the Unilorin experience of ICT contributions to institutional management and academic work and gave highlights of the ICT evolution at Unilorin as summarised in Table 4.

Furthermore, **Mejabi** and Raji (2010) provided data on the ranking position of the University of Ilorin on 4ICU: 2008, 1st in Nigeria and 33rd in Africa; 2009, 1st in Nigeria and 32nd in Africa; 2010 – 3rd in Nigeria and 37th in Africa. On Webometrics, the raking on 2009 July, was 2nd in Nigeria, 77th in Africa, and 7,902 in the World; 2010 January, was 1st in Nigeria, 55th in Africa and 5,846 in the World; 2010 July, 1st in Nigeria, 31st in Africa and 5,484 in the World. In the 2024 rankings of 4ICU, Unilorin is ranked 3rd in Nigeria, 34th in Africa, but is not in the top 200 universities of the world that were published. On Webometrics 2024 January rankings, Unilorin is ranked 19th in Nigeria, 119th in Africa, and 3,125 in the World.

Table 4: ICT integration at the University of Ilorin (1980 – 2010)

Year	Activity
1980	Establishment of the University Computer Centre
1989	Establishment of the Management Information System (MIS) Unit
1990	The first E-mail link in a public institution in Nigeria is established in Unilorin
1996	Establishment of the Nigerian Universities Network (NUNET) Office
1996-1997	Unilorin Library implements the first local area network (LAN) on campus
1996	Academic Planning Unit implements Computerised Estimates Software
2001	Integration of ICT-related units into one Directorate
2002	Driving ICT at Unilorin through Strategic Plans (2002, 2007)
2002	University-wide ICT Network
2004	University Website (www.unilorin.edu.ng)
2004	ICT Policy document crafted in 2004 and revised in 2009
2007	Towards a Paperless Organisation
2008	Unilorin introduces Computer Based Testing (CBT), the first in a Nigerian University
2008	E-Library

Mejabi and Salihu (2014) embarked on a study to evaluate the extent to which retail stores in Ilorin metropolis utilise computerised sales systems and the attitude of the retail staff to such systems. Thirty (30) stores and 87 retail staff were sampled. The study revealed that of the 80% of the stores that had computers, 58% used them for sales related transactions or calculations, and 40% of them had some type of sales software installed. Furthermore, 27% of the stores had printers, barcode readers and a network connection to the computers in the store, while only 13% had debit/credit card readers. Ten years after, practically every retail store in Ilorin metropolis has a card payment machine (or PDQ) but the picture has not improved with respect to the adoption of the computerised POS system.

Vice-Chancellor, the convergence of technologies such as electronic networking, Internet, World Wide Web, VSAT, and mobile phones has been a game changer for organisations in the past two decades. The changes were so profound that Olujide and **Mejabi** (2005) undertook a review of redesigns of the workplace. The study highlighted the infusion of ICT in the workplace that led to the term, the "e-organisation", which is the degree to which global (Internet) and private (intranet and extranet) network links are used. The study further identified borderless locations, decentralisation, paperless offices, work space, and work schedule options, as the areas where the redesign of the workplace was taking place. It also identified the shorter time required for decision making and the susceptibility of employees to distractions from mobile phone calls, surfing the Internet, playing online games, and e-shopping, as some of the challenges of the e-organisation. Issues of concern highlighted included; the ethics of electronic surveillance of employees by employers, social isolation of employees (made worse today by the increased 'work from home' model), and injuries associated with the ergonomics of computer use.

Following the implementation of the web-based student information system in the 2007/2008 session at the University of Ilorin, **Mejabi** (2008) undertook an evaluation from the service quality perspective. The study embraced a two-stage process of evaluation by the users and feedback/reaction from the service provider and organisations managers. The generic dimensions of service quality – tangibles, reliability, assurance, responsiveness, and empathy – were the anchors for identifying relevant attributes. The three major perceived service attributes were the fact that the MIS support's online instructions, registration pages and printouts from it were clear and easy to understand. When the MIS support promised to do something by a certain time, it did so (e.g. the registration instructions and forms were available online and removed online when the MIS support promised it would be); and that the MIS support performed the service right the first time (i.e. there was no need to repeat the release of online registration pages, screening results or admission lists because of errors or problems at the first release).

