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**IMPACT OF E-GOVERNMENT DETERMINANTS ON PUBLIC SERVICE
DELIVERY: THE MODERATING ROLE OF TRAINING IN KADUNA
STATE, NIGERIA**

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**DOCTOR OF PHILOSOPHY
UNIVERSITI UTARA MALAYSIA
[2026]**

**IMPACT OF E-GOVERNMENT DETERMINANTS ON PUBLIC SERVICE
DELIVERY: THE MODERATING ROLE OF TRAINING IN KADUNA
STATE, NIGERIA.**



**A thesis submitted to Ghazali Shafie Graduate School of Government,
Universiti Utara Malaysia in fulfilment of the requirement for the Doctor of
Philosophy in (Public Management)**



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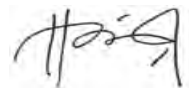
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ABSTRACT

Despite increasing investments in e-government systems in Nigeria, public service delivery remains uneven, particularly at the sub-national level, due to challenges related to utilization, capacity, and institutional readiness. In Kaduna State, the persistence of bureaucratic inefficiencies alongside digital reforms raised critical questions about the factors that influence effective e-government use and its ability to improve service delivery. This study examined the determinant factors of e-government utilization and their effect on effective public service delivery in Kaduna State using the Unified Model of Electronic Government Adoption (UMEGA) as a theoretical framework. The key variables include level of application, performance expectancy, effort expectancy, social influence, facilitating conditions, and perceived risk, with training programs for public servants serving as a moderating factor. The study adopted quantitative research design with a target population of 3,844 civil servants across selected ministries. Using the Taro Yamane formula, 472 questionnaires were distributed, and 391 usable responses (82.8%) were retrieved and analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The results showed that effort expectancy, social influence, and level of application significantly improve public service delivery, while performance expectancy, facilitating conditions, and perceived risk exert varying degrees of influence. The moderation effect analysis revealed that training programs significantly strengthen the relationships between performance expectancy, social influence, facilitating conditions, and effective public service delivery in Kaduna State. Training programs thus emerged as a critical mechanism that equips public servants with the skills, confidence, and competence required for effective e-government utilization. The study highlights the need to address challenges such as infrastructural deficits, perceived risks, and low application levels to maximize the impact of e-government on service delivery. Theoretically, this study contributed to the use of UMEGA in studying the context of e-government determinant factors at improving public service delivery in Kaduna State. From a practical point of view, policymakers are encouraged to implement targeted training programs to enhance the digital literacy of public servants. Improving digital infrastructure, including reliable internet connectivity and stable power supply, is also essential. Collectively, these strategies are crucial for optimizing e-government initiatives and improving public service delivery outcomes in Kaduna State.

Keywords: Digital Infrastructure, E-Government Utilization, Public Service Delivery, Training Programs, Unified Model of Electronic Government Adoption (UMEGA)

ABSTRAK

Walaupun pelaburan dalam sistem e-kerajaan di Nigeria semakin meningkat, penyampaian perkhidmatan awam masih tidak sekata, khususnya di peringkat sub-nasional, disebabkan oleh cabaran yang berkaitan dengan penggunaan, kapasiti, dan kesediaan institusi. Di Negeri Kaduna, kewujudan ketidakcekapan birokrasi yang berterusan di samping pembaharuan digital menimbulkan persoalan kritikal tentang faktor-faktor yang mempengaruhi penggunaan e-kerajaan secara berkesan dan keupayaannya untuk menambah baik penyampaian perkhidmatan. Kajian ini meneliti faktor-faktor penentu penggunaan e-kerajaan dan kesannya terhadap penyampaian perkhidmatan awam yang berkesan di Negeri Kaduna dengan menggunakan *Unified Model of Electronic Government Adoption* (UMEGA) sebagai rangka kerja teori. Pemboleh ubah utama merangkumi tahap aplikasi, jangkaan prestasi, jangkaan usaha, pengaruh sosial, keadaan pemudah cara, dan risiko yang dirasakan, dengan program latihan untuk penjawat awam bertindak sebagai faktor penyederhana. Kajian ini menggunakan reka bentuk penyelidikan kuantitatif dengan populasi sasaran seramai 3,844 penjawat awam di kementerian terpilih. Menggunakan formula Taro Yamane, sebanyak 472 soal selidik diedarkan, dan 391 respons yang boleh digunakan (82.8%) diperolehi serta dianalisis menggunakan *Partial Least Squares Structural Equation Modeling* (PLS-SEM). Hasil kajian menunjukkan bahawa jangkaan usaha, pengaruh sosial, dan tahap aplikasi meningkatkan penyampaian perkhidmatan awam secara signifikan, manakala jangkaan prestasi, keadaan pemudah cara, dan risiko yang dirasakan menunjukkan tahap pengaruh yang berbeza-beza. Analisis kesan penyederhanaan mendedahkan bahawa program latihan mengukuhkan hubungan antara jangkaan prestasi, pengaruh sosial, keadaan pemudah cara, dan penyampaian perkhidmatan awam yang berkesan secara signifikan di Negeri Kaduna. Oleh itu, program latihan muncul sebagai mekanisme kritikal yang melengkapkan penjawat awam dengan kemahiran, keyakinan, dan kecekapan yang diperlukan untuk penggunaan e-kerajaan secara berkesan. Kajian ini menekankan keperluan untuk menangani cabaran seperti kekurangan infrastruktur, risiko yang dirasakan, dan tahap aplikasi yang rendah bagi memaksimumkan impak e-kerajaan terhadap penyampaian perkhidmatan. Secara teorinya, kajian ini menyumbang kepada penggunaan UMEGA dalam mengkaji konteks faktor-faktor penentu e-kerajaan dalam meningkatkan penyampaian perkhidmatan awam di Negeri Kaduna. Dari sudut praktikal, penggubal dasar digalakkan untuk melaksanakan program latihan yang disasarkan bagi meningkatkan literasi digital penjawat awam. Penambahbaikan infrastruktur digital, termasuk kesambungan internet yang boleh dipercayai dan bekalan elektrik yang stabil, juga adalah penting. Secara kolektif, strategi-strategi ini adalah penting untuk mengoptimumkan inisiatif e-kerajaan dan menambah baik hasil penyampaian perkhidmatan awam di Negeri Kaduna.

Kata Kunci: Infrastruktur Digital, Penggunaan E-Kerajaan, Penyampaian Perkhidmatan Awam, Program Latihan, *Unified Model of Electronic Government Adoption* (UMEGA)

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LIST OF ABBREVIATIONS

AP	Application
BVN	Bank Verification Number
CBT	Computer-Based Tests
CIAPS	Center for International Advanced and Professional Studies
DOI	Diffusion of Innovation
E-Government	Electronic Government
EGDI	Electronic Government Development Index
EGSR	E-Gov Service Reforms
E-HRM	Electronic Human Resource Management
FIRS	Federal Inland Revenue Service
G2B	Government-to-Business
G2C	Government-to-Citizens
G2E	Government-to-Employees
G2G	Government-to-Government
GDP	Gross Domestic Product
ICT	Information and Communication Technology
IDT	Innovation Diffusion Theory
ILO	International Labour Organization
INEC	Independent National Electoral Commission
IPPIS	Integrated Personnel and Payroll Information System
IR	Industrial Revolution
JAMB	Joint Admission and Matriculation Board
LG	Local Government

MDAs	Ministries, Departments and Agencies
NBS	National Bureau of Statistics
NITDA	National Information Technology Development Agency
NPM	New Public Management
NYSC	National Youth Service Corps
OGP	Open Government Partnership
PPP	Public-Private Partnerships
PSD	Public Service Delivery
PSSD	Public Sector Service Delivery
SD	Service Delivery
SEGIA	Sustainable E-Government Impact Assessment
SEM	Structural Equation Model
SPSS	Statistical Package for the Social Sciences
TAM	Technology Acceptance Model
TPB	Theory of Planned Behavior
TSA	Treasury Single Account
UMEGA	Unified Model of Electronic Government Adoption
UN	United Nations
USA	United States of America
WEF	World Economic Forum

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter begins with the background of the study, focusing on the status of e-government utilization and public service delivery in Nigeria, with emphasis on Kaduna State. The problem statement is then presented, followed by the research questions and objectives guiding the study. The scope and significance of the study are also discussed, highlighting both the theoretical and practical contributions. In addition, the operational definitions of key terms are provided to ensure clarity. Finally, the organization of the thesis is outlined, and for better understanding, the structure of this chapter is illustrated in Figure 1.1.

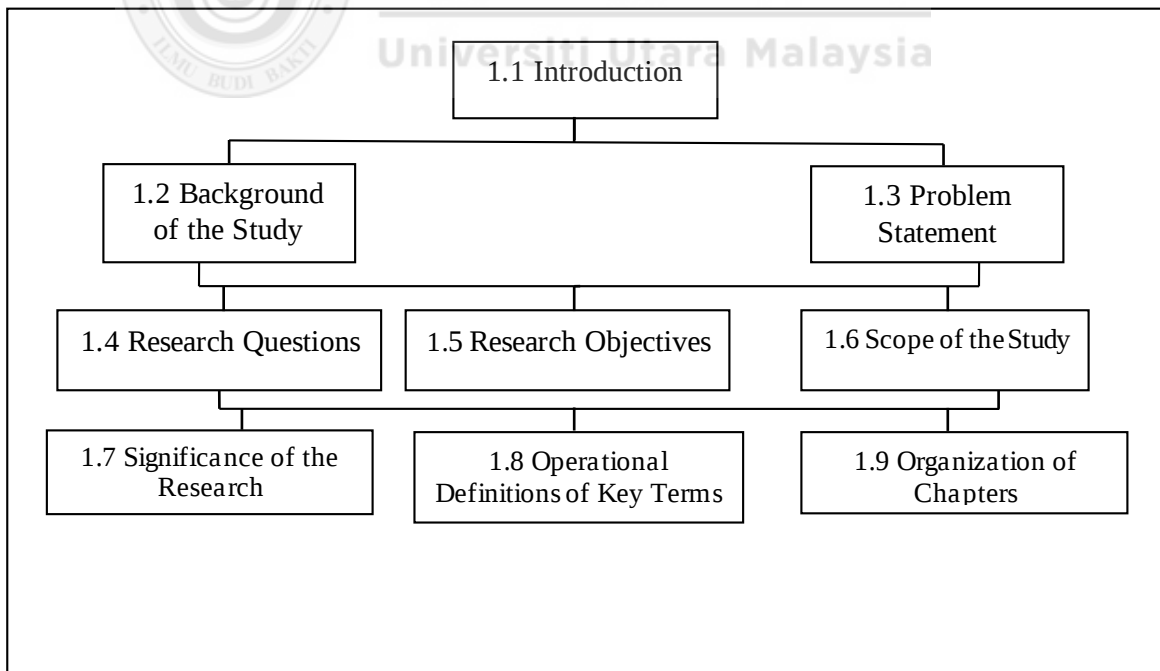


Figure 1.1: The Organization of Chapter One

1.2 Background of the Study

Over the past two decades, the rapid advancement of information and communication technologies (ICTs) has led governments worldwide to adopt e-government as a transformative mechanism to improve public service delivery, enhance transparency, and increase administrative efficiency. International institutions such as the World Bank (2024) identify digital governance as a fundamental driver of accountability, citizen participation, and institutional modernization. In developed regions, particularly Europe, countries such as Estonia, Denmark, and Finland have successfully integrated government services into seamless digital platforms (Umar et al., 2025). Estonia's X-Road system enables citizens to access healthcare, tax records, and education services through a single interoperable interface, resulting in near-universal utilization, reduced transaction times, and increased public trust (Pramuditha et al., 2025; Ogu & Chukwurah, 2023). These successes demonstrate that, when effectively adopted and used, e-government can transform bureaucratic systems into efficient and citizen-centred digital ecosystems (Olabimitan et al., 2025).

Similar progress is evident in Asia, where governments have invested heavily in infrastructure and human capital to support digital governance (Efthymiou, 2025; Hossain, 2024; Umar et al., 2025). Singapore's Smart Nation initiative leverages real-time data and automation to improve the responsiveness and inclusiveness of public services, while South Korea's AI-enabled platforms and citizen engagement tools have consistently positioned it among the top nations in the UN e-government development index (UN, 2022). Malaysia's MyDIGITAL blueprint has improved access to services through portals such as Mygovernment (Hossain, 2024). However, rural connectivity

and unequal ICT literacy continue to hinder full utilisation (Yasin et al., 2025). These Asian examples show that technology alone is not sufficient; successful e-government requires a combination of infrastructure, system usability, institutional readiness, and user capacity.

In the Middle East, the United Arab Emirates (UAE) has been globally recognised for its Paperless Strategy, which eliminates over 336 million sheets of paper annually and integrates more than 130 services through platforms such as DubaiNow (UAE government, 2022; Efthymiou, 2025). Similarly, Saudi Arabia's Absher portal enables millions of users to access integrated administrative services conveniently (Hossain, 2024; Umar et al., 2025). These examples demonstrate the transformative potential of e-government when fully utilized and supported by strong institutional frameworks.

In the same vein, across Africa, countries such as Mauritius and South Africa have made remarkable progress by establishing strong policy frameworks and digital infrastructure to support transparency and efficiency (Stephen John, 2025). Mauritius's online tax and business registration systems have reduced processing times and increased compliance (Arumede & Edwin, 2025). However, in many African countries, including Nigeria, the expected benefits of e-government remain limited due to infrastructural deficiencies, unstable electricity supply, low broadband penetration, bureaucratic resistance, and inadequate ICT skills among public servants (Nurhidayat et al., 2024). Thus, while e-government is recognised as a powerful tool for improving governance, its effectiveness in developing countries is highly inconsistent (Stephen John, 2025).

At the federal level, Nigeria has implemented various digital reforms such as the integrated payroll and personnel information system (IPPIS), treasury single account (TSA), and the government integrated financial management information system (GIFMIS), which have improved fiscal discipline and reduced corruption (Omotayo et al., 2025). Nevertheless, these successes have not been uniformly replicated at the state and local levels, where e-government utilisation is often low, infrastructure remains inadequate, and the workforce lacks the training and confidence required to fully adopt digital systems (Ahmed & Dhoon, 2024). This discrepancy between adoption and actual utilisation limits the impact of e-government on service delivery.

Kaduna State is frequently cited as one of the leading subnational examples of e-government progress in Nigeria (Hossain, 2024; Umar et al., 2025). It has introduced digital platforms such as electronic land registration through the Kaduna Geographic Information Service (KADGIS), online tax payment via the Kaduna Internal Revenue Service (KADIRS), and digital recruitment portals for civil service employment (Jejenywa et al., 2024). These initiatives have demonstrated notable improvements in revenue generation and administrative transparency (Stephen John, 2025). However, despite these efforts, the actual utilization of these platforms by public servants remains inconsistent (Umar et al., 2025). Many employees continue to rely on manual processes due to the perceived low usefulness of digital systems, complexity of user interfaces, inadequate technical support, and insufficient training (Suliman et al., 2022). This indicates that the presence of e-government systems does not automatically translate into effective public service delivery; utilization behaviour is influenced by deeper technological, psychological, and organizational factors (Eze et al., 2021).

Additionally, e-government is not merely a technological upgrade but a structural transformation that requires changes in workflows, institutional culture, and workforce competencies (Hwang & Seo, 2024). While some scholars argue that technology inherently enhances efficiency and transparency, others caution that without organisational reform and capacity building, digital systems may replicate existing bureaucratic inefficiencies in digital form (Kassen, 2022). This concern is particularly relevant in Nigeria, which ranked 144th in the 2024 UN EGDI, reflecting weak digital readiness and low system utilization (Hossain, 2024). In Kaduna State, specifically, utilization rates in key sectors remain below 50%, and fewer than 40% of public servants have received formal e-government training over the past two years (Efthymiou, 2025; Umar et al., 2025). These statistics highlight the critical importance of capacity development in unlocking the true potential of digital governance.

To understand the factors that influence e-government utilization, this study draws on the Unified Model of Electronic Government Adoption (UMEGA), which integrates constructs from major technology adoption theories such as TAM, TPB, UTAUT, and DOI (Dwivedi et al., 2017). UMEGA identifies five key determinants such as Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, and Perceived Risk that influence behavioral Intention and utilization (Mensah, 2022). However, most studies using UMEGA stop at intention or basic usage and fail to examine the ultimate outcome effective public service delivery. Furthermore, few studies in developing countries have examined how post-adoption interventions, such as training, can strengthen the effectiveness of e-government systems.

In addition, performance expectancy (PE) reflects the belief that using e-government improves job performance (Venkatesh et al., 2003). When systems like KADGIS automate processes and speed up tasks, PE increases (Nwuba & Nuhu, 2018). However, when technical issues, system downtime, or lack of training make the system seem more burdensome than helpful, PE decreases, leading employees to revert to manual methods (Adeolu-Akande et al., 2023). This tells you that when PE is low, effective service delivery suffers.

On the other hand, effort expectancy (EE) is defined as the degree of ease associated with using the system (Venkatesh et al., 2003). It essentially captures how much effort a public servant believes is required to interact with the e-government platform to perform their official duties (Ajibola & Ogunmodede, 2025). In Kaduna State, the practical reality of using e-government platforms is often complicated by a confluence of factors that directly impact EE. Public servants frequently report that complex, non-intuitive interfaces and a lack of standardized design across different government applications increase the mental and temporal effort required for task completion. This complexity often negates the promised efficiency gains (Nwachukwu, 2025).

Furthermore, social influence (SI) refers to the extent to which public servants feel pressured by leaders, supervisors, or peers to use e-government (Venkatesh & Davis, 2000). In the hierarchical structure of the public service, if top officials actively promote and use e-systems, utilization increases (Ajibola & Ogunmodede, 2025). However, if leaders continue using manual processes, digital tools lose legitimacy, and employees follow suit (Adeolu-Akande et al., 2023). This tells you that Weak SI leads to partial or symbolic utilization, undermining service delivery.

Also, Facilitating Conditions (FC) encompass the availability of ICT infrastructure, technical support, policies, and training that enable system usage (Venkatesh et al., 2023). In Kaduna State, inadequate internet, insufficient bandwidth, power interruptions, lack of IT support, and limited institutional resources severely constrain utilization (Nwachukwu, 2025). When FC is weak, even willing users cannot effectively use e-government platforms, leading to delays, system abandonment, and poor service outcomes (Mensah, 2022).

Additionally, perceived risk (PR) reflects users' concerns about security breaches, data privacy, system failure, legal uncertainty, and accountability (Fakhruzzaman & Dimitrova, 2020). In environments where cyber threats are high and legal frameworks for digital transactions are unclear, public servants may fear sanctions for system errors or data loss (Ayesha et al., 2025). Consequently, they adopt risk-averse behaviours, such as keeping parallel manual records or avoiding full digital submission, which undermines transparency and efficiency (Adeolu-Akande et al., 2023).

Beyond these five constructs, this study introduces level of application (LoA) as a new independent variable to address a major limitation in existing models. While many studies measure whether systems are used, few assess how deeply they are used (Thabit & Yaser, 2019). LoA captures the comprehensiveness, frequency, and sophistication of system engagement, ranging from basic information retrieval to advanced transactional and analytical functions (Yaqub et al., 2025). In Kaduna State, employees may log into systems but only use basic features, leaving advanced modules (e.g. automated workflows, data analytics, inter-departmental integration) underutilized (Kim & Lee, 2024). Low LoA results in incomplete digitization, parallel manual processes, and

continued inefficiencies (Thabit & Yaser, 2019). Therefore, LoA is critical for understanding whether e-government is truly transforming service delivery.

A major limitation of UMEGA and other adoption models is their limited focus on post-adoption capacity building. This study addresses this gap by introducing training programmes as a moderating variable, recognizing that training not only increases utilization but also improves the quality of system use by enhancing LoA (Thabit & Yaser, 2019). Training builds digital literacy, increases confidence, reduces perceived risk, improves performance expectancy, and equips staff to exploit complex system functionalities (Efthymiou, 2025; Umar et al., 2025). Without training, even well-designed systems fail.

Despite progress in digital reform, empirical evidence from Kaduna State shows that inconsistent utilisation, high perceived effort, weak infrastructure, institutional resistance, and inadequate training continue to limit the effectiveness of e-government (Irhebhude et al., 2022). While previous studies have examined adoption or intention, few have linked utilization factors to actual public service delivery outcomes, and almost none have evaluated the moderating role of training in this relationship, particularly at the subnational level in developing countries (Umar et al., 2025).

Therefore, this study extends UMEGA by integrating level of application and training as critical constructs, offering a more comprehensive framework for understanding both utilization and outcomes. By empirically examining how performance expectancy, effort expectancy, social influence, facilitating conditions, perceived risk, and level of application affect effective public service delivery, and how training moderates these relationships, this study fills a significant theoretical, methodological, and practical gap.

Ultimately, this research is essential to help Kaduna State and similar contexts transition from merely “having” e-government systems to using them effectively to deliver faster, more transparent, more efficient, and citizen-centred public services.

1.3 Problem Statement

E-government, the application of Information and Communication Technologies (ICT) in public administration, is globally recognised as a critical mechanism for enhancing public service delivery by widening access to services, enabling faster transactions, reducing opportunities for corruption, and improving efficiency, transparency, and accountability (Efthymiou, 2025; Umar et al., 2025). In Nigeria, the Federal Government, through the National e-Government Master Plan (2015), and sub-national entities such as Kaduna State, have made significant investments in digital platforms, including the Kaduna State Geographic Information System (KADGIS), Kaduna State electronic procurement system (KADSEPS), and the electronic civil service management system (e-CSMS) for payroll, human resources, and various other online portals for service delivery, such as business registration and tax filing (Efthymiou, 2025). All these initiatives are part of their drive towards modernized governance, signalling political will to digitize government processes and expand digital services for citizens and businesses (Balaji et al., 2025; Kim & Lee, 2024). However, despite these initiatives and technological readiness, the actual utilization and subsequent effect of e-government systems on effective public service delivery in Nigeria remain inconsistent and often below expectations (Ajibade & Mutula, 2021). Nigeria ranked low in the 2022 UN e-government maturity survey, at 140th out of 193 countries, and 144th out of 193 in 2024, indicating a pervasive gap between policy and practical implementation (United

Nations e-government Survey, 2024). Evidence indicates substantial variation in the extent to which e-government tools are used by public servants and whether their use leads to measurable improvements in service delivery outcomes (Stephen John et al., 2025). Empirical evidence further reveals that the mere deployment of sophisticated technology does not automatically guarantee its utilization or the realization of its intended benefits (Afieroho et al., 2023). This uneven implementation and uncertain translation from technology availability to service improvement form the empirical problem motivating this study (Ajibade & Mutula, 2021; Umar et al., 2025).

The unified model of electronic government adoption (UMEGA) suggests that the adoption of ICT in e-government is driven by several key factors, such as performance expectancy, effort expectancy, social influence, facilitating conditions, and perceived risks (Yaqub et al., 2025). However, in the context of the Nigerian public sector, particularly in Kaduna State, the influence of these factors is complex and often counteracted by contextual challenges (Ajibade & Mutula, 2021; Umar et al., 2025).

While e-government promises enhanced speed and less corruption, public servants may perceive the initial transition as disruptive rather than beneficial, especially if system rollout is poor (Chinelo, 2025). Although the e-procurement system is mandatory, there are reports of attempts to bypass it or of users struggling to complete processes, leading to delays (Ayesha et al., 2025). It is unclear whether public servants in Kaduna State perceive e-government systems as genuinely enhancing their job performance (Nwachukwu, 2025). Similarly, the e-CSMS, designed to streamline personnel management, may not be fully exploited for its analytical capabilities, remaining a digital ledger rather than a strategic management tool (Chinelo, 2025). This

underutilisation represents a critical risk: the wastage of public funds on technology that fails to deliver its promised value, thereby undermining the very goals of efficiency, transparency, and effectiveness it was designed to achieve (Olabimitan et al., 2025). For example, does the digital tax platform genuinely help a KADIRS officer collect more revenue with less effort? A study by Adeolu-Akande et al. (2023) in the Nigerian public service found PE to be the strongest predictor of intention to use e-government, yet its actual strength in the specific, high-stakes context of Kaduna's reforms remains unquantified (Umar et al., 2025). Thus, a public servant may not use the e-filing system because they believe the traditional paper method is faster for handling urgent files, despite the e-system's long-term efficiency (Rhebhude et al., 2022). This problem is not unique to Kaduna but is a common challenge in e-government utilization, particularly in the public sector of developing nations (Olabimitan et al., 2025).

A critical barrier to this utilization is effort expectancy (EE). Theoretically, low EE (i.e., the system is easy to use) promotes high utilization, leading to effective service delivery (Mensah, 2022). In Nigeria, complex interfaces and the lack of simplified, user-friendly designs often increase the perceived difficulty of use, thereby lowering utilization rates (Ajibbola & Ogunmodede, 2025). A complex, non-intuitive interface for applying for leave on the e-CSMS can deter less tech-savvy civil servants, leading to a reversion to paper-based requests (Nwuba & Nuhu, 2018). Mensah (2022) identified EE as a critical barrier in Ghana, but the unique usability challenges of Kaduna's integrated platforms remain unknown. While e-government platforms are intended to be easy to use, the operational reality in Kaduna State plagued by infrastructural deficiencies such as inconsistent power supply, poor internet connectivity, and inadequate technical support

means that the actual effort required to use the system is perceived as unacceptably high (Ajibade & Mutula, 2021). Public servants are often left with "complex interfaces and limited support structures," leading to unfulfilled user expectations (Umar et al., 2025). This high perceived effort forces a reversion to familiar, less efficient manual processes. Existing literature often identifies high EE as a general challenge (Alryalat et al., 2021). However, there is a distinct lack of recent, verifiable statistical evidence that specifically measures the direct and significant negative causal effect of effort expectancy on effective public service delivery (measured by metrics such as transaction speed, accuracy, and transparency) within the various MDAs of Kaduna State. Without quantifying this relationship, policymakers cannot prioritize investments (e.g., system simplification versus infrastructure upgrades) that specifically target and reduce the effort burden on public servants (Stephen John, 2025).

While the state government officially mandates e-government use, entrenched bureaucratic norms and resistance to change from influential senior public servants can create a counter-social influence, significantly hindering utilization irrespective of the system's quality (Nwachukwu, 2025). For instance, if high-ranking officials or key departmental leaders continue to favour or tolerate manual, opaque processes, often to maintain discretion or due to lack of digital literacy, subordinates are socially pressured to conform to these traditional practices rather than the formal digital mandate (Afieroho et al., 2023). This creates a situation where socially accepted behaviour is non-compliant. Existing research notes that bureaucratic resistance is a challenge (Nwachukwu, 2025). However, there is a distinct lack of recent, verifiable statistical evidence that specifically measures the direct causal effect of social influence, both

positive endorsement and negative resistance, on effective public service delivery (e.g., impact on accountability and transaction time) within Kaduna State MDAs (Efthymiou, 2025; Umar et al., 2025). Without quantifying the magnitude of this social pressure, policymakers cannot design effective change management strategies, leadership mandates, or internal social campaigns to positively realign peer and supervisory norms with digital utilization goals (Eze et al., 2021). This suggests that the hierarchical nature of the Nigerian civil service amplifies this factor, but its precise influence in Kaduna's reform-driven environment remains a critical knowledge gap (Efthymiou, 2025).

Theoretically, robust FC (e.g., stable internet, reliable power, technical support) should lead to high system utilization and, consequently, effective public service delivery (Olabimitan et al., 2025). Despite policy ambition, the empirical reality in the Nigerian context demonstrates a failure to provide the supportive environment necessary for e-government to thrive (Nwachukwu, 2025). Studies in Nigeria frequently cite poor ICT infrastructure, inconsistent power supply, expensive data, slow internet connectivity, and a lack of dedicated, responsive IT support as major challenges, reducing the practical feasibility of utilization (Ajibbola & Ogunmodede, 2025). For public servants in Kaduna State, these deficits mean that accessing and utilizing e-platforms is routinely difficult and unreliable, causing frustration and high EE (Nwachukwu, 2025). When FC is low, e-government systems are effectively non-functional for extended periods (Mensah, 2022). Systematic reviews and Nigeria-focused studies indicate that poor ICT infrastructure and intermittent power are cited in the majority of cases as primary obstacles, with many reports noting that over 70–90% of studies identify infrastructure and low digital literacy as persistent barriers to effective e-government implementation (Chinelo, 2025). In

Kaduna, practical realities such as offices with limited backup power, weak internet links in rural local government areas, and uneven IT support capacity can prevent even well-designed systems from being used consistently, thereby limiting potential improvements in processing times, transparency, and citizen satisfaction (Olabimitan et al., 2025; Umar et al., 2025). These structural barriers underscore the need to examine FC alongside other determinants. The specific deficiencies in FC that are most crippling Kaduna's civil servants need to be identified.

Trust and security concerns, captured by Perceived Risk (PR), have emerged as decisive in public-sector digital adoption (Chinelo, 2025). Despite the technological promise, public servants in Kaduna State fear that system errors could lead to wrongful financial deductions, data breaches could expose sensitive information, or the digital trail could make them vulnerable to sanctions (AbdulKareem & Oladimeji, 2024). Their fears about privacy breaches, data loss, or misuse of sensitive records undermine both public servants' and citizens' willingness to transact online (Olabimitan et al., 2025). This high Perceived Risk leads to risk-averse behaviour, such as avoiding the upload of sensitive citizen data or maintaining parallel, unofficial paper records, which compromises the integrity and effectiveness of the digital system (Adeyemi & Aigbavboa, 2021). The resulting behaviour of low and incomplete utilization, driven by the fear of data loss, legal exposure, or system error, directly frustrates the goals of effective public service delivery (Ahmad & Dhoon, 2024). When services such as land registration are not processed end-to-end digitally due to PR-driven avoidance, the systems fail to deliver transparency and speed (Adeolu-Akande et al., 2023). The original problem of bureaucratic opacity and delay persists because public servants are afraid to commit

fully to the digital audit trail (Adeyemi & Aigbavboa, 2021). Public servants are hesitant to upload sensitive citizen data onto the KADGIS portal due to lack of confidence in the state's data protection measures (Olabimitan et al., 2025; Umar et al., 2025). While the literature acknowledges that security fears are a general challenge, there is a distinct lack of recent, verifiable statistical evidence that specifically measures the direct negative causal magnitude of Perceived Risk on effective public service delivery (e.g., its direct correlation with increased processing time or reduced accountability) within the MDAs of Kaduna State. This deficiency prevents policymakers from accurately assessing the return on investment for security upgrades and institutional trust-building measures necessary to alleviate PR (Adeyemi & Aigbavboa, 2021). The efficiency of Kaduna State's e-government is being curtailed not just by technical issues, but by the psychological barrier of PR. This study is crucial to empirically quantify how this risk perception translates into ineffective service delivery, thereby providing the data needed for targeted trust-building interventions (Ajibade & Mutula, 2021).

