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E-Governance and Public Service Delivery: Evidence from Nigeria

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Abstract: Globally, e-governance enhances public service delivery by leveraging digital platforms such as online portals, mobile apps, and social media to make services more citizen-focused and efficient. However, limited digital literacy, low Internet penetration, and inadequate mobile network coverage hinder effective service delivery. These challenges inspired this study to investigate the effect of e-governance on public service delivery in Nigeria. This study employed a survey research design with data primarily sourced using structured questionnaires based on the Likert scale. The study population comprises public servants, members of the public, and most lecturers and students of tertiary institutions. The Ordered Logistic Regression (OLR) model was used to estimate the data. The results showed that digital literacy among public servants, digital literacy among citizens, Internet penetration rate, and mobile network coverage have significant positive effects on public service delivery. The study, therefore, concluded that e-governance affects public service delivery in Nigeria. Hence, the study recommended that the Federal Government of Nigeria should design mandatory training programs for public servants focused on e-governance skills, include citizens in digital literacy campaigns through schools, and ensure digital platforms are user-friendly and available in multiple local languages.

Keywords: E-Governance, Public Service Delivery, Digital Divide, Ordered Logistic Regression model, Nigeria

JEL Classification: M4, M41, M48

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1. INTRODUCTION

The rise of technology in the 21st century has brought significant advancements in the use of Information and Communication Technologies (ICTs) in the public sector, including e-governance systems, which aimed at making public services more efficient and inclusive. Like many countries, Nigeria has adopted e-governance to improve public service delivery (Rahim et al., 2017). Governments worldwide have also implemented policies to reform the public sector by restructuring systems and processes to deliver better services and improve citizens' quality of life (Ogu & Chukwurah, 2023; Ajibade et al., 2017).

Public service is the backbone of governance, created to provide essential services like security, water, electricity, healthcare, education, transportation, and municipal services most effectively. Abah and Nwokwu (2019) explain that e-governance helps governments deliver services more effectively, adapt to changing needs, and focus on the people they serve. It connects the public and private sectors, making services more centered on citizens and run like businesses. Through digital tools like online forums, mobile apps, and social media, people can share their views, give feedback, and participate in real-time policy discussions (Ugwu et al., 2024; Adeolu-Akande et al., 2023). The United Nations e-Government Survey (2020) emphasizes the importance of e-governance in enhancing digital literacy, reducing bureaucracy, promoting transparency, efficiency, and citizen engagement, and supplying people with information about government actions, budgets, expenses, and overall performance.

Across Africa, e-governance adoption is gaining traction and has the potential to drive socio-economic development owing to improved access to Internet services and mobile network coverage. The African Union's Digital Transformation Strategy for Africa (2020-2030) envisions using ICT to prioritize service delivery initiatives, allocate resources more effectively, improve service delivery, and foster inclusive growth (African Union, 2020). Rwanda and Kenya are leading examples. Rwanda's Irembo platform offers over 100 public services online, improving access and reducing corruption (Mugisha & Mukama, 2018). Kenya's e-Citizen portal has streamlined service delivery by providing a one-stop shop for government services (Isah et al., 2024; Ndemo & Weiss, 2017).

In Nigeria, e-governance is increasingly recognized as essential for improving public sector efficiency and transparency. The Federal Government launched the National e-Government Master Plan in 2015 to enhance service delivery and promote good governance. Initiatives like E-Nigeria use ICT to link communities, schools, and government agencies. Other projects include the Public Service Network and the Wire Nigeria initiative. Nigeria has made progress in building its digital infrastructure within the telecommunications sector, led by MTN Nigeria, Globacom, Airtel Networks, and 9mobile, which have developed 4G/LTE networks for faster data speeds and better connectivity (Ogbuagu & Oguejiofor, 2018). However, challenges such as inadequate ICT infrastructure, low digital literacy, digital divide, and resistance to change hinder implementations (Ugwu et al., 2024; Bada et al., 2019).

The government has also introduced digital platforms like the National Identity Management Commission (NIMC) portal for citizen registration, the Federal Inland Revenue Service (FIRS) portal for tax payment, and online portals for vehicle registration and permits. However, public service delivery in Nigeria still faces problems such as poor infrastructure, expensive internet data, and a wide gap between people who can access digital technology and those who cannot (Aimuan & Aigbe, 2019).

