

Effect of Data Communication Technologies on Public Service Delivery

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Abstract

The study examined the effect of data communication technologies on public service delivery. Specifically, the study seeks to: examine the effect of internet connectivity on public service delivery; determine the influence of electronic data management systems on public service delivery; assess the effect of mobile communication technologies on public service delivery; examine the relationship between cloud computing technology and public service delivery; evaluate the contribution of cybersecurity and data protection systems to effective public service delivery. This study adopted a conceptual review method. Based on the conceptual review, the findings revealed thus: Internet connectivity has a positive effect on public service delivery. Electronic data management systems have a positive effect on public service delivery. Mobile communication technologies have a positive effect on public service delivery. Cloud computing technology has a positive effect on public service delivery. Cybersecurity and data protection systems have a positive effect on public service delivery. The study recommended that the government should invest in reliable internet infrastructure to improve connectivity and ensure that digital public services are accessible to citizens across urban and rural areas. Government agencies should expand mobile-based service platforms to improve citizen engagement and provide convenient access to public services.

Keywords: *Data communication technologies, internet connectivity, electronic data management systems, mobile communication, cloud computing, cybersecurity, data protection systems, public service delivery.*

Introduction

Data communication technologies (DCTs) have become a significant driver of transformation in public sector management by improving the way government institutions communicate, process information, and deliver services to citizens. These technologies, which include internet-based communication systems, electronic databases, mobile platforms, and digital information-sharing networks, have enhanced the speed, accuracy, and accessibility of public services. The increasing adoption of digital technologies has enabled public organizations to move from traditional bureaucratic processes toward more efficient and citizen-oriented service delivery models (Mensah & Adams, 2023). Through improved communication channels, government agencies can

coordinate activities effectively, respond quickly to citizens' needs, and enhance transparency in administrative operations. The application of data communication technologies has become particularly important in developing countries such as Nigeria, where public institutions continue to face challenges related to delays, poor coordination, and limited access to government services. Digital communication systems provide opportunities for improving service delivery in areas such as healthcare, education, taxation, public procurement, and social welfare by enabling faster data exchange and real-time access to information. According to Eze, Nwankwo, and Okeke (2024), the integration of digital platforms in public administration strengthens institutional efficiency by reducing administrative bottlenecks and improving the quality of services provided to citizens. Similarly, Adeyemi and Adebayo (2023) noted that technology-enabled communication enhances accountability and promotes greater citizen participation in governance processes.

Statement of the problem

Despite the numerous benefits associated with data communication technologies, their impact on public service delivery is influenced by several challenges, including inadequate digital infrastructure, cybersecurity concerns, poor internet connectivity, and insufficient digital skills among public sector employees. These limitations can reduce the effectiveness of technology-driven reforms and prevent government institutions from fully realizing the benefits of digital transformation (Ogunleye & Bello, 2023). Therefore, investigating the effect of data communication technologies on public service delivery is essential for understanding how digital innovations can be effectively utilized to improve efficiency, responsiveness, and citizen satisfaction within public sector organizations. Despite the growing adoption of data communication technologies in public institutions, public service delivery in many developing countries, including Nigeria, continues to experience challenges such as delays in service processes, poor information flow, limited accessibility, and inadequate responsiveness to citizens' needs. Many government agencies still rely on traditional administrative systems characterized by manual procedures, weak coordination, and inefficient data management, which hinder effective service delivery. Although data communication technologies have the potential to improve transparency, efficiency, and accessibility of public services, their actual impact remains constrained by factors such as poor digital infrastructure, cybersecurity threats, and limited technological capacity among public sector workers. This creates a need to empirically examine the extent to which data communication technologies influence public service delivery and determine how their effective utilization can enhance the performance of public institutions.

Objectives of the study

The main objective of this study is to examine the effect of data communication technologies on public service delivery. Specifically, the study seeks to:

1. Examine the effect of internet connectivity on public service delivery.
2. Determine the influence of electronic data management systems on public service delivery.
3. Assess the effect of mobile communication technologies on public service delivery.
4. Examine the relationship between cloud computing technology and public service delivery.
5. Evaluate the contribution of cybersecurity and data protection systems to effective public service delivery.