Beyond these classical predictors, the Level of Application (LoA), which measures how deeply a digital tool is embedded into routine workflows and across agency boundaries, is a critical but under-measured factor. Many government agencies, even those with digital platforms, are noted to operate at a basic or limited level of e-governance, often maintaining parallel manual processes (Adeolu-Akande et al., 2023). This low LoA means public servants may use the digital system only for data entry but revert to manual ledgers for approvals, effectively bypassing the core digital controls intended to ensure transparency and efficiency (Thabit & Yaser, 2019). This partial use sustains bureaucratic bottlenecks and administrative delays (Ajibbola & Ogunmodede, 2025).

When the LoA is low, for instance, if e-procurement systems are used only for advertising but not for contract award, the essential digital audit trail is broken (Thabit & Yaser, 2019). This perpetuates opportunities for human discretion and corruption, directly undermining the intended impact of e-government on public accountability (Nwuba & Nuhu, 2018). Kaduna's documented strategic plans and selective innovations (for example, partnerships to deliver health logistics and specific digital services) indicate both potential and fragmentation, making LoA a salient explanatory variable for why some initiatives improve services while others stall (Thabit & Yaser, 2019). While systems may be deployed, a low level of application by public servants (e.g., using the system only for basic tasks) fundamentally limits the delivery of effective public service (Adeolu-Akande et al., 2023). Although the literature recognizes the general challenge of low utilization in Nigeria, there is a distinct lack of recent, verifiable statistical evidence that specifically measures the direct causal effect of the LoA (i.e., the depth of use) on actual metrics of effective public service delivery (e.g., time-to-service, reduction in citizen complaints, or cost savings) within Kaduna State (Umar et al., 2025). This deficit hinders policymakers' ability to set performance targets and identify which specific system functionalities public servants are failing to utilize fully (Irhebhude et al., 2022). The central research problem, therefore, is to systematically investigate and diagnose the specific human, technological, and organisational factors that determine whether public servants in Kaduna State effectively utilize e-government systems, and how this utilization translates into effective public service delivery (Nwachukwu, 2025).

While the above determinants explain utilization likelihood, training programmes (structured in-service capacity building) are a promising moderator that may strengthen adoption and ensure that utilization translates into beneficial outcomes such as effective public service delivery (AbdulKareem & Oladimeji, 2024). Empirical evidence from both global public-sector transformation studies and Nigerian case studies shows that training, especially hands-on, job-focused, and sustained mentoring combined with helpdesk support, raises digital literacy, increases perceived ease of use, clarifies performance benefits, and reduces security anxieties (Bello et al., 2021). Several recent Nigerian studies recommend mandatory and contextualized training for public servants as a primary enabler of successful e-government rollouts. Empirical results show that jurisdictions pairing technology deployment with robust training and change management achieve higher utilization levels and measurable reductions in processing times and complaints (Bello & Mela, 2022). Training thus plausibly moderates the relationships between PE, EE, SI, FC, PR, LoA and e-government utilization, amplifying positive drivers and buffering negative ones.

Despite the theoretical and policy relevance of these determinants and the apparent promise of training, important empirical gaps remain, particularly at the employee (demand-side) level and within subnational contexts such as Kaduna State (Olabimitan et al., 2025; Umar et al., 2025). First, many Nigerian studies focus on citizen uptake or macro assessments of national progress, while fewer provide rigorous employee-level analyses that integrate UMEGA constructs and LoA, explicitly modelling training as a moderator. Second, existing datasets frequently lack objective service delivery outcome measures (such as measured processing times, error rates, or independent citizen

satisfaction indices) and therefore cannot conclusively link public servant utilization to actual improvements in service delivery. Third, Kaduna State offers a distinctive mix of policy commitment (documented digital strategy and OGP action plans) and on-the-ground variability (urban–rural digital divides, pilot innovations alongside under-resourced units), making it an ideal case for a focused study that can produce contextually relevant policy guidance (Olabimitan et al., 2025; Umar et al., 2025). These gaps mean that policymakers lack robust, empirically grounded answers to crucial questions such as: Which determinants most strongly predict e-government use by public servants in Kaduna? Under what conditions does utilization lead to measurable service improvements? How effective are training programmes at strengthening the causal chain from determinants → utilization → service outcomes?

Answering these questions is of practical consequence. Kaduna policymakers and practitioners require evidence on where to prioritise investments whether in interface and usability improvements (targeting EE), communicating performance benefits (targeting PE), strengthening infrastructure and helpdesks (FC), addressing data governance and security (PR), raising integration and standards (LoA), or investing in scaled training programmes to amplify impact (Chan et al., 2025). A focused empirical study that measures determinants among public servants, tests the moderating effect of training, and links utilization to objective service delivery indicators will produce actionable recommendations to maximise the returns on Kaduna’s digital investments and guide replication in similar Nigerian states.

Hence, the problem this study addresses is the lack of integrated, employee-level, and Kaduna-specific empirical evidence on how classical UMEGA determinants and Level of Application jointly affect e-government utilization, and whether training programmes meaningfully moderate those relationships so that utilization translates into effective public service delivery. Filling this gap enables the government to identify which of the key determinants PE, EE, SI, FC, PR, and LoP are most critical in driving or hindering e-government utilization among Kaduna State's public servants (Yaquub et al., 2025). It also provides empirically tested evidence of the moderating effect of training programmes on the relationships between these determinants and effective public service delivery. Furthermore, it establishes a verifiable statistical link between the utilization of these systems and concrete metrics of effective public service delivery. It further supplies policymakers with precise, evidence-based guidance on the combination of technical, organisational, and capacity investments most likely to produce measurable improvements in public services in Kaduna State and comparable contexts. Addressing this problem is not an academic exercise; it is a practical necessity for ensuring accountability for public expenditure, providing actionable insights for the Kaduna State government, and ultimately, for achieving the promised dividends of e-government for the people of Kaduna State, Nigeria.

1.4 Research Questions

This study examines the relationship between training programs for public servants in Kaduna State and the impact of determinants of e-government services on effective public service delivery in Kaduna State, Nigeria. This study examines this relationship using more focused questions that include:

- i. What is the level of application of e-government in enhancing effective public service delivery in Kaduna State, Nigeria?
- ii. To what extent does the determinants of e-government utilization enhance effective public service delivery in Kaduna State, Nigeria?
- iii. How does training program moderate the relationship between the determinants of e-government utilization and effective public service delivery in Kaduna State, Nigeria?

1.5 Research Objectives

The main objective of the study is to examine the impact of e-government determinants on effective public service delivery, moderating the role of training in Kaduna State, Nigeria. The specific objectives are:

- i. To examine the level of application of e-government in enhancing effective public service delivery in Kaduna State, Nigeria.
- ii. To investigate the effect of the determinants of e-government utilization on effective public service delivery in Kaduna State, Nigeria.
- iii. To assess how training program moderates the relationship between the determinants of e-government utilization and effective public service delivery in Kaduna State.

1.6 Scope of the Study

This study examines the impact of e-government determinants on public service delivery, with training serving as a moderating factor among public servants in Kaduna State, Nigeria. As governments increasingly adopt government systems to enhance

efficiency, transparency, and service outcomes, this research focuses on the key factors influencing utilization and their effects on service delivery. Training programs are treated as moderating rather than mediating variables, since they do not explain why e-government affects service delivery but instead shape the strength of this relationship by either enhancing or weakening its impact (Hong & Park, 2024). This perspective aligns with the study's aim of exploring how external factors, such as training, can support the effective utilization of e-government systems (Abdulkareem & Oladimeji, 2024).

The study is limited to public servants in selected MDAs in Kaduna State, as these institutions play a critical role in implementing e-government initiatives and public service reforms (Aneja & Xu, 2024). The target population comprises 3,844 public servants, from which a sample of 472 respondents was drawn using Taro Yamane's formula to ensure statistical representation. Selection focused on individuals directly involved in e-government activities, digital service provision, and administrative decision-making processes. Only those actively engaging with e-government platforms in their daily work were included. Care was taken to capture perspectives across hierarchical levels, from senior management to frontline employees, to provide a comprehensive understanding of e-government adoption. The chosen ministries and agencies were selected for their strategic role in service delivery and digital governance, making them suitable for evaluating the relationship between e-government utilization and service efficiency. This sampling strategy reflects existing research on e-government adoption in developing countries, which highlights the importance of human capital, training programs, and institutional readiness in driving successful digital transformation (Dwivedi et al., 2020; Iqbal & Sidhu, 2022).

The conceptual framework of the study is based on the UMEGA, which provides a structured lens for analyzing technology adoption in public service contexts. Six independent PE, EE, SI, FC, PR, and LoA, are examined to assess their influence on effective service delivery. Training programs are incorporated as a moderating variable to evaluate how structured interventions influence the relationship between e-government determinants and delivery outcomes.

Geographically, the study focuses on Kaduna State, one of the early adopters of e-government initiatives in Nigeria. The state has invested considerably in modernizing public administration through digital governance, making it a relevant case for examining both opportunities and challenges of e-government utilization. While the findings offer valuable insights at the sub-national level, caution is warranted in generalizing them to other Nigerian states with differing socio-political and infrastructural conditions.

Methodologically, the study adopts a quantitative approach, using structured questionnaires to collect data from public servants in Kaduna State MDAs. Data analysis is conducted through Partial Least Squares Structural Equation Modeling (PLS-SEM), a robust statistical method for exploring relationships among multiple variables and testing the moderating effect of training programs.

1.7 Significance of the Study

1.7.1 Practical Significance

This study provides empirical evidence on the determinants of e-government utilization and their impact on effective public service delivery in Kaduna State, Nigeria. At a time when e-government initiatives are increasingly deployed to enhance efficiency, transparency, and accountability in governance, the research offers timely and relevant insights (Sadik-Zada et al., 2024). Its findings carry practical value for policymakers, government agencies, and IT professionals responsible for implementing and managing digital governance systems.

A key contribution of the study lies in its focus on the moderating role of training programs in strengthening e-government utilization among public servants (Abdul-Kareem & Oladimeji, 2024). By demonstrating how structured training enhances digital literacy, user confidence, and the effective use of e-government platforms, the study provides a framework for capacity-building initiatives tailored to the needs of the public service. This evidence can guide policymakers in developing targeted interventions that address persistent barriers such as technological resistance, digital skill gaps, and limited infrastructure support.

Beyond capacity development, the study also offers evidence-based recommendations for improving the accessibility, usability, and security of e-government platforms. It highlights practical challenges commonly faced during digital transformation in the public sector, including perceived risks, infrastructure limitations, and user-experience issues, and proposes actionable strategies to mitigate these barriers. In doing so, the

study contributes to the formulation of strategic policies that can accelerate e-government effective utilization, optimize resource allocation, and strengthen administrative efficiency. Ultimately, the practical significance of this research lies in its potential to inform sustainable digital governance reforms in Kaduna State and other contexts with similar socio-political and infrastructural realities.

1.7.2 Theoretical Significance

From a theoretical perspective, this study makes an important contribution to the Unified Model of Electronic Government Adoption (UMEGA) by extending its application to the context of a developing country, specifically Kaduna State in Nigeria. In contrast to earlier studies such as Rana et al. (2015) who validated UMEGA in the United Kingdom and Shareef et al. (2017) who applied it to e-government in Canada, and more recent studies such as Puspita et al. (2025) who use UMEGA as a determinant of trends in the use of rent payment systems and Puspitasari et al. (2025), who use UMEGA to examine the key factors influencing the use of e-procurement catalog for SMEs in Indonesia, this research applies the model to a subnational government in an African setting. This change broadens the empirical scope of UMEGA and emphasizes its adaptability to studied regions with different socio-political and infrastructural dynamics.

Furthermore, this study fills a critical gap in the literature by including training programs as a moderating variable in the relationship between e-government determinants and public service delivery outcomes. While existing studies have examined the direct effects of e-government adoption on service delivery, few have examined how training programs influence this relationship. By introducing this moderating effect, the study

increases the explanatory power of UMEGA and provides a new dimension for future research on digital governance and capacity building strategies.

Furthermore, this study contributes to the ongoing discourse on public sector innovation and digital transformation by integrating insights from theories of technology adoption, organizational behaviour, and public administration. The empirical findings validate and refine the theoretical assumptions on performance expectancy, effort expectancy, social influence, enabling conditions and perceived risks in utilization and provide a context-specific perspective on the interplay of these factors in a developing country.

Finally, the study provides a foundation for future research by proposing a conceptual framework that links e-government utilization, public service delivery, and training programs. Scholars interested in digital governance, technology adoption, and public sector reform can build on this study to examine additional moderating and mediating variables, conduct comparative studies across different regions, and assess long-term trends in e-government adoption.

1.8 Operational Definition of Key Terms

The following definitions of some key terms are provided for clarity and better understanding of the study.

1.8.1 Effective Public Service Delivery:

Effective public service delivery involves the timely and appropriate provision of public services by public authorities using ICT (Jejenywa, 2024). This ensures that citizens can access and use these services effectively to meet their needs. It can also be seen as the

provision of basic social and infrastructural facilities and amenities such as clean water, healthcare, education, housing, electricity and well-maintained roads by the government for the benefit of the people.

1.8.2 Level of Application

In the context of this study, the application level refers to the extent to which e-government platforms and tools are effectively implemented and utilized in the delivery of public services. It encompasses the depth and breadth of digital integration into administrative processes and reflects how well these systems are used to improve efficiency, accessibility and service quality.

1.8.3 Performance Expectancy

Performance expectancy, originally introduced by Davis (1989) in the Technology Acceptance Model (TAM), refers to the degree to which an individual believes that using a particular system will improve their job performance. In the context of e-government, this concept captures the expectation that digital platforms such as government websites or online portals will make tasks faster, easier, and less resource-intensive (Atmadja, 2025). For this study, performance expectancy specifically examines whether public servants perceive that adopting and utilizing e-government systems will enhance their efficiency, effectiveness, and overall productivity in carrying out official responsibilities.

1.8.4 Effort Expectancy

Effort expectation or perceived ease of use reflects a user's perception of how effortless it will be to operate a new system. This includes how clear, understandable, adaptable and controllable the system is and how easy it is to acquire the necessary skills to use it effectively (Nwokuke, 2022). EE can also be defined as the belief that a product is user-friendly. In this study, EE of public servants is defined as their ability to use e-government systems effectively (Nanda & Lita, 2025).

1.8.5 Social Influence

As described by Venkatesh et al. (2003), social influence refers to the extent to which someone believes that important people around them think that they should use a new system. This includes people such as family, friends and colleagues. It is important to note that this influence can be positive or negative, encouraging or discouraging someone to use the new system. Complementing this concept, Duan & Dong (2025) emphasize that favourable social conditions, where the use of the system is encouraged by the environment, can significantly increase a person's willingness to utilize a new information system.

1.8.6 Facilitating Conditions

Facilitating conditions, as described by Chan et al. (2025), refer to an individual's perception of the adequacy of an organization's technical and structural infrastructure to support the use of a particular system. In the context of this study, facilitating conditions represent the availability of essential resources such as reliable technology, supportive

infrastructure, and trained personnel that enable public servants to adopt and effectively use e-government platforms. These conditions are critical for the successful integration of ICT tools into government operations, ultimately enhancing organizational performance and ensuring more efficient delivery of public services.

1.8.7 Perceived Risks

Perceived risk refers to an individual's concerns about the potential negative consequences of using digital government services (Li, 2021). In the context of e-government, this includes uncertainties about whether online systems will function reliably, fears of technical failures, and worries about the security and privacy of personal data during digital interactions with government agencies. High levels of perceived risk can discourage citizens and public servants from adopting and utilizing e-government platforms. However, research shows that these concerns can be mitigated through clear regulations on data protection, the implementation of robust cybersecurity measures and proactive communication strategies that keep users well informed and confident in the system's reliability.

1.8.8 Training

Training can be defined as a systematic and planned process designed to develop an individual's knowledge, skills, and behaviours in order to enhance performance and productivity (Iqbal & Sidhu, 2022). It serves both individual and organizational goals by equipping employees with the competencies required to perform tasks effectively. According to the International Labour Organization (ILO, 2021), training is a structured learning process that improves work performance and organizational outcomes.

Similarly, Xie et al. (2021) emphasize that training involves the acquisition of knowledge, skills, and attitudes necessary to achieve desired results in specific roles. In the context of this study, training is conceptualized as a deliberate and structured intervention aimed at strengthening public servants' knowledge, skills, and abilities, thereby supporting the effective adoption and utilization of e-government systems.

1.8.9 Electronic Government

E-government refers to the use of information and communication technologies (ICT) by governments to interact with citizens, businesses, and other public institutions. It involves the electronic delivery of services and information with the overarching goal of enhancing efficiency, transparency, and accessibility in governance (Sadik-Zada et al., 2024). Adeolu-Akande et al. (2023) further describe e-government as the application of ICT in the conduct of government activities, enabling more effective administration and service provision. In essence, e-government serves as a digital channel through which governments can deliver services, share information, and engage stakeholders more responsively and inclusively.

1.8.10 Service Delivery

In this study, service delivery refers to the government's effectiveness in providing essential public services such as clean water, healthcare, education, housing, electricity, and transportation infrastructure. It emphasizes not only the availability of these services but also their consistent, equitable, and efficient delivery to citizens (Ogu et al., 2023).

1.9 Organization of Chapters

The opening chapter (Chapter One) provides the framework for the introduction to the research topic. It deals with the background, the problem to be addressed, the research questions guiding the study and the general aims. It also clarifies the scope of the research and defines key terms. Chapter two deepens the existing knowledge by presenting a comprehensive literature review. It also establishes a theoretical framework that examines key issues such as information and communication technology (ICT), e-government, its various dimensions and characteristics, the concept of effective public service delivery, and the importance of training public servants in government organizations. Previous empirical studies on variables were also examined to identify possible gaps in literature. The Unified Model of Electronic Government Adoption (UMEGA) was used as a theoretical framework to identify the link between the different variables studied.

Chapter three of this study deals specifically with the research methodology. In this chapter, the research methodology is explained in minute detail. The researcher explains the structure of the study, the methods of data collection and the source of data. The group of people involved in the study (the study population) is also presented. To ensure the quality of the results, the study tests the validity (truthfulness) and reliability (consistency) of the results. These results are then examined in more detail in chapter four. In this chapter, the data is analyzed further, the results are discussed, and a comparison is made with previous studies in this field. Finally, chapter five draws meaningful conclusions, generalizations and recommendations based on the results.

CHAPTER TWO

LITERATURE REVIEW AND RESEARCH FRAMEWORK

2.1 Introduction

A thorough review of the relevant literature on the key concepts of this study is essential to provide a solid foundation for answering the research questions (Kraus et al., 2022). By summarizing, analyzing and critically evaluating previous scientific papers, surveys and theoretical contributions, a literature review not only highlights what is already known but also identifies areas where knowledge is still limited (Lim et al., 2022). This process enables the researcher to identify gaps in existing studies and position their current research to make a meaningful contribution to the body of knowledge. For this study, a comprehensive literature review is particularly important as it provides insight into the relationship between the use of e-government and training programmes while deepening the understanding of how these factors jointly influence the effectiveness of public service delivery. More importantly, situating this study in the Nigerian context and Kaduna State in particular ensures that the study captures local realities such as infrastructural constraints, lack of digital skills and organisational resistance, thereby justifying the relevance and necessity of this study

2.2 Concept of Effective Service Delivery

The concept of effective service delivery is understood differently by different scholars, reflecting variations in institutional focus, governance context, and evaluative criteria (Iddrisu & Fuseini, 2025). While definitions vary, there is broad agreement that effective service delivery involves the consistent provision of high-quality services that meet the

needs, expectations, and rights of recipients in a timely, efficient, and responsive manner. For instance, Anshari et al. (2025) define effective service delivery as the optimal use of available resources to ensure accountability, accessibility, sustainability, and user satisfaction. Similarly, Ojiako et al. (2024) explain effective service delivery as the systematic execution of service processes that ensure accuracy, timeliness, equity, and continuous improvement, while Maina and Otieno emphasize the achievement of desired outcomes and measurable benefits that improve quality of life and meet stakeholders' expectations. These definitions converge on the importance of efficiency, quality, and satisfaction, although they differ in the degree of emphasis placed on outcomes versus processes.

International scholars further conceptualize effective service delivery as a fundamental responsibility of government, focusing on how public services are provided directly or indirectly to citizens (Nanda & Lita, 2025; Nkgapele, 2024; Dillon et al., 2021). Nanda and Lita (2025) explain that governments may deliver services directly through public institutions or indirectly by financing third parties to provide essential services such as security, water supply, healthcare, and education. Similarly, Anshari et al. (2025) and Osborne and Strokes (2022) argue that activities such as building roads, hospitals, and providing electricity, water, and sanitation constitute core components of service delivery. While this perspective highlights the institutional role of government, it places relatively less emphasis on citizens' subjective evaluations of service quality and satisfaction, suggesting a more institution-centred understanding of service delivery.

Other scholars adopt a welfare-oriented perspective, defining effective service delivery as the method through which local, state, or federal governments provide public services

aimed at improving citizens' wellbeing (Omodero & Fandango, 2019; Mehmood, 2021; Abdulkareem et al., 2024). These services include waste disposal, public education, healthcare, and street cleaning, all of which are intended to ensure equitable access to basic needs (Anshari et al., 2025). Nnaji et al. (2023) emphasize that service delivery represents a crucial link between the state and its citizens, as the provision of public goods and social amenities forms the core of government legitimacy. Méndez-Rivera et al. (2023) further explain that service delivery encompasses the activities of government employees and institutions in formulating and implementing public policies in the interest of the masses. Collectively, these studies emphasize equity, accessibility, and welfare outcomes, thereby extending the concept of effective service delivery beyond operational efficiency.

Despite these shared views, scholars differ in how they interpret the broader implications of effective service delivery. Stewart et al. (2022) describe service delivery as a broad concept encompassing utilities, healthcare, education, security, and policing, arguing that certain services, such as national defence, are better provided by governments than by private entities. Sadik-Zada et al. (2024) similarly stress citizen satisfaction as a key indicator of effective service delivery. In contrast, Van der Voet et al. (2025) argue that effective service delivery not only demonstrates concern for citizens' welfare but also promotes economic progress by increasing public trust in government institutions. This trust, in turn, motivates citizens to comply with civic responsibilities such as tax payment (Anshari et al., 2025). These perspectives suggest that effective service delivery serves both social and economic functions, reinforcing governance effectiveness and public confidence.

In defining effective public service delivery, the contributions of earlier scholars such as Besley and Ghatak (2006) remain significant, particularly their emphasis on institutional incentives and organizational effectiveness within the public sector (Prasad et al., 2023). Chi et al. (2021) further observe that the effectiveness of public services is assessed differently by various stakeholders, including citizens, public servants, taxpayers, and policymakers, each applying distinct criteria and priorities. Consequently, as noted by Prasad et al. (2023), there are no fixed or universal benchmarks for evaluating public service effectiveness. This complexity is amplified in e-government contexts, where effectiveness is assessed not only in terms of service outcomes but also accessibility, user-friendliness, responsiveness, and trust in digital platforms. In Kaduna State, for example, citizens tend to emphasize efficiency and accessibility of services such as land registration and tax payments, while public servants focus on system usability and workload implications, and policymakers prioritize transparency and accountability.

Nevertheless, several scholars agree that effective public service delivery comprises measurable and tangible elements, including quantity of services delivered, speed of delivery, effectiveness, and user satisfaction (Tiwari, 2022; Prasad et al., 2023). Tiwari (2022) further emphasizes that satisfaction is a critical indicator of service effectiveness, as it reflects both service quality and perceived value. Efthymiou (2025), however, cautions that improving service delivery requires more than superficial changes in procedures, stressing the need for organizational commitment and service-oriented cultures within public institutions.

In developing appropriate measures of effective public service delivery, Prasad et al. (2023) initially identified multiple organizational and service-related dimensions

through empirical analysis and focus group discussions. Although their framework includes multidimensional constructs such as clarity of organizational structure, service reliability, responsiveness, and communication, their findings indicate that the core dimensions of quantity, speed of delivery, effectiveness, and satisfaction account for a substantial proportion of variation in service delivery outcomes. However, they also acknowledge that contextual factors influencing service delivery, particularly in developing-country settings, remain underexplored.

Despite the extensive literature reviewed, two critical gaps remain evident. First, most studies focus on national-level or cross-country analyses, with limited attention to state-level public institutions in developing countries. Second, there is insufficient empirical evidence on how effective public service delivery is shaped within e-government-enabled environments, especially where training and digital capacity constraints persist. Addressing these gaps, this study adopts the unidimensional measure of effective public service delivery proposed by Prasad et al. (2023), focusing on quantity, speed of delivery, effectiveness, and satisfaction, as these dimensions are most appropriate for evaluating e-government-driven service delivery outcomes among MDAs in Kaduna State, Nigeria.

2.2.1 Measures of Scaling Effective Public Service Delivery

International scholars like Prasad et al. (2023) employed the results of an intensive literature review, complemented by the personal experiences of the researchers, to develop measurement items with strong face and criterion validity. Their approach builds on earlier empirical work, particularly the variables proposed by Ojugo and

Eboka (2021), thereby reinforcing the robustness and continuity of measurement approaches used to assess effective service delivery in public sector organizations. This alignment suggests a growing scholarly consensus on the key organizational and managerial dimensions that underpin service delivery effectiveness.

According to Ojugo and Eboka (2021), effective service delivery systems depend on an optimal combination of factors, including a clear organizational structure, service specialization, service reliability, management aligned with defined objectives, and a balanced distribution of authority and responsibility. They further emphasize the importance of empathy, effective communication, organizational strategy, and institutional responsiveness in ensuring quality service outcomes. Similarly, Prasad et al. (2023) underscore that the alignment of these organizational and human elements with performance goals is critical for achieving both efficiency and effectiveness in public service delivery. While both studies converge on the importance of internal organizational coherence and strategic alignment, Prasad et al. (2023) extend this perspective by empirically demonstrating how these dimensions collectively explain variations in service delivery performance.

In the context of e-government, these factors assume heightened importance, as digital platforms place additional demands on service reliability, process clarity, and institutional responsiveness. The effectiveness of e-government systems is therefore not determined solely by the availability of digital technologies, but also by how well organizational structures, managerial practices, and human capacities are integrated into system design and utilization. In sub-national settings such as Kaduna State, where MDAs operate under varying levels of digital readiness, these organizational and human

factors become critical determinants of whether e-government initiatives translate into improved service delivery outcomes. This reinforces the need to assess effective public service delivery within e-government environments through measurement approaches that capture both operational performance and organizational capacity.

2.2.1.1 Clarity of Organizational Structure

Clarity of organizational structure (COS) can be understood as the foundational framework that defines how an organization functions and coordinates its activities (Rasul et al., 2021). It is widely assumed that organizational structure shapes the behaviour of organizational members by guiding how tasks, responsibilities, and authority are distributed and executed (Schnackenberg et al., 2021). Every organization therefore relies on an administrative structure to manage and control its processes, and when such structures are clearly defined and well designed, they minimize unnecessary effort, reduce ambiguity, and limit variations that can disrupt performance (Rasul et al., 2021). Empirical studies consistently underscore the importance of organizational structure at both the organizational and subunit levels, demonstrating its strong influence on efficiency and effectiveness. However, the literature also reveals that clarity of structure is conceptualized and operationalized differently across service delivery contexts, suggesting that its effects are contingent on organizational environment and mode of service provision.

In the context of e-government utilization, clarity of organizational structure assumes heightened importance due to the formalization and standardization required by digital systems. Without clearly defined roles, reporting lines, and responsibilities, e-

government platforms risk being underutilized or misapplied, as public servants may be uncertain about system ownership, accountability, and decision-making authority. This observation aligns with institutional perspectives which argue that technology adoption outcomes are shaped not only by system availability but also by organizational readiness and structural coherence. In Kaduna State, for instance, initiatives such as the Kaduna Geographic Information Service (KADGIS) and the Kaduna Internal Revenue Service (KADIRS) rely heavily on structured administrative frameworks to embed digital platforms into routine operations. Where organizational clarity is weak, public servants often revert to manual procedures, thereby undermining the efficiency, transparency, and responsiveness gains expected from e-government initiatives. Consequently, COS influences not only general organizational performance but also determines the extent to which e-government systems are effectively utilized to enhance public service delivery

2.2.1.2 Service Specialization

Recipients of public services often derive significant social benefits from long-term relationships with the government agencies responsible for delivering such services, including professional sectors such as education and healthcare (Schnackenberg et al., 2021). These benefits are associated with feelings of familiarity, personal recognition, trust, connectedness, and social support that develop over time. Specialization within public institutions plays a crucial role in this process, as officials who are trained and entrusted to provide specific services are better able to promptly address citizens' needs and complaints, thereby delivering the desired outcomes with minimal time and effort (Nnaji et al., 2023). In the context of e-government, specialization becomes even more important, since digital systems require skilled personnel who can manage platforms

effectively and assist citizens in navigating online services. Where specialized staff are available, citizens are more likely to trust and consistently utilize e-government platforms. However, in states such as Kaduna, the shortage of adequately trained and specialized personnel often forces citizens back to manual service channels, limiting the efficiency and effectiveness of digital governance initiatives.

2.2.1.3 Management by Objectives

Recipients of public services often derive significant social benefits from sustained and long-term relationships with the government agencies responsible for service provision, particularly within professional sectors such as education and healthcare (Schnackenberg et al., 2021). These benefits are reflected in feelings of familiarity, personal recognition, trust, connectedness, and social support that develop through repeated interactions over time. Such relational benefits underscore the importance of institutional specialization, as public officials who are trained and assigned to specific service functions are better positioned to understand service processes, respond promptly to citizens' needs, and resolve complaints efficiently, thereby achieving desired service outcomes with minimal time and effort (Nnaji et al., 2023).

In e-government contexts, the role of specialization becomes even more pronounced, as digital service delivery systems require personnel with both technical competence and service-specific knowledge to manage platforms effectively and support users. Where specialized staff are available, citizens are more likely to experience reliable and responsive services, which in turn strengthens trust and encourages sustained utilization of e-government platforms. Conversely, limited specialization within public institutions

constrains the effective deployment of digital systems. In sub-national contexts such as Kaduna State, shortages of adequately trained and specialized personnel often compel citizens to revert to manual service channels, thereby undermining the efficiency, responsiveness, and service-quality gains expected from e-government initiatives. This suggests that specialization is not only a determinant of relational trust between citizens and public institutions but also a critical enabling condition for translating e-government adoption into improved public service delivery.

2.2.1.4 Service Reliability

Reliability is an interdisciplinary concept applied across diverse sectors such as energy supply, transportation, education, banking, healthcare, and public service delivery. Across these domains, organizational effectiveness cannot be meaningfully assessed without consideration of the reliability of systems and processes (Nnaji et al., 2023). In the context of service delivery, reliability reflects a structured and consistent approach to service provision, often supported by systematic problem-solving methods, even when service outcomes are partly intangible. For public service providers, reliability is ultimately evaluated by citizens based on their lived experiences, which are shaped by the consistency of service specifications, system performance, and the actual delivery of promised services (Schnackenberg et al., 2021).