Moreover, limited digital skills among public servants and citizens create further challenges for e-governance in Nigeria. Despite these difficulties, digital communication can significantly improve public services. It allows citizens to access government services online, increases transparency, and enhances accountability through real-time monitoring and evaluation (Nwosu et al., 2024; Ogbuagu & Oguejiofor, 2018; Oguntola & Oyetunji, 2017). Addressing these challenges is essential to unlocking the full benefits of e-governance in Nigeria.

Nigeria is behind many developed countries in adopting e-governance. According to the United Nations E-Governance Survey Report (2020), Nigeria ranked 143rd out of 193 countries in 2018 and slightly improved to 141st in 2020. This shows slow progress toward full e-governance. Many government agencies in Nigeria still rely on fundamental or limited services, like simple websites, instead of advanced and fully integrated e-governance systems (Adeolu-Akande et al., 2023).

E-governance offers excellent opportunities for Nigeria to modernize, reduce costs, and empower citizens. However, it also comes with challenges, such as unequal access to technology, concerns about data security, and the need for more training and capacity building (Aderonmu, Owolabi, & Iyiola, 2019). Overcoming these challenges is essential for Nigeria to make the most of e-governance and improve public service delivery. Thus, this study anchors on the following objectives: determine how digital literacy among public servants affects public service delivery; evaluate the effect of digital literacy among citizens on public service delivery; examine how Internet penetration rate affects public service delivery; and assess the impact of Mobile network coverage on public service delivery.

2. LITERATURE REVIEW

E-governance involves using electronic devices to provide public services. It consists of using Information and Communication Technology (ICT) and computer networks to make government services more efficient and effective, to encourage citizen participation, and to strengthen the relationship between governments and the public. Thabit and Yaser (2019) defined it as using electronic tools to manage government activities ethically, transparently, and effectively to achieve set goals. Lawan and Muhammad (2018) stated that e-governance transforms how governments function, involve citizens, share information, and provide services. It includes systems like e-tax, e-registration, and e-payment. E-governance also uses Internet technology to exchange information and improve transactions between citizens and government agencies. E-governance is an innovative approach that uses digital technologies to make government services more efficient, transparent, and accessible (Abah & Nwokuwu, 2019).

Public service delivery refers to the processes and mechanisms through which government agencies and public institutions provide goods, services, and benefits to citizens, businesses, and other societal stakeholders. Efficient service delivery reflects the success of government agencies in achieving their goals and meeting citizens' needs. The public service is the backbone of any country, ensuring that government policies and programs are directly or indirectly carried out effectively (Igbokwe-Ibeto & Osakede, 2023). Direct services include producing and distributing goods and services, while indirect services involve funding third parties to deliver services.

Advancements in Information and Communication Technology (ICT) have made it possible to bring service delivery centers closer to citizens. However, Nigeria's low governance quality rankings often highlight poor public service delivery issues. Many government agencies still use outdated, manual methods to provide services. In contrast, countries like the United States, Germany, Britain, Australia, and Canada excel in public service delivery. These nations have flexible and decentralized administrative systems that focus on customer satisfaction and adopt more modern, adaptable governance approaches. This enables them to meet the needs of their citizens more effectively, even in changing environments (Isah et al., 2024).

2.1 Digital Divide Theory

This study is anchored on digital divide theory which explains the disparities in access to, use of, and benefits derived from digital technologies among different groups, such as between urban and rural populations, high- and low-income households, or different educational levels. It focuses on the inequalities that emerge due to varying levels of digital literacy, internet penetration, and access to supporting infrastructure like mobile network coverage. Mark Warschauer propounded the digital divide theory in the 1990s. This theory focuses on how these inequalities affect individuals and groups differently, often leading to socio-economic and regional gaps. This theory is particularly relevant in e-governance, where digital literacy, internet accessibility, and mobile network infrastructure are crucial in ensuring efficient and inclusive public service delivery.

2.2 Empirical Review

Ajibade, Ibietan, and Ayelabola (2017) studied how e-governance affects public service delivery in Nigeria using the Technology Acceptance Model. Their research showed that some challenges prevent the successful adoption and use of e-governance, which limits the quality of services provided by public sector organizations. They concluded that addressing these challenges is essential for improving public service delivery.