About ten years later, **Mejabi**, Sikiru and Agbeti (2017) undertook a service quality analysis of the Kwara State University's ICT centre by undergraduate students. The objective was to determine the service quality gap using the service quality model, SERVQUAL, first conceptualized by Parasuraman, Zeithamal and Berry (1985). Each of the SERVQUAL determinants of reliability, assurance, tangibles, empathy and responsiveness, were operationalised with four statements each, rated on a 5-point Likert scale from 'strongly agree' to 'strongly disagree'. The study assessed expectation rather than importance, and the quality of service was determined by finding the difference between the mean ratings of performance and expectation. The result revealed that of the 20 items, only on the item that Employees at the centre have the knowledge to answer student queries, did performance exceed expectation. The study further revealed that the responsiveness dimension had the widest performance-expectation gap (-1.06).In contrast, the assurance dimension had the narrowest gap of (-0.52) which is not surprising since it is under this dimension that performance on an item exceeded student expectations. Overall, weaknesses that adversely influenced the quality of service were found in the inability of the ICT services staff to give prompt service to students, to fulfil promises to students, and to tell students when services will be performed. Lack of up-to-date hardware and software were also identified as weaknesses. The major issue disliked by students with respect to the quality of service at the centre was the unreliability of their Internet services.

4. **Adoption of ICT**

Technology adoption is the process by which people or organisations accept and use new technologies and it involves learning and adapting to new technologies, user attitude and personality, social influence, trust, and other facilitating conditions that affect the accompanying change (Sharma & Mishra, 2014). As of January 2024, most of the web traffic in Nigeria occurred via mobile devices, which covered nearly 86 percent of the total traffic; moreover, accessing the Internet

through laptops and desktop computers corresponded to around 13 percent, while tablets had a share of 0.5 percent (Sasu, 2024).According to Balogun, Ahlan, **Mejabi** and Bello (2017), the educational sector has been a major adopter of ICT, in both developed and developing countries. However, the adoption also works in reverse such as their research into introducing learner infrastructural capabilities into information systems success using e-learning models.

As more universities in Nigeria increased the use of ICT in teaching and interactions with students, **Mejabi** and Ajiboye (2014) examined students' usage and preferences of technology mediated communication platforms. The study focused on determining preference on usability and perception of interactivity of the various communication platforms and the effectiveness of the platforms. The study revealed that 60% of the students preferred to use phone calls for their communication followed by social media (24%), and text messages (16%). For those on social media, networks preferred were Facebook-(30%), WhatsApp-(26%), BlackBerry Messenger (BBM)-(17%) and Twitter, now X,-(12%). Frequency of use was daily for nearly all the respondents (98%) while phone call was perceived as the most efficient (70%). Social media was perceived as the most interactive (51%), closely followed by phone calls (47%) while text messages were regarded as the least efficient (2%).On the pattern of Internet and GSM use, the study revealed that students accessed the Internet mostly daily (49%) or weekly (44%) and the majority patronised Airtel (37%) and MTN (45%). Nearly half of the respondents (47%) owned two SIMs while 23% owned one and 23% owned three. The recharge (or top-up) amount favoured by 42% of the respondents was for the N100-N500 range, 52% for the N501-N1000 range and 6% for the N1001-N3000 range. In contrast to the data plans which most students (56%) funded on a monthly basis and 31% on a weekly basis, top-up of their GSM line was done mostly on a daily basis (45%) and weekly basis (48%).

Open and distance learning (ODL) allows the flexibility of teachers and learners to not necessarily be present in the same place or at the same time in order for teaching and learning to

take place. ICT provides the means to make ODL a cost-effective and widely used mode of education. **Mejabi**, Azeez, Adeoyin and Oloyede (2015), undertook an analysis of ODL education through ICT in Nigeria. The study took a comprehensive inventory of the Nigerian universities that had full ODL programmes and examined the structure and the mode of operation of the programmes in relation to the policy document of the NUC on distance learning. At the time of the study, the National Open University of Nigeria (NOUN) was the only institution operating in 100% ODL mode accounting for 58% of the 120,000 ODL student enrolment. The study revealed that the current practice of ODL in Nigeria could be rightly described as an analogue style of ODL, which can be largely considered as part-time or correspondence study. This was attributed to the general infrastructure problem of electricity and the cost of Internet connections in Nigeria.

Oyekunle, **Mejabi** *et al.* (2017) explored the awareness and use of digital assistants among postgraduate students at the University of Ilorin. The study revealed that about 60% of the postgraduate students were aware of digital assistants and 57% of this group said they used them. Those that used digital assistants used them to: find information, people, and locations (25%); schedule appoints and events (22%); manage their email and voicemail (19%); shop for goods and services (13%) and others (15%). Frequently searched information with the digital assistants was for general things like exchange rates (34%), local deals (25%), local events and concerts (16%), directions (5%), information on weather (3%), and others (17%). Google Now had the highest use (40%), while 23% used Siri, 13% used Cortana and 23% used other digital assistant software such as Blackberry assistant, IRIS, Skyvi and Samsung's S-Voice. IRIS (which stands for Intelligent Response Information System, a sophisticated AI assistant) was recently described by Dalmien (2024) as a game changer for businesses and individuals because it offers a myriad of benefits that can transform the way businesses and individuals approach marketing tasks due to its powerful AI capabilities and an intuitive no-code web interface for non-technical users, among others.