Within e-government environments, service reliability assumes heightened importance, as citizens' willingness to adopt and continue using digital platforms depends largely on the stability, accessibility, and trustworthiness of such systems (Schnackenberg et al., 2021). Unlike traditional service channels, digital platforms expose users more directly

to system failures, service interruptions, and response delays, thereby making reliability a critical determinant of user trust and sustained utilization. Where e-government systems function reliably, citizens are more likely to perceive government services as efficient, transparent, and dependable; conversely, unreliable systems erode confidence and discourage continued use.

In Kaduna State, initiatives such as the Kaduna Geographic Information Service (KADGIS) and the Kaduna Internal Revenue Service (KADIRS) illustrate both the potential and challenges of e-government-enabled service delivery. While these platforms have enhanced access to services, recurring issues such as internet disruptions, inconsistent platform performance, and delayed response times have weakened citizens' confidence in digital channels. When reliability is compromised, users frequently revert to manual service processes, thereby undermining the efficiency, transparency, and cost-saving objectives of digital transformation. Ensuring service reliability through robust technological infrastructure, responsive institutional processes, and continuous system maintenance is therefore central to strengthening e-government utilization and enhancing effective public service delivery in Kaduna State.

2.2.1.5 Sense of Responsibility and Authority

Authority is closely linked to responsibility, as the delegation of authority to another individual does not absolve the original holder from accountability for outcomes (Syafei, 2025). Responsibility represents the obligation to complete assigned tasks effectively, and individuals entrusted with such duties are expected to perform them diligently, with commitment, and in alignment with organizational objectives (Ärleskog, 2025). When

responsibilities are neglected or tasks remain incomplete, accountability mechanisms require both acknowledgment of failure and corrective action. However, responsibility without commensurate authority often generates frustration and dissatisfaction among public officials, as effective performance depends on the ability to make decisions, access resources, and influence processes. As Syafei (2025) observes, responsibility tends to flow upward while authority flows downward, underscoring the need for a balanced distribution of both for effective governance and service delivery.

Within e-government environments, the alignment between authority and responsibility becomes even more critical due to the procedural rigidity and technical complexity of digital systems. Public servants may be assigned responsibility for operating, monitoring, or delivering services through digital platforms but lack the authority to make decisions regarding system access, workflow adjustments, or resource allocation. This imbalance can limit responsiveness and reduce the effectiveness of digital service delivery. In Kaduna State, for example, staff in ministries, departments, and agencies are often expected to utilize platforms such as the Kaduna Geographic Information Service (KADGIS) or the Treasury Single Account (TSA) system without sufficient decision-making power or technical autonomy. As a result, officials may feel accountable for service outcomes while being constrained by limited authority, thereby discouraging proactive system use and innovation. Bridging this gap through clearer delegation of authority and institutional empowerment is therefore essential for ensuring that e-government systems are not only adopted but fully utilized to enhance effective public service delivery.

2.2.1.6 Service Empathy

Empathic communication is widely recognised as a fundamental component of interactions between government organizations and service-seeking citizens, particularly in shaping perceptions of service quality and citizen satisfaction (Coker & Thakur, 2024). Proponents argue that the ability of public officials to accurately infer citizens' feelings, goals, attitudes, motivations, beliefs, intentions, and behaviours directly enhances service effectiveness and the perceived value of public services (Waghid, 2024). This view aligns with service quality literature which emphasises empathy as a core dimension of effective service delivery, especially in public and professional service contexts (Parasuraman et al., 1988; Osborne, 2018). From this perspective, empathy is not merely a personal attribute but a professional capability that strengthens communication, builds trust, and facilitates meaningful engagement between public servants and citizens (Wang, 2024).

However, this perspective has been questioned by scholars who argue that empathic communication alone is insufficient to guarantee effective service delivery in bureaucratic systems constrained by rigid procedures, limited resources, and weak institutional coordination (Lipsky, 2010; Andrews & Van de Walle, 2013). These scholars contend that while empathy may improve citizens' experiences at the interactional level, its impact on service outcomes is conditional on organizational capacity, system reliability, and institutional support. This argument suggests that empathy enhances service delivery only when embedded within functional administrative and technological structures.

The debate becomes more pronounced in e-government contexts. On one hand, digital platforms are often criticised for reducing face-to-face interaction, thereby limiting emotional cues and personalised engagement (Margetts & Dunleavy, 2013). On the other hand, emerging evidence suggests that empathic communication can be reconfigured rather than eliminated in digital environments through responsive help desks, interactive feedback mechanisms, user-centred system design, and timely human intervention (Bertot, Estevez & Janowski, 2016; Luna-Reyes & Gil-Garcia, 2014). This counterargument implies that empathy remains relevant in e-government but must be operationalised differently.

In Kaduna State, for example, citizens interacting with platforms such as KADGIS and KADIRS may experience frustration when challenges are not acknowledged or when responses are overly technical and impersonal. Such experiences lend support to critiques of poorly designed digital systems. Conversely, when public servants complement digital service delivery with empathic communication by acknowledging concerns, simplifying guidance, and responding promptly, citizens are more likely to trust and consistently utilise e-government services. Consistent with relational governance theory (Van de Walle & Bouckaert, 2003), this suggests that empathic communication functions as a context-dependent enabler that strengthens the relationship between e-government utilisation and effective public service delivery rather than acting as an independent determinant.

2.2.1.7 Responsiveness in Services Delivery

Service readiness refers to the extent to which an organization is equipped to provide effective service delivery through systems capable of receiving, analysing, recording, and tracking the needs of the public (Latupeirissa et al., 2024). Beyond technical capacity, service readiness also encompasses organizational culture, particularly the ability of an institution or its departments to articulate a clear service vision, ensure internal alignment, and promote teamwork in support of that vision (Wang, 2024). From this perspective, a high level of service readiness reflects not only the presence of reliable information systems but also a supportive organizational environment that prioritizes responsiveness, learning, and continuous improvement in addressing public needs.

While many scholars agree that service readiness is a prerequisite for effective service delivery, there is debate regarding the relative importance of technological versus organizational dimensions. Some studies emphasize the primacy of ICT infrastructure and data management systems in enabling readiness, arguing that without robust digital systems, service delivery processes remain fragmented and inefficient (Heeks, 2006; Gil-Garcia, 2012). In contrast, other scholars contend that technological readiness alone is insufficient, stressing that organizational culture, leadership support, and interdepartmental coordination are equally critical determinants of readiness and performance (Osborne, 2018; Mergel, Edelmann & Haug, 2019). This divergence suggests that service readiness is inherently multidimensional, requiring the alignment of technical capacity with organizational and human factors.

In the context of e-government, service readiness becomes a decisive factor in determining whether digital platforms are effectively adopted and utilized. E-government initiatives require not only ICT infrastructure but also strong data governance frameworks, interoperability across departments, and an enabling organizational culture that supports innovation and change (Bertot, Estevez & Janowski, 2016; Luna-Reyes & Gil-Garcia, 2014). In Kaduna State, platforms such as the Kaduna Geographic Information Service (KADGIS) and the Kaduna Internal Revenue Service (KADIRS) demonstrate the potential of digital systems to enhance transparency and efficiency. However, their effectiveness has often been constrained by weak information systems, limited interoperability, and insufficient internal support for digital transformation. These challenges reinforce arguments in the literature that inadequate service readiness undermines the capacity of public institutions to translate digital investments into tangible service improvements

2.2.1.8 Service Strategy and Performance

In analysing the relationship between strategy and performance, traditional measures of service delivery barriers are often inadequate, as public service providers are not merely passive responders to citizen demands but active agents that shape how services are designed, delivered, and evaluated. From this perspective, performance extends beyond output indicators to encompass a set of coordinated processes and managerial practices aimed at meeting citizens' expectations and enhancing their overall service experience. Scholars argue that public service organizations therefore assess performance by evaluating how effectively these processes function and by formulating strategies that

promote efficiency, effectiveness, and responsiveness in addressing public needs (Latupeirissa et al., 2024). This view aligns with strategic public management literature, which emphasizes that performance outcomes are inseparable from the quality of strategic alignment between organizational goals, service processes, and citizen expectations (Boyne, 2003; Andrews et al., 2011).

However, this strategic view of performance has generated debate within the literature. While some scholars contend that well-designed strategies directly improve service outcomes, others argue that performance gains are often constrained by institutional rigidities, resource limitations, and weak implementation capacity, particularly in public sector contexts (Pollitt & Bouckaert, 2017; Osborne, 2018). This suggests that strategy alone is insufficient unless it is translated into operational practices and supported by appropriate performance measurement systems. In response to this challenge, recent studies advocate the use of clear, outcome-oriented performance measures that capture citizens' experiences rather than relying solely on internal efficiency metrics.

To guide this study, the unidimensional measure of effective public service delivery proposed by Prasad et al. (2023) is adopted, which evaluates performance in terms of quantity of services delivered, speed of delivery, effectiveness, and user satisfaction. This measurement approach responds directly to calls in the literature for performance indicators that are both operationally meaningful and citizen-centred, particularly in public service contexts where service quality and satisfaction are critical indicators of success.

In the context of e-government, the relationship between strategy and performance becomes even more salient. Digital platforms require clear and coherent strategies to ensure that systems are not only deployed but effectively utilized to meet citizens' expectations. Scholars argue that e-government performance depends heavily on strategic alignment between digital initiatives, organizational processes, and user needs (Heeks, 2006; Gil-Garcia & Pardo, 2005). In Kaduna State, initiatives such as the Kaduna Geographic Information Service (KADGIS) and the Kaduna Internal Revenue Service (KADIRS) illustrate how performance can be strengthened when strategies prioritize speed, accessibility, transparency, and user satisfaction. Conversely, where strategies are poorly aligned with performance objectives such as when systems lack interoperability, staff training is inadequate, or platforms fail to address user concerns e-government initiatives often experience underutilization and declining citizen trust. This reinforces arguments in the digital governance literature that strategic misalignment undermines performance and limits the capacity of e-government initiatives to deliver meaningful improvements in public service delivery.

2.3 Public Service Reform Characteristics

The delivery of public services remains a cornerstone of effective governance, as it directly shapes citizens' trust in government and the legitimacy of public institutions (Iddrisu & Fuseini, 2025). Governments worldwide continue to pursue improvements in efficiency, accessibility, and responsiveness in service provision in response to rising citizen expectations and fiscal pressures (Kuhlmann et al., 2025). Recent public sector modernization efforts have therefore emphasized streamlining bureaucratic processes, enhancing transparency, and adopting citizen-centric approaches to service delivery

(Kuhlmann et al., 2025). However, the effectiveness of these reforms is not automatic. Their success depends largely on the willingness and capacity of public servants to embrace change and innovation, as officials' attitudes, competencies, and behaviours play a decisive role in translating reform strategies into improved organizational performance (Clifton et al., 2021).

Empirical evidence suggests that countries with strong public service systems tend to achieve better socio-economic outcomes, underscoring the importance of continuous administrative improvement and institutional learning (Tobi & Oikhala, 2021). Nevertheless, scholars caution that service delivery reforms often yield uneven results across contexts. While modernization initiatives may succeed in some settings, they can fail or produce limited gains in others due to variations in institutional capacity, resource availability, governance quality, and levels of technology adoption (Clifton et al., 2021; Kuhlmann et al., 2025). This divergence highlights the argument that public service effectiveness is context-dependent rather than universally transferable.

In advanced economies such as the United States, improvements in public service delivery are frequently supported by sustained investments in workforce development, technological integration, and performance management systems (Tobi & Oikhala, 2021). Studies show that comprehensive training programmes, merit-based incentives, and performance-oriented management frameworks contribute significantly to service quality while reinforcing accountability and transparency (Asaju & Ayeni, 2021). However, critics argue that these models are difficult to replicate wholesale in developing-country contexts, where structural and institutional constraints often limit reform implementation (Pollitt & Bouckaert, 2017).

In contrast, many developing countries continue to face persistent challenges such as bureaucratic inertia, inadequate funding, weak accountability mechanisms, and systemic corruption, all of which constrain improvements in service delivery (Blum & Rogger, 2021). Evidence from African and Latin American contexts indicates that financial constraints, coupled with resistance to organizational change among public servants, constitute major barriers to effective reform (Mahmoud & Othman, 2021). These challenges are further intensified by rigid hierarchical structures and fragmented administrative systems that discourage innovation and reduce coordination across public agencies (Pribadi, 2021). As a result, reforms that focus solely on structural changes without addressing behavioural and institutional dynamics often fail to produce sustainable improvements.

The literature therefore increasingly emphasizes that effective public service delivery requires multi-faceted solutions that address both systemic and human factors (Lowe et al., 2021). Building institutional capacity through targeted training, improved remuneration, and strengthened anti-corruption mechanisms is widely regarded as essential for enhancing public sector performance (Mahmoud & Othman, 2021). Equally important is fostering inter-agency collaboration to reduce organizational silos and improve service coordination, particularly in digitally enabled governance environments. For developing countries such as Nigeria, prioritizing investment in human capital and physical infrastructure remains critical to creating an enabling environment for reform. At the same time, scholars stress the importance of visionary leadership and reform-oriented public servants capable of adapting global best practices to local realities (Mahmoud & Othman, 2021). Ultimately, the success of public service reforms depends

on sustained political will, adequate resource allocation, and the ability to align institutional reforms with citizens' evolving needs and expectations.

2.3.1 Public Service Reform in Some Selected Asian Countries.

Asian countries are frequently cited in the literature as global leaders in public service innovation, demonstrating how strategic and sustained reforms can transform administrative efficiency and service quality (Bush et al., 2023). However, scholars caution that these successes are not the result of isolated policy interventions but rather of long-term institutional investments, coherent reform strategies, and strong alignment between human capital development and technological adoption (Pribadi, 2021). This suggests that public service innovation in Asia is best understood as a systemic process rather than a purely technological one.

Japan represents a distinctive model of public service excellence grounded in human resource development and institutional continuity. Its public service system emphasizes lifelong learning, merit-based promotion, and professionalization, contributing to one of the most efficient bureaucracies globally (Raja Adnan et al., 2022). Facing profound demographic pressures, with approximately 29% of its population aged 65 or older, Japan has implemented innovative reforms in elderly care by transitioning from hospital-centred delivery to community-based integrated care systems (Mahmoud & Othman, 2021). Scholars argue that this shift reflects strategic adaptation rather than crisis response, as it has improved service accessibility while simultaneously reducing healthcare costs (Raja Adnan et al., 2022). Japan's high EGDI score (0.9002) and global

ranking further illustrate how sustained investment in human capital, rather than rapid digitalization alone, underpins effective service delivery outcomes.

China's approach to public service reform presents a contrasting but equally instructive case. Unlike Japan's gradual, human-centred model, China has pursued large-scale, state-driven digital transformation across the public sector (Pribadi, 2021). Through centralized one-stop service centres and the integration of advanced technologies such as artificial intelligence and blockchain, China has achieved notable gains in service efficiency and accessibility (Mahmoud & Othman, 2021). However, scholars debate whether China's success is transferable, noting that its centralized governance structure and strong regulatory enforcement play a critical role in ensuring uniform service quality across regions (Pribadi, 2021). This suggests that digital transformation yields positive outcomes when supported by strong institutional coordination and regulatory capacity, rather than technology deployment alone.

Within Southeast Asia, Malaysia has emerged as a regional leader through its performance-oriented Star Rating System, which evaluates and incentivizes service quality across government agencies (Raja Adnan et al., 2022). Unlike purely compliance-based reforms, this framework promotes continuous improvement, knowledge sharing, and innovation among public servants (Pribadi, 2021). Similarly, Thailand's adaptation of Japanese management techniques illustrates how international best practices can be localized to suit domestic administrative contexts. By combining performance tracking with talent retention strategies, Thailand has enhanced operational efficiency while supporting broader economic development goals (Raja Adnan et al.,

2022). These cases reinforce the argument that reform effectiveness depends on contextual adaptation rather than policy imitation.

Indonesia provides further evidence that digital investment alone is insufficient without complementary governance reforms. While the country has expanded nationwide e-service platforms and mobile administrative applications to improve service accessibility across its geographically dispersed population, these initiatives have been most effective when accompanied by capacity-building and anti-corruption measures (Mahmoud & Othman, 2021; Raja Adnan et al., 2022). Increased transparency and accountability have played a crucial role in strengthening public trust, highlighting the interdependence between digital tools and institutional integrity.

Across these Asian cases, several analytical patterns emerge. First, the integration of technology with sustained human capital development appears central to successful reform, whether through Japan's training-oriented bureaucracy or China's digitally enabled service platforms (Mahmoud & Othman, 2021). Second, performance measurement and accountability mechanisms such as Malaysia's Star Rating System serve as critical drivers of service quality improvement. Third, the ability to adapt global best practices to local political, cultural, and institutional contexts, as seen in Thailand and Indonesia, determines the sustainability of reform outcomes.

Collectively, these experiences challenge simplistic narratives that equate public service reform with digitalization alone. Instead, the literature increasingly emphasizes holistic reform approaches that combine technological innovation with organizational capacity building, performance management, and context-sensitive policymaking (Raja Adnan et

al., 2022). As governance challenges become more complex, the Asian experience offers valuable but conditional lessons for other countries, underscoring that effective public service delivery is ultimately shaped by the alignment of technology, institutions, and human agency (Pribadi, 2021).

2.3.2 Public Service Reform in Some Selected European Countries

European countries are widely regarded as global benchmarks for public service delivery due to their sustained investments in digital government and administrative reform (Chapman, 2024). However, scholars caution that Europe's success in digital governance is not merely the result of technological adoption but reflects long-term institutional capacity, high levels of public trust, and strong alignment between policy design, workforce capability, and service outcomes (Clifton et al., 2021). This suggests that European public service reforms should be interpreted as integrated governance systems rather than isolated digital initiatives.

Denmark represents one of the most advanced examples of digital public service delivery, consistently ranking first on the United Nations E-Government Development Index with a score of 0.9717 (Chapman et al., 2025). Its reform model is characterized by comprehensive digital infrastructure and near-universal citizen access, with approximately 99% of citizens using online government services (Clifton et al., 2021). Scholars argue that Denmark's success stems from early adoption of digital identification systems and continuous investment in workforce development, ensuring that public servants possess the skills required to operate evolving digital platforms effectively (Pribadi, 2021). The national digital mail platform exemplifies this integrated

approach by serving as a centralized communication channel between government and citizens. Notably, initiatives such as e-invoicing have generated annual savings of approximately €150 million, illustrating the fiscal benefits of digital transformation when embedded within coherent administrative systems (Sehl et al., 2022).

Finland provides a complementary model, ranking second globally with an EGDI value of 0.9533 (Chapman, 2024). Unlike Denmark's efficiency-driven narrative, Finland's reform emphasizes transparency, interoperability, and citizen empowerment. The country's open data policy enables real-time access to government information, while widespread adoption of electronic identification facilitates seamless access to both domestic and cross-border European Union services (Clifton et al., 2021). Approximately 86% of Finns use e-ID systems, reflecting high levels of digital trust and inclusion (Sehl et al., 2022). Scholars further attribute Finland's success to its emphasis on continuous training and digital literacy among public servants, ensuring that technological advances are matched by institutional competence (Pribadi, 2021). However, critics note that Finland's achievements are partly enabled by relatively small population size and strong social cohesion, raising questions about scalability in less cohesive administrative contexts.

The United Kingdom has pursued a distinct path through its Government Digital Service (GDS) initiative, which emphasizes user-centred design and agile development rather than comprehensive system centralization (Sehl et al., 2022). Ranked 11th globally in e-government development, the UK model integrates rigorous digital standards with iterative service design informed by user feedback (Clifton et al., 2021). This approach has delivered tangible outcomes, including significant reductions in operating costs and

high citizen satisfaction with online platforms (Pribadi, 2021). Scholars argue that the UK's success reflects the strategic role of adaptive governance, where flexibility and experimentation compensate for institutional complexity (Chapman, 2024). At the same time, critics highlight that uneven digital capacity across local authorities has limited the uniformity of reform outcomes.

Estonia's digital transformation offers perhaps the most comprehensive example of end-to-end e-government integration. Despite its small size, Estonia has achieved near-universal online service availability and operated a paperless cabinet system since 2000 (Sehl et al., 2022). The X-Road data exchange platform securely links government databases while granting citizens control over personal data through digital identification cards used by approximately 98% of the population (Clifton et al., 2021). Scholars attribute Estonia's success to early investment in digital education, robust cybersecurity frameworks, and strong legal protections that have sustained public trust in e-services (Chapman, 2024). Nevertheless, the literature cautions that Estonia's model benefits from centralized coordination and a relatively homogenous administrative environment, which may not be easily replicated in larger or more fragmented states.

Taken together, these European experiences challenge the notion that digital technology alone drives public service excellence. While Denmark, Finland, the United Kingdom, and Estonia follow different reform trajectories, common features include strong digital infrastructure, continuous staff training, institutional coordination, and sustained public trust (Sehl et al., 2022). Importantly, these cases illustrate that effective digital government emerges when technological innovation is aligned with organizational capacity, performance management, and democratic accountability (Chapman, 2024).

As governments globally seek to modernize public service delivery, the European experience provides valuable but conditional lessons, underscoring that successful reform depends not only on adopting digital tools but on embedding them within resilient administrative and institutional frameworks.

2.3.3 Public Service Reform in Leading African Nations

Although public administration in Africa continues to face significant structural and institutional challenges, the literature increasingly recognizes that several African countries have emerged as regional leaders in modernizing public service delivery (Tobi et al., 2021). Scholars caution, however, that these successes should not be interpreted as continent-wide transformation but rather as context-specific reform trajectories shaped by political commitment, institutional capacity, and governance choices (Blum & Rogger, 2021). Countries such as South Africa, Mauritius, Seychelles, and Tunisia are frequently cited as reform-oriented cases that demonstrate how targeted interventions can yield measurable improvements in administrative efficiency and citizens' access to public services.

South Africa represents one of the most institutionally advanced public service systems on the continent, particularly through its adoption of integrated service delivery centres that consolidate multiple government functions within a single access point (Asaju & Ayeni, 2021). The Batho Pele ("People First") initiative is widely regarded as a normative shift in public administration, reorienting public servants toward citizen-centred service delivery. Empirical evidence suggests that this initiative has contributed to improvements in service quality and response times (Asaju & Ayeni, 2021). However,

scholars also note that the effectiveness of South Africa's reforms varies across provinces, indicating that institutional capacity and leadership at sub-national levels play a decisive role in shaping reform outcomes. The introduction of performance management systems linking promotion and remuneration to measurable results has strengthened accountability, yet concerns remain regarding uneven implementation and resistance within certain bureaucratic segments.

Mauritius offers a contrasting model rooted in administrative professionalism and strategic prioritization despite limited resources. Often cited as a role model for small island developing states, Mauritius has built an efficient public service anchored in merit-based recruitment and promotion systems (Asaju & Ayeni, 2021). This professional bureaucracy has enabled the country to deploy technology-enabled services effectively, even in the absence of large-scale financial capacity (Blum & Rogger, 2021). The "Maurice Île Durable" programme further illustrates how public service delivery can be aligned with broader sustainability objectives, integrating environmental governance into service provision in areas such as waste management and renewable energy. Scholars argue that Mauritius's success reflects the benefits of policy coherence and institutional stability rather than technological sophistication alone.

Seychelles provides another instructive case, demonstrating how small population size can facilitate responsiveness and service personalization. The country's community health programme, which delivers primary healthcare through mobile clinics and home-based services, has achieved near-universal coverage and is often cited as a benchmark for healthcare delivery in Africa (Blum & Rogger, 2021). In education, sustained investment in teacher training has translated into improved learning outcomes,

positioning Seychelles among the continent's best-performing systems (Chapman, 2024). Nevertheless, the literature cautions that Seychelles' model benefits from scale advantages and high per-capita investment, raising questions about its replicability in larger, resource-constrained states.

Tunisia's reform trajectory highlights the role of decentralization and governance reform in improving public service delivery. Following its democratic transition, Tunisia expanded the authority of local governments, enabling more responsive and context-sensitive service provision, particularly in marginalized regions (Chapman, 2024). Anti-corruption reforms in public procurement have enhanced transparency and reduced fiscal leakages, while e-government initiatives have streamlined administrative procedures for citizens and businesses (Blum & Rogger, 2021). Scholars note, however, that Tunisia's progress remains vulnerable to political instability and fiscal pressures, underscoring the importance of sustained institutional support for reform continuity.

Across these African cases, several analytical patterns emerge. First, successful reforms are consistently associated with strong political commitment and leadership rather than technological adoption alone (Blum & Rogger, 2021). Second, investment in public service capacity through professionalization, training, and performance management appears central to improving service outcomes. Third, reform effectiveness depends heavily on tailoring strategies to local institutional and socio-economic conditions rather than replicating external models wholesale. While challenges such as inconsistent implementation and sustainable financing persist, these experiences demonstrate that African countries can develop public service systems that meet international standards while addressing region-specific development needs. Collectively, these cases provide

valuable but conditional lessons for other African countries seeking to strengthen governance and improve public service delivery outcomes.

2.3.4 Public Service Reform in Nigeria

Nigeria has in recent years intensified efforts to transform public service delivery through a combination of technological adoption and institutional reforms, reflecting a broader shift toward efficiency, transparency, and digital governance (Asaju & Ayeni, 2021). A notable development is the introduction of Service-Wise GPT by the federal government, which represents an innovative attempt to integrate artificial intelligence into bureaucratic processes (Blum & Rogger, 2021). The platform has reportedly enhanced information access and processing among public servants, with early evidence suggesting time savings of approximately two to three hours per day for users and high satisfaction levels (Asaju & Ayeni, 2021). Such initiatives align with the broader Renewed Hope agenda, which emphasizes administrative efficiency and transparency as core public sector reform objectives (Blum & Rogger, 2021).

Complementing these digital innovations, the Federal Civil Service Online Compendium of Circulars has consolidated nearly three decades of policy documents into a centralized digital repository, thereby strengthening institutional memory and improving the consistency of administrative decision-making (Asaju & Ayeni, 2021). Similarly, the ambitious 3 Million Technical Talent (3MTT) programme underscores Nigeria's commitment to long-term digital capacity building by equipping young people with skills in emerging technologies such as artificial intelligence and data analytics. The strong response to the programme, reflected in over 1.7 million applications during its

initial phase, highlights the growing demand for digital competencies within the Nigerian economy (Blum & Rogger, 2021).

Despite these promising developments, the literature cautions that technological innovation alone does not automatically translate into improved public service delivery. Nigeria's reform trajectory continues to face persistent implementation challenges, particularly uneven adoption of digital tools across ministries, departments, and agencies. Evidence indicates that only about 35% of government agencies fully utilize available digital platforms, compared to approximately 85% adoption in the private sector, suggesting significant gaps in institutional readiness and organizational capacity (Blum & Rogger, 2021). Furthermore, delays in implementing long-standing structural reforms, such as the Oronsaye Report aimed at streamlining the federal bureaucracy, continue to undermine coordination, efficiency, and accountability across the public sector.

These contradictions reveal a central tension in Nigeria's public service reform agenda, while innovative technologies and capacity-building programmes signal strong reform intent, weak institutional alignment and inconsistent implementation limit their transformative potential. Scholars therefore argue that the effectiveness of digital reforms in Nigeria depends not only on technological availability but also on complementary factors such as organizational structure, training, leadership commitment, and performance management systems (Asaju & Ayeni, 2021). This reinforces the need for empirical examination of how public servants actually utilize digital systems and how such utilization translates into effective public service delivery outcomes, particularly at sub-national levels of government.

2.3.5 Public Service Reform in Kaduna State

Kaduna State has attracted scholarly attention as a notable example of sub-national innovation in public service delivery within Nigeria, particularly through its emphasis on governance reform, citizen participation, and digital transformation (Shafiu, 2021). The state's SUSTAIN agenda reflects an integrated development strategy that links rural development priorities with digital governance initiatives, thereby positioning technology as an enabler of participatory and inclusive service delivery rather than an end in itself (Tobi et al., 2021). Through its Open Government Partnership Action Plan (2020–2025), Kaduna has institutionalized transparency and accountability mechanisms such as the Community Development Charter, which enables citizens to influence budgetary priorities and monitor project implementation at the grassroots level (Blum & Rogger, 2021). This approach aligns with governance literature that emphasizes citizen engagement as a critical driver of service effectiveness and public trust.

Sector-specific reforms further illustrate Kaduna State's reform orientation. In the health sector, the One Health Strategic Plan integrates disease surveillance and management systems while expanding service access through mobile clinics in remote communities, addressing long-standing gaps in healthcare coverage (Blum & Rogger, 2021). At the same time, the state's collaboration with Huawei on a smart city initiative demonstrates how partnerships with private technology firms can support innovations in urban safety, traffic management, and land administration. The deployment of IoT and AI solutions, alongside blockchain-based land registries, has contributed to reducing land fraud and improving administrative efficiency (Blum & Rogger, 2021). Additionally, Kaduna's commitment to fiscal responsibility is reflected in its performance-based budgeting

framework and transparent budget defence processes, which have strengthened financial discipline and oversight (Tobi et al., 2021).

Despite these achievements, scholars caution that Kaduna's reform trajectory is not without limitations. Persistent challenges such as uneven rural connectivity, infrastructural gaps, and the need for continuous capacity building among public servants constrain the full realization of digital governance benefits (Tobi et al., 2021). Moreover, as with many sub-national reforms in developing contexts, the sustainability of these initiatives depends on consistent political support, adequate funding, and institutionalization beyond individual administrations. These challenges underscore the argument that innovation at the sub-national level is inherently fragile unless supported by strong organizational structures and human capacity.

A comparative assessment of federal- and state-level reforms in Nigeria reveals important analytical insights. While nationwide initiatives such as Service-Wise GPT illustrate the potential of large-scale digital transformation, Kaduna's localized, community-driven approaches highlight the importance of tailoring digital solutions to specific institutional and socio-economic contexts (Tobi et al., 2021). The coexistence of top-down policy frameworks at the federal level and bottom-up implementation strategies at the state level suggests that hybrid governance models may offer more sustainable pathways for public service reform. However, the persistence of bureaucratic resistance, infrastructure deficits, and skills shortages indicates that technological innovation alone is insufficient to guarantee effective service delivery.

Overall, the experiences of both the Federal Government of Nigeria and Kaduna State reinforce a central theme in the literature: while digital technologies can enhance efficiency and transparency, effective public service delivery ultimately depends on political will, institutional capacity, skilled public servants, and meaningful citizen engagement (Tobi et al., 2021). Kaduna State therefore provides a compelling empirical context for examining how e-government utilization translates into effective public service delivery, particularly at the sub-national level where institutional constraints and implementation dynamics are most pronounced. These insights not only justify the focus of the present study but also offer valuable lessons for other Nigerian states and developing countries pursuing context-specific public sector modernization.

2.4 Concept of Electronic Government

The concept of e-government is understood differently by scholars, reflecting variations in disciplinary perspectives, governance contexts, and reform objectives (Iddrisu & Fuseini, 2025). Despite definitional diversity, there is broad consensus that e-government involves the strategic use of digital technologies particularly information and communication technologies (ICT) and the Internet to deliver public services, enhance administrative efficiency, improve transparency, and strengthen citizen–government interaction (Ezeobele et al., 2021; Ogu et al., 2023). From this perspective, e-government represents both a technological and organizational transformation of public administration.