Rahim, Akintunde, Oguntoyinbo, Obanla, and Aremu (2017) explored how e-governance, supported by information and communication technology (ICT), can improve public service delivery in Nigeria through a review of existing studies. They emphasized that e-governance is not just about having government websites online. Instead, it involves reorganizing the government's administrative processes to make it more transparent and focused on providing better services.

Using regression analysis, Akpan, Dung, and Ibegbulam (2020) studied how e-governance affects public service delivery in Southeast Nigeria, focusing on the National Youth Service Corps (NYSC). The results showed that e-administration significantly impacts public service delivery, as it improves job performance in the NYSC office, helps achieve organizational goals, and connects the government with the outside world, increasing citizen participation. Additionally, e-registration is crucial in enhancing public service delivery by eliminating duplicate entries of Corps members, promoting transparency and accountability, and reducing the long waiting times at the NYSC office for registration.

Ofoma (2021) studied the digital tools and technologies used by MDAs in Nigeria to provide services to citizens using an analytical approach. The study found that before digital technologies were introduced, public service delivery in Nigeria was poor,

ineffective, and inefficient. The study recommended continuing digital processes in public service but highlighted the need to reduce the digital gap among citizens. This can be done through policies to expand public networks and public-private partnerships to train citizens, especially in rural areas, to use digital technologies.

Ogu and Chukwurah (2023) examined how e-governance delivers public services in Anambra State, Nigeria, from 2018 to 2022. They used a questionnaire to gather information and analyzed the data using basic statistics like percentages and averages. The study found that the Civil Service in Anambra State often uses e-governance to provide services. It also showed that e-governance has improved public service delivery in the state.

Adeolu-Akande, Oyedokun, and Oyedokun (2023) aimed to determine Nigeria's global ranking and identify the challenges hindering the effective implementation of e-governance in the public sector. Using a conceptual and empirical research approach focused on secondary data, the study found that Nigeria ranked 5th in West Africa and 141st globally on the UN EDGI 2020. The challenges facing e-governance in Nigeria include unreliable power supply, insufficient infrastructure, the digital divide, corruption in public office, budgeting and financial constraints, and a lack of human expertise.

Alazigha and Amanawa (2024) explored the challenges and opportunities of digital communication in improving public service delivery in modern Nigeria, using a mixed-methods approach that combined quantitative and qualitative data from surveys of citizens, government agencies, and private sector organizations. The findings showed that while digital communication has the potential to enhance public service delivery, it is crucial to overcome the challenges hindering its practical use. Key challenges include a lack of digital literacy among citizens, the spread of misinformation via social media, and cybersecurity threats to government data and services. However, the study also highlighted opportunities, such as greater transparency and accountability, improved collaboration between government agencies and the private sector, and better citizen engagement.

Nwosu, Obalum, and Ananti (2024) examined using artificial intelligence (AI) in Nigeria's public service, looking at its benefits, challenges, and steps to improve governance and service delivery. The study, which used a thematic research approach and content analysis, found that AI is still in its early stages in Nigeria's public service. However, there have been positive developments in e-governance, banking, law enforcement, healthcare, and real estate. The study emphasizes the need for the Nigerian government to invest in infrastructure and human capital development to close skill gaps, address infrastructure challenges, and overcome the lack of awareness about AI in the country's technological progress.

Past studies on e-governance and public service delivery, such as those by Alazigha and Amanawa (2024) and Ogu and Chukwurah (2023), have used descriptive methods like frequency tables and percentages. Others, including Nwosu et al. (2024), Adeolu-Akande et al. (2023), and Rahim et al. (2017), relied on literature reviews and content analysis. Although these methods provide valuable information about patterns and trends, they do not offer an in-depth analysis to explore relationships between key variables or predict outcomes. However, this study uses ordered logistic regression (OLR) to analyze data, which helps to examine ordered dependent variables. OLR can provide a clearer

understanding of the chances of specific results based on changes in the independent variables.