Vice-Chancellor, sir, recognising the game changing power of technology, the Federal Government of Nigeria came up with policies to integrate the use of ICT in the Nigerian School System as far back as 1988, with special focus on primary and secondary schools. **Mejabi** and Siyanbola (2017) evaluated computer networks in Federal Government Colleges in Kwara and Niger States. The study identified the number of students to a functional computer in the colleges at Ilorin, Minna, and Kuta as 200:1, 121:1, and 52:1, respectively, which were below the standard of 40 students to one computer for post-primary schools in Nigeria. However, the colleges at Omu-Aran (13:1), Bida (21:1), and New Bussa (8:1) met the standard. The challenges identified were irregular power, low bandwidth, and poor wireless signal strength due to weather and topology of the location. A major hindrance to full utilization of the computer networks in the schools was inadequate knowledge of ICT by the teachers in charge of the ICT laboratories.

The infusion of ICT into the banking sector in Nigeria has led to the transition from crowded banking halls, to being able to undertake most banking operations through a mobile phone or over the Internet. ICT has therefore been a real game changer for the banking industry. As with any technology-mediated process, experiences from the change have not been the same for all bank customers. To obtain empirical evidence of the experiences of customers, Aremu, **Mejabi**, and Gbadeyan (2011), assessed customer's perception of the use of information technology by Nigerian banks. The findings revealed that customers had a positive perception to the infusion of ICT in banking with more than 80% respondents agreeing that ICT created better accessibility to their account at any location and at any point in time, enhanced funds transfer, and it resulted in quick service at a physical branch. The study concluded that information technology was "both 'a need to have' and a 'nice to have' facility" in the Nigerian banking industry.

Social media has been a game-changer, creating new words such as like, follow, influencer, emoji, and selfie. From the way we communicate, to how we interact, and to how we conduct business. In the height of the social media adoption

wave, politicians started using social media because it was fashionable to have a Twitter account, Facebook, LinkedIn, etc. Consequently, **Mejabi** and Fagbule (2014) examined how Nigerian State Governors were engaging with their citizens through social media. Each Governor's personal public Facebook page was scanned for activity between the Governor and the governed. This included checking for posts from the Governor and the Governor's reactions to visitor comments/enquiries. Governor's activity levels were compared to citizen engagement on social media with leading celebrities in Nigeria from the film, music and business sectors. The study revealed that while many Governors had social media accounts, citizen engagement was quite low although there is a perceived relationship between a Governor's social media activity and governance performance.

5. **Empowerment through ICT**

Mr. Vice-Chancellor, ICT has not only influenced the lives of the elites, it has been a game changer for rural dwellers as well. In this regard, several people might think of the impact of mobile phones. However, long before mobile phones became ubiquitous, there were viewing centres in our towns and villages where the centre owner accessed events such as football matches for the viewing pleasure of the public and for a fee from viewers. Afolayan, Ehikhamenor, **Mejabi** *et al.* (2015), through a Senate Research Grant of N1.4million, carried out a study of ICT adoption in the rural communities of Kwara State. Data was collectedacross the three senatorial districts. A major finding was the wide spread use of mobile phones within the communities. The study revealed that the majority of rural dwellers (83%) had personal ownership of mobile phones. Majority used their phones for receiving calls (90%) and making calls (89%) while other mobile phone functionalities used included text messaging (71%), calculator (63%), alarm (63%), organiser (53%), gaming (54%), listening to radio (56%), listening to music (52%), and Internet browsing (27%). The preferred mobile network was MTN (66%), followed by Glo (20.3%) and Airtel (19.5%). The challenges highlighted by the respondents in the use of their

mobile phones were the high cost of a phone, inability to read and write, lack of money to buy recharge cards (or mobile credit), lack of electricity, network quality-of-service problems, and theft of handsets.

Balogun, Ehikhamenor, **Mejabi** *et al.* (2020), identified several ICTs used among respondents in rural communities as shown in Table 5. The study revealed that mobile phones, radios, televisions, and video players garnered the highest use at 83%, 80%, 72%, and 53%, respectively. The computer system was at 28%.