One dominant strand of the literature conceptualizes e-government primarily as a service delivery and information provision mechanism. Scholars in this tradition emphasize the

electronic provision of services and information to citizens, businesses, and other government agencies, enabling access “anytime and anywhere” (Almutairi et al., 2020; Dash & Jain, 2025). According to Abdulkareem et al. (2024) and Anak (2020), e-government improves service speed, reduces administrative bottlenecks, and enhances communication between public authorities and citizens. This view highlights the external, citizen-facing dimension of e-government, focusing on accessibility, convenience, and responsiveness.

A second strand extends this understanding by emphasizing the internal administrative transformation enabled by e-government. Scholars argue that beyond service provision, e-government restructures internal workflows, streamlines decision-making processes, reduces duplication of tasks, and enhances coordination across ministries, departments, and agencies (Méndez-Rivera, 2023; Tiika et al., 2024; Balaji, 2025). According to Efthymiou (2025), e-government should be understood as a governance model that modernizes how government organizations function internally, share information, and collaborate. This internal dimension is particularly critical in developing-country contexts, where fragmented systems and weak inter-agency coordination often undermine service delivery effectiveness.

Relatedly, several scholars emphasize e-government as a tool for transparency, accountability, and democratic engagement. Studies argue that digital platforms enhance openness by enabling citizens to access reliable information, provide feedback, participate in policy discussions, and monitor government actions (Nnaji et al., 2023; Hartanto et al., 2021; Karunia et al., 2023). In this sense, e-government supports not only administrative efficiency but also democratic governance through mechanisms such

as e-participation, e-democracy, and online consultation (Nkgapele, 2024; Haridy et al., 2025). This perspective aligns with arguments that e-government reshapes the relationship between the state and citizens by promoting trust, inclusion, and accountability.

However, scholars caution against equating e-government solely with technology deployment. Critics argue that the mere introduction of ICT does not automatically lead to improved governance or service delivery outcomes (Pramuditha et al., 2025). Instead, effective e-government requires fundamental changes in administrative processes, organizational culture, leadership commitment, and citizen engagement practices (Balaji, 2025). Akpan et al. (2020) further broaden the concept by noting that e-government is not limited to Internet-based systems but includes a wide range of electronic technologies such as mobile phones, text messaging, radio, and television, particularly in contexts with limited digital infrastructure.

In operational terms, e-government encompasses multiple functional dimensions, including electronic information sharing, online service delivery, internal collaboration tools, citizen feedback mechanisms, policy discussions, and digital participation platforms (Efthymiou, 2025; Pandey, 2023). Ogu and Chukwurah (2023) conceptualize e-government as the strategic application of ICT to ensure that public service delivery is both effective, achieving intended objectives and efficient minimizing waste and delays. This strategic orientation underscores the importance of utilization rather than mere availability of digital systems.

In the context of Kaduna State, the internal dimension of e-government is particularly salient. Fragmented administrative systems, limited interoperability, and uneven staff training have historically constrained coordination across ministries and agencies. While the integration of digital systems in areas such as revenue collection and land administration has reduced bureaucratic bottlenecks, challenges related to system interoperability and human capacity persist. These constraints illustrate that e-government effectiveness depends not only on technological infrastructure but also on organizational readiness, training, and institutional alignment.

Empirical studies have therefore increasingly focused on the determinants of e-government utilization, highlighting factors such as technological infrastructure, perceived usefulness, user training, organizational support, and leadership commitment (Coker & Thakur, 2024; Haridy et al., 2025). AbdulKareem and Oladimeji (2024) argue that without adequate training and supportive organizational environments, e-government systems remain underutilized and fail to deliver expected service improvements. Consequently, understanding how public servants utilize e-government systems and how such utilization translates into effective public service delivery remains a critical research gap, particularly at sub-national levels in developing countries.

By synthesizing these perspectives, this study conceptualizes e-government as a multidimensional governance tool that integrates digital service delivery, internal administrative reform, transparency, and citizen engagement. Examining the utilization of e-government systems among public servants in Kaduna State therefore provides valuable insights into how digital governance initiatives influence effective public service delivery in practice.

2.5 Determinant of E-Government Utilization

2.5.1 Level of Application and E-Government Utilization

The Level of Application (LoA) represents a critical yet frequently overlooked dimension in evaluating the effectiveness of e-government initiatives. Unlike measures that focus primarily on adoption or initial system deployment, LoA captures the extent to which e-government platforms are embedded into routine administrative processes and service delivery practices (Chan et al., 2025). Rather than relying on perceptual or intention-based indicators, LoA provides a more tangible assessment of digital transformation by examining whether e-government systems are actively reshaping workflows, decision-making, and service outcomes, or merely serving as symbolic digital additions to existing bureaucratic routines (Mphahlele et al., 2025).

This distinction is particularly relevant in contexts such as Kaduna State, where several e-government initiatives have been launched with significant political commitment and public visibility, yet reveal uneven patterns of utilization across ministries, departments, and agencies. While agencies such as the Kaduna Geographic Information Service (KADGIS) demonstrate relatively high levels of application integrating digital processes into land registration and title management to reduce delays and corruption, other agencies continue to operate at a superficial level of application, where digital platforms exist but are underutilized, and staff frequently revert to manual systems. Such contrasts illustrate that system availability does not necessarily translate into meaningful transformation of service delivery practices.

Global evidence supports this observation. Studies on e-government reform increasingly emphasize that system failure often arises not from technological inadequacy but from what has been described as an “implementation gap” the disconnect between the technical capabilities of digital platforms and their consistent, intensive use in practice (Mphahlele et al., 2025; Ameen et al., 2025). In Kaduna State, for instance, the Kaduna Internal Revenue Service (KADIRS) has introduced digital payment platforms intended to simplify revenue collection, yet manual transactions persist among both staff and citizens due to limited ICT literacy and insufficient training support. Similarly, although the Treasury Single Account (TSA) has reduced financial leakages, inconsistent application across ministries has constrained its full efficiency. These examples reinforce the argument that without sustained utilization, e-government initiatives risk becoming symbolic reforms rather than operational tools for improving public service delivery.

At the national level, challenges associated with LoA are evident across the Nigerian public sector. Many government agencies engage in what scholars describe as “ceremonial digitization”, maintaining parallel paper-based and digital systems due to limited trust in electronic processes or restricting digital platforms to only basic functions (Zubir et al., 2024). A 2023 survey of federal ministries revealed that approximately 62% of digitized processes operated at less than 40% of their intended functionality, as civil servants continued to rely on familiar manual procedures for complex transactions (Ameen et al., 2025). Kaduna State reflects this broader pattern. While KADGIS records high usage for basic land searches, advanced functionalities such as automated valuation and spatial analytics remain underutilized. Similarly,

although supplier registration under the e-procurement system is widespread, deeper application in tender evaluation and contract monitoring remains limited, with many officials still dependent on physical documentation (Mphahlele et al., 2025).

The determinants of LoA in Kaduna reveal the structural and behavioural complexity of digital transformation. First, persistent bureaucratic complexity often exceeds the functional scope of digital systems, forcing users into hybrid analog–digital workflows (Mphahlele et al., 2025). Second, inadequate training restricts users’ awareness of system capabilities, confining utilization to basic functions and preventing deeper integration into administrative processes (Ameen et al., 2025). Third, institutional inertia and resistance to process redesign lead many departments to adapt digital tools to existing workflows rather than reengineering workflows to exploit the transformative potential of technology (Zubir et al., 2024). Collectively, these factors produce what has been termed “superficial digitization”, where systems are technically operational but fail to alter underlying service delivery practices in meaningful ways.

Evidence from within and beyond Kaduna further underscores the analytical value of LoA. While electronic document management systems may successfully digitize file storage, the absence of advanced features such as workflow automation, analytics, or collaborative processing limits their impact on efficiency and responsiveness (Zubir et al., 2024). Comparative experiences from other Nigerian states support this view. For example, Borno State has achieved notable improvements in internally displaced persons (IDP) management by prioritizing consistent and intensive system use across departments rather than focusing solely on platform rollout (Ameen et al., 2025). These

experiences suggest that LoA is a more reliable indicator of digital transformation than the mere availability or adoption of e-government systems.

Strengthening LoA in Kaduna therefore carries significant implications for public service delivery. Higher levels of application have been associated with improved administrative efficiency, faster service delivery, enhanced transparency, and more consistent policy implementation (Ameen et al., 2025). Moreover, advanced utilization of e-government tools such as data analytics and integrated information systems has the potential to shift governance from a transactional orientation toward an insight-driven and evidence-based policymaking model (Kim & Lee, 2024). Ultimately, the effectiveness of e-government reforms is determined not by the sophistication of installed technologies but by the degree to which these systems are embedded in daily administrative practice and used to their full capacity. Kaduna State's experience thus illustrates both the opportunities and limitations of digital governance, highlighting LoA as a critical mechanism through which e-government utilization translates into effective public service delivery.

2.5.2 Performance Expectancy and E-Government Utilization

Performance Expectancy (PE) has been widely identified as one of the most influential determinants of technology adoption and utilization across organizational contexts (Wu et al., 2024). In their seminal Unified Theory of Acceptance and Use of Technology (UTAUT), Venkatesh et al. (2003) define PE as the extent to which an individual believes that using a system will enhance job performance. This definition foregrounds the perceived instrumental benefits of technology, emphasizing productivity, efficiency,

and task accomplishment as central motivators for use (Fetrina et al., 2024). Extending this concept to the e-government context, Meiranto et al. (2025) conceptualize PE as public servants' perceptions of whether digital systems improve work efficiency, decision-making quality, and service delivery outcomes. Similarly, Latupeirissa (2024) introduces a public-sector-specific nuance, defining PE as civil servants' assessments of whether technological solutions simplify rather than complicate bureaucratic processes. Collectively, these perspectives position PE as a cognitive bridge between technological capability and expectations of workplace productivity (Haridy et al., 2025).

Empirical evidence further suggests that the influence of PE on e-government utilization varies significantly across national and institutional contexts (Atmadja, 2025). In advanced digital economies such as South Korea and Estonia, robust infrastructure, stable systems, and comprehensive digital skills training create environments in which performance expectations are consistently met, resulting in high levels of sustained utilization (Fetrina et al., 2024). OECD (2022) reports indicate that approximately 78% of public servants in these contexts experience measurable productivity gains from e-government tools. However, in developing countries such as Nigeria, the relationship between PE and e-government utilization is more complex and less linear (Haridy et al., 2025). Adegboye et al. (2023) reveal that although Nigerian public servants generally acknowledge the potential benefits of e-government, only about 32% believe that existing systems meaningfully improve their job performance. This expectation–performance gap has been attributed to frequent system failures, misalignment between digital tools and local administrative processes, and inadequate training that limits users' ability to exploit system functionalities (Anshari et al., 2025; Meiranto et al., 2025).

The experience of Kaduna State provides a concrete illustration of these dynamics (Abdulkareem & Oladimeji, 2024). The implementation of the Kaduna Geographic Information System (KADGIS) significantly reduced land record processing time from approximately six months to two weeks, generating positive performance perceptions among land registry staff as efficiency gains became immediately observable (Shafiu, 2021). In contrast, the state's e-health management system has produced weaker outcomes, with only about 15% of health workers reporting performance improvements. This shortfall has been linked to poor system design, limited offline functionality, and workflow disruptions, all of which undermine PE despite the system's availability (Shafiu, 2021). These contrasting cases highlight three critical insights. First, PE is strengthened when e-government systems address specific, clearly defined operational problems rather than offering broad, generic solutions. Second, concerns about system reliability exert a disproportionate influence on PE in contexts characterized by fragile digital trust. Third, visible personal benefits such as reduced paperwork and faster task completion tend to outweigh abstract organizational benefits in shaping performance perceptions.

The moderating role of training programmes further underscores the contextual nature of PE. Evidence suggests that many conventional training initiatives are ineffective because they focus narrowly on procedural or technical system use without demonstrating tangible performance benefits (Meiranto et al., 2025). In contrast, Rwanda's e-procurement training model illustrates how productivity-oriented demonstrations explicitly showing time savings and efficiency gains can strengthen PE and encourage sustained system utilization (Nkundabagenzi et al., 2022). This contrast highlights the

importance of aligning training content with the practical realities of daily workflows and the lived experiences of public servants rather than treating training as a purely technical exercise (Wu et al., 2024).

Further research indicates that the effectiveness of training in shaping PE is influenced by generational and contextual factors. Younger public servants often approach digital tools with an inherent expectation of performance enhancement, whereas older employees typically require clearer, task-specific evidence of relevance before committing to new systems (Eze et al., 2023). In Kaduna State, this generational divide reinforces disparities in how PE is formed and sustained, influencing not only initial utilization but also the depth of application of e-government platforms. These dynamics suggest that training should not be conceptualized as a neutral background variable but as a critical moderating mechanism that can either reinforce existing inequalities in digital utilization or bridge them by aligning technological benefits with diverse user expectations (Meiranto et al., 2025).

Overall, the literature indicates that PE plays a pivotal role in determining whether e-government systems are merely adopted or meaningfully utilized. In contexts such as Kaduna State, where infrastructural constraints, skills gaps, and organizational inertia persist, PE emerges as a key explanatory mechanism linking e-government utilization to effective public service delivery outcomes.

2.5.3. Effort Expectancy and E-Government Utilization

Effort Expectancy (EE) is widely recognized as a critical psychological determinant of e-government utilization, particularly within public sector environments characterized by complex procedures and entrenched bureaucratic routines (Atmadja, 2025). Within the Unified Theory of Acceptance and Use of Technology (UTAUT), Venkatesh et al. (2003) define EE as the degree of ease associated with the use of a system, emphasizing the cognitive and physical effort required to adopt new technologies. This definition foregrounds usability as a key factor influencing whether individuals are willing to engage with digital systems. Extending this concept to e-government contexts, Atmadja (2025) conceptualizes EE as public servants' perceptions of how easily digital platforms can be navigated to complete administrative tasks without extensive training or disruption to existing workflows (Haridy et al., 2025). Carter and Bélanger (2015) further refine this understanding by introducing a cost–benefit dimension, arguing that EE reflects users' evaluations of whether the time and effort invested in learning a system are justified by corresponding efficiency gains (Meiranto et al., 2025). Collectively, these perspectives position EE as a psychological threshold that shapes the transition from system exposure to actual utilization (Wu et al., 2024).

Global evidence consistently demonstrates that e-government systems designed for intuitive use achieve higher adoption and utilization rates (Nasri, 2025). Advanced digital administrations such as Estonia and Singapore illustrate this pattern. Estonia's seamless digital identification system and Singapore's integrated Moments of Life application exemplify how streamlined interfaces, reduced procedural steps, and consistent user experiences can generate near-universal acceptance among both citizens

and public officials (Pathak et al., 2025). However, the relationship between EE and utilization becomes considerably more complex in developing-country contexts such as Nigeria, where structural and institutional constraints amplify perceptions of effort (Atmadja, 2025). Empirical studies indicate that Nigerian public servants frequently discontinue the use of e-government platforms after initial exposure, with approximately 60% citing cumbersome authentication processes, fragmented interfaces, and non-intuitive navigation as primary barriers (Maharjan et al., 2025).

Kaduna State reflects these broader national dynamics. Older public servants who are accustomed to paper-based workflows often report greater difficulty adapting to digital systems, encountering challenges such as unclear error messages, inconsistent menu structures, and interfaces that do not align with familiar administrative routines (Pathak et al., 2025; Maharjan et al., 2025). These findings suggest that EE in Kaduna is shaped not only by interface design but also by users' prior experiences, institutional norms, and confidence in digital processes. Consequently, perceived effort becomes a significant deterrent to utilization when digital systems are perceived as adding complexity rather than reducing it.

Importantly, the influence of EE on utilization is not static but evolves over time. While perceived ease of use plays a decisive role in overcoming initial resistance, its relative importance tends to diminish as users gain experience and familiarity with a system (Nasri, 2025). The nationwide rollout of e-government platforms in Saudi Arabia provides an illustrative example. Despite early resistance driven by perceptions of complexity, widespread utilization became normalized within 18 to 24 months as public servants adapted through repeated use, peer learning, and institutional support (Maharjan

et al., 2025). Comparative research identifies three key moderators of the EE–utilization relationship: the quality of training programmes, system reliability, and generational adaptation patterns. For instance, Rwanda’s simulation-based training approach reduced perceived effort by approximately 40%, whereas frequent system failures in Nigeria have been shown to undermine EE regardless of interface simplicity (Meiranto et al., 2025).

Beyond individual perceptions, the broader institutional and infrastructural environment further conditions the impact of EE. In rural areas of Kaduna State, unstable electricity supply and erratic internet connectivity frequently prevent even well-designed systems from meeting basic usability thresholds (Maharjan et al., 2025). This challenge mirrors experiences in Kenya, where Huduma Centres successfully mitigated infrastructural constraints by combining digital platforms with physical service points (Pathak et al., 2025). Conversely, Lagos State’s deployment of biometric authentication systems without offline alternatives illustrates how infrastructural insensitivity can exacerbate perceptions of effort, particularly among field staff, thereby weakening utilization (Maharjan et al., 2025). These cases reinforce the argument that EE cannot be reduced to interface design alone but must be understood within a broader technological, organizational, and infrastructural context.

Hence, EE functions as both a barrier and a catalyst for digital transformation. When digital systems are poorly aligned with existing workflows, unsupported by training, or constrained by infrastructural weaknesses, perceived effort discourages utilization. Conversely, when systems are stable, user-friendly, and supported by effective training and peer networks, EE concerns diminish over time, allowing utilization to deepen and

normalize (Wu et al., 2024). Emerging innovations further illustrate this dynamic. In Nigeria, initiatives such as peer-based Digital Champions programmes have shown promise in reducing perceived effort, while lightweight applications with offline capabilities such as those piloted in Kano State's tax collection system demonstrate how infrastructural sensitivity can enhance usability (Maharjan et al., 2025).

Looking forward, EE should be conceptualized as an evolving design and institutional challenge rather than a fixed barrier. In contexts such as Kaduna State, where oral communication remains culturally significant and mobile phone penetration is high, voice-driven and conversational digital interfaces may play an increasingly important role in reshaping perceptions of ease of use (Wu et al., 2024). Ultimately, sustainable e-government utilization depends less on technological sophistication and more on whether public servants perceive digital systems as intuitively valuable to their daily work. When the perceived benefits of use outweigh the effort required, EE transitions from an obstacle into a driver of utilization, reinforcing e-government as a practical instrument for improving public service delivery in Kaduna State (Maharjan et al., 2025).

2.5.4 Social Influence and E-Government Utilization

Social Influence (SI) is a critical determinant of e-government utilization in public sector organizations, particularly within hierarchical and collectivist societies such as Nigeria (Maharjan et al., 2025). Anchored in the Unified Theory of Acceptance and Use of Technology (UTAUT), SI is defined as the extent to which an individual perceives that important others such as supervisors, colleagues, or the organization believe that a

particular system should be used (Venkatesh et al., 2003; Atmadja, 2025). In bureaucratic settings, where authority, norms, and organizational culture strongly shape behaviour, SI plays a decisive role in influencing whether public servants comply with or resist digital reforms (Hasan et al., 2025).

Unlike effort or performance expectancy, which are primarily cognitive and individual-level evaluations, SI operates through normative pressure, authority endorsement, and peer conformity. Scholars argue that public servants often adopt digital systems not solely because of perceived benefits but because usage is expected, monitored, or symbolically associated with professionalism and compliance (Dang et al., 2025). This is particularly evident in public administrations where hierarchical reporting lines and senior directives strongly influence daily work practices.

Comparative evidence suggests that SI exerts stronger influence in developing and transitional governance contexts than in advanced digital economies (Atmadja, 2025). In countries such as Estonia and Singapore, where e-government use has become institutionalized, digital interaction is normalized and no longer dependent on social pressure (Pathak et al., 2025). By contrast, in many developing countries, including Nigeria, e-government utilization remains highly sensitive to leadership signals, managerial enforcement, and peer behaviour (Maharjan et al., 2025). Studies show that Nigerian public servants are significantly more likely to use digital platforms when system usage is explicitly mandated by supervisors or reinforced through performance appraisal mechanisms (Dang et al., 2025).

The Nigerian public sector presents a particularly complex SI environment, where formal hierarchy coexists with informal peer networks. While official circulars and top-down directives encourage system use, day-to-day behaviour is often shaped by colleagues' practices and shared coping strategies (Hasan et al., 2025). When influential peers or senior officers bypass digital systems in favour of manual processes, such behaviour legitimizes non-use and weakens institutional digital norms. Conversely, when respected supervisors actively use and promote e-government platforms, utilization rates tend to increase, even in the presence of infrastructural or usability challenges (Maharjan et al., 2025).

Kaduna State reflects these dynamics clearly. In agencies such as the Kaduna Geographic Information Service (KADGIS), strong leadership commitment and visible managerial endorsement have fostered a culture in which digital system use is perceived as both expected and professionally rewarding (Shafiu, 2021). Staff members report greater willingness to utilize digital platforms when senior officers model system use and explicitly discourage manual alternatives. In contrast, in ministries where leaders continue to rely on paper-based approvals or delegate digital tasks to junior staff, e-government utilization remains superficial, reinforcing parallel manual–digital workflows.

Empirical studies further suggest that SI is particularly influential during the early stages of system implementation, when uncertainty is high and users look to others for behavioural cues (Wu et al., 2024). Over time, as systems become routinized, the influence of SI may diminish, giving way to individual evaluations such as performance and effort expectancy. However, in environments characterized by frequent leadership

turnover and policy discontinuity as is common in sub-national governments SI continues to play a sustained role in shaping utilization patterns (Hasan et al., 2025).

Training and organizational communication also interact closely with SI. Training programmes that involve senior officials or departmental champions send strong normative signals that system use is valued and legitimate (Dang et al., 2025). Conversely, when training is limited to junior staff or treated as optional, it reinforces the perception that e-government is peripheral rather than integral to administrative work. In Kaduna State, peer-led initiatives and informal mentoring have shown greater impact on sustained utilization than standalone technical workshops, highlighting the social nature of learning and compliance in public organizations.

Hence, the literature indicates that SI functions as a powerful social mechanism through which organizational expectations, leadership behaviour, and peer norms shape e-government utilization. In contexts such as Kaduna State, where hierarchical authority and collective norms remain strong, SI can either accelerate or undermine digital transformation depending on how it is leveraged. Within the framework of this study, SI is therefore conceptualized as a key determinant of e-government utilization, operating alongside performance expectancy and effort expectancy, and interacting with training and organizational context to influence the depth and consistency of system use in public service delivery.

2.5.5 Perceived Risk and E-Government Utilization

Perceived risk is widely recognized as a major psychological barrier to the utilization of e-government systems, particularly in developing-country contexts such as Nigeria

(Rouibah et al., 2022). It encompasses users' concerns about data security, privacy breaches, system failures, transaction errors, and the potential misuse of digital information (Li, 2021). These concerns are often amplified in environments characterized by weak digital infrastructure, limited cybersecurity safeguards, and low institutional trust. Global evidence demonstrates that perceived risk significantly shapes e-government utilization decisions. Even in advanced economies, high-profile cybersecurity breaches have been shown to undermine public confidence in digital government platforms (Ilieva et al., 2024). However, industrialized nations typically benefit from stronger legal frameworks, robust security institutions, and higher levels of public trust conditions that are often lacking in many African countries (Zubir et al., 2024).

In the Nigerian public sector, perceived risk takes on distinct dimensions shaped by the country's governance challenges and technological landscape (Rouibah et al., 2022). Empirical studies consistently report that fears surrounding data security and system reliability discourage public servants from fully utilizing e-government platforms, particularly following widely publicized incidents such as the data breach at the National Identity Management Commission (Li, 2021). These perceptions are further reinforced by lived experiences of system failures. For example, disruptions associated with the Integrated Personnel and Payroll Information System (IPPIS), which resulted in delayed or unpaid salaries for extended periods, have heightened skepticism among public servants regarding the dependability of digital systems (Ilieva et al., 2024). In this context, many officials accustomed to paper-based processes perceive digital platforms as opaque and more vulnerable to manipulation. Such perceptions are not merely

attitudinal but are rooted in tangible institutional weaknesses, including inadequate cybersecurity capacity, insufficient technical support, and limited opportunities for user training (Li, 2021).

Kaduna State reflects these national patterns while also exhibiting context-specific risk perceptions. Despite the state's ambitious e-government initiatives, resistance among public servants has often emerged due to concerns about system reliability and data protection (Ilieva et al., 2024). For instance, the introduction of electronic medical records in primary healthcare centres encountered resistance from health workers worried about the confidentiality of patient information. Similarly, suppliers expressed apprehension toward the e-procurement platform due to fears that sensitive business data could be compromised (Li, 2021). These concerns are reinforced by evidence from cybersecurity audits in Kaduna, which have revealed vulnerabilities in government digital systems. Moreover, infrastructural challenges such as unstable electricity supply and unreliable internet connectivity contribute to legitimate anxieties about data integrity, system availability, and transactional accuracy.

Addressing perceived risk therefore requires a multidimensional approach that extends beyond technical safeguards alone (Li, 2021). While cybersecurity infrastructure remains essential, research increasingly emphasizes that risk perception is also shaped by institutional trust, transparency, and credibility (Ilieva et al., 2024). Measures such as clearly communicating system security features, establishing accessible channels for reporting and resolving digital issues, and demonstrating consistent commitment to data protection have been shown to reduce users' perceived vulnerability (Zubir et al., 2024). Training programmes play a particularly critical role in this regard. Beyond building

technical skills, effective training helps demystify digital systems, correct misconceptions, and equip public servants with practical strategies for navigating platforms securely (Li, 2021). Comparative evidence from states such as Lagos and Ekiti further suggests that involving end-users in system design and implementation reduces perceived risk by aligning digital platforms with users' operational realities and security concerns (Ilieva et al., 2024).

The broader literature indicates that perceived risk influences not only initial utilization but also the long-term sustainability of e-government systems (Zubir et al., 2024). In Kaduna State, where infrastructural constraints and uneven digital literacy persist, concerns about system reliability and data protection often translate into cautious or selective use of e-government platforms. This mirrors a wider pattern in developing contexts, where even technically sound systems struggle to achieve deep utilization if users lack confidence in their safety and dependability. Consequently, the effectiveness of e-government reforms cannot be assessed solely by the sophistication of digital infrastructure but must also account for the level of trust that public servants place in these systems. Within the framework of this study, perceived risk is therefore conceptualized as a critical determinant of e-government utilization, shaping both the depth and sustainability of digital transformation in public service delivery.

2.5.6 Facilitating Conditions and E-Government Utilization

Facilitating Conditions (FC) constitute a core determinant of e-government utilization, referring to the degree to which users believe that adequate organizational and technical infrastructure exists to support the use of digital systems (Venkatesh et al., 2003; Abdul

Wahi & Berenyi, 2024). While favourable attitudes and perceived benefits may encourage initial engagement with e-government platforms, sustained and effective utilization depends heavily on the availability of reliable internet connectivity, stable power supply, functional hardware, and responsive technical support. In many developing-country contexts, including Nigeria, these enabling conditions remain uneven and fragile, significantly constraining the practical use of digital government systems (Meiranto et al., 2024).

Nigeria's broader digital ecosystem is characterized by chronic infrastructural deficits that undermine e-government implementation. Frequent power outages, unstable network coverage, and limited bandwidth regularly disrupt online government services, reducing system reliability and eroding user confidence (Chan et al., 2024). These challenges are particularly pronounced in northern states such as Kaduna, where infrastructural gaps are compounded by security concerns that further limit the deployment, maintenance, and consistent use of ICT infrastructure (Mphahlele et al., 2025). In such contexts, FC operate not merely as background conditions but as decisive constraints shaping whether e-government systems can be meaningfully utilized.

Evidence from Kaduna State illustrates the practical implications of weak facilitating conditions. Public servants across several ministries identify unstable electricity supply as one of the most significant barriers to effective e-government utilization. Many offices rely on petrol-powered generators that are costly, environmentally unsustainable, and unsuitable for continuous digital operations (Mphahlele et al., 2025). Internet connectivity presents an additional challenge, as limited bandwidth and intermittent network failures frequently disrupt online transactions, data uploads, and system access

(Chan et al., 2024). Beyond physical infrastructure, the shortage of skilled IT support personnel within ministries and agencies means that even minor technical faults can halt operations for extended periods, generating frustration among users and reinforcing resistance to digital platforms (Abdul Wahi & Berenyi, 2024).

These FC deficiencies have measurable consequences for e-government utilization. Findings from the 2023 state e-government audit indicate that approximately 42% of attempted digital transactions in government offices could not be completed due to technical failures, while about 68% of public servants reported being unable to continue work at various times because of unexpected system crashes or power disruptions (Mphahlele et al., 2025). Such experiences reinforce perceptions that digital systems are unreliable, thereby interacting with perceived risk and effort expectancy to weaken sustained utilization.

Notwithstanding these challenges, evidence from Kaduna demonstrates that targeted interventions can strengthen facilitating conditions when strategically implemented (Chan et al., 2024). Partnerships with private-sector service providers to establish dedicated broadband infrastructure have improved connectivity in selected urban centres, although rural areas continue to face significant access gaps (Mphahlele et al., 2025). The establishment of centralized IT support units within key ministries has reduced system downtime and improved responsiveness to technical issues. Similarly, the deployment of solar-powered digital workstations in remote offices represents an innovative attempt to address persistent energy constraints (Zubir et al., 2024). Comparable initiatives in other Nigerian states such as Lagos' unified government network and Anambra's digital capacity-building centres further illustrate how

coordinated investments in infrastructure and support systems can enhance the overall e-government ecosystem (Mphahlele et al., 2025).

The Kaduna experience underscores that facilitating conditions encompass both technological and human resource dimensions. Reliable connectivity, power stability, and equipment maintenance form the foundation of technical readiness, while skilled IT personnel, continuous training, and clear support structures ensure that systems remain operational, trusted, and usable (Zubir et al., 2024). Comparative studies also suggest that incremental solutions such as offline-enabled applications, modular system design, and localized digital tools can partially offset infrastructural weaknesses while broader systemic improvements are pursued (Ilieva et al., 2024).

Hence, the relationship between FC and e-government utilization is best understood as dynamic and reciprocal. Strong facilitating conditions enable adoption and deeper utilization, while successful e-government implementation creates incentives for further investment in infrastructure and organizational support by demonstrating tangible gains in efficiency and service delivery (Ilieva et al., 2024). In Kaduna State, uneven progress across sectors highlights both the constraints imposed by infrastructural fragility and the potential for improvement through sustained investment and institutional commitment. These findings reinforce the view that FC should not be treated as static prerequisites but as evolving conditions that shape and are shaped by the trajectory of digital transformation in public service delivery.