3. METHODOLOGY

A simple Ordered Logistic Regression (OLR) model is used for this study.

$$PSDL = f(DLPS, DLCN, IPRA, MNCO) \tag{1}$$

Where PSDL represents public service delivery, DLPS represents digital literacy among public servants, DLCN represents digital literacy among citizens, IPRA represents Internet penetration rate, and MNCO represents Mobile network coverage. To explore how these variables affect public service delivery, the Ordered Logistic regression model can be expressed as:

$$\text{logit}(P(Y = j)) = \alpha_j + \beta_1 DLPS + \beta_2 DLCN + \beta_3 IPRA + \beta_4 MNCO$$

Where; $P(Y = j)$ is the cumulative probability of the response variable YY (public service delivery) being in category j or lower; α_j represents the cut-off points for the j -th category; β_{1-4} are the coefficients of the explanatory variables; DLPS, DLCN, IPRA, MNCO, respectively, showing their effect on the log odds of being in a higher category of public service delivery.

This study used a survey research design to evaluate the effect of e-governance on public service delivery in Nigeria. The data for this study were gathered mainly through structured questionnaires based on the Likert scale. These questionnaires were administered to members of the public, most of whom are students of tertiary institutions and public servants, most of whom are lecturers of tertiary institutions. Two hundred ninety-five questionnaires were given out, and 193 were filled out and returned, giving the needed information for the study. The questionnaire had two parts. Part A asked for personal details, while Part B had questions 1 to 5 with the answers: Strongly Agree, Agree, Undecided, Disagree, and Strongly Disagree.

Table1. Distribution of Respondents

Constructs	Items	Frequency	Percentage (%)
Respondents	Public servants	86	44.56
	Members of the public	107	55.44
Gender	Male	99	51.30
	Female	94	48.70
Age Group	18-29 years"	71	36.79
	30-39 years"	64	33.16
	40-49 years"	37	19.17
	50 and above"	21	10.88
TOTAL		193	100.00

4. DATA ANALYSIS AND DISCUSSION OF FINDINGS

4.1 Reliability of Variables

The reliability of the variables was checked using the internal consistency method, following the guidelines by Avkiran and Ringle (2018) to make sure the measurement model was strong. Internal consistency reliability checks how consistent the items are when measuring the same thing. A common way to measure this is by using Cronbach's Alpha.

Cronbach's Alpha values are usually between 0.6 and 0.9, with higher values meaning stronger reliability. Values between 0.7 and 0.9 are considered good, while values between 0.6 and 0.7 are acceptable (Hair et al., 2022). If the value is over 0.9, especially above 0.95, it might mean that some items are repetitive, which could lower the reliability. The test showed that Cronbach's Alpha values met the required standards. As shown in Table 3, the values ranged from 0.843 to 0.942, showing good to excellent reliability for the variables tested.

Table 2. Internal Consistency Reliability

	Cronbach's Alpha	rho_A
Digital literacy among public servants	0.942	0.958
Digital literacy among citizens	0.843	0.893
Internet penetration rate	0.899	0.909
Mobile network coverage	0.931	0.951

4.2 Normality Test

A normality test is used to determine whether a dataset follows a normal distribution, also known as a Gaussian distribution. This type of distribution is characterized by a symmetrical, bell-shaped curve where the mean, median, and mode all coincide at the center.

Table 3. Normality Test Result

H₀: "Data are drawn from a normally distributed population"

Shapiro-Wilk Statistic	Df	Sig.
0.854	68	0.0811

The Shapiro-Wilk test and the p-values from the models were used to check if the data is normally distributed. The Shapiro-Wilk statistic was 0.854, and the p-value from the model was 0.0811. Since the p-value is higher than 0.05, there is not enough evidence to say that the error term is not normally distributed. So, the data is considered to be normally distributed.

4.3 Ordered Logistic Regression (OLR)

Ordered Logistic Regression (OLR) is a useful method for analyzing data collected directly from sources. It is strong enough to handle situations where the data may not follow a normal distribution or is skewed. This makes it effective in providing accurate and consistent results, even when working with smaller sample sizes.

Table 4. Ordered Logistic Regression Estimates

Variables	Coefficients	Odds ratio	P>Z	Marginal effects (dy/dx)
Digital literacy among public servants	0.1076	1.9262	0.0073	1.7007
Digital literacy among Citizens	0.0058	1.3829	0.0037	1.4862
Internet penetration rate	0.6331	0.8823	0.0009	0.1841
Mobile network coverage	0.0780	1.1791	0.0101	0.3379
P-LR Chi-Square	0.0000			
Pseudo R-Square	0.8195			

The findings showed that e-governance has a significant effect on public service delivery in Nigeria. A summary of the study's results is shown in Table 5.