Table 5: Types of ICT used by respondents

	Yes		**No**	
Type of ICT	**Frequency**	**Percentage**	**Frequency**	**Percentage**
Mobile Phone	1223	82.9	252	17.1
Radio set	1177	79.8	298	20.2
Television set	1064	72.1	411	27.9
Video Player	788	53.4	687	46.6
Tape recorder	484	32.8	991	67.2
Computer system	417	28.3	1057	71.7
Satellite television	268	18.2	1207	81.8
Photocopying Machine	244	16.5	1231	83.5
Digital camera	208	14.1	1267	85.9
Printer	207	14.0	1268	86
Gaming device (PS2, PS3, PSP, Xbox)	197	13.4	1277	86.6
Scanner	152	10.3	1323	89.7
Close circuit television	88	6.0	1387	96
VSAT	72	4.9	1403	95.1
Fax Machine	60	4.1	1415	95.9

The research included identifying ICT facilities available in the communities and the most prevalent; were Call Centres (65%), followed by TV Viewing centres (56%), Computer business centre (52%) Computer training centre (35%), Gaming centre (35%), and Cybercafé (17%). We concluded that although

we found a variety of ICTs in the rural areas education and training programmes were necessary for improved usage.

Dunmade and **Mejabi** (2009) confirmed the role of education in seeking specialised digital literacy skills in the analysis of enrolment trends between 1996 and 2006, from the University of Ilorin Computer Centre training programme. The study further revealed that majority of the trainees were working-class people who identified the need to add computer skills to their daily work to increase their effectiveness.

Recognising the empowering role of ICT, the ICT in Education and Research group comprising researchers from the Department of Information Technology, Telecommunication Science, and Electrical and Electronics Engineering, identified the Almajiri as a group that potentially could benefit from exposure to ICT through its formal or informal educational systems. Abdulrahaman, Faruk, ...,**Mejabi**, *et al.* (2020), undertook a systematic review to deepen understanding of multimedia tools in the teaching and learning process. The review considered various case study reports of multimedia tools, their success and limiting factors, application areas, evaluation methodologies, technology components, and age groups targeted by the tools. We concluded that the majority of the multimedia solutions deployed for teaching and learning target the solution to the pedagogical content of the subject of interest and the users of the solution. Furthermore, the success of the different multimedia tools depends on the technologies and components embedded in their development.

Armed with the knowledge from the review, Fahm, Azeez, Imam-Fulani, **Mejabi**, *et al.* (2021), carried out a study that would enhance our knowledge of the Almajiri, their teachers and their parents in order to identify what to offer and how to promote interaction with such ICT. A descriptive research methodology was adopted and data was collected from the Almajiri children, their teachers, and parents from communities with a high concentration of Almajiri schools. The results showed that while the official language of instruction in schools in Nigeria is English, the language often spoken by children and teachers was Hausa. The study also found that while teachers

and parents were quite familiar with ICTs such as mobile phones, computers, and television, the Almajiri children were more familiar with television and mobile phones, and very few had used a computer. Based on the findings, we commenced work on a prototype multimedia enabled courseware in the Hausa and English language, using the television that is more familiar to the Almajiri children. Results from the evaluation of the courseware are in progress for publication.

The Sustainable Development Goals (SDGs) pay particular attention to ICT and development. Dunmade, Are, and **Mejabi** (2021) examined the role of ICTs in the actualisation of the Sustainable Development Goals (SDGs) in Nigeria. Ten of the 17 goals regarded as the basics for a developing country were analysed, in light of how ICTs can improve their actualisation. These were Goal 1 (No poverty) through to Goal 10 (Reducing inequality). The study identified the challenges to ICT adoption that exist within the Nigerian context in achieving each goal and proffered recommendations to mitigate the identified challenges. With respect to Goal 5, Gender equality, Dunmade and **Mejabi** (2009) noted that ICT reduces gender equality by increasing women's access to health, nutrition, education, training, employment, and even political participation, particularly for those who face social isolation. Therefore, **Mejabi** (2007) proposed complementary strategies for women empowerment using ICT, which included training women to take advantage of ICT-enabled opportunities and involving their families.

6. Open Data Research

My venture into Open Data Research came about from the University of Ilorin's subscription to Research Africa in late 2011. A call for proposals on *From Data to Development: Exploring the Emerging Impacts of Open Data in Developing Countries (ODDC)* was among some of the curated materials relevant to researchers in Africa on the Research Africa platform in August 2012. We responded to the call under the umbrella of the Unilorin Open Data Research Group and we were successful.

Subsequently, **Mejabi**, Azeez, Adedoyin and Oloyede (2014) investigated the use of the online national budget of

Nigeria, classifying the budget data published on the website of the Budget Office of the Federation as 'open data'. The research gathered evidence on six key ODDC research case study components and cut across diverse stakeholders from government officials to civil society and from the media to academic researchers. Vice-Chancellor, sir, the study generated a number of key findings, but I will only provide some highlights. The study revealed that:

(a) media and social media use of budget data can generate interest and engagement with budget issues spurred by the promulgation of the 2007 Fiscal Responsibility Act and enactment of Freedom of Information (FOI) Act in 2011;
(b) there are differences of opinion over the best data formats for open data with the Budget Office preferring to release the data as PDF while those who analyse the data prefer it in at least an Excel format;
(c) there is growing awareness of open data. Many respondents who became aware of open data in 2014 said they were part of the Open Data Roundtable organised by the Federal Ministry of Communication Technology and the World Bank in January 2014;
(d) license requirements for open data are unclear. The availability of Nigeria's budget data for re-use is not clear because of the copyright notice on the host website. Moreover, stakeholders often assume that data that is online, is open, and can be reused and re-distributed even when there is no explicit license such as the Creative Commons license; and
(e) budget data is widely used, but there is significant potential for greater use of *open* budget data. The study established that media professionals, civil society organisations and re-packagers like Budgit, Connected Development, and Centre for Social Justice, are the main intermediaries in the budget data flow in Nigeria.

As part of the open data research, the first hackathon was organised at the University of Ilorin to coincide with the 2014

International Open Data Hackathon Day, which took place on 22nd February, 2014. Also organised, was a research dissemination workshop for stakeholders at Abuja on 7th April, 2014, for 100 participants from government, media, civil society, professional associations, and independent experts. Winners of the Unilorin ODD Chackathon presented their budget data visualisation output at the workshop. A picture of members of the research team, our assigned mentor from Jamaica, and top government officials that attended the opening ceremony of the workshop, is shown in Figure 5. In the photograph, you can see Professor Oladele, the Deputy Vice-Chancellor (Research, Technology, and Innovation) at the time.

Figure 5: Participants at the Open Data Research Dissemination Workshop in Abuja, 7th April, 2014.

Mejabi, Azeez, Adedoyin and Oloyede (2017), explored the intersection of open data and freedom of information practice in Nigeria. The results showed that respondents who were aware of Nigeria's 2011 FOI Act was 70% and those aware of the open data concept were 55%. Furthermore, between civil society and the media, the proportion of those that invoked the FOI Act in order to obtain information from the government were more from civil society (64%) than the media (17%). Of the 30 government offices in the study, only 27% admitted to responding to FOI requests that came in. The study revealed that custodians of data or information were likely to seek ways to avoid meeting such requests.

By the end of the ODDC research, Budgit and Connected Development were no longer the only start-ups in the Nigeria open-budget data ecosystem. **Mejabi** and Walker (2016) conducted a study of eight (8) start-ups located in Lagos, Abuja, Benin, Uturu (Abia State), and Ogbomosho, towards developing a model of sustainability for open data motivated start-ups. We combined social enterprise and business sustainability theories to conceptualise a model that we validated with data collected from the start-ups. After analysis, we proposed the model of open data business sustainability shown in Figure 6. The influence that more established start-ups have on the positive outcome of external factors was however, not envisaged.

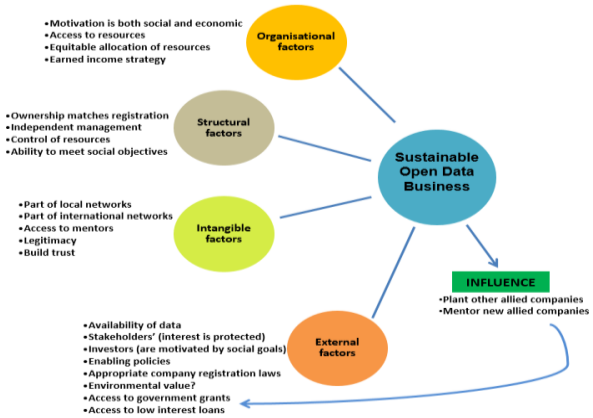

Figure 6: Model of open data business sustainability

Concerned about privacy issues of open data, **Mejabi**, *et al.* (2018) assessed the knowledge and attitude of individuals to privacy issues of open data. Respondents were asked about their attitude to open data, knowledge of data privacy, and privacy implementation techniques. Fifty-five percent (55%) of the respondents had previous knowledge of open data. The study revealed that while more than 50% of the respondents considered credit card details and medical records to be personal and a breach of privacy if open, only 16% felt that way about pictures.

Furthermore, respondents' preferred data security mechanism was anonymity (34%), aggregation (19%), policy-based solution (16%), and differential privacy and perturbation (11% each).