2.6 Effective E-Government, Public Service Delivery and the Use of ICT among Public Servants in Nigeria

In recent decades, growing demands for transparency, efficiency, and accountability have intensified pressure on public organizations to adopt transformative governance solutions (Omotayo et al., 2025). Influenced by the principles of New Public Management (NPM), governments worldwide including Nigeria have increasingly embraced innovation and information and communication technologies (ICT) as instruments for improving public sector performance and service delivery (Haridy et al., 2025). Within this reform agenda, effective e-government is understood not merely as the introduction of digital systems, but as the successful application of ICT to enhance transparency, streamline bureaucratic processes, strengthen accountability, and deliver citizen-centred services. When appropriately embedded, digital tools enable governments to reduce administrative costs, eliminate redundancies, and rebuild trust in public institutions (Sadik-Zada et al., 2024).

Public service delivery constitutes the core arena in which these reforms are tested. In Nigeria, where citizens have long experienced service delays, inefficiencies, and governance-related corruption, ICT-enabled e-government initiatives offer important opportunities to improve responsiveness and effectiveness. Federal platforms such as the Integrated Personnel and Payroll Information System (IPPIS), the Treasury Single Account (TSA), and the Government Integrated Financial Management Information System (GIFMIS) were introduced to strengthen fiscal discipline, minimize leakages, and enhance accountability (Oluwole & Ajayi, 2023). At the sub-national level, systems such as the Kaduna Geographic Information Service (KADGIS) and state-level e-

procurement platforms illustrate how ICT is being deployed to address entrenched inefficiencies in service delivery. However, evidence across federal and state institutions consistently shows that while these systems have recorded notable gains, their level of application remains uneven, with many public servants continuing to rely on manual processes for complex administrative tasks (Mphahlele et al., 2025).

This unevenness underscores the central role of public servants in determining whether e-government achieves its intended outcomes. ICT adoption equips employees with tools to process information more efficiently, communicate effectively, and align service delivery with global best practices. Yet, adoption and utilization patterns remain mixed within the Nigerian public sector. Younger employees often display greater ICT readiness and openness to digital platforms, whereas older civil servants socialized into paper-based administrative systems frequently perceive e-government platforms as complex, unreliable, or disruptive to established routines (Pathak et al., 2025; Maharjan et al., 2025). These generational differences highlight the importance of training, organizational support, and leadership commitment in shaping utilization outcomes. Without adequate capacity building, many public servants are unable to exploit advanced system functionalities, resulting in what the literature describes as “superficial digitization,” where digital platforms exist but are not deeply integrated into daily work practices (Ameen et al., 2025).

Beyond individual capabilities, the transformation of public service delivery through e-government is shaped by broader organizational and environmental conditions. Studies consistently emphasize that effective e-government requires more than technological tools; it depends on supportive organizational structures, clear roles and responsibilities,

leadership commitment, manageable workloads, and an institutional culture that encourages collaboration and innovation (Akida & Kandiri, 2024). Training and routine professional practices are particularly critical, as they enable ICT use to become habitual rather than exceptional, thereby embedding digital systems into everyday administrative processes (Alshehri, 2020). Values, competencies, and organizational practices therefore function as foundational pillars that determine how ICT tools are utilized and how they ultimately influence service delivery outcomes (Nkgapele, 2024).

Nigeria's experience with e-government also reflects broader global technological transformations. Just as earlier industrial revolutions reshaped production and administration through mechanization and automation, the fourth industrial revolution has extended this trajectory by integrating digital technologies and ICT across all sectors of governance (Al-Azzam, 2022). Aligning e-government initiatives with this global shift requires public servants to perceive ICT not as an external imposition, but as an integral component of modern governance practice.

Ultimately, the effectiveness of e-government in Nigeria depends less on the sophistication of installed technologies and more on the extent to which public servants utilize ICT to deliver services that are timely, transparent, and citizen-focused. While platforms such as IPPIS, TSA, GIFMIS, and KADGIS provide the structural foundation for reform, their success is determined by how deeply they are embedded in routine administrative practice. Without committed and sustained utilization by public servants, even the most advanced systems risk underperformance. Conversely, when ICT adoption is supported by training, leadership, and conducive organizational conditions, e-government becomes a transformative mechanism capable of reshaping public service

delivery and strengthening public trust in Nigerian institutions. This synthesis of the literature provides the basis for the conceptual framework and key variables summarized in Table 2.1 below.

Table 2.1
The Main Characteristics of Industrial Revolutions

Industrial Revolution (IR) & Period	Transition Period	Energy Resources	Main Technical Achievement	Main Developed Industries	Transport Means
IR 1.0 1760-1900	1860-1900	Coal	Steam Engine	Textile, Steel	Train
IR 2.0 1900-1960	1940-1960	Oil Electricity	Internal Combustion Engine	Metallurgy, Auto, Machine Building	Train, Car
IR 3.0 1960-200	1980-2000	Nuclear Energy, Natural Gas	Computers, Robots	Auto, Chemistry	Car, Plane
IR 4.0 2000- Date	2000-2023	Green Energies	Internet, 3D Printing, Generic, Engineering	High Tech Industries	Electric Car, Ultra-Fast Train

Source: Awwal (2021)

Table 2.1 illustrates how successive waves of technological innovation have consistently reshaped economic systems, organizational structures, and governance practices. Each industrial revolution introduced distinct energy sources, technological capabilities, and modes of production and transportation that fundamentally altered how organizations functioned and interacted with citizens. The first and second industrial revolutions (IR 1.0 and IR 2.0) established the foundations of mechanization, mass production, and

modern transport systems, while the third industrial revolution (IR 3.0) marked a shift toward automation, robotics, and the widespread integration of computers into organizational processes. In contrast, the fourth industrial revolution (IR 4.0) represents a more profound transformation, characterized by the convergence of digital, physical, and biological systems through information and communication technologies (ICT), internet-based platforms, artificial intelligence, and green energy innovations (Al-Azzam, 2022).

Within the Nigerian context, the transition toward IR 4.0 is increasingly evident in the adoption of ICT across public administration and the expansion of e-government platforms. Federal initiatives such as the Integrated Personnel and Payroll Information System (IPGIS), the Treasury Single Account (TSA), and the Government Integrated Financial Management Information System (GIFMIS) exemplify how digital technologies are being deployed to enhance transparency, strengthen fiscal discipline, and reduce administrative leakages (Oluwole & Ajayi, 2023). At the sub-national level, Kaduna State mirrors this transition through platforms such as the Kaduna Geographic Information Service (KADGIS) and e-procurement systems, which are designed to streamline bureaucratic procedures, improve accountability, and enhance service delivery outcomes. Although these reforms demonstrate alignment with global technological trends, their implementation remains uneven, reflecting broader infrastructural, institutional, and human-capacity constraints.

The critical link between IR 4.0 and effective e-government therefore lies not merely in the availability of digital infrastructure but in the transformative use of ICT as a catalyst for organizational change and service delivery reform. As shown in Table 2.1, each

technological revolution only achieved its full impact when new technologies were embedded into everyday organizational practices. In the context of e-government, public servants occupy a pivotal position in this transformation. Their skills, attitudes, and work practices determine whether ICT-driven systems become fully integrated into routine administrative processes or remain confined to symbolic or superficial applications (Ameen et al., 2025). Consequently, the effectiveness of e-government in Nigeria—and particularly in Kaduna State depends not only on technological sophistication but also on the extent to which public servants utilize digital platforms in their daily work.

This interpretation underscores the relevance of examining e-government utilization through behavioural, organizational, and institutional lenses. It reinforces the argument that IR 4.0–driven technologies can only deliver meaningful improvements in public service delivery when supported by adequate skills, positive attitudes, and enabling organizational practices. Thus, Table 2.1 provides an important conceptual foundation for the study, linking global technological evolution to contemporary e-government initiatives and justifying the focus on public servants’ utilization of ICT as a critical mechanism for achieving effective public service delivery in Kaduna State.

2.7 Public Servants as Mechanisms for E-Government Success in Kaduna State

A public servant is commonly understood as an individual employed by the state to implement public policies and deliver services to citizens (Ameen et al., 2025). While this definition provides a functional starting point, scholars increasingly emphasize that the role of the public servant is far more complex and context dependent (Sadik-Zada et al., 2024). For instance, Latupeirissa et al. (2024) conceptualize public servants as

public-interest administrators embedded within bureaucratic systems who translate political decisions into concrete service outcomes. Similarly, the World Bank (2023) adopts an operational perspective, defining public servants as government employees performing administrative, technical, or professional functions in the delivery of public services. In the Nigerian context, Adebayo (2021) adds an important cultural dimension, describing public servants as professionals whose actions are shaped not only by formal institutional rules but also by informal social norms and expectations.

Synthesizing these perspectives reveals three defining characteristics of public servants that are particularly relevant for e-government studies. First, public servants occupy an intermediary position between the state and citizens, acting as the primary interface through which government policies are experienced in practice. Second, they function as policy implementers rather than policy designers, meaning that the effectiveness of reforms depends heavily on their willingness and capacity to apply new systems. Third, they are embedded within organizational cultures that shape attitudes toward innovation, accountability, and change. This embeddedness explains why identical e-government systems can produce different outcomes across institutions and regions.

The transition to e-government systems introduces both opportunities and tensions for public servants in Kaduna State. On the one hand, digital platforms promise efficiency gains, reduced paperwork, and faster service delivery. On the other hand, public servants must operate these systems within a context of infrastructural constraints, limited technical support, and persistent organizational routines (Ameen et al., 2025). Empirical evidence from Nigeria suggests that many public servants perceive e-government as a double-edged sword. While recognising its potential benefits, they also associate digital

systems with heightened surveillance, stricter performance monitoring, and fears of job insecurity (Olatokun, 2022; Zubir et al., 2024). This contradiction highlights a critical gap between the reform intentions of e-government and the lived experiences of its primary implementers.

In Kaduna State, this tension is further intensified by generational differences and entrenched bureaucratic traditions. Younger public servants, who are generally more technologically confident, tend to perceive digital platforms as tools for efficiency and career advancement, whereas older employees socialized in paper-based systems often view them with skepticism and apprehension (Eze et al., 2023). Such divergence has important implications for utilization. Where senior staff resist or minimally comply with digital systems, e-government risks becoming a symbolic reform rather than a transformative one.

The success of e-government initiatives therefore depends on how well digital systems align with the professional identity and daily work realities of public servants. As Latupeirissa et al. (2024) argue, effective digital governance requires socio-technical systems that integrate technology with users' skills, incentives, and organizational environments. Evidence from Kaduna illustrates the consequences of failing to achieve this integration. Despite the formal adoption of the IPPIS payroll system, many public servants continue to maintain parallel manual records due to mistrust in system reliability and fear of errors (Adesina & Ojo, 2023). Such practices reflect what Gichoya (2022) describes as "workarounds," adaptive behaviors that emerge when formal digital systems do not adequately support users' needs. While these workarounds allow

employees to cope, they simultaneously undermine the efficiency and transparency objectives of e-government.

These dynamics underscore the importance of capacity-building initiatives that go beyond technical training. As Dwivedi et al. (2022) note, effective training reshapes not only what public servants can do, but how they perceive their role within digital governance systems. In this regard, comparative experiences such as the Rwanda e-Government Academy demonstrate that resistance can be reduced when digital skills are framed as pathways to professional growth rather than externally imposed requirements (Ndayisaba et al., 2021). Such approaches emphasize peer learning, continuous support, and opportunities for user feedback, thereby fostering ownership of digital reforms.

Ultimately, redefining the role of the public servant in Nigeria's digital era requires recognizing them as active co-creators rather than passive recipients of technological change (Zubir et al., 2024). As Kaduna State advances its e-government agenda, sustainable progress is most likely to emerge from systems that incorporate public servants' practical knowledge, adaptations, and suggestions what Ojo (2023) terms "organic digitization." When digital platforms are aligned with professional values, supported by adequate infrastructure and training, and embedded into routine workflows, public servants are more likely to become champions of reform rather than reluctant users. In this sense, the effectiveness of e-government ultimately hinges on empowering public servants as the central agents of service delivery transformation (Ndayisaba et al., 2021).

Table 2.2
Paradigm shift of public service delivery

S/N	Operation	Bureaucratic Paradigm	E-government Paradigm
1	Orientation	Production cost efficiency	User satisfaction and control flexibility
2	Process Organization	Functional rationality, departmentalization, vertical hierarchy of control	Horizontal hierarchy, network organization, information sharing
3	Management principle	Management by rule and mandate	Flexible management, interdepartmental team work with central coordination
4	Leadership style	Command and control	Facilitation and coordination, innovation entrepreneurship
5	Internal communication	Top down hierarchical	Multidirectional network with central coordination, direct communication
6	External communication	Centralized, formal, limited channels	Formal and informal direct and feedback, multiple channels
7	Mode of service delivery	Documentary mode and interpersonal interaction	Electronic exchange, non-face to face interaction
8	Principle of service deliver	Standardization, impartiality and equity	User customization, personalization

Source: Ndou, 2004; Abdulrazaq, 2015; Ibikunle, Eweje, & Obisanya, 2019

Table 2.2 illustrates that the shift from traditional bureaucratic administration to e-government represents not merely a technological upgrade, but a fundamental transformation in how public services are conceptualized, organized, and delivered. Under the classical bureaucratic paradigm, public administration has historically prioritized production cost efficiency, procedural compliance, and standardization. Efficiency was largely interpreted in terms of minimizing expenditure and maintaining

uniform rules, often at the expense of responsiveness and user experience. By contrast, the e-government paradigm redefines efficiency through the lens of user satisfaction, accessibility, and service quality, recognizing citizens as active participants and co-producers of public value rather than passive recipients of services.

This transformation is particularly evident in organizational design. Bureaucratic systems are typically structured around functional rationality, departmental silos, and vertical hierarchies of control. While such arrangements promote order and predictability, they often generate rigidity, duplication of tasks, and slow decision-making. E-government challenges this logic by promoting horizontal coordination, networked organizations, and cross-departmental information sharing. The underlying assumption is that digital platforms can break down institutional silos and enable collaborative governance. However, scholars caution that technology alone cannot dissolve entrenched bureaucratic boundaries unless accompanied by organizational and cultural reforms. This tension explains why many public institutions exhibit digital systems layered on top of unchanged bureaucratic structures.

Management principles also undergo a significant shift in the e-government paradigm. Traditional bureaucracy emphasizes rule compliance, hierarchical supervision, and mandate enforcement, which limits discretion and innovation. In contrast, e-government encourages flexible management approaches that rely on teamwork, interdepartmental coordination, and outcome-oriented performance. Central coordinating units replace fragmented control mechanisms, enabling faster responses to emerging service demands. Nevertheless, this transition is not automatic. In many developing contexts, including Nigeria, formal e-government frameworks coexist with managerial practices that remain

deeply bureaucratic, creating inconsistencies between digital aspirations and operational realities.

Leadership roles are similarly redefined. Bureaucratic leadership is rooted in command-and-control authority, where compliance is enforced through hierarchy. E-government leadership, by contrast, emphasizes facilitation, coordination, and innovation. Leaders are expected to function as enablers who create conditions for collaboration, experimentation, and learning. This shift places new demands on public sector leaders, particularly in contexts where leadership legitimacy has traditionally been derived from positional authority rather than transformational capacity. The persistence of authoritarian leadership styles can therefore undermine the adaptive potential of e-government systems.

Communication patterns further distinguish the two paradigms. In bureaucratic systems, internal communication is predominantly top-down, reinforcing hierarchical control and limiting feedback. External communication is centralized, formal, and often unidirectional. E-government transforms communication into a multidirectional process, enabling real-time interaction across departments and two-way engagement with citizens through multiple digital channels. However, empirical evidence from Nigeria suggests that while external communication has expanded through online portals, internal communication within many MDAs remains hierarchical, constraining the full benefits of digital interaction.

Service delivery mechanisms also reflect this paradigmatic shift. Bureaucracy relies heavily on documentary processes and face-to-face interactions, which increase

transaction costs and delay service provision. E-government replaces these mechanisms with electronic exchanges that enable remote, non-face-to-face interactions, improving accessibility and convenience. Importantly, while bureaucratic systems prioritize standardization and uniformity to ensure equity, e-government introduces customization and personalization of services without necessarily compromising fairness. This reorientation aligns with contemporary governance models that emphasize citizen-centric service design.

In Nigeria, and particularly in Kaduna State, these paradigm shifts are unfolding unevenly. On the one hand, initiatives such as TSA, IPPIS, and KADGIS demonstrate the capacity of ICT to enhance efficiency, transparency, and accountability. The digitization of land records through KADGIS, for example, has reduced bureaucratic bottlenecks and limited opportunities for discretionary abuse. Similarly, the state's e-procurement platform has expanded communication channels by enabling electronic interaction between suppliers and government agencies.

On the other hand, deeply embedded bureaucratic traditions continue to constrain the full realization of the e-government paradigm. Many MDAs in Kaduna still operate vertical hierarchies, maintain parallel paper-based systems, and rely on command-and-control leadership styles that discourage innovation. Internal communication remains largely top-down, while external engagement is often formal and restricted. Service delivery continues to depend heavily on physical interactions, especially in rural areas characterized by limited connectivity and low digital literacy.

This contrast highlights a critical analytical insight: Nigeria's digital transformation is occurring within a hybrid governance environment where bureaucratic and e-government paradigms coexist. While digital infrastructure and platforms are expanding, the deeper institutional, cultural, and behavioral transformations required to sustain e-government remain incomplete. Kaduna's experience therefore reflects a transitional stage rather than a completed paradigm shift. The extent to which public servants embrace ICT use supported by training, leadership commitment, and organizational reform will ultimately determine whether e-government evolves into a transformative governance model or remains a form of partial and symbolic digitization.

2.8 E-Government Characteristics

Public services are an important focus for governments worldwide (Chilunjika, 2025). Recently, many countries have used e-government to take measures to make service delivery easier and more efficient for their citizens (Osborne & Strokosch, 2022). Therefore, the perception of e-government by public servants in public organizations is identified as an essential component to increase organizational efficiency (Balaji, 2025). Zindi (2024) states that e-government services are necessary for organizational development and sustainable performance (Chilunjika, 2025). Professionals and scholars such as Saleh et al. (2025) and Balaji (2025) have therefore recognized that the use of technology has a significant impact on the success of organizations.

Public organizations have undergone remarkable changes in recent decades (Chilunjika, 2025). In the United States, for example, the special forces are now considered the best in the world because they can strategically conduct military operations more

successfully (through the use of intelligence and technology) than any other superpower in the world (Chilunjika, 2025). Training has also been found to have a significant impact on the quality of services in the US and now has the largest and most technologically capable economy in the world (Chohan & Hu, 2022; Sadik-Zada et al., 2024).

However, in African countries (developing countries), empirical evidence has shown that there is a persistent barrier to the promotion of e-government that often emanates from the side of public servants because they view the use of e-government services negatively (Chohan & Hu, 2022; Chilunjika, 2025). Against this backdrop, scholars and practitioners have cited commitment, willingness, courage and perseverance as prerequisites for public organizations to cultivate effective e-government practices in African countries (Balaji, 2025; Haridy et al., 2025).

In particular, financial resources play an important role in the way Latin American countries use technology in their governments. A study by Nkgapele (2024) looked at 20 countries in the region, including Argentina, Brazil and Mexico, and found that the level of financial resources has a significant impact on the use of technology in the public sector. According to Chohan & Hu (2022), there are three key challenges that prevent developing countries from successfully implementing ICT and achieving efficient e-government in their public sectors (Chohan & Hu, 2022). These challenges include the capacity of government agencies to collaborate and share information effectively (connective capacity), the ability to strike a balance between improving existing services and exploring innovative new approaches (ambidextrous capability), and the capacity of

organizations to learn from past experiences while adapting to new technologies and techniques (Nkgapele, 2024).

The ineffectiveness of public organizations in most African countries, for example, is attributed to factors such as the lack of responsiveness to technological advances and modern organizational techniques, the flattering behaviour of public servants who believe that it is safer to follow than to take the initiative, and poor working conditions, highly hierarchical work structure streamlined organizational structures, lack of financial and material resources, corruption in almost all spheres of public life due to insecure employment, inadequate remuneration, egregious indiscipline and unethical behavior, and a decline in efficiency, effectiveness and productivity (Nkgapele, 2024).

The Nigerian government seeks to transition from its current state of administration to a more desirable and effective model of governance (Sale et al., 2025). This shift requires public servants to adapt to new opportunities, processes, and technologies in order to minimize economic losses, particularly since organizational change is often complex and marked by uncertainty (Omotayo et al., 2025). The effectiveness of e-government initiatives is closely tied to their alignment with organizational goals and priorities (Chohan & Hu, 2022). Consequently, sustaining Nigeria's global competitiveness depends on cultivating a new generation of government employees who can assume leadership roles, adopt entrepreneurial mindsets, and drive innovation within the public sector (Sadik-Zada et al., 2024).

2.8.1 E-government Service Characteristics in Some Selected European Countries

The effectiveness of e-government in Europe is closely linked to the professional capacity, values, and adaptive competencies of public servants, whose skills and attitudes significantly shape organizational performance and service delivery outcomes (Ogu & Chukwurah, 2023). Across the region, governments increasingly recognize that managing present administrative demands, reforming legacy systems, and preparing for future governance challenges depend on the strategic integration of ICT into public service delivery (Tannady & Dewi, 2024; Schork et al., 2016). Consequently, European countries have emerged as global leaders in e-government, demonstrating that technological innovation yields meaningful results only when it is supported by institutional commitment, skilled personnel, and a culture that encourages learning and innovation.

Countries such as Denmark, Finland, and Estonia represent the most advanced examples of this transformation. According to the 2024 United Nations E-Government Development Index (EGDI), Denmark ranks first globally with a score of 0.9847, followed closely by Estonia with 0.9727. These high rankings reflect more than extensive investments in ICT infrastructure; they also signal deep institutional reforms emphasizing citizen-centered governance, open data policies, interoperability, and digital inclusivity. In these countries, e-government success is reinforced by high levels of public trust and a professional civil service culture that values competence, accountability, and continuous improvement. Such conditions encourage both citizens and public servants to engage confidently with digital platforms.

The United Kingdom has similarly recorded substantial progress, ranking 7th globally with an EGDI score of 0.9577. The UK's digital governance strategy emphasizes service integration through platforms such as GOV.UK, which consolidates multiple government services into a single, user-friendly interface. This approach has reduced administrative complexity and improved accessibility, illustrating how organizational redesign and user-centric thinking can enhance the practical impact of e-government. Although not a European country, the United States provides a useful comparative benchmark. Ranking 19th globally with an EGDI score of 0.9159, the U.S. reflects similar trends of digital integration, organizational transformation, and professional capacity building, reinforcing the broader leadership of Western nations in digital governance.

What unites these high-performing countries is not technology alone but their ability to align technological sophistication with the values, competencies, and work practices of public servants (Chilunjika, 2025). Empirical research consistently shows that the beliefs, professional norms, and skill sets of public employees significantly influence the success or failure of e-government initiatives (Ogu & Chukwurah, 2023; Omotayo et al., 2025). In European contexts, public servants are expected not only to operate digital systems but also to collaborate across departments, adapt workflows, and embrace innovation as part of routine administrative practice. These institutionalized expectations help explain why European countries consistently dominate global e-government rankings.

However, the European experience also highlights an important analytical insight for this study: high EGDI performance is the outcome of long-term investments in human

capital, organizational culture, and governance values, not merely the availability of digital tools. This reinforces the argument that e-government effectiveness depends fundamentally on how public servants perceive, adopt, and utilize ICT in their daily work. Accordingly, Figure 2.1 illustrates European countries with the highest EGDI values, underscoring the close relationship between professional capacity, institutional maturity, and successful digital governance.



Source: UN Survey 2024

Figure 2.1: Countries in Europe with the Highest EGDI Value

Hence, the European experience highlights that effective e-government is not solely a product of technological investment but also of human capacity, organizational culture, and institutional trust. The consistently high EGDI rankings of Denmark, Estonia, and the UK illustrate how digital governance, when anchored in strong professional values and skills, can produce highly responsive, efficient, and citizen-oriented public service delivery (Omotayo et al., 2025).

2.8.2 Electronic Government Services in Some Selected Asian Countries

Several Asian countries have recorded substantial progress in the adoption and utilization of e-government, reflecting a deliberate commitment to digital transformation in public administration (Akida & Kandiri, 2024). Unlike early technology-driven reforms that focused primarily on infrastructure, many Asian governments have emphasized the integration of ICT into organizational routines, human resource practices, and performance management systems. Countries such as Malaysia and Thailand illustrate how e-government reforms can succeed when international best practices are adapted to local institutional contexts and embedded within workplace cultures (Chilunjika, 2025; Omotayo et al., 2025; Manaf, 2016; Tiika et al., 2024). In these settings, organizational efficiency is closely linked to the perceived usefulness of ICT and the extent to which public servants internalize digital practices as part of their daily work (Haridy et al., 2025).

Empirical studies across Asia show that e-government utilization has contributed to improved policy formulation, stronger inter-agency collaboration, and more sustainable public organizations (Mohamed & Manaf, 2020; Fitri et al., 2017; Haroon et al., 2019). These outcomes suggest that the value of e-government lies not merely in technological deployment but in its capacity to reshape administrative processes and coordination mechanisms. This perspective aligns with the broader argument that digital governance outcomes depend on utilization depth rather than system availability alone.

Malaysia represents one of the most notable performers in the Asian region. In the 2024 United Nations E-Government Development Index (EGDI), Malaysia ranked 57th

globally, with a score above the world average of 0.8111 (EGDI, 2024). While this position does not place Malaysia among the global top tier, it reflects sustained institutional commitment to reform and innovation within the public service (Omotayo et al., 2025). A key driver of this progress is the Star Rating System, which institutionalizes performance evaluation across government agencies and incentivizes innovation, accountability, and service improvement (Tannady & Dewi, 2024). Through systematic knowledge sharing and widespread adoption of digital services, Malaysian ministries have cultivated a culture of responsiveness that supports continuous improvement rather than one-off digital reforms (Omotayo et al., 2025).

Thailand provides a complementary example of e-government advancement shaped by human capital development and performance management. Influenced by Japanese administrative and management traditions, Thailand places strong emphasis on employee appraisal, retention, and continuous skills development as mechanisms for improving public sector efficiency (Haridy et al., 2025). Technology adoption in Thailand has been explicitly aligned with national development goals, particularly the improvement of citizens' quality of life (Akida & Kandiri, 2024). As a result, e-government initiatives have strengthened administrative capacity and contributed to steady economic growth, illustrating how digital governance reforms can generate both administrative and developmental benefits when effectively utilized (Balaji, 2025).

The experience of China further demonstrates the strong relationship between e-government utilization and service delivery performance. Ranking 35th globally in the EGDI and above the world average, China has expanded digital platforms across multiple sectors, improving accessibility, efficiency, and scale of public services (Haridy

et al., 2025). Empirical evidence indicates a positive correlation between the expansion of e-government systems and improvements in service responsiveness and administrative efficiency (Pramuditha et al., 2025). China's adoption of advanced technologies, including artificial intelligence, smart platforms, and integrated digital systems, illustrates how policy innovation combined with technological capability can transform public administration and support large-scale governance in complex societies (Saleh et al., 2025).

Similarly, Japan stands out as a global leader in e-government maturity, ranking 13th in the 2024 EGDI. A defining feature of Japan's digital governance is its long-term investment in training, workforce stability, and human capital development (Chilunjika, 2025; Tannady & Dewi, 2024). Japanese administrative culture emphasizes lifelong learning, structured knowledge transfer, and continuous professional development, ensuring that public servants remain adaptable to technological change. Recent reforms have focused on balancing innovation with employee retention, reinforcing institutional memory while advancing digital service delivery. This balance explains Japan's sustained presence among the world's top e-government performers (Haridy et al., 2025).

Taken together, the Asian experience reveals several critical insights. First, successful e-government adoption depends on the perceived usefulness of ICT and its integration into organizational routines. Second, human capital development and performance management systems play a decisive role in sustaining utilization. Third, policy coherence and institutional support determine whether digital platforms translate into tangible service delivery improvements. These insights are particularly relevant for

developing contexts, as they demonstrate that e-government effectiveness is driven less by technology alone and more by how public servants are enabled, motivated, and supported to use ICT in practice. Accordingly, Figure 2.2 presents Asian countries with the highest EGDI values, illustrating the strong linkage between utilization, institutional capacity, and digital governance performance.

Source: UN e-government survey 2024

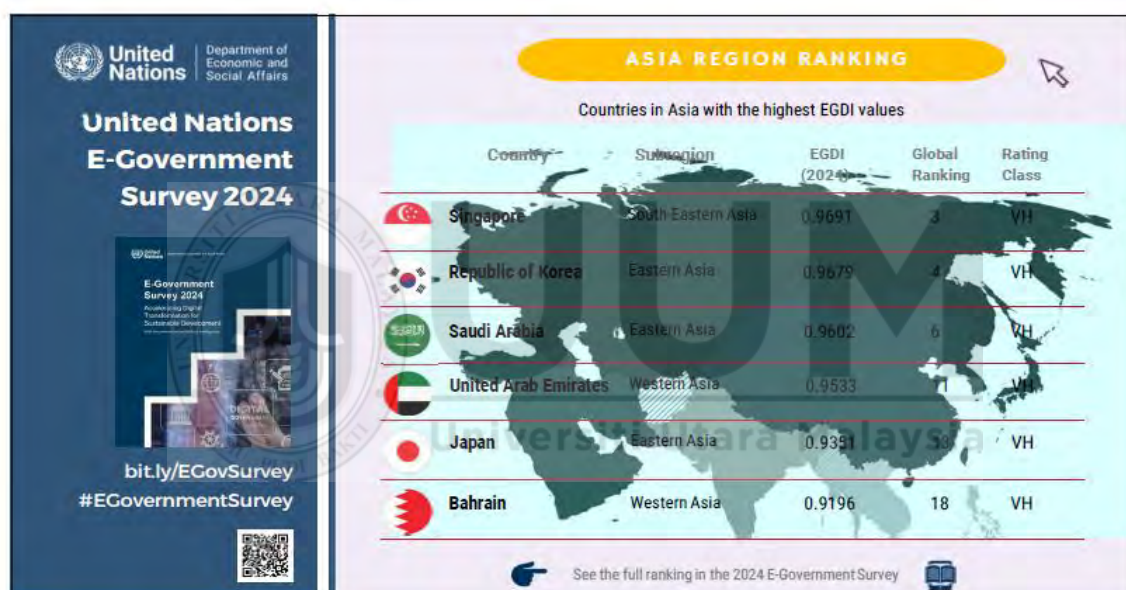


Figure 2.2: Countries in Asia with the highest EGDI value

2.8.3 Electronic Government in Some Selected African Countries

Across Africa, e-government has attracted increasing attention as a mechanism for improving governance, enhancing transparency, and strengthening public service delivery. Despite this growing interest, most African countries continue to occupy the medium or low categories of the United Nations E-Government Development Index (EGDI), reflecting persistent structural constraints that limit the depth and effectiveness of digital governance reforms (Haridy et al., 2025). According to the 2024 EGDI survey,

no African country has yet attained the “very high” category, and only a small number have progressed into the upper segment of the “high” category. This pattern underscores a persistent regional gap between Africa and more digitally advanced regions, reinforcing the broader global digital divide in which developed economies consolidate digital gains while many developing countries struggle to translate policy commitments into sustained outcomes (Tannady & Dewi, 2024; Omotayo et al., 2025).