Theoretical framework

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) was developed by Davis (1989) and explains the factors that influence individuals' acceptance and usage of new technologies. The theory suggests that technology adoption is mainly determined by two major factors: perceived usefulness and perceived ease of use. Perceived usefulness refers to the extent to which users adopt technology that will improve their job performance, while perceived ease of use relates to the degree to which users believe that the technology requires minimal effort to operate. In the context of public service delivery, TAM explains how government employees' and citizens' acceptance of data communication technologies influences the effectiveness of digital public services. When public sector workers perceive technologies such as electronic data management systems, mobile communication platforms, and cloud-based systems as useful and easy to operate, they are more likely to adopt and utilize them effectively. Consequently, increased technology acceptance can lead to improved efficiency, faster service delivery, enhanced transparency, and better citizen satisfaction (Venkatesh & Bala, 2021). The relevance of TAM to this study lies in its ability to explain that the availability of data communication technologies alone does not guarantee improved public service delivery; rather, successful outcomes depend on users' willingness and ability to accept and utilize these technologies effectively.

Diffusion of Innovation (DOI) Theory

The Diffusion of Innovation Theory was developed by Rogers (2003) to explain how new ideas, technologies, and innovations spread and become adopted within a social system. The theory identifies five major attributes that influence innovation adoption: relative advantage, compatibility, complexity, trialability, and observability. Relative advantage refers to the perceived benefits of an innovation compared with existing methods, while compatibility reflects how well the innovation aligns with existing organizational practices. Applied to this study, DOI explains how public institutions adopt data communication technologies as innovative tools for improving service delivery. Technologies such as internet connectivity systems, electronic records management, cloud computing, and cybersecurity solutions are adopted when public organizations recognize their ability to enhance administrative efficiency and provide better services to citizens. The theory further suggests that successful technology diffusion depends on institutional readiness, employee skills, infrastructure availability, and supportive government policies (Rogers et al., 2022). The Technology Acceptance Model explains the behavioural factors influencing the adoption and effective use of data communication technologies by public sector employees and citizens, while the Diffusion of Innovation Theory explains the broader process through which these technologies are introduced and integrated into public institutions. Together, the theories provide a strong foundation for examining how data communication technologies influence public service delivery by linking technological adoption, organizational utilization, and improved service outcomes.

Literature Review

Internet Connectivity

Internet connectivity represents the foundation upon which modern digital public services are developed. Reliable internet infrastructure enables government institutions to exchange information, operate online platforms, and provide citizens with faster access to public services. The availability of high-speed internet improves communication between government departments

and reduces delays associated with traditional administrative procedures. According to Latupeirissa et al. (2024), digital transformation initiatives in the public sector depend largely on effective connectivity infrastructure because it determines citizens' ability to access electronic government services. Similarly, Shibambu (2024) noted that improved digital connectivity enhances efficiency, accountability, and transparency in public administration by supporting real-time communication and information sharing. In Nigeria, inadequate internet infrastructure remains a major barrier to effective digital public service delivery. Many government institutions experience challenges such as unstable network coverage, high operational costs, and unequal access to digital services, particularly among citizens in rural communities. Alazigha and Amanawa (2024) argued that while digital communication provides opportunities for improving government service delivery, infrastructure limitations and digital inequality continue to restrict its effectiveness in Nigeria. Therefore, strengthening internet connectivity is essential for ensuring accessible, reliable, and efficient public services.