7. **Impact on the environment (e-waste and disposal issues)**

Vice-Chancellor, sir, the inventions that bring about the game changing effect of ICT are not without an impact on the environment through the generation of ICT waste. The term ICT waste is a component of the more general term, "electronic waste" or "e-waste" and results from obsolescence due to advancement in technology, changes in fashion, style, and status, and nearing the end of the product's useful life (Ramachandra & Saira, 2004; Parthasarathy, 2005). Curious about what people and organisations do with their obsolete or spoilt computer systems, handsets, VSAT dishes, printers and photocopying machines, **Mejabi** (2012) did a review of the subject. The study revealed that e-waste may also occur from equipment or devices becoming unserviceable and from used materials such as printer cartridges. Equipment, devices, and materials that contribute to such ICT waste include:

(a) Computers – servers, mainframes
(b) Monitors, including Televisions
(c) Scanners
(d) Printers, copiers, fax machines
(e) Cartridges for printers, copiers
(f) Storage devices - DVDs, CDs, floppies, tapes
(g) Audio & video devices
(h) networking & communications systems
(i) Cellular phones & pagers
(j) Components - chips, processors, motherboards, printed circuit boards.

Mejabi (2012) further provided insight into the improper disposal of e-waste and its toxicity. Improper ways of disposing ICT waste identified were:

(i) Land-filling (i.e. burying) which can cause environmental hazards arising from mercury,

cadmium, lead, etc., leaching into the soil and groundwater.

(ii) Incineration (i.e. burning) which can cause the emission of toxic fumes and gases, thereby polluting the surrounding air. Also leads to ozone depletion by the release of gases such as polychlorinated biphenyls (PCBs).

(iii) Dumping i.e. shipping from industrialised countries to developing countries which was quite commonplace in the late 1980s.

(iv) Recycling by unconventional or unsafe recycling methods.

(v) Storage (a "do nothing approach") which is common where there are no policies to guide the disposal of e-waste.

ICT equipment contain toxic substances such as lead and mercury, much of which enters the environment through the dumping, land-filling or incineration of disposed equipment (Yousif, 2009). In spite of this, **Mejabi** (2012) showed that unsafe recycling such as that depicted in Figure 7, of a youth at work trying to recover resources from e-waste, is quite common in Nigeria.

Figure 7: Unconventional resource recovery

In order to have empirical evidence of institutional e-waste management, **Mejabi** (2014) conducted a study comparing the two oldest Institutions in Ilorin – the University of Ilorin and the Kwara State Polytechnic. The choice of the Institutions was based on the premise that since both Institutions were established

in the 1970s, ICT products would have been purchased and disposed over the decades. E-waste considered included waste from ICT equipment, devices, and consumables as well as others such as refrigerators, televisions, and air conditioners. Since the study was an institutional one, all academic departments at Kwara State Polytechnic were selected as well as departments from closely related faculties at the University of Ilorin. The Stores department at both institutions were visited for additional information on methods of e-waste disposal. The study established that there were two main disposal methods used by both Institutions. These were to either store the unused equipment away in the department or send them to the Stores department.

Furthermore, at the Stores department of the Kwara State Polytechnic, **Mejabi** (2014) revealed that after receiving unserviceable goods from departments across the Polytechnic, an attempt was usually made to reuse some parts to repair others. This was the case for desktop computers, laptops, monitors (CRTs), flat screens (VCDs) and printers. Televisions, refrigerators, air conditioners, photocopiers, fax machines, and UPS were also for this purpose. In addition to reuse for other repairs, the Polytechnic periodically auctioned electronic equipment at its end of life. Nevertheless, most of the e-waste still remained in the warehouse of the Stores department.

On the other hand, **Mejabi** (2014) identified the following e-waste disposal methods at the University of Ilorin Stores department –

(a) Moved to another department or unit within the university that can still use the equipment
(b) Sold to the University staff at reduced price
(c) Donated
(d) Sold to other organisations/firms as second-hand equipment
(e) Auction of the equipment
(f) Recommending items for final disposal was done at the University of Ilorin through a 'Board of Survey' constituted by University Management

(g) Just as in the case of Kwara State Polytechnic, it was also found that despite the efforts at discarding the e-waste, most of it still remained stored in the various warehouses of the Stores department at the University of Ilorin.

Ramachandra and Saira (2004) observed that an estimated 75% of electronic items are stored due to uncertainty of how to manage them. Images of the equipment in the stores are shown in Figure 8 (from Kwara State Polytechnic) and Figure 9 (from University of Ilorin).

Figure 8: Photos of ICT waste waiting for disposal from Kwara Polytechnic store in 2014

Figure 9: Pictures of ICT waste waiting for disposal from the University of Ilorin store in 2014

Mejabi (2012), identified two strategies by which green disposal of e-waste could be achieved. One strategy was to practice green computing. Green computing has the goals of reducing the use of hazardous materials, maximising energy efficiency during the product's lifetime, and promoting the recyclability or biodegradability of defunct products and factory

waste. The second strategy was through policies that promote green disposal at the international level, such as the Basel Convention, or at the country level. At the country level, such policies or guidelines usually outline the responsibilities and roles of government, industries, and consumers (organisations and citizens). Regional policies are also influenced by non-governmental organisations such as the Council of European Professional Informatics Societies (CEPIS), which works at promoting the ideas of Green ICT among its members in order to contribute to the environment's protection.