A critical issue highlighted in the literature is that global indices such as the EGDI, while useful for cross-national comparison, often obscure incremental progress achieved within African countries. Several governments have introduced innovative reforms, yet their impact is frequently diluted by structural deficits including unreliable electricity supply, limited broadband penetration, low levels of ICT literacy, and institutional resistance to organizational change (Omotayo et al., 2025). Scholars therefore argue that Africa’s relatively weak EGDI performance should not be interpreted solely as policy failure, but rather as evidence of deep-seated structural inequalities that constrain the utilization of digital systems (United Nations, 2024). This perspective suggests the need for more context-sensitive assessments that capture domestic realities alongside global benchmarks.

Within this constrained environment, some African countries have nonetheless emerged as relative leaders. South Africa represents one of the continent’s most advanced cases of e-government adoption. Benefiting from comparatively stronger infrastructure and a more digitized economy, South Africa has implemented integrated digital platforms for tax administration, business registration, and municipal services (Omotayo et al., 2025). These initiatives have improved administrative efficiency and reduced bureaucratic

delays. However, empirical studies also highlight persistent challenges related to inclusivity, as rural and disadvantaged communities continue to face barriers to accessing digital services. South Africa's experience therefore illustrates both the potential of e-government to enhance accountability and the difficulty of achieving equitable service delivery in highly unequal societies (Haridy et al., 2025).

In the same vein, Kenya offers a contrasting and more adaptive model. Through the establishment of Huduma Centres, Kenya has combined digital platforms with physical service points, enabling citizens to access essential services such as national identification, driver's licensing, and business permits (Omotayo et al., 2025). This hybrid approach compensates for infrastructural and digital literacy gaps by embedding human support within digital service delivery. Research suggests that Kenya's model reflects a pragmatic strategy in which technology is tailored to contextual constraints rather than imposed as a standalone solution (Pathak et al., 2025). As such, Kenya provides a valuable example of how African governments can localize e-government reforms to enhance utilization despite infrastructural limitations.

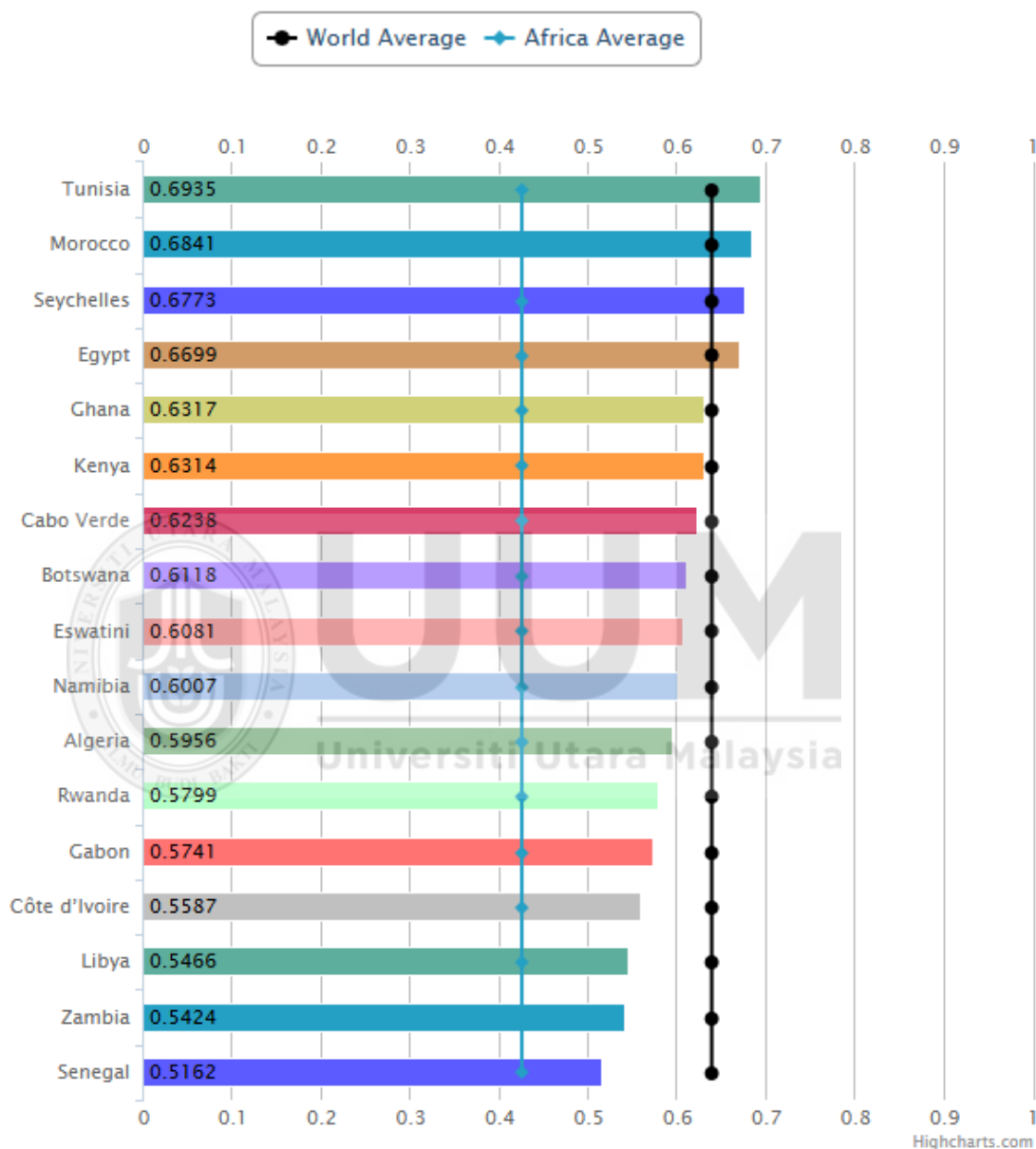
Similarly, Rwanda has emerged as a standout case in Africa's digital transformation. Through the Irembo platform, the government has digitized a wide range of public services, including civil registration and business licensing. The success of this initiative is widely attributed not only to technical innovation but also to strong political will, coordinated institutional reforms, extensive training programs, and sustained citizen awareness campaigns (Nkundabagenzi et al., 2022). Rwanda's performance demonstrates that when digital tools are aligned with governance priorities and

supported by human capital development, e-government utilization can advance rapidly even in resource-constrained contexts.

By contrast, Nigeria illustrates the coexistence of notable progress and persistent structural challenges. National initiatives such as the IPPIS, TSA, and GIFMIS have contributed to improved fiscal discipline, reduced leakages, and enhanced accountability within public financial management (Oluwole & Ajayi, 2023). Despite these gains, Nigeria's overall EGDI performance remains low. The 2024 index assigns the country a score of 0.4815, ranking it 144th out of 193 countries, well below the global average of 0.6382 (United Nations, 2024). This weak performance reflects entrenched infrastructural deficits, limited internet penetration particularly in rural areas, and insufficient training and support for public servants, all of which constrain the level of application of e-government systems.

Comparative analysis across Africa reveals a consistent pattern. While countries such as Rwanda and Kenya demonstrate how innovative, context-sensitive approaches can enhance e-government utilization, cases like Nigeria and South Africa highlight the challenges of scaling digital reforms in environments characterized by inequality, infrastructural fragility, and deeply embedded bureaucratic cultures. The literature converges on the argument that e-government effectiveness in Africa is shaped less by the availability of technology and more by how digital reforms are embedded within organizational structures, human resource capacity, leadership commitment, and citizen trust (Chilunjika, 2025; Omotayo et al., 2025). This insight reinforces the central premise of the present study: that understanding the utilization of e-government by

public servants, rather than adoption alone, is critical for explaining variations in public service delivery outcomes in African and sub-national contexts such as Kaduna State.



Source: 2024 EGDI Report

Figure 2.3: Countries in Africa with the Highest EGDI

Figure 2.3 presents a comparative overview of African countries with the highest E-Government Development Index (EGDI) scores, revealing a pattern of uneven progress

that reflects both innovation and persistent structural constraints in the continent's digital transformation (Omotayo et al., 2025). Countries such as Tunisia, Morocco, Egypt, and Seychelles emerge as the top performers, recording EGDI values above 0.66 and positioning themselves closer to the global average. Tunisia leads this group with an index value of 0.693, ranking 87th globally, followed by Morocco at 0.684. These relatively strong performances reflect sustained investments in ICT infrastructure, online service delivery, and human capital development, which together have enabled these countries to progress beyond basic digitization toward more mature e-government systems. Egypt's comparatively strong e-participation score (0.589) further signals deliberate efforts to involve citizens in digital governance, while Seychelles demonstrates how targeted investments in human capital and telecommunications can yield high returns despite small population size, as reflected in its strong telecommunication index score of 0.891.

A second group of countries occupies the middle range of EGDI performance, with values between 0.60 and 0.63. This group includes Kenya, Ghana, Cabo Verde, Namibia, and Eswatini. Kenya and Ghana stand out within this cluster due to relatively strong online service indices of 0.777 and 0.608 respectively, reflecting initiatives such as Kenya's Huduma Centres and Ghana's digital service portals. Cabo Verde's comparatively high e-participation score (0.548) highlights the island nation's strategic emphasis on citizen engagement as part of its digital governance agenda. However, Namibia and Eswatini, despite maintaining balanced scores across EGDI dimensions, continue to face challenges in scaling online services and expanding connectivity to match the performance of North African leaders. Collectively, this group illustrates a

transitional stage in which foundational systems are in place, but deeper utilization and inclusivity remain constrained.

At the lower end of the dataset are countries such as Rwanda, Algeria, Gabon, Côte d'Ivoire, Zambia, Senegal, and Libya, with EGDI values ranging from approximately 0.51 to 0.59. Rwanda represents a particularly instructive paradox. Although its overall EGDI score stands at 0.580, it records one of the highest e-participation scores in Africa (0.753) and the strongest online service index (0.821), reflecting the effectiveness of its Irembo platform. Yet, Rwanda's progress is constrained by weaknesses in telecommunication infrastructure, with a low score of 0.372, illustrating how service innovation and citizen engagement can be limited by connectivity bottlenecks. In contrast, Algeria and Gabon display relatively strong telecommunication indices (0.813 and 0.826 respectively) but extremely low e-participation scores (0.055 and 0.123), indicating that infrastructure availability alone does not guarantee citizen engagement or effective utilization of digital platforms.

Libya presents another contrasting case. Despite possessing one of the strongest telecommunication infrastructures on the continent (0.964), its online service index remains extremely low (0.081), and e-participation is almost negligible (0.014). This imbalance highlights the role of political instability and weak governance institutions in undermining the effective use of digital infrastructure. Similarly, Senegal and Zambia, both recording EGDI values below 0.55, face acute challenges in human capital development, with Senegal's human capital index falling as low as 0.338. These cases demonstrate that deficits in skills, institutional capacity, and governance stability can significantly limit the benefits of e-government initiatives.

Taken together, Figure 2.4 reveals several important continental patterns. North African countries particularly Tunisia, Morocco, and Egypt along with island states such as Seychelles and Cabo Verde, consistently outperform much of Sub-Saharan Africa, reflecting stronger infrastructure, institutional continuity, and targeted digital strategies. Reform-oriented countries in East and West Africa, notably Kenya and Ghana, are making gradual progress through innovations in online service delivery yet continue to be constrained by infrastructural gaps and uneven human capital development. Rwanda's experience underscores that even advanced digital platforms and strong citizen engagement cannot fully compensate for weak connectivity, while cases such as Libya and Algeria illustrate that infrastructure without governance capacity yields limited outcomes.

The broader implication is that Africa's e-government landscape is characterized by pronounced asymmetries across EGDI dimensions. While many governments are digitizing services, far fewer are achieving balanced progress across online services, telecommunications, human capital, and e-participation. In particular, low e-participation scores across most countries suggest that digital governance in Africa remains largely state-centric, with limited empowerment of citizens as active participants in decision-making. Consequently, Figure 2.4 reinforces the argument that advancing e-government in Africa requires more than technological deployment; it demands sustained investment in human capital, resilient infrastructure, institutional stability, and trust-building mechanisms that enable citizens and public servants alike to meaningfully utilize digital platforms for improved public service delivery.

2.8.4 Electronic Government in Nigeria

Nigeria's pursuit of e-government has been driven by a strategic ambition to modernize public administration, improve public service delivery, and strengthen accountability through the use of digital technologies (Omotayo et al., 2025). A major institutional milestone in this process was the launch of the National Digital Economy Policy and Strategy (NDEPS) on 28 November 2019 under the late Nigerian President Muhammadu Buhari. The policy represented a deliberate attempt to institutionalize digital governance by expanding access to government services, improving transparency, and enhancing administrative efficiency (Ogu & Chukwurah, 2023; Omotayo et al., 2025). The COVID-19 pandemic further intensified the urgency of digital reform, as electronic platforms became essential for sustaining government operations, ensuring business continuity, and maintaining service delivery during lockdowns (Abdulkareem et al., 2024).

Under this policy direction, Nigeria's ICT sector recorded remarkable growth. The sector expanded by 14.7% in 2020 and contributed approximately 17.92% to GDP in the second quarter of 2021, making it the fastest-growing sector of the economy at the time (NBS, 2022; Haridy et al., 2025). This performance played a significant role in Nigeria's post-recession recovery and positioned ICT as a central pillar of national economic transformation. International recognition followed, as Nigeria's Minister of Communications and Digital Economy was elected to chair the World Summit on the Information Society in 2022, signaling global acknowledgment of the country's digital economy initiatives.

Despite these achievements in the broader digital economy, Nigeria's progress in e-government development has been comparatively slow and uneven. According to the EGDI, Nigeria remains in the lower performance category. In 2022, the country recorded an EGDI score of 0.4406, ranking 140th out of 193 countries globally. By 2024, the score improved to 0.4815; however, Nigeria's global ranking declined to 144th, as other countries advanced more rapidly. This paradox highlights a critical analytical insight: although Nigeria has achieved incremental improvements in digital governance, these gains have not been sufficiently transformative to keep pace with international benchmarks (Omotayo et al., 2025). A similar pattern is evident in the e-participation index, where Nigeria improved marginally from 117th in 2022 to 115th in 2024. While this suggests growing efforts to engage citizens digitally, progress remains modest when compared to African peers with stronger institutional capacity and broader citizen uptake.

Nigeria's e-government trajectory is also characterized by the introduction of several flagship digital initiatives aimed at improving fiscal discipline, reducing corruption, and streamlining administrative processes (Ahmad & Dhoon, 2024). The TSA centralized government revenue collection and significantly reduced financial leakages, enhancing transparency and accountability (Ogu & Chukwurah, 2023). IPPIS reformed payroll administration by eliminating ghost workers and improving control over salary payments (Abdulkareem et al., 2024). Similarly, the BVN strengthened financial accountability by authenticating bank accounts and reducing fraud, while also creating opportunities for greater integration across government service platforms (Ahmad &

Dhooon, 2024). Collectively, these initiatives demonstrate Nigeria's intent to address long-standing systemic inefficiencies and lay the foundation for digital governance.

However, the effectiveness of these reforms has been constrained by persistent structural and institutional challenges. While ICT's contribution to GDP reflects strong sectoral growth, this success has not translated proportionately into improved e-government outcomes. Many ministries, departments, and agencies (MDAs) continue to operate hybrid administrative systems in which digital platforms coexist with manual, paper-based processes. This duality undermines efficiency gains and limits the depth of digital transformation. Inadequate ICT skills among public servants, insufficient training programs, frequent system downtimes, and weak change-management practices further reduce utilization levels. More fundamentally, infrastructural deficits—such as unstable electricity supply, limited broadband coverage, and unreliable internet connectivity—continue to restrict the inclusiveness and effectiveness of e-government across the country (Ogu & Chukwurah, 2023; Omotayo et al., 2025).

The UN E-Government Survey (2024) emphasizes that strong EGDI performance depends not merely on the presence of digital platforms but on their depth of use, inclusivity, and sustainability. In Nigeria, relatively low scores in the online service index and moderate performance in the human capital index reflect enduring weaknesses in service availability, digital skills, and citizen readiness. Although reforms such as TSA, IPPIS, and BVN have contributed positively to fiscal transparency and accountability, the broader governance ecosystem continues to struggle with accessibility, institutional readiness, and trust. This disconnect illustrates a fundamental

implementation gap, where economic growth in ICT has not been matched by corresponding advances in e-government utilization and public service transformation.

In comparative terms, Nigeria lags behind several African peers. Mauritius consistently leads the continent with EGDI scores above 0.75, placing it in the “very high” category. Countries such as Morocco, Tunisia, and South Africa also record substantially higher scores, benefiting from stronger infrastructure, more comprehensive online services, and deeper institutional embedding of digital practices. By contrast, Nigeria’s lower EGDI scores and slower pace of adoption reveal persistent weaknesses in scaling reforms and integrating digital systems into routine administrative practice across all levels of government.

Hence, Nigeria’s experience underscores a central argument of this study: that the success of e-government depends not only on policy ambition or technological investment but on how deeply digital systems are utilized by public servants in their everyday work. Without sustained attention to training, infrastructure, organizational culture, and change management, e-government reforms risk remaining fragmented and symbolic, rather than becoming transformative instruments for effective public service delivery.

Table 2.3
showing Nigeria's annual UNEDI from 2010 to 2024

EGDI	2024	2022	2020	2018	2016	2014	2012	2010
E-Government Development Index rank	144	140	141	143	143	141	162	150
E-Government Development Index value	0.4815	0.4525	0.4406	0.3807	0.3291	0.29287	0.26756	0.26868
E-Participation Index rank	115	117	114	117	118	97	75	157
E-Participation Index value	0.48146	0.3068	0.4881	0.4831	0.35593	0.33333	0.1842	0.01428
Online Service Index value	0.5372	0.525	0.5176	0.5278	0.41304	0.30708	0.22222	0.09523
Telecommunication Infrastructure Index value	0.4836	0.3886	0.3534	0.1883	0.19582	0.19045	0.12696	0.05937
Human Capital Index value	0.4236	0.4439	0.4507	0.4261	0.37843	0.3811	0.45352	0.6567

Source: E-Government Development Index Report (2024).

The historical trend of Nigeria's performance on the EGDI between 2010 and 2024 reveals a pattern of gradual improvement alongside persistent structural challenges in the country's digital governance trajectory. Over this fourteen-year period, Nigeria's EGDI score increased from 0.268 in 2010 to 0.482 in 2024, indicating measurable gains in digital infrastructure, online service provision, and institutional awareness of e-government reforms. This steady rise suggests that successive policy initiatives and investments in ICT have contributed to strengthening Nigeria's baseline digital governance capacity.

Despite this absolute improvement, Nigeria's global ranking has remained largely stagnant and, at certain points, has even declined. The country ranked 150th in 2010 and only marginally improved to 144th by 2024, with notable fluctuations in between (141st

in 2014, 143rd in 2016 and 2018, 141st in 2020, and 140th in 2022). This divergence between score improvement and ranking performance highlights a fundamental paradox: while Nigeria has advanced in absolute terms, it has progressed at a slower pace than many other countries, resulting in limited gains in relative global positioning. This pattern indicates that Nigeria's reforms have been largely incremental rather than transformative.

A closer examination of the E-Participation Index (EPI) reveals an inconsistent but overall positive trajectory in citizen engagement. Nigeria's EPI score rose sharply from an extremely low base of 0.014 in 2010 to 0.481 in 2024, reflecting growing efforts to provide digital platforms for citizen interaction, consultation, and information sharing. However, the global ranking tells a more volatile story. Nigeria ranked 157th in 2010, peaked at 75th in 2012, before declining to 117th in 2018 and 115th in 2024. These fluctuations suggest that although platforms for digital participation have expanded, citizen uptake and sustained engagement remain uneven and fragile. In practice, this points to weaknesses in continuity, trust, and inclusiveness of participatory mechanisms, rather than a complete absence of engagement initiatives (Omotayo et al., 2025).

Nigeria's Online Service Index (OSI) shows one of the most notable areas of progress. The OSI score increased substantially from 0.095 in 2010 to 0.537 in 2024, reflecting deliberate efforts to digitize government services and administrative processes. The most significant improvements occurred between 2012 (0.222) and 2016 (0.413), coinciding with the rollout of major reforms such as the Treasury Single Account (TSA) and other fiscal transparency initiatives. However, progress after 2016 has been relatively modest, with scores stabilizing around the 0.52 range. This plateau suggests a growing gap

between the availability of online platforms and their effective utilization by both public institutions and citizens, often due to concerns related to system reliability, usability, institutional readiness, and user trust.

The Telecommunication Infrastructure Index (TII) reflects Nigeria's most visible long-term gains, but also underscores enduring infrastructural weaknesses. From a very low baseline of 0.059 in 2010, Nigeria's TII score rose to 0.484 in 2024, driven by increased mobile subscriptions, expanded internet access, and broader broadband coverage. Much of this progress occurred after 2016, with the index rising from 0.188 in 2018 to 0.354 in 2020, and further to 0.484 in 2024. Nevertheless, Nigeria continues to lag behind many African peers with more robust and affordable telecommunications networks. Persistent challenges such as unstable electricity supply, poor last-mile connectivity, and high data costs continue to limit digital inclusion and constrain the effective use of e-government platforms.

The Human Capital Index (HCI), which captures education and skills relevant to digital service use, presents a particularly concerning pattern. Nigeria recorded a relatively high HCI score of 0.657 in 2010, but this declined sharply in subsequent years, reaching a low of 0.378 in 2016. Although there has been a modest recovery to 0.424 in 2024, the index remains well below its initial level. This decline reflects broader challenges in the education and training system, including weak digital literacy, limited vocational and ICT-focused training, and unequal access to quality education. The erosion of human capital relative to improvements in infrastructure and online services suggests that Nigeria's e-government progress is constrained not only by technical or institutional factors, but also by insufficient skills among both citizens and public servants.

Taken together, the data indicate that Nigeria has made incremental but uneven progress in e-government development. Gains in telecommunications infrastructure and online service provision demonstrate growing institutional capacity to digitize governance, while improvements in e-participation signal attempts albeit inconsistent, to involve citizens more actively. However, stagnation in global rankings and persistent weaknesses in human capital development reveal systemic constraints, including infrastructural deficits, limited ICT literacy, uneven service integration, and discontinuity in reform implementation. Thus, although Nigeria's EGDI score nearly doubled between 2010 and 2024, the country's difficulty in translating these gains into sustained, transformative service delivery outcomes underscores a persistent implementation gap at the core of its e-government journey.

2.8.5 E-Government in Kaduna State

Kaduna State has emerged as one of Nigeria's most reform-oriented subnational governments in the adoption of e-government to enhance transparency, accountability, and public service delivery (Ogu & Chukwurah, 2023). A defining milestone in this trajectory was the state's decision in May 2016 to join the Open Government Partnership (OGP), making Kaduna the first Nigerian state to do so. This decision positioned the state among global reform leaders and signaled a strong political commitment to open governance, citizen participation, and the use of digital tools to strengthen accountability (Ahmed et al., 2023). Building on this foundation, Kaduna has implemented a range of digital reforms, particularly in land administration, public procurement, and fiscal management, which have attracted both national and international recognition as examples of subnational innovation (Mphahlele et al., 2025).

One of the state's flagship e-government initiatives is the KADGIS, which has digitized land administration processes. Through KADGIS, property registration has become faster and more transparent, opportunities for corruption have been reduced, and internally generated revenue has improved through better land records and valuation. In a similar vein, the introduction of an electronic procurement platform has expanded supplier registration, improved transparency in public contracting, and reduced discretionary decision-making that previously characterized manual procurement systems (Mphahlele et al., 2025). These initiatives illustrate Kaduna's strategic effort to leverage ICT to modernize governance structures and improve service delivery outcomes. However, the depth of utilization remains uneven. While KADGIS is widely used for basic land searches and title verification, more advanced functions such as spatial analysis, automated valuation, and integrated planning tools remain underutilized. Likewise, despite the availability of digital procurement systems, many procurement officials still rely on manual filing for contract management and monitoring.

Beyond land and procurement reforms, Kaduna has pursued digital initiatives aimed at strengthening fiscal discipline and administrative efficiency. The adoption of electronic payment platforms and centralized databases has contributed to reducing financial leakages and improving planning, monitoring, and coordination of government programs. These reforms align with broader national initiatives such as the TSA and the IPPIS, but Kaduna has attempted to adapt them to the specific realities of state-level governance. Nevertheless, implementation remains uneven. Many ministries, departments, and agencies (MDAs) continue to operate "hybrid systems" that combine

digital platforms with parallel paper-based processes, significantly limiting efficiency gains and undermining the transformative potential of e-government (Ogu & Chukwurah, 2023).

Despite its reformist posture, Kaduna continues to face challenges that mirror Nigeria's broader e-government experience. Infrastructural weaknesses, particularly unstable electricity supply, limited broadband coverage, and frequent system downtimes, constrain the consistent use of digital platforms (Ibikunle et al., 2022). Resistance to change among public servants further compounds these challenges, as many officials prefer familiar analogue methods due to low ICT literacy, fear of increased accountability, or concerns about job displacement. The absence of comprehensive and continuous training programs exacerbates this problem, as employees may be aware of digital tools but lack the skills and confidence to use them effectively (Chukwurah, 2023; Dike, 2018). As a result, the Level of Application (LoA) of e-government systems remains shallow. Platforms are often launched with high visibility and political celebration but are not fully embedded into routine administrative practices. This phenomenon of "ceremonial digitization" significantly reduces the long-term impact of digital reforms (Zubir et al., 2024).

From the citizens' perspective, Kaduna's e-government initiatives have produced mixed outcomes. On the positive side, platforms such as KADGIS and the e-procurement system have reduced processing times, enhanced transparency, and limited opportunities for rent-seeking. However, access barriers persist, particularly for rural populations with limited internet connectivity and low digital literacy. In addition, weak integration across platforms means that citizens often encounter manual bureaucratic steps even after

initiating processes online, which undermines trust in digital services and weakens user satisfaction.

Hence, Kaduna State presents a paradox of progress and limitation. On one hand, it stands out as a pioneer of subnational e-government reform in Nigeria, having embraced international governance frameworks and introduced digital systems that demonstrate tangible improvements in transparency and efficiency. On the other hand, infrastructural deficits, limited training, resistance within the public service, and shallow levels of application continue to constrain the effectiveness of these reforms. Kaduna's experience therefore reflects a central lesson of Nigeria's e-government journey: meaningful transformation requires more than the launch of digital platforms. It depends on embedding systems into daily administrative practice, expanding inclusivity, and strengthening institutional and human capacity to sustain digital governance over time.

2.9 Components of E-Government

E-government refers to the use of digital technologies to transform the way government operates and delivers services. Its core objective is to streamline the flow of information and services both within government agencies and between government and citizens, thereby enhancing efficiency, transparency, and accountability. By digitizing administrative processes, e-government helps revamp internal procedures, reduce bureaucratic bottlenecks, and improve the overall functionality of public institutions.

2.9.1 Government to Citizens (G2C)

Government-to-Citizen (G2C) represents one of the most visible and citizen-facing dimensions of e-government, as it focuses on the direct delivery of public information and services to citizens through digital platforms (Haridy et al., 2025). At its core, G2C is designed to reduce bureaucratic complexity, enhance transparency, and improve administrative efficiency by enabling citizens to interact with government institutions without physical presence or prolonged procedural delays (Retnowati & Nugraheny, 2021). Scholars frequently conceptualize G2C as a pillar of citizen-centered governance, emphasizing the reorientation of public services around citizens' needs, convenience, and expectations rather than rigid administrative routines (Saylam Yıldız, 2022).

Beyond service provision, G2C plays a crucial democratic role by facilitating citizen engagement and participation in governance. Through digital portals, mobile applications, and online platforms, citizens are able not only to access services but also to express opinions, submit complaints, participate in surveys, and contribute to public consultations (Aswani & Mutua, 2023). This interactive dimension distinguishes G2C from traditional service delivery models, which were largely one-directional and informational. By enabling two-way communication, G2C strengthens government responsiveness and fosters a sense of inclusion, which scholars identify as essential for building public trust and legitimacy in digital governance systems (Saylam Yıldız, 2022).

In developing contexts, however, the effectiveness of G2C initiatives is shaped by institutional capacity, infrastructure, and citizens' digital readiness. While G2C

platforms promise efficiency and accessibility, their impact depends on the extent to which citizens are aware of these services, trust digital systems, and possess the skills and resources needed to use them effectively (Haridy et al., 2025). Without these enabling conditions, G2C risks becoming symbolic rather than transformative, offering digital access in principle but failing to achieve meaningful utilization in practice.

In Nigeria, and particularly in Kaduna State, G2C initiatives have increasingly been deployed as tools for improving public service delivery and strengthening state–citizen relationships. Citizens can now pay taxes and levies electronically through secure government portals, eliminating the need for physical visits to government offices and reducing opportunities for informal payments and discretionary practices (Saylam & Yıldız, 2022). These platforms allow for real-time calculations, electronic document uploads, instant payment confirmation, and digital record keeping, which collectively enhance efficiency and transparency in revenue administration. In addition, governments have leveraged G2C systems to disseminate real-time information on public safety, health advisories, weather alerts, and emergency situations through SMS, email, and online dashboards (Akida & Kandiri, 2024).

These developments illustrate Kaduna State’s effort to reposition citizens at the center of public service delivery by offering faster, more transparent, and more convenient digital interaction channels. However, the depth of G2C utilization remains uneven. While urban residents and digitally literate citizens benefit more fully from online services, rural populations and vulnerable groups often face barriers related to internet access, digital literacy, and awareness. This uneven utilization underscores a critical insight from the literature: G2C effectiveness is not determined solely by the availability of

digital platforms, but by the degree to which such platforms are inclusive, trusted, and embedded in citizens' everyday interactions with government (Haridy et al., 2025; Aswani & Mutua, 2023).

2.9.2 Government-to-Business (G2B)

Government-to-Business (G2B) refers to the interaction and exchange of information, services, and resources between government agencies and private sector organizations through digital platforms (Aidinlis, 2022). These interactions typically encompass public procurement, licensing and permitting, tax administration, regulatory compliance, and the dissemination of business-related information. G2B e-government initiatives rely on ICT-enabled systems to simplify transactions, standardize procedures, and enhance communication between public institutions and the business community, thereby reducing administrative burdens and transaction costs (Abbouti et al., 2024).

One of the most prominent applications of G2B is electronic procurement (e-procurement), through which governments acquire goods and services via online platforms. E-procurement systems enable electronic publication of tenders, digital submission of bids, automated evaluation processes, and transparent contract awards. In Nigeria, platforms such as the online application system operated by the Joint Admissions and Matriculation Board demonstrate how high-volume transactions can be processed more efficiently, securely, and transparently through digital means (Ogu & Chukwurah, 2023). Although primarily service-oriented, such platforms illustrate the broader G2B logic of reducing human discretion, minimizing delays, and enhancing accountability. Empirical studies indicate that these systems significantly reduce

bureaucracy, save time, lower administrative costs, and improve trust between government and private actors (Abdulkareem & Oladimeji, 2024).