Electronic Data Management Systems

Electronic data management systems involve the use of computerized platforms for collecting, storing, processing, and retrieving government information. These systems improve administrative efficiency by reducing paperwork, minimizing errors, and enabling faster access to accurate information for decision-making. Public institutions that adopt electronic data management systems can coordinate activities more effectively and provide improved services to citizens. Ayesha et al. (2024) emphasized that digital government systems enhance service delivery by streamlining processes, reducing bureaucratic delays, and promoting transparency in government operations. Furthermore, electronic databases allow government agencies to integrate information across departments, thereby improving coordination and accountability. For instance, digital records management in healthcare, taxation, education, and public procurement enables institutions to deliver more responsive services. However, the effectiveness of electronic data management systems depends on adequate technological skills, proper maintenance, and institutional readiness. Poor system integration and resistance to technological change may limit the benefits of digital information management in public organizations.

Mobile Communication Technologies

Mobile communication technologies have transformed public service delivery by providing citizens with convenient access to government information and services through mobile phones and applications. Mobile platforms allow governments to communicate policies, provide notifications, collect feedback, and deliver services without requiring citizens to visit government offices physically. Urhibo et al. (2024) found that digital communication technologies improve citizen engagement and strengthen interaction between public institutions and service users. In developing economies where mobile phone penetration is relatively high, mobile technologies provide an opportunity to bridge service delivery gaps. They support initiatives such as mobile payment systems, online applications, and digital complaint platforms. However, challenges including limited digital literacy, cybersecurity concerns, and unequal access to smartphones may reduce their effectiveness. Consequently, public institutions need to design inclusive mobile service platforms that accommodate different categories of citizens.

Cloud Computing Technology

Cloud computing technology provides public organizations with flexible platforms for storing, managing, and sharing information. Through cloud-based systems, government agencies can reduce the cost of maintaining physical infrastructure while improving accessibility and collaboration among departments. Cloud computing enhances service delivery by allowing employees and citizens to access information and services from different locations. The adoption of cloud-based public services supports efficient resource utilization, faster data processing, and improved institutional performance. However, concerns relating to data privacy, cybersecurity, and regulatory compliance remain significant issues affecting cloud adoption in the public sector. Effective policies and security frameworks are therefore required to ensure that cloud computing contributes positively to public service delivery.

Cybersecurity and Data Protection Systems

Cybersecurity and data protection systems are essential components of digital public service delivery because they safeguard sensitive government and citizen information from unauthorized access, cyberattacks, and data breaches. As government institutions increasingly depend on digital platforms, maintaining secure communication networks has become necessary for building public confidence in electronic services. Research has shown that weaknesses in cybersecurity can reduce citizens' willingness to adopt digital government services due to concerns about privacy and trust (Alazigha & Amanawa, 2024). Effective cybersecurity measures, including encryption, authentication systems, and data protection policies, improve trust and reliability in digital public services. Therefore, government institutions must prioritize cybersecurity investments and develop strong governance frameworks to protect digital infrastructure.

Empirical Literature Review

Empirical evidence has consistently demonstrated the importance of data communication technologies in enhancing public service delivery across different sectors and countries. Alazigha and Amanawa (2024) investigated the role of digital communication in public service delivery in Nigeria using a mixed-method approach involving government agencies, citizens, and private sector stakeholders. The study found that digital communication technologies significantly improved transparency, accountability, information dissemination, and citizen participation in governance. The findings further revealed that the adoption of digital communication platforms enabled public institutions to provide faster and more accessible services to citizens. However, the study noted that challenges such as poor digital infrastructure, cybersecurity threats, and low levels of digital literacy constrained the effectiveness of these technologies. The authors concluded that strengthening digital infrastructure and improving technological competence among public servants would enhance public service delivery outcomes. Similarly, Urhibo, Aruoren, Ivwighren, and Imene (2024) examined the impact of digital communication technologies on public administration using the Ministry of Basic and Secondary Education in Delta State, Nigeria, as a case study. Utilizing survey data collected from employees and service users, the researchers found that digital communication technologies significantly enhanced administrative efficiency, information sharing, citizen engagement, and service responsiveness. The study revealed that the use of digital communication tools improved interactions between government institutions and citizens, thereby reducing delays associated with traditional administrative procedures. The authors concluded that sustained investment in communication technologies would improve the effectiveness and quality of public service delivery. In another study, Ogbeide, Enabunene, and