Mejabi (2014) further revealed from the study of e-waste management at the Kwara State Polytechnic and the University of Ilorin, that the main source for acquiring electrical and electronics equipment at both institutions was from retail outlets and stores. This has implications for green disposal at end-of-life, as retailers in Nigeria are not known to offer reuse or recycling options such as trading-in the old for a new one. On 16thApril, 2024, Governor Soludo announced the procurement of 2,000 laptops for teachers in Anambra State. While this is a laudable step and potentially a game-changer for the teachers and for ICT infusion into the teaching and learning experience in the state, it would be good if the laptops are procured from a seller who will collect the 2,000 computers in three years, and supply new ones at an additional marginal cost.

Award of Project and Research Grants

Vice-Chancellor, sir, below is a list of grants for project or research that I have been involved with as either lead or member:

1. **Mejabi, O. V.,** (Principal Investigator), Co-Researchers: Faruk, N., Fahm, A. O., Azeez, A.L., Imam-Fulani, Y. O., Abdulrahaman, M.D., Olawoyin, L.A., Oloyede, A. A., & Surajudeen-Bakinde, N. T. (2017). 2016-2017 intervention research grant of Institutional-Based Research Fund (IBRF) by the Tertiary Education Trust Fund (TETFund) on the research "ICT enabled model for Al-Majiri Education in Nigeria"

(Research theme of Unilorin ICT in Education and Research group). Grant amount of N1,530,000.00.

2. Adedokun-Shittu, N.A. (Principal Investigator), Co-Researchers: **Mejabi, O. V.**, Yusuf, M. O., Olasehinde-Williams, F. A. O., Akindele-AbdulRaheem, M. (2017). 2016-2017 intervention research grant of Institutional-Based Research Fund (IBRF) by the Tertiary Education Trust Fund (TETFund) on the research application "Contextualizing the Teaching of Sciences: Exploring Local Culture and Tradition". Grant amount of N680,000.00

3, **Mejabi, O. V.,** & Walker, J. (Co-Researcher from Southampton University, UK). (2016). Grant from the World Wide Web Foundation for the research "Towards a Model of Sustainability for Open Data Motivated Start-Ups". Grant amount of US$7,000.

4. **Mejabi, O. V.,** (Principal Investigator), Co-Researchers: Azeez, A. L., Adedoyin, A., & Oloyede, M. O. (2013). Grant from the World Wide Web Foundation and IDRC, Canada, as part of the global research on *From Data to Development: Exploring the Emerging Impacts of Open Data in Developing Countries (ODDC).*The grant was awarded for "Investigation of the use of the Online National Budget of Nigeria". Grant amount of US$56,562.50.

5. Ayorinde, K. L. (Team Leader), Members: Mokuolu, O. A., Adimula, I. A., Yusuf, M. O., **Mejabi, O. V.,** Opadiji, J., & Akande, O. H. (2012). World Bank Assisted STEP-B Project Grant for Upgrading of ICT Infrastructure and Fibre Optics Network, University of Ilorin. Grant amount of US$750,000.00.

6, Ehikhamenor, F. A. (Principal Investigator), Co-Researchers: **Mejabi, O. V.,** Oyekunle, R. A., Bello, O., Balogun, N. & Afolayan, T. O. (2010). University of Ilorin Senate Research Grant for research on "Assessing the State of ICT Facilities and Infrastructure in Selected Rural Communities of Kwara State". Grant amount of ₦420,000.00

Other Professional and Administrative Contributions

Vice-Chancellor, sir, my contributions in the use of ICT to achieve game-changing systems in the University of Ilorin spans the period of my employment. Some of these include the introduction of computerised ID card, and applying computing and management techniques in the data processing of Post-UTME screening tests conducted with paper and pencil and later with CBT.

I have been member of various committees tasked with ICT-enabled reform in the University, such as the committee on University Library computerisation, University website management, development of a web-based student information system, and campus networking. Over time, these committees evolved, sometimes as new committees, as the need to step up to the latest technology emerged.

On administrative contributions, I have served as Chairman or Secretary of several University committees. In 1992, I was assigned from the Unilorin Computer Centre to lead the newly established MIS Unit and from 2011 to 2014, I was Ag. Head of my present Department. University Management thought it fit to appoint me Ag. Dean of the Faculty of Communication and Information Sciences, serving as the Foundation Dean from July 2008 to July 2009. In these three roles, I led in their formative periods. Briefly, in 2020, I was Director of the Computer Services and Information Technology (COMSIT) Directorate.