Beyond procurement, G2B initiatives extend to core transactional functions such as electronic tax filing, business registration, licensing, and permit issuance, all of which are critical for creating an enabling environment for investment, trade, and tourism (Nkgapele, 2024). By digitizing these regulatory processes, governments improve compliance monitoring while allowing businesses to operate with greater predictability and fewer procedural obstacles. This, in turn, enhances competitiveness and encourages domestic and foreign investment, as firms increasingly value regulatory systems that are transparent, efficient, and rules-based (Abbouti et al., 2024).

In Kaduna State, G2B platforms have been deployed to strengthen fiscal management, promote fair competition, and improve service delivery to the private sector. The state government now electronically publishes tender notices, receives bids online, and conducts electronic auctions, thereby limiting discretionary practices and widening access to public contracts (Ogu & Chukwurah, 2023). These platforms also support electronic contract management, supplier performance tracking, and continuous communication between government agencies and businesses (Omotayo et al., 2025). Such reforms reduce opportunities for corruption, shorten procurement cycles, and enhance transparency in public spending.

Nevertheless, the effectiveness of G2B initiatives in Kaduna, as in other parts of Nigeria, depends on the level of application and consistent utilization of these digital platforms. While basic functions such as tender publication and bid submission are increasingly

digitized, more advanced features related to contract monitoring and supplier analytics remain underutilized in some agencies. This highlights that the transformative impact of G2B e-government is realized not merely through platform availability but through deep integration into routine administrative and commercial practices.

Hence, G2B constitutes a critical pillar of e-government by directly linking public administration with economic activity. Kaduna State's experience demonstrates that well-designed G2B systems can enhance efficiency, accountability, and investor confidence at the subnational level. However, sustaining these gains requires continued investment in infrastructure, capacity building, and institutional reforms to ensure that digital platforms move beyond symbolic adoption and become embedded tools for transparent and effective governance.

2.9.3 Government-to-Government (G2G)

Government-to-Government (G2G) refers to the structured cooperation and communication that occurs between different levels and units of government local, regional, national, and international through ICT-enabled platforms (Rai et al., 2021; Takagi et al., 2024). The central objective of G2G is to enhance policy coherence, information sharing, and institutional coordination across public organizations. Unlike Government-to-Citizen (G2C) or Government-to-Business (G2B) interactions, G2G focuses exclusively on intergovernmental processes, making it a foundational mechanism for reducing administrative fragmentation, duplication of effort, and policy inconsistency within the public sector.

Scholars conceptualize G2G as operating along two interrelated dimensions: vertical and horizontal integration (Takagi et al., 2024). Vertical G2G links different tiers of government, such as federal ministries, state agencies, and local government authorities, facilitating the downward and upward flow of information, resources, and policy directives. This form of integration is critical for ensuring uniform policy implementation and monitoring across jurisdictions. For instance, integrated digital platforms allow national ministries to transmit real-time policy guidelines and operational data to subnational agencies, thereby reducing delays and minimizing discretion at lower administrative levels. Horizontal G2G, by contrast, connects agencies and departments operating at the same level of government. This is evident when personnel, financial, or operational data are shared electronically between ministries or units, such as human resource departments coordinating with finance units to ensure accurate payroll administration (Choiriyah et al., 2023; Nkgapele, 2024). Together, these dimensions illustrate how G2G platforms strengthen institutional interoperability, improve efficiency, and enhance accountability.

In Nigeria, and particularly in Kaduna State, G2G applications have become increasingly important in strengthening governance capacity and public sector coordination. At the subnational level, digital platforms are used to harmonize budgeting processes, procurement planning, and performance reporting across ministries, departments, and agencies (MDAs). These systems support consistency in fiscal management and reduce information asymmetries that often undermine effective service delivery. At the international level, G2G mechanisms enable Kaduna State to engage with external partners on issues such as trade facilitation, security cooperation, and

environmental governance, reflecting the expanding role of digital government tools in intergovernmental diplomacy and policy alignment (Haridy et al., 2025). Through such collaborations, the state benefits from technical assistance, funding, and the transfer of best practices in sectors including health, education, and infrastructure development (Choiriyah et al., 2023).

The strategic value of G2G lies in its ability to translate intergovernmental coordination into tangible improvements in governance outcomes. This is particularly evident in policy domains that require synchronized action across multiple authorities, such as humanitarian assistance, disaster response, and public health management. In these contexts, effective G2G systems enable faster decision-making, real-time data sharing, and coordinated deployment of resources, thereby improving the speed, efficiency, and effectiveness of government responses (AbdulKareem & Oladimeji, 2024; Haridy et al., 2025).

However, the effectiveness of G2G initiatives ultimately depends on their level of application and institutionalization. Where digital platforms are poorly integrated or underutilized, intergovernmental coordination remains fragmented, and the potential benefits of e-government are diminished. In Kaduna State, as in other parts of Nigeria, the persistence of parallel manual systems and limited interoperability across agencies constrains the full realization of G2G benefits. This underscores the need for sustained investment in digital infrastructure, standardized data protocols, and capacity building among public servants to ensure that G2G platforms function not merely as technical tools but as embedded mechanisms for collaborative governance. Hence, G2G represents a critical backbone of e-government, enabling governments to operate as

coherent systems rather than isolated administrative units. Its effective deployment strengthens institutional capacity, supports coordinated service delivery, and enhances the overall performance of the public sector.

2.9.4 Government-to-Employees (G2E)

Government-to-Employee (G2E) refers to the application of digital technologies to manage the relationship between government institutions and their employees, including communication, human resource management, and professional development processes (Fadellelmoula, 2022). As governments remain the largest employers in most developing countries, the efficiency of internal employee management systems is central to overall administrative performance (Muhammad et al., 2024). G2E represents a shift from traditional, paper-based personnel administration to digital platforms that enable two-way interaction, allowing employees not only to receive information but also to provide feedback, participate in decision-making, and engage more actively with organizational processes. Scholars argue that such interaction strengthens organizational commitment, improves job satisfaction, and enhances coordination across departments (AbdulKareem & Oladimeji, 2024; Adetomiwa & Gbervbie, 2022).

From an analytical perspective, the core objective of G2E is to optimize internal government operations by improving how employee-related functions are administered. Digital G2E platforms support payroll management, benefits administration, training, performance appraisal, and internal communication, thereby reducing administrative delays and minimizing human error (Adetomiwa & Gbervbie, 2022). Comparative studies from advanced e-government contexts show that effective G2E systems

contribute to higher workforce productivity by creating transparent, predictable, and standardized personnel processes. However, the literature also cautions that G2E systems may generate resistance where employees perceive them primarily as surveillance or control mechanisms rather than as tools for empowerment and professional growth (Fadellelmoula, 2022).

In Nigeria, and particularly in Kaduna State, G2E has been most visibly implemented through the Integrated Payroll and Personnel Information System (IPPIS). The system represents one of the most extensive attempts to digitize employee management in the Nigerian public sector by automating payroll administration, tax deductions, pension contributions, and personnel records (Chilunjika, 2025; Omotayo et al., 2025). Empirical evidence suggests that IPPIS has contributed significantly to fiscal discipline by eliminating ghost workers, reducing payroll fraud, and improving transparency in salary administration. These outcomes align with broader e-government objectives of accountability and efficiency.

Nevertheless, a more critical reading of the literature reveals that the effectiveness of IPPIS as a G2E platform is uneven. While the system has improved financial control at the organizational level, several studies report mixed employee perceptions regarding its impact on job satisfaction and trust (Balaji, 2025). In Kaduna State, for example, although public servants benefit from more predictable salary payments, many still express concerns about system rigidity, delayed issue resolution, and limited avenues for meaningful employee feedback. Moreover, the dominance of IPPIS as a payroll-centric system highlights a narrow interpretation of G2E, where employee engagement,

continuous training, and career development functionalities remain underdeveloped compared to best practices observed in advanced digital administrations.

Beyond payroll management, scholars emphasize that effective G2E should encompass digital learning platforms, performance management systems, and internal communication portals that support skill development and organizational learning (Balaji, 2025). In this regard, the Nigerian G2E experience reflects a partial implementation. Although IPPIS has introduced some online training and recognition features, these initiatives remain limited in scope and are not consistently integrated into broader human resource development strategies. This creates a gap between the technical success of payroll digitization and the deeper organizational transformation expected from comprehensive G2E systems.

Hence, G2E constitutes a critical internal pillar of e-government, as the effectiveness of digital service delivery to citizens ultimately depends on the motivation, competence, and engagement of public servants. Kaduna State's experience demonstrates that while digital employee management systems such as IPPIS can enhance transparency and efficiency, their transformative potential depends on how well they balance control with empowerment. Without sustained investment in training, feedback mechanisms, and employee-centered design, G2E risks becoming a compliance-driven tool rather than a catalyst for improved public service delivery.

2.10 Benefits of E-Government

The implementation of e-government initiatives generates significant benefits for both citizens and public administrations (Adetomiwa & Gberevbie, 2022). For citizens,

digital services offer greater convenience and accessibility, enabling them to access government platforms, submit applications, or pay fees anytime and anywhere through user-friendly systems (Muhammad et al., 2024). This reduces the need for physical visits to government offices, saves time, and encourages active engagement with governance processes (Adetomiwa & Gberevbie, 2022).

For public administrations, e-government helps to streamline processes, reduce administrative burdens, and enhance efficiency (Balaji, 2025). Routine tasks can be automated, freeing public servants to focus on more complex responsibilities and thereby improving the overall quality of service delivery (Saleh et al., 2025). In addition, e-government fosters transparency and accountability by making information more accessible to citizens, which strengthens trust and encourages a more open relationship between government and the public (Adetomiwa & Gberevbie, 2022).

Hence, e-government has the potential to transform governance by reshaping how services are delivered, decisions are made, and citizens interact with public institutions. It creates a public service that is not only more efficient and accessible, but also more inclusive and transparent. Beyond these core outcomes, several other outstanding benefits can be identified:

i. Better Access to Information and Quality Services for Citizens:

E-government significantly enhances citizens' access to accurate, timely, and relevant information across a wide range of government functions (Saleh et al., 2025). At the foundational stage, ICT enables the digitization and online dissemination of essential administrative resources such as application forms, laws, regulations, service standards,

and procedural guidelines, thereby reducing information asymmetry between government institutions and citizens (Saleh et al., 2025). This initial level of information provision is critical, as it establishes transparency and empowers citizens to understand their rights, obligations, and service entitlements without reliance on intermediaries. As e-government systems evolve, their informational scope expands to include more advanced resources such as open data portals, budget and performance reports, and insights into policy formulation and decision-making processes, which further strengthen accountability and public trust (Balaji, 2025).

At more advanced stages, centralized digital service portals supported by integrated back-end systems enable citizens to access multiple services through a single interface, significantly simplifying interactions with government agencies (Balaji, 2025). Rather than navigating fragmented departmental structures, citizens are able to complete transactions, track applications, and receive feedback in a seamless manner. Scholars describe this progression as a lifecycle-based approach to service delivery, where e-government systems are structured around key stages in citizens' lives such as education, employment, healthcare, business registration, and retirement rather than around bureaucratic boundaries (Adetomiwa & Gberevbie, 2022). This approach shifts public administration from a supply-driven to a demand-driven model, aligning services more closely with citizens' real-world needs.

However, the literature also cautions that improved access to information does not automatically translate into effective utilization or improved service outcomes. Without adequate digital literacy, reliable infrastructure, and user-friendly system design, the benefits of information availability may remain unevenly distributed (Adetomiwa &

Gbervbie, 2022). Consequently, while e-government has the potential to reduce transaction costs, save time, and enhance convenience for citizens, these gains depend on the extent to which information systems are accessible, inclusive, and consistently updated. Thus, the value of e-government lies not only in making information available but in ensuring that such information is meaningful, usable, and integrated into a broader framework of effective public service delivery.

ii. Simplicity, Efficiency, and Accountability in the Government:

E-government, when combined with information and communication technology (ICT) and business process re-engineering (BPR), represents a fundamental shift in how public administration is organized and delivered (Saleh et al., 2025). Rather than merely digitizing existing practices, this transformation requires a critical re-examination of legal, institutional, and procedural frameworks. Outdated regulations are revised, overly complex procedures are streamlined, and duplicative functions across ministries, departments, and agencies are eliminated to align administrative processes with digital capabilities (Adetomiwa & Gbervbie, 2022). In this sense, ICT serves as an enabler, while BPR acts as the mechanism through which deep organizational change is achieved.

The literature consistently emphasizes that the effectiveness of e-government reforms depends on the extent to which governments redesign processes rather than automate inefficiencies (Saleh et al., 2025). When properly implemented, ICT integration facilitates seamless inter-agency collaboration through shared databases, interoperable platforms, and real-time information exchange. This not only reduces transaction costs

and processing delays but also enhances policy coherence and administrative accountability by making workflows traceable and auditable (Adetomiwa & Gberevbie, 2022). Conversely, studies caution that where BPR is neglected, e-government initiatives often result in “digital layering,” where new systems coexist with old bureaucratic procedures, limiting efficiency gains and undermining reform objectives.

From a service delivery perspective, the combination of e-government, ICT, and BPR produces a more productive and responsive government structure. Citizens and businesses benefit from clearer rules, simplified procedures, and faster access to services, while public institutions gain improved oversight and performance monitoring capabilities (Saleh et al., 2025). However, the literature also highlights that these outcomes are contingent upon strong leadership commitment, adequate training of public servants, and continuous evaluation of redesigned processes. Thus, e-government-driven BPR should be understood not as a one-off technological intervention but as an ongoing institutional reform process aimed at enhancing transparency, efficiency, and citizen-centered public service delivery.

iii. Expanded Reach of Government:

The rapid advancement of information and communication technology (ICT), particularly in mobile technology, broadband internet, and digital platforms, has fundamentally reshaped the capacity of governments to deliver services beyond traditional administrative boundaries (Haridy et al., 2025). These technological developments have reduced geographical constraints and enabled governments to reach wider demographic groups, including populations in rural, remote, and historically

underserved areas. E-government applications leverage this expanded digital infrastructure to shorten processing times, standardize procedures, and improve the consistency of service delivery, thereby promoting fairer and more equitable access to public services (Saleh et al., 2025).

From a governance perspective, the literature emphasizes that the convenience and reliability offered by digital platforms can significantly alter citizen–government relationships. When services are accessible online, citizens are less dependent on physical offices, intermediaries, or discretionary decision-making by officials, which reduces opportunities for inefficiency and exclusion (Ahmad & Dhoon, 2024). Moreover, improved access to digital services lowers participation costs, encouraging citizens to interact more frequently with government institutions, submit feedback, and engage in consultative processes. This expanded interaction supports not only administrative efficiency but also democratic participation, as citizens become more informed and empowered to contribute to public decision-making (Saleh et al., 2025).

However, scholars caution that the benefits of ICT-enabled service expansion are not automatic. The extent to which e-government enhances participation and inclusivity depends on complementary factors such as digital literacy, affordability of internet access, system usability, and institutional responsiveness (Haridy et al., 2025). Without addressing these enabling conditions, digital platforms may unintentionally reinforce existing inequalities by privileging technologically skilled users. Therefore, while ICT advancement provides the technical foundation for inclusive and participatory governance, its effectiveness ultimately depends on how well e-government systems are

designed, implemented, and embedded within broader public service delivery frameworks (Ahmad & Dhoon, 2024).

iv. Enabling the Environment for Promoting Economic Development:

ICT contributes to the creation of a more business-friendly environment by digitizing and simplifying interactions between government institutions and the private sector (Saleh et al., 2025). Through the deployment of e-government tools such as e-procurement systems, digital licensing platforms, and online compliance portals, governments are able to lower entry barriers for firms, promote fair competition, and enhance transparency in public sector markets (Haridy et al., 2025). These systems reduce discretionary decision-making and limit face-to-face interactions, which have traditionally been associated with delays, rent-seeking, and opaque administrative practices.

By streamlining business registration, licensing, tax filing, and regulatory compliance processes, e-government reduces administrative complexity and transaction costs for firms (Ahmad & Dhoon, 2024). This efficiency is particularly significant for small and medium-sized enterprises (SMEs), which often lack the financial and administrative capacity to navigate cumbersome bureaucratic procedures. The literature suggests that when compliance costs are reduced and procedures become more predictable, firms are more likely to formalize their operations, expand investment activities, and engage with government programs (Saleh et al., 2025).

However, scholars caution that the effectiveness of ICT-enabled government–business interactions depends not only on the availability of digital platforms but also on their

reliability, usability, and institutional enforcement (Haridy et al., 2025). In contexts where digital systems coexist with manual processes or where infrastructure and user capacity are weak, the expected gains in efficiency and transparency may be undermined. Nonetheless, when effectively implemented, e-government platforms play a critical role in fostering private sector confidence, stimulating innovation, and supporting sustainable economic growth by creating a regulatory environment that is more transparent, predictable, and accessible (Ahmad & Dhoon, 2024).

v. Enhancing Transparency and Accountability:

E-government strengthens democratic governance by institutionalizing transparency and broadening public access to critical government information, including legislative debates, budget allocations, expenditure reports, and official justifications for major policy decisions (Haridy et al., 2025). By making such records readily available online, governments reduce information asymmetry between public officials and citizens, thereby enhancing oversight and limiting opportunities for discretionary abuse of power. This digital openness enables citizens, the media, and civil society organizations to engage in real-time scrutiny of government actions, transforming accountability from a reactive process into a continuous mechanism of governance (Ahmad & Dhoon, 2024).

Beyond transparency, e-government facilitates deeper civic engagement by providing platforms for feedback, consultation, and participation in policy discussions. When citizens are able to access information easily and contribute to governance processes, trust in public institutions is strengthened, and democratic norms are reinforced (Saleh et al., 2025). However, the literature also cautions that transparency alone is insufficient to

guarantee democratic outcomes. Without complementary factors such as digital literacy, institutional responsiveness, and political commitment to act on public feedback, e-government risks becoming symbolic rather than transformative. Nonetheless, when effectively implemented, e-government plays a critical role in deepening democratic culture by embedding accountability, participation, and openness into everyday public administration.

vi. Improving Service Delivery:

Traditional government service delivery is frequently associated with procedural inefficiencies, prolonged waiting times, fragmented service channels, and limited transparency, all of which undermine public confidence in government institutions (Haridy et al., 2025). E-government directly addresses these shortcomings by digitizing service delivery processes and redesigning them around efficiency, accessibility, and user convenience (Ahmad & Dhoon, 2024). Rather than requiring citizens to navigate multiple offices and paper-based procedures, integrated digital platforms enable users to complete tasks such as tax filing, license renewal, and benefit applications through a single online interface that is accessible anytime and anywhere (Balaji, 2025).

From an administrative perspective, these platforms reduce transaction costs by minimizing manual processing, eliminating redundant steps, and accelerating service turnaround times. For citizens, the reduction in physical visits, paperwork, and processing delays translates into tangible benefits in terms of time savings and ease of access (Haridy et al., 2025). However, the literature also suggests that the efficiency gains of e-government are contingent on system reliability, interoperability, and user

competence. Where digital platforms are poorly integrated or coexist with parallel manual systems, expected improvements may be diluted.

Nonetheless, when effectively implemented, e-government contributes to more inclusive service delivery by extending access to previously underserved populations, including those in remote areas or with limited mobility. By enhancing efficiency while improving transparency and responsiveness, e-government reshapes the relationship between citizens and the state, leading to higher levels of user satisfaction and a more citizen-oriented public service environment (Haridy et al., 2025).

2.11 Challenges of E-Government in Nigeria:

Despite the progress made in digital initiatives, the implementation of e-government in Nigeria still faces major challenges (Balaji, 2025). Several scholars have identified some of these obstacles. Each challenge is discussed below with further discussion and examples from the field to illustrate the extent of the problems.

i. Limited ICT Literacy and Public Awareness

A major obstacle to the adoption of e-government is the low level of ICT literacy among both civil servants and the general public (Balaji, 2025). Many public sector employees lack basic computer skills and are reluctant or afraid to engage with digital systems (Abolade, et al, 2018). In some cases, people associate ICT with unemployment or surveillance, leading to distrust of government digital platforms (Barlian, et al, 2025). For example, in several local authorities in rural Nigeria, staff continue to rely on manual record keeping due to lack of computer training and internet access (Revaldhi, et al, 2025). In one case from Enugu State, a local registry office worker was unable to

enter birth data into the national database because he had never used a computer before (Totonchi, et al, 2025). Digital illiteracy is hindering the successful introduction of national electronic services, such as the National Identity Management System (NIMS).

ii. Weak Legal and Regulatory Frameworks

Another challenge is the weak legal and regulatory framework governing digital governance in Nigeria. While policies such as the National Information Technology Development Agency (NITDA) Act and the Cybercrime Act provide a foundation for promoting e-government, enforcement remains inconsistent (Nurhidayat et al., 2024). Important areas including data protection, user privacy, and accountability for online services, are either poorly implemented or inadequately legislated (Zhang & Kaur, 2024). Kaduna, like other states, has faced cases where citizens expressed distrust in submitting personal information online due to fears about unauthorized access and misuse. For example, national incidents such as the reported breaches of the Nigerian Immigration Service's passport portal in 2020 revealed gaps in privacy protection and legal recourse for affected users (Totonchi et al., 2025). These weaknesses highlight the urgent need for stronger, enforceable digital governance laws at both federal and state levels. Without such safeguards, public trust in Kaduna's digital initiatives such as e-procurement and public service databases, remains fragile, limiting their effectiveness.

iii. Inadequate Infrastructure

The state of ICT infrastructure in Nigeria remains a critical obstacle to the full realization of e-government, particularly in rural and underserved areas (Totonchi et al., 2025). Essential components such as broadband internet, data centers, and stable electricity supply are either insufficient or unreliable, limiting both the accessibility and

effectiveness of digital public services (Revaldhi et al., 2025). A striking example is the federal government's TSA, which has faced recurrent outages in some ministries due to poor internet connectivity, undermining its goal of promoting transparency and efficiency in financial management (Totonchi et al., 2025). Similarly, in northern states such as Zamfara and Yobe, weak broadband coverage and inadequate ICT facilities have caused significant delays in processing federal financial reports, slowing down service delivery and fiscal oversight (Revaldhi et al., 2025). In Kaduna, despite being more digitally reform-minded than many states, gaps in electricity reliability and rural internet access continue to restrict the level of application of platforms like KADGIS and the state's e-procurement system, limiting their ability to deliver the full benefits of transparency and efficiency.

iv. Corruption and Resistance to Change

E-government systems are intended to curb corruption by introducing automation, standardization, and traceable processes that minimize opportunities for discretionary abuse (Balaji, 2025). Yet, resistance often emerges from those who benefit from the inefficiencies of manual systems (Barlian et al., 2025). In many cases, fear of greater transparency and reduced personal discretion drives public sector employees to obstruct or bypass digital reforms (Totonchi et al., 2025). For instance, when the Federal Road Safety Corps (FRSC) launched its online driver's license application system, some staff resisted its use because it restricted avenues for collecting unofficial payments (Balaji, 2025). In several states, applicants were even instructed to continue using manual forms or to pay unofficial "facilitation fees" to expedite processing, effectively undermining the integrity of the new system (Barlian et al., 2025). A similar challenge has been

observed in Kaduna State, where initiatives such as e-procurement and KADGIS have faced pushback from officials accustomed to manual processes that allowed informal transactions. This persistence of resistance highlights how cultural and institutional factors can weaken the impact of e-government reforms, even when the technology itself is sound.

v. Lack of Political Will and Policy Continuity

E-government initiatives depend heavily on strong leadership commitment and long-term political continuity (Hakimi et al., 2024). In Nigeria, however, successive administrations have often failed to prioritize or sustain these programs, leading to inconsistent funding and weak implementation (Barlian et al., 2025). As a result, reforms are frequently stalled midway or abandoned altogether after a change in government. A notable example is the national e-government master plan, launched in 2019 in partnership with South Korea, which was designed to streamline digital administration across ministries. Despite its ambitious goals, including the creation of an integrated government portal, the initiative lost momentum and funding following a change in political leadership (Hakimi et al., 2024). This lack of continuity not only undermines long-term reform at the national level but also affects states like Kaduna, where sustained political will is essential to ensure that digital projects such as e-procurement and KADGIS remain functional and expand over time. Without consistent leadership and dedicated resources, even well-designed e-government initiatives struggle to deliver their intended impact.

2.12 Empirical Review

A review of empirical research reveals mixed and sometimes contradictory findings. While several studies report a positive relationship between e-government utilization and effective public service delivery, highlighting gains in efficiency, transparency, and citizen satisfaction, others suggest that the impact can be negligible or even negative, particularly in contexts where infrastructure, digital literacy, or institutional capacity remain weak.

2.12.1 Positive Relationship Between E-Government and Service Delivery

The reviewed literature consistently demonstrates a positive relationship between e-government and public service delivery across both developed and developing contexts. Empirical studies from Nigeria (Akpan et al., 2020; Francis & Ibiang, 2023; Nnaji & Nri, 2022; Ogu & Chukwurah, 2022; Modu et al., 2021) and other developing countries such as Kenya (Riany, 2021), Ethiopia (Kenenissa, 2019), Bangladesh (Salam, 2017), Indonesia (Aritonang, 2017), and Pakistan (Shaikh et al., 2016) largely converge on the conclusion that e-government improves efficiency, transparency, accountability, and responsiveness in public service delivery. Similarly, evidence from China (Zhen et al., 2022) reinforces the view that digital governance enhances accessibility and service quality when supported by institutional coordination and capacity building.

Despite this broad consensus, literature reveals important inconsistencies and structural weaknesses that limit the explanatory power and generalizability of existing findings. First, many Nigerian studies rely heavily on descriptive statistics or secondary **data**

(Francis & Ibiang, 2023; Obi et al., 2020; Abasilim et al., 2017), which constrains their ability to empirically test causal relationships between e-government utilization and service delivery outcomes. Even where inferential methods are applied, sample sizes are often small or institution-specific (e.g., JAMB-focused studies by Okeke, 2019; Chukwuemeka et al., 2018), limiting the extent to which findings can be generalized across ministries, departments, and agencies (MDAs).

Second, a recurring limitation across studies is **the** treatment of e-government as a unidimensional construct. Many scholars examine e-government as a single variable without disaggregating it into critical components such as performance expectancy, effort expectancy, facilitating conditions, perceived risk, social influence, or level of application (LoA). As a result, existing studies often confirm that e-government “matters” without explaining why, how, or under what conditions it influences service delivery. Even studies that employ established models such as UTAUT (Aneke et al., 2019) focus primarily on adoption intentions rather than actual utilization and depth of application within routine administrative practices.

Third, while several studies acknowledge challenges such as inadequate infrastructure, poor ICT skills, resistance to change, and financial constraints (Nnaji & Nri, 2022; Modu et al., 2021; Kenenissa, 2019), these factors are rarely modeled empirically as moderators or mediators. Consequently, the mechanisms through which training, organizational support, or institutional capacity shape the effectiveness of e-government remain underexplored. This gap is particularly evident in Nigerian studies, where training is frequently recommended but seldom examined as a moderating variable

influencing the relationship between e-government utilization and service delivery outcomes.

Fourth, comparative insights reveal a contextual imbalance in the literature. While international studies emphasize strategic implementation, stakeholder involvement, and institutional alignment (Riany, 2021; Zhen et al., 2022), Nigerian studies tend to focus more on operational challenges and surface-level adoption. This suggests a need for research that bridges global theoretical models with local administrative realities, particularly at the subnational level.

Taken together, these gaps indicate that although the positive impact of e-government on service delivery is well established, existing studies provide fragmented and incomplete explanations. There remains a clear need for a study that:

- i. conceptualizes e-government as a multidimensional construct,
- ii. focuses on actual utilization and level of application, rather than mere adoption,
- iii. empirically examines training as a moderating variable, and
- iv. situates analysis within a specific institutional and subnational context, such as Kaduna State.

By addressing these limitations, the present study extends the literature beyond descriptive confirmation and contributes a more nuanced, empirically grounded understanding of how e-government utilization influences effective public service delivery in Nigeria.

2.11.2 Negative Relationship Between E-Government and Service Delivery

Although much of the literature reports a positive association between e-government and service delivery, a growing body of research suggests that this relationship is weak, inconsistent, or even negative in several developing countries, including Nigeria (Ogu & Chukwurah, 2023). These studies challenge the assumption that the introduction of digital technologies automatically translates into improved public service outcomes and instead point to a persistent implementation gap.

For instance, Macdonald et al. (2022) examined the application of e-government by the Independent National Electoral Commission (INEC) during Nigeria's 2019 general elections. Using secondary data from official reports and prior studies, the authors found that e-government tools were poorly integrated into electoral service delivery. The continued incidence of electoral fraud highlighted a disconnect between the introduction of digital technologies and their effective utilization in practice. This finding suggests that technological adoption without institutional readiness, enforcement mechanisms, and operational integration may fail to enhance service integrity. However, the study's exclusive reliance on secondary data limited its ability to capture the perceptions and experiences of electoral officials and voters, thereby constraining the depth of its conclusions.

Similarly, Laila et al. (2020) investigated the relationship between e-government and good governance in Pakistan and found that the impact of digital platforms on service delivery was uneven due to a pronounced digital divide. While urban residents benefited from improved access to e-government services, rural populations faced infrastructural

and connectivity barriers that significantly limited effectiveness. This study underscores how unequal access to ICT infrastructure can weaken the overall impact of e-government initiatives. Nevertheless, the analysis did not disaggregate e-government into its core dimensions such as infrastructure readiness, user competence, institutional support, or legal frameworks thereby offering only a partial explanation of why digital governance outcomes remain uneven.

In the Nigerian context, Dibie and Quadri (2018) reported a negative relationship between e-government initiatives and the quality of public services delivered by the Federal Government. However, this conclusion must be interpreted with caution. The study was constrained by a small sample size and methodological weaknesses, and it failed to account for the multidimensional nature of e-government implementation. Critical factors such as ICT infrastructure, staff capacity, organizational culture, and legal support were not incorporated into the analysis, reducing the reliability and generalizability of the findings.

Robert and Quadri (2018) reached a similar conclusion, identifying a negative relationship between e-government initiatives and service delivery effectiveness at the federal level in Nigeria. They further observed weak citizen–government interaction and highlighted inadequate legal frameworks and institutional capacity as major barriers. While their recommendations emphasized legal reform and citizen-centred approaches, the study’s exclusive focus on the federal level overlooked subnational dynamics, where variations in capacity and implementation strategies may produce different outcomes. Moreover, the absence of empirical testing of key e-government dimensions limited the explanatory strength of their analysis.

Beyond Nigeria, Wagama et al. (2016) examined Kenyan county governments and found that while administrative decentralization significantly improved service performance, e-government did not play a meaningful role in strengthening this relationship. This finding suggests that structural governance reforms may yield greater service delivery gains than technology-driven interventions when digital systems are not fully embedded into administrative processes. The study reinforces the argument that e-government, when treated as a standalone solution rather than as part of broader institutional reform, may have limited impact.