Evwiekpamare (2023) investigated the effects of information and communication technology on service delivery at Edo State Specialist Hospital, Nigeria. Using a descriptive survey design, the study established that the adoption of ICT significantly improved operational efficiency, electronic record management, communication processes, and service quality within the hospital. The findings indicated that digital communication systems reduced administrative bottlenecks, enhanced information accessibility, and improved the speed of service delivery. The researchers therefore concluded that public institutions that effectively integrate communication technologies into their operations are more likely to achieve higher levels of efficiency and citizen satisfaction. Furthermore, Inakefe, Bassey, and Amadi (2024) assessed the implications of digital tools and e-governance reforms on service delivery in the Cross River State Civil Service. The study employed a mixed-method research design and found that digital technologies positively influenced administrative efficiency, communication effectiveness, and access to government services. The researchers observed that electronic communication systems facilitated faster decision-making and enhanced coordination among government departments. Nevertheless, inadequate funding, weak technological infrastructure, and insufficient technical skills among public sector employees were identified as major obstacles to effective implementation. The study concluded that successful digital transformation requires continuous investment in technology infrastructure and human capacity development. Likewise, Latupeirissa, Dewi, Prayana, Srikandi, Ramadiansyah, and Pramana (2024) conducted a comprehensive review of digitization initiatives and their influence on public service delivery. Their findings revealed that digital communication technologies significantly improved efficiency, transparency, accessibility, and responsiveness in government services. The study emphasized that the adoption of internet-based communication systems, cloud computing, and electronic data management platforms enabled governments to provide more citizen-centered services while reducing operational costs. However, the authors highlighted the digital divide and unequal access to technology as critical challenges affecting the successful implementation of digital public services. The study concluded that governments should pursue inclusive digital policies to ensure that the benefits of technological innovation are accessible to all citizens.

Methodology

This study adopted a conceptual review method. Information on data communication technologies and public service delivery was gathered using textbooks, journals, published and unpublished journals, libraries, and internet applications

Summary of findings

The findings revealed thus:

1. Internet connectivity has a positive effect on public service delivery.
2. Electronic data management systems have a positive effect on public service delivery.
3. Mobile communication technologies have a positive effect on public service delivery.
4. Cloud computing technology has a positive effect on public service delivery.
5. Cybersecurity and data protection systems have a positive effect on public service delivery.

Conclusion

The study examined communication technologies and public service delivery. It was revealed that electronic data management systems have a positive effect on public service delivery. Mobile communication technologies have a positive effect on public service delivery. Cloud computing

technology has a positive effect on public service delivery. Cybersecurity and data protection systems have a positive on public service delivery. Data communication technologies (DCTs) have become a significant driver of transformation in public sector management by improving the way government institutions communicate, process information, and deliver services to citizens. The application of data communication technologies has become particularly important in developing countries such as Nigeria, where public institutions continue to face challenges related to delays, poor coordination, and limited access to government services. Digital communication systems provide opportunities for improving service delivery in areas such as healthcare, education, taxation, public procurement, and social welfare by enabling faster data exchange and real-time access to information. It is concluded that the integration of digital platforms in public administration strengthens institutional efficiency by reducing administrative bottlenecks and improving the quality of services provided to citizens.

Recommendations

1. Government should invest in reliable internet infrastructure to improve connectivity and ensure that digital public services are accessible to citizens across urban and rural areas
2. Public institutions should adopt integrated electronic data management systems that promote efficient record-keeping, information sharing, and faster decision-making.
3. Government agencies should expand mobile-based service platforms to improve citizen engagement and provide convenient access to public services.
4. Public organizations should adopt secure cloud computing solutions to enhance data management, collaboration, and operational efficiency.
5. Strong cybersecurity policies, employee training, and data protection mechanisms should be implemented to safeguard government information systems and increase citizens' trust in digital services.

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