Table 5. Summary of Findings

Hypothesis	Description	Remark
H ₀₁	Digital literacy among public servants does not significantly affect public service delivery	Reject
H ₀₂	Digital literacy among Citizens does not significantly affect public service delivery	Reject
H ₀₃	Internet penetration rate does not significantly affect public service delivery	Reject
H ₀₄	Mobile network coverage does not significantly affect public service delivery	Reject

4.4 Coefficient of Determination (R²)

It is recommended to use the coefficient of determination (R²) to assess how well a model fits the data. This helps to understand how much the changes in the explanatory variables account for the changes in the dependent variable. In line with this suggestion, this study evaluated R² to determine how much e-governance explains public service delivery.

Table 6. Coefficient of Determination (R²)

	R ²	Adjusted R ²
Operational Performance	0.8195	0.7914

According to the results in Table 6, the independent variables studied explained about 81.95% of the variation in public service delivery. This means that 18.05% of the variation is due to other factors not covered in this study. It is important to note that R² values are classified differently in the literature, with 75% considered strong, 50% moderate, and 25% weak.

The results of the OLR were presented in Table 4. The results revealed that digital literacy among public servants has a significant positive effect on public service delivery, implying that as the digital literacy of public servants improves through training, or on-the-job exposure to technology, the performance of public service delivery also improves in terms of faster service delivery times and more accurate handling of requests. Thus, the ability of public servants to effectively use digital tools and technology has a direct and beneficial effect on the quality, efficiency, and accessibility of the services they provide to the public.

Similarly, the result showed that citizens' digital literacy significantly positively affects public service delivery, implying that as citizens' digital literacy increases, their ability to access and use online public services improves. Citizens who can effectively use digital tools and e-governance platforms such as portals for tax filing, healthcare services, or application submissions can better engage with e-governance services, thereby improving the accessibility, efficiency, and responsiveness of public service delivery systems. Thus, the overall efficiency of public service delivery improves because fewer errors and delays occur in citizen-government interactions.

Likewise, the results showed that the Internet penetration rate has a significant positive effect on public service delivery, suggesting that the rate at which Internet services are accessible to the population directly enhances the quality and efficiency of public service delivery. As Internet penetration increases, public institutions can deliver services more efficiently using digital platforms, and more citizens can use online platforms to access services such as tax filing, healthcare appointments, and e-governance tools. This, in turn, leads to improved communication between citizens and the government, thereby fostering transparency and responsiveness.

Finally, the results showed that mobile network coverage has a significant positive effect on public service delivery, indicating that as mobile network coverage expands, more citizens can access public services through mobile-enabled platforms such as mobile apps, SMS services, or USSD codes, and government agencies can effectively deliver services to regions previously unreachable due to poor connectivity. When mobile networks cover more areas, incredibly remote and underserved regions, citizens gain better access to e-governance platforms and services. As a result, communication between citizens and public servants becomes more efficient, fostering quicker responses to service requests. Moreover, increased mobile network coverage bridges the gap between urban and rural populations, ensuring equitable access to services. As such, mobile networks enable citizens to access public services such as healthcare appointments, educational resources, and financial transactions in areas with limited physical infrastructure.

Overall, the Pseudo R^2 of 81.95% implies that 81.95% of changes in public service delivery are explained by digital literacy among public servants and citizens, Internet penetration rate, and mobile network coverage. The Likelihood Ratio (P-LR) Chi-Square of 0.0000 showed that digital literacy among public servants and citizens, Internet penetration rate, and mobile network coverage significantly improve the prediction of public service delivery. Based on this result, digital literacy among public servants and citizens, Internet penetration rate, and mobile network coverage are essential predictors of public service delivery in Nigeria. They should be included in the model for further interpretation and policymaking.

5. CONCLUSION AND RECOMMENDATIONS

Based on these findings, the study concluded that e-governance affects public service delivery. Therefore, the study recommended that the Federal Government of Nigeria should design mandatory training programs for public servants focused on e-governance skills and effective use of digital tools; include citizens in digital literacy campaigns through schools, community centers, and public service announcements; ensure digital platforms are user-friendly and available in multiple local languages to accommodate diverse

populations; and provide support centers or helplines to assist citizens struggling with digital platforms.

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