Conclusion

Mr. Vice-Chancellor, advancements in technology and communication, particularly web-based and mobile solutions, have shrunk geographical distance by fostering cultural exchange, economic integration, and shared challenges.ICT, when creatively adopted and strategically implemented, emerges as a game-changer for individuals and organisations. Web-based platforms provide crucial tools for collaboration, online market places, crowdsourcing, and global awareness and movements for social change. ICT can empower rural dwellers, women and girls, and the Almajiri through better access to information and education facilities to participate actively in society, improve their livelihoods, and advocate for their rights. Applications of ICT have also sparked a wave of innovations within institutions and enterprises. From the rise of 5G networks to the explosion of mobile applications, collaborative platforms and artificial intelligence, these advancements have revolutionised how organisations operate and fostered increased efficiency, boosted productivity, and opened doors to entirely new business models.

The metaphor that the world is a global village, therefore, captures the interconnectedness and interdependence of the modern world. Resultant challenges include the rapid spread of misinformation, violation of privacy, cyber threats as well as inadequate management of obsolete ICT equipment and devices within households and institutions.

I will, therefore, continue to explore the ***Game Changer of ICT*** by aligning my research to focus on the use of the technology to empower individuals and provide strategic advantage for organisations. Narrowing the digital divide, giving support to the introduction of low-cost computerised POS to the small and medium retail enterprises in Nigeria, as well as responsible e-waste management, are specific areas of my future research plans.

Recommendations

Reflecting on my varied experiences from research and practice, I hereby make the following recommendations to maximise the impact and the transformative potential of Information and Communication Technology (ICT) as a game changer and driver of inclusive growth, innovation, and societal progress.

1. Governments and organisations should prioritise investment in digital infrastructure, including broadband networks and cybersecurity measures, to ensure widespread access to reliable and secure ICT services.
2. Initiatives aimed at promoting digital literacy should be implemented at all levels of education and across various demographics to empower individuals with the skills needed to effectively navigate and utilize ICT tools and platforms.
3. ICT solutions should be designed with inclusivity in mind, considering the diverse needs and capabilities of users. This includes designing accessible interfaces, providing multiple language options, and ensuring compatibility with assistive technologies for users with disabilities.
4. Governments at all levels should invest more in cost-effective training and ICT tools required to overcome inadequate ICT infrastructure and lack of digital skills among teachers and students at all levels of education in Nigeria.
5. Policymakers should develop and enforce ethical guidelines and regulations to govern the responsible development, deployment, and use of ICT technologies. This includes measures to address data privacy, cybersecurity, and algorithmic bias. ICT-related curricula and professional development programmes should incorporate ethical behaviour.
6. There should be continued investment in research and development is critical for driving ICT innovation and maintaining global competitiveness while funding

should be allocated to support research initiatives in ICT that demonstrate transformative potential.

7. Engaging communities in the design and implementation of ICT initiatives is necessary to foster a sense of ownership that will ensure that solutions are responsive to local needs and priorities. Community participation can also help bridge the digital divide by addressing barriers to access and usage.
8. The regular for monitoring and evaluation of ICT initiatives cannot be overemphasised. This is essential for assessing their impact, identifying areas for improvement, and ensuring accountability. By actively involving stakeholders in the development and implementation of ICT initiatives, policymakers can ensure that technological solutions align with the needs, preferences, and capabilities of the intended users. This can enhance adoption rates and mitigate resistance to change.
9. Organisations should adopt sustainable ICT practices to minimise environmental impact and promote resource efficiency. This includes measures such as energy-efficient computing, electronic waste recycling, and responsible sourcing of materials for ICT hardware.
10. Researchers from Africa, particularly Nigeria, should aim to have all of their publications available on the web, without violating publisher copyrights.
11. There should be effective collaboration between the public and private sectors in driving ICT innovation and expanding access to technology solutions. Public-private partnerships can facilitate the development of ICT infrastructure, promote digital skills training, and support technology start-ups and SMEs.
12. Given the global nature of ICT, international cooperation and collaboration are vital for addressing cross-border challenges and harnessing the full potential of technology for sustainable development. Multilateral partnerships can facilitate knowledge sharing, capacity building, and technology transfer among nations.

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Today, the Lord has made it possible for me to deliver the 258th Inaugural Lecture of the University of Ilorin, titled: "***Game Changer of ICT"***. However, I want to state unequivocally that the Lord God, Almighty, is the ultimate Game Changer. Whenever He steps into a situation, He turns the table around and changes the outcome for good. *The Holy Bible* is overflowing with stories of such game changing circumstances. My walk with God in my personal life and my career is resplendent with God's game changing touch. To God be the Glory.

Vice-Chancellor, sir, distinguished ladies and gentlemen, I am sincerely grateful to all who have honoured the invitation to attend this lecture from far and near, physically or virtually. It is my prayer that God will grant all who have to journey back to base, journey mercies.

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