Taken together, these studies reveal a critical pattern, e-government does not automatically improve service delivery. Where digital platforms are introduced without adequate infrastructure, training, institutional support, legal backing, or integration into routine workflows, their impact may be weak or even counterproductive. The negative or insignificant findings reported in these studies do not necessarily invalidate e-government as a governance tool; rather, they highlight the importance of examining how, to what extent, and under what conditions e-government is utilized.

These contradictions in the literature expose a significant research gap. Most studies reporting weak or negative relationships fail to empirically examine the level of application, the role of human capacity and training, or the organizational conditions that mediate the relationship between e-government and service delivery. Consequently, there remains a need for a more nuanced, multidimensional, and context-specific investigation that moves beyond binary assessments of success or failure. Addressing this gap, particularly at the subnational level in contexts such as Kaduna State, provides the basis for the present study.

2.13 Gaps in Literature

The literature review on the relationship between e-government utilization and effective public service delivery reveals mixed and inconclusive findings. While a substantial body of empirical evidence from Western (developed) countries reports a strong and positive relationship between e-government services and improved public service delivery (e.g., Dahiru et al., 2022), several studies conducted in African and other developing-country contexts document weak, inconsistent, or even negative outcomes (Dibie & Quadri, 2018). These contrasting results suggest that findings from developed economies may not be directly transferable to African public-sector environments due to differences in institutional capacity, infrastructure, organizational culture, and socio-economic context. Consequently, there is a clear need for context-specific empirical evidence from African settings to better understand how e-government initiatives influence public service delivery in practice.

Furthermore, although previous studies have acknowledged the importance of training in shaping public servants' perceptions and acceptance of e-government systems, the review indicates that training has largely been treated as a background or control factor rather than as a core analytical construct. To the best of the researcher's knowledge, no empirical study has explicitly examined training as a moderating variable in the relationship between e-government utilization and effective public service delivery. This represents a significant empirical gap, as training may strengthen or weaken the effectiveness of e-government by enhancing digital skills, reducing resistance to change, and improving users' confidence and competence. Investigating this moderating role is

therefore critical for generating actionable insights into how capacity-building interventions can maximize the benefits of e-government initiatives.

In addition, the literature shows considerable variation in the theoretical frameworks applied to the study of e-government utilization and service delivery, including models such as TAM, UTAUT, DOI, and institutional perspectives. However, none of the reviewed studies adopted the Unified Model of Electronic Government Adoption (UMEGA), which extends traditional technology adoption models by incorporating broader behavioral, organizational, and contextual determinants relevant to public-sector environments. The absence of UMEGA in prior empirical work constitutes a notable theoretical gap, limiting the depth and comprehensiveness of existing explanations of e-government utilization.

In light of these empirical, contextual, and theoretical gaps, the present study examines the effect of the determinants of e-government utilization on effective public service delivery, with training programs as a moderating variable, within the context of Kaduna State, Nigeria. By applying the UMEGA framework, this study provides a more holistic understanding of e-government utilization while offering context-specific evidence from a subnational African public-sector setting. The findings would contribute to theory by extending the application of UMEGA and to practice by informing policymakers on how targeted training interventions can enhance the utilization and effectiveness of e-government systems.

2.14 Theoretical Background

Several established theories have been developed to explain how individuals adopt and use information systems (IS). Among these, the Unified Model of Electronic Government Adoption (UMEGA) provides a comprehensive framework by integrating key insights from the Theory of Reasoned Action (TRA), the Theory of Planned Behavior (TPB), the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and the Diffusion of Innovations (DOI) (Aytekin et al., 2022). UMEGA thus offers a robust theoretical foundation for understanding the adoption of e-government services. Building on this framework, the present study goes further by incorporating additional factors that capture contextual influences on the acceptance, utilization, and effectiveness of e-government systems.

2.14.1 Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB) was introduced by Ajzen (1985, 1991) as an extension of the Theory of Reasoned Action (TRA) to overcome its limitations in predicting behaviours over which individuals do not have complete volitional control. While the TRA emphasised the role of attitudes and subjective norms in the formation of behavioural intentions, the TPB added a crucial third construct such as perceived behavioural control (PBC). Perceived behavioural control reflects the extent to which individuals believe they have the necessary resources, skills and opportunities to perform a behaviour (Ajzen, 1991). Essentially, the TPB argues that an individual's intention to act is jointly determined by attitude, subjective norms and perceived behavioural control, with perceived behavioural control also having a direct influence on actual behaviour when control is limited.

Perceived behavioural control itself is determined by two elements such as control beliefs, which relate to a person's confidence in their ability to perform the behaviour, and perceived power, which reflects the availability of resources or opportunities. By incorporating the PBC, the TPB provides a more comprehensive explanation of behaviour in real-world contexts where constraints often exist, such as when using technology, complying with regulations or adopting new systems.

Despite its contributions, the TPB has also been criticised. Conner and Armitage (1998) state that it does not fully capture the volitional processes that translate intentions into concrete actions. Similarly, Taylor and Todd (1995a) argue that the TPB undervalues the role of initial motivation, which must precede intention formation. This criticism suggests that although the TPB improves on the TRA, it still does not capture the full complexity of human behaviour, especially in dynamic environments.

2.14.2 Diffusion of Innovation Theory

The theory of diffusion of innovations (DOI) explains how new ideas, practices, or technologies spread within a social system over time (Rogers, 2003). At the heart of this process are communication channels, which allow information about innovations to circulate among members of the system. An innovation is considered "new" when it is first introduced to potential adopters, and the perception of this novelty shapes the decision to accept or reject it (Rogers, 2003). DOI has been widely applied across diverse research fields, providing insights into the process, pace, and rationale of innovation adoption (Rogers, 1995, 2003). A central idea is that the speed of adoption depends on the perceived relative advantage of the innovation whether measured in

economic benefits, enhanced social standing, alignment with cultural norms, or simply user preference (Dibra, 2015). The greater the perceived benefits, the more likely an innovation is to be embraced by individuals or organizations.

Despite its influence, DOI is not without limitations. Critics such as Damanpour (1996) and Greenhalgh et al. (2004) argue that the model sometimes underestimates the complexity of human behaviour and the role of social networks within organizations, limiting its predictive power in contexts where interpersonal dynamics and institutional politics are decisive. These critiques underscore the importance of adapting DOI to contemporary challenges and combining it with complementary theories when analyzing organizational or societal innovation.

2.14.3 Technology Acceptance Model

The Technology Acceptance Model (TAM) was developed to explain how people accept and use new technologies and is based on the Theory of Reasoned Action (TRA) by Ajzen and Fishbein (1975). It remains one of the most commonly used frameworks in technology acceptance studies (Davis & Granić, 2024; Venkatesh & Fred, 2000). TAM emphasises two key beliefs that shape user acceptance. perceived usefulness (PU), the extent to which a person believes a technology will improve job performance, and perceived ease of use (PEOU), the extent to which using the system requires no effort (Davis et al., 1989). These constructs have a direct influence on users' attitudes towards the technology, their behavioural intentions and ultimately their actual use of the system.

Despite its widespread use, the TAM is not without its limitations. Critics highlight that it focuses primarily on perception rather than actual long-term use and that results often

show inconsistencies across contexts when additional variables such as cultural, organisational or infrastructural factors are taken into account (Davis & Granić, 2024). By emphasising perceived usefulness and ease of use, TAM may also oversimplify the complex socio-technical dynamics associated with technology adoption, limiting its ability to fully capture context-dependent behavioural changes.

2.14.4 Unified Theory of Acceptance and Use of Technology

Research on technology adoption has progressively moved beyond the early frameworks of the Theory of Reasoned Action (TRA) and the Technology Acceptance Model (TAM) (Davis et al., 1989), giving rise to several extended models. These include Ajzen's Theory of Planned Behavior (TPB) (1991), Rogers' Diffusion of Innovation (DOI) (1995), the combined TAM–TPB model by Taylor and Todd (1995), and TAM2 by Venkatesh and Davis (2000). Each of these sought to address specific limitations of the earlier models by incorporating additional explanatory variables and contextual factors. Building on this trajectory, Venkatesh et al. (2003) introduced the Unified Theory of Acceptance and Use of Technology (UTAUT) to consolidate the insights from previous approaches.

The UTAUT model retained the central constructs of TAM, particularly perceived usefulness and perceived ease of use but reframed them as performance expectancy and effort expectancy (Marchewka & Kostiwa, 2007). This refinement emphasized not only initial perceptions of ease of use but also the sustained effort required for long-term technology utilization. By integrating additional determinants such as social influence and facilitating conditions, UTAUT accounted for the role of user characteristics and

organizational context in shaping adoption behavior. Importantly, the model explains up to 70% of the variance in behavioural intention, a substantial improvement over TAM (Marchewka & Kostiwa, 2007). This demonstrates that UTAUT provides a more comprehensive and robust framework for understanding technology adoption, particularly in complex environments such as public administration and e-government.

Despite its broad application and predictive power, the UTAUT model has also been criticised. One limitation is the overemphasis on intention rather than actual utilization, as behavioural intention does not always translate into actual use, especially in complex institutional environments such as e-government (Williams et al., 2015). Furthermore, the fact that the model relies on the four core constructs of performance expectancy, effort expectancy, social influence and facilitating conditions has been criticised for being too deterministic and narrow, as it ignores other contextual, cultural and organisational factors that may influence adoption in developing countries (Bagozzi, 2007). For example, aspects such as political will, digital literacy, infrastructural deficits and resistance to transparency are not fully captured in the UTAUT framework, limiting its explanatory power in regions such as Nigeria, particularly in Kaduna State. Thus, scholars argue that the original formulation of the model was largely tailored to the environment of organisations and businesses, raising questions about its direct applicability to the public sector, where the dynamics of adoption are more fragmented and influenced by bureaucratic structures (Dwivedi et al., 2019).

2.14.5 Underpinning Theory

The present study is underpinned by the UMEGA developed by Dwivedi et al. (2017). UMEGA is a comprehensive and context-sensitive theoretical framework specifically designed to explain the adoption and utilization of e-government systems. It is widely recognized for its strong theoretical grounding and empirical robustness in predicting both intention to use and actual use of e-government technologies, particularly in public-sector environments where organizational, social, and institutional factors play a critical role in shaping technology use.

UMEGA builds upon and extends earlier technology acceptance and diffusion theories, including the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), the Theory of Planned Behavior (TPB), and the Diffusion of Innovations (DOI). While these foundational models have contributed significantly to understanding individual technology adoption, they have been criticized for their limited ability to fully capture the complex, risk-sensitive, and institutionally driven nature of e-government systems, especially in developing-country contexts. UMEGA addresses these limitations by integrating additional constructs that reflect the unique characteristics of public-sector service delivery, such as governance structures, perceived risk, and enabling conditions. As noted by Taherdoost (2019), integrative models such as UMEGA provide a more comprehensive and contextually relevant theoretical basis for explaining user acceptance and utilization of digital public services.

In this study, the core constructs of UMEGA are operationalized through five key dimensions, i.e, performance expectancy, effort expectancy, social influence, facilitating

conditions, and perceived risk. Performance expectancy captures the extent to which public servants believe that using e-government systems will enhance their job performance and service delivery outcomes. Effort expectancy reflects the perceived ease of use associated with e-government platforms, while social influence represents the degree to which important others such as supervisors, colleagues, and institutional norms influence adoption behavior. Facilitating conditions refer to the availability of technical infrastructure, organizational support, and resources necessary for effective system use. Perceived risk captures concerns related to data security, system reliability, and potential negative consequences of using e-government systems, which are particularly salient in public-sector environments.

Beyond these core determinants, the study introduces level of application and training programs as critical contextual mechanisms that shape how e-government intentions are translated into actual utilization and service delivery outcomes. Training programs are incorporated as a moderating variable, reflecting their role in strengthening digital skills, reducing uncertainty, and enhancing users' confidence in e-government systems. This extension aligns with the logic of UMEGA, which emphasizes that adoption alone is insufficient without adequate capacity-building and institutional support. By integrating training into the model, the study acknowledges that public servants' ability to effectively apply e-government systems depends not only on perceptions and intentions but also on continuous skill development and organizational learning.

Hence, the resulting research framework adopts a holistic and theoretically grounded approach to examining the determinants of e-government utilization and their effects on effective public service delivery. By applying UMEGA and extending it through the

inclusion of training as a moderating factor, the study addresses key theoretical and contextual gaps in the literature, while offering a robust explanatory lens for understanding e-government utilization within the public service environment of Kaduna State, Nigeria.

2.14.5.1 Justification for the Adoption of UMEGA Theory

The Unified Model of Electronic Government Adoption (UMEGA) represents a significant advancement in the study of technology adoption, as it builds upon and extends earlier frameworks such as the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), the Theory of Planned Behavior (TPB), and the Diffusion of Innovation (DOI) (Aytekin et al., 2022). While these classical models have made substantial contributions to understanding individual technology acceptance, they were largely developed within commercial or organizational contexts and assume relatively stable infrastructure, high user readiness, and minimal institutional distrust. Such assumptions limit their explanatory power in public-sector environments, particularly in developing countries where governance structures, accountability pressures, and trust deficits fundamentally shape technology use.

UMEGA, developed by Dwivedi et al. (2017), responds directly to these limitations by providing a framework specifically tailored to e-government contexts. Unlike TAM or UTAUT, which primarily emphasize perceived usefulness and ease of use, UMEGA incorporates public-sector realities such as institutional trust, perceived risk, and organizational support, all of which are critical in explaining why e-government systems

often exist but remain underutilized. This makes UMEGA particularly suitable for the Nigerian context and Kaduna State in particular, where infrastructural constraints, uneven digital literacy, and scepticism toward government platforms continue to influence public servants' willingness to adopt digital systems.

A central strength of UMEGA is its integration of multiple constructs, including performance expectancy, effort expectancy, social influence, facilitating conditions, perceived risk, attitude, and behavioural intention. The inclusion of attitude as a mediating construct is especially important. Earlier models tend to assume that positive perceptions automatically lead to usage; however, UMEGA recognizes that these perceptions only translate into adoption when they shape a favourable psychological disposition toward e-government. This is highly relevant in Nigeria, where public servants may acknowledge the functional benefits of digital platforms yet remain reluctant to use them due to fear of increased monitoring, loss of discretion, or system failure. In such contexts, attitude becomes the critical bridge between perception and behaviour.

Equally important is UMEGA's explicit treatment of perceived risk, a factor often marginalised or entirely absent in earlier adoption models. In Kaduna State, concerns about data security, payroll errors, privacy breaches, and system reliability have been widely reported in relation to platforms such as IPPIS and e-procurement systems. These concerns directly influence public servants' trust in e-government and their willingness to rely on digital platforms for routine administrative tasks. By explicitly incorporating perceived risk, UMEGA captures an essential barrier to e-government utilization that traditional models such as TAM and DOI fail to adequately explain.

UMEGA further enhances explanatory depth through its emphasis on facilitating conditions, including ICT infrastructure, technical support, and training. This aligns closely with the focus of the present study, which examines training as a moderating variable in the relationship between e-government utilization and effective public service delivery. Training does not merely improve technical competence; it also reshapes attitudes, reduces uncertainty, lowers perceived risk, and strengthens confidence in system reliability. In this sense, training operates as a mechanism through which facilitating conditions amplify the positive effects of performance expectancy and effort expectancy on actual system use.

Empirical applications of UMEGA across diverse developing contexts provide additional support for its relevance. Studies conducted in Indonesia and Uzbekistan have demonstrated that effort expectancy, social influence, and perceived risk significantly shape attitudes toward e-government, which in turn determine behavioural intention and usage (Lavena et al., 2022). Evidence from Odisha further illustrates that when UMEGA constructs are combined with institutional capacity-building initiatives, including training and digital skills development, e-government systems are more likely to translate into improved decision-making and service delivery outcomes (Lavena et al., 2022). These findings confirm that UMEGA is both adaptable and robust in complex governance environments.

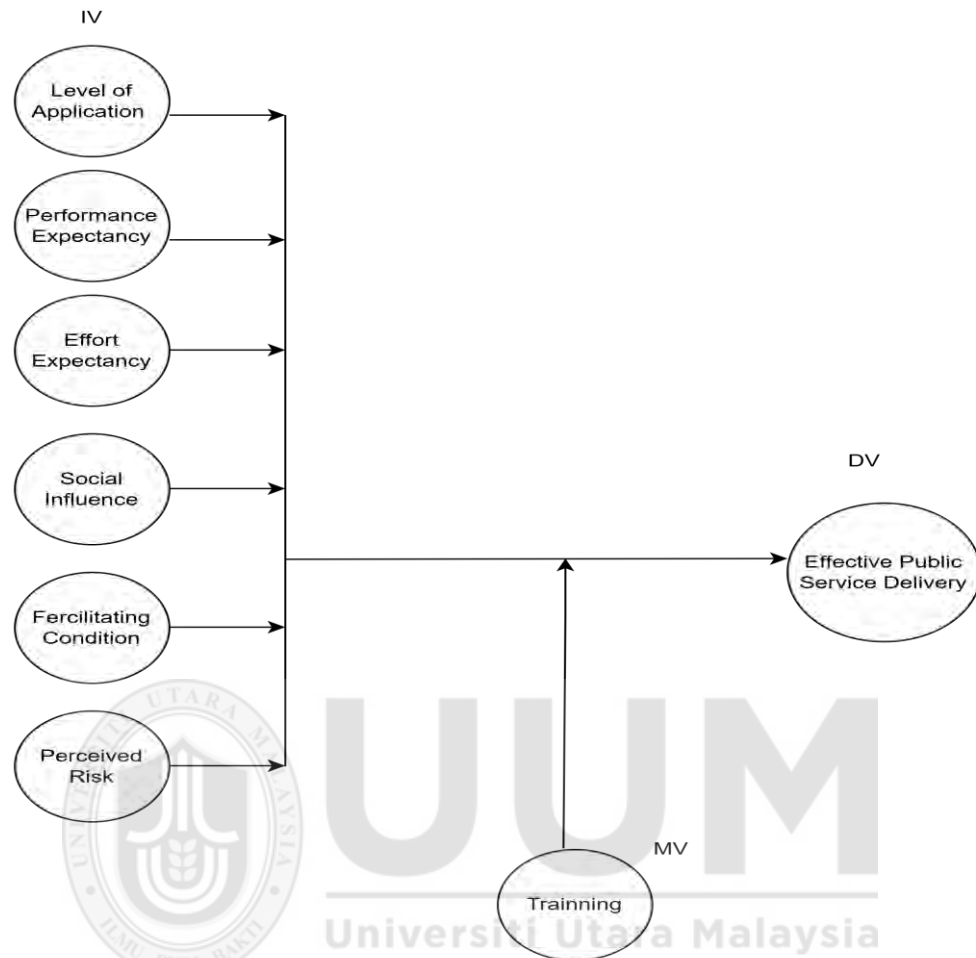
Within the Nigerian context, UMEGA's constructs map directly onto the challenges confronting Kaduna State. Performance expectancy reflects anticipated benefits such as faster service delivery and reduced corruption; effort expectancy captures usability concerns associated with online portals; social influence accounts for organizational

pressure and leadership support; facilitating conditions emphasize infrastructure and training availability; and perceived risk reflects the trust deficit surrounding government digital platforms. Together, these factors shape attitudes, which ultimately influence behavioural intention, level of application, and effective utilization.

In summary, UMEGA provides a comprehensive, context-sensitive, and empirically validated framework that moves beyond simplistic adoption explanations to account for both enablers and barriers to e-government utilization. Its integration of attitude and perceived risk, combined with its emphasis on facilitating conditions and training, makes it more suitable than TAM, UTAUT, TPB, or DOI for analysing e-government in Nigeria. By adopting UMEGA, this study not only strengthens its theoretical foundation but also ensures that its findings generate actionable insights for policymakers and administrators seeking to enhance effective public service delivery in Kaduna State and across Nigeria.

2.15 Research Framework

The research framework in Figure 2.4 below illustrates the relationship between the key variables in this study, providing a structured representation of how e-government utilization is expected to influence effective public service delivery. This framework is grounded in the Unified Model of Electronic Government Adoption (UMEGA), which integrates established theories such as TAM, TPB, UTAUT, and DOI, while extending them with additional constructs that better capture the unique characteristics of e-government utilization.



Source: Researcher's Conceptualization (2026)

Figure 2.4: Conceptual Framework

Figure 2.4 presents the conceptual framework developed to examine public servants' perceptions of e-government utilization and their influence on effective public service delivery in Kaduna State, Nigeria. The framework is grounded in the Unified Model of Electronic Government Adoption (UMEGA) and reflects the study's objective of explaining both the direct and conditional effects of key determinants of e-government utilization on service delivery outcomes.

The framework illustrates two interrelated pathways. The first pathway represents the direct effects of the determinants of e-government utilization namely performance

expectancy, effort expectancy, social influence, facilitating conditions, perceived risk, and level of application on effective public service delivery. This pathway assumes that when public servants perceive e-government systems as useful, easy to use, socially supported, adequately facilitated, and low in risk, they are more likely to apply these systems in their daily tasks, thereby enhancing efficiency, transparency, responsiveness, and overall service quality.

The second pathway introduces training programs as a moderating variable that conditions the strength of the relationship between the determinants of e-government utilization and effective public service delivery. This moderating role recognizes that positive perceptions alone may not automatically translate into effective utilization or improved service outcomes. Rather, training serves as a critical capacity-building mechanism that strengthens public servants' technical competence, reduces uncertainty and perceived risk, and reinforces confidence in the reliability of e-government platforms. Through training, public servants are better equipped to translate favourable perceptions and intentions into sustained and effective application of digital systems.

By integrating training into the framework, the model emphasizes that e-government effectiveness is not purely a technological outcome but a socio-technical process shaped by human capacity, organizational support, and continuous skill development. In the context of Kaduna State, where infrastructural limitations, uneven ICT literacy, and resistance to change persist, training becomes a decisive factor in determining whether e-government platforms achieve their intended service delivery objectives or remain underutilized.

Overall, the framework underscores that effective public service delivery emerges from the interaction between technological determinants and human capacity development. While the determinants of e-government utilization exert direct influence on service delivery, their impact is significantly enhanced when supported by systematic and well-designed training programs. Thus, Figure 2.4 provides an integrated analytical lens for understanding how e-government utilization translates into tangible service delivery improvements in the public sector.

2.16 Research Hypothesis Development

Based on the factors identified in the literature review and the underpinning theoretical framework, the following null hypotheses were formulated to ensure methodological rigor and analytical neutrality. Formulating null hypotheses allows the study to avoid presupposing positive outcomes and ensures that conclusions regarding the applicability of UMEGA in Kaduna State are derived strictly from empirical evidence rather than assumptions. This approach aligns with the principle of falsifiability, a cornerstone of scientific inquiry, by creating room for both confirmation and rejection of expected relationships. Furthermore, testing these null hypotheses provides an opportunity to evaluate whether factors validated in Western and Asian contexts under UMEGA also hold true in an emerging economy such as Kaduna State, Nigeria. In doing so, the study not only strengthens its methodological validity but also enhances its theoretical contribution by enabling direct comparison with previous UMEGA-based studies across different contexts.

H₀₁: The level of application of e-government services does not enhance effective public service delivery in Kaduna State, Nigeria.

H₀₂: Performance expectancy does not enhance effective public service delivery in Kaduna State, Nigeria.

H₀₃: Effort expectancy does not enhance effective public service delivery in Kaduna State, Nigeria.

H₀₄: Social influence does not enhance effective public service delivery in Kaduna State, Nigeria.

H₀₅: Facilitating conditions does not enhance effective public service delivery in Kaduna State, Nigeria.

H₀₆: Perceived risk does not enhance effective public service delivery in Kaduna State, Nigeria.

H₀₇: Training programs among public servants does not moderate the relationship between level of application of e-government utilization and effective public service delivery in Kaduna State.

H₀₈: Training programs among public servants does not moderate the relationship between performance expectancy and effective public service delivery in Kaduna State.

H₀₉: Training programs among public servants does not moderate the relationship between effort expectancy and effective public service delivery in Kaduna State.

H₁₀: Training programs among public servants does not moderate the relationship between social influence and effective public service delivery in Kaduna State.

H11: Training programs among public servants does not moderate the relationship between facilitating conditions and effective public service delivery in Kaduna State.

H12: Training programs among public servants does not moderate the relationship between perceived risk and effective public service delivery in Kaduna State.

2.16.1 Relationship of E-government Utilization and Effective Public Service

Delivery

E-government has become a widely adopted governance tool across both developed and developing nations, offering governments an opportunity to deliver services to citizens more efficiently and transparently (Nkgapele, 2024). Within public organizations, the perception of e-government among public servants is increasingly recognized as a critical factor that enhances organizational efficiency and service quality (Efthymiou, 2025). As McGrath and MacMillan (2000) emphasize, e-government services are central to organizational development and sustainable performance, a view also supported by Nanda and Lita (2025). Adeyemi (2019) further underscores that technology adoption plays a decisive role in shaping organizational success.

Despite these global advancements, evidence from developing African countries reveals persistent barriers to the effective utilization of e-government. These challenges often stem from public servants' negative perceptions toward digital platforms, which undermine the level of application and utilization of e-government systems (Maynard, 2015; Paulsen et al., 2013). In Nigeria, such constraints remain particularly pronounced. For instance, Macdonald et al. (2022) examined the use of e-government by the Independent National Electoral Commission (INEC) during the 2019 general elections.

Their study, which drew primarily on secondary data, highlighted that e-government tools were only partially implemented, contributing to inefficiencies in the electoral process. This finding reinforces broader concerns that inadequate skills, training, and acceptance among public servants, especially in states such as Kaduna, pose significant obstacles to realizing the full benefits of e-government initiatives. Building on these insights, the current study proposes the following hypothesis to investigate how public servants' perceptions of e-government influence effective public service delivery in Kaduna State:

H₀₁: The level of application of e-government does not enhance effective public service delivery in Kaduna State, Nigeria.

2.16.2 Determinants of E-Government Utilization and Effective Public Service Delivery (D-E-G-U < EPSD)

Existing literature emphasizes that sustainable national development is closely tied to the adoption of modern strategic systems that foster innovation and enhance the quality of life for citizens (AbdulKareem & Oladimeji, 2024; Balaji, 2025). For public organizations to operate efficiently and effectively, governments must design and implement robust policies and procedures that strengthen accountability, streamline processes, and improve overall institutional performance. These reforms are especially crucial in emerging economies like Nigeria, where increasing global technological connectivity has heightened both opportunities and expectations for digital governance (Saleh et al., 2025). Consequently, many countries, including developing nations, have turned to e-government as a means of modernizing public administration and improving

service delivery. E-government is widely recognized as a transformative instrument for ensuring transparency, reducing inefficiencies, and providing citizen-focused services (Akida & Kandiri, 2024; Chukwuemeka & Okeke, 2018).

The relationship between e-government determinants and effective public service delivery, however, is not uniform across contexts. In advanced economies, empirical studies consistently reveal a strong positive association (Francis et al., 2023; Nnaji & Nri, 2022), while evidence from developing countries is more mixed. Some studies report minimal or no significant correlation, often attributing the gap to weak infrastructure, poor institutional capacity, or limited digital literacy (Macdonald et al., 2022; Laila et al., 2020). For Nigeria, particularly Kaduna State, secondary evidence drawn from government reports and official websites highlights persistent challenges, including weak implementation strategies and insufficient alignment between digital initiatives and service delivery goals. Indeed, some findings even point to a negative relationship between federal e-government initiatives and the actual quality of service delivery, underscoring the complexity of achieving meaningful outcomes in this context. Based on the foregoing discussion and empirical evidence, this study hypothesizes the following:

H₀₂: Performance expectancy does not enhance effective public service delivery in Kaduna State, Nigeria.

H₀₃: Effort expectancy does not enhance effective public service delivery in Kaduna State, Nigeria.

H₀₄: Social influence does not enhance effective public service delivery in Kaduna State, Nigeria.

H₀₅: Facilitating conditions does not enhance effective public service delivery in Kaduna State, Nigeria.

H₀₆: Perceived risk does not enhance effective public service delivery in Kaduna State, Nigeria.

2.16.3 Moderating Role of Training Among Public Servants on the Relationship Between Determinants of E-Government Utilization and Effective Public Service Delivery

In recent years, scholars and policymakers have shown increasing interest in the performance of public organizations in Nigeria (Sadik-Zada et al., 2024). This attention has been fueled by growing public demand for more efficient service delivery and accountable governance (Balaji, 2025). To respond effectively, modern approaches to public administration such as investment in staff training, adoption of digital solutions, research collaborations, and broader access to external sources of information, are considered essential (Akida & Kandiri, 2024; Sanni, 2018).

Nevertheless, one of the most persistent barriers to progress is the low level of technological literacy among many public servants, which limits their ability to fully utilize e-government tools to enhance organizational performance (Bawuro et al., 2018). This challenge is further compounded by widespread skepticism toward ICT within African bureaucracies, where structural weaknesses such as weak rule of law, poor human resource management, unstable political environments, and leadership crises undermine reform efforts (Akanmu, 2018; Cheeseman et al., 2018; Chidiebere &

Ndaguba, 2018; Elrehail, 2018; Lowndes & Francis, 2023). Many public servants perceive e-government not as an enabler of efficiency but as a threat, fearing that digital platforms may gradually replace their roles.

Empirical studies reflect this tension. For instance, Robert and Quadri (2018), in their analysis of Nigeria's federal e-government initiatives, identified significant barriers to efficiency and a negative relationship between e-government and service delivery outcomes. Although the study acknowledged the potential benefits of e-government, it also highlighted the limited citizen interaction facilitated by current systems and the absence of adequate legal and institutional frameworks. The authors recommended revising existing laws and adopting more citizen-centered digital platforms to foster engagement and accountability. Similarly, Wagama et al. (2016), studying Kenyan county governments, found that while administrative decentralization positively influenced service delivery, the utilization of e-government did not significantly improve outcomes, even within decentralized structures. Comparable patterns have been observed in Nigeria, where e-government reforms have not consistently translated into improved service delivery. For instance, Ahmed (2019) concluded that despite multiple reform efforts, e-government has had little measurable impact on the effectiveness of many Nigerian government agencies.

The literature thus presents a mixed picture, while some studies associate e-government utilization with improved service delivery, others report minimal or even negative effects. These inconsistencies suggest the presence of mediating or moderating factors that shape the relationship between e-government and public service outcomes. One such factor is training. This study posits that training programs can play a critical

moderating role by equipping public servants with the digital skills and confidence needed to effectively utilize e-government platforms. Targeted training has the potential to shift perceptions of ICT from threat to opportunity, thereby strengthening the positive impact of e-government on service delivery. Despite this, the role of training as a moderator has been largely overlooked in prior studies. To address this gap, the present study investigates whether training enhances the influence of key e-government determinants on effective public service delivery, with specific focus on Kaduna State, Nigeria. Based on the foregoing discussion and empirical evidence, the following hypotheses are proposed:

H07: Training programs among civil servants does not moderate the relationship between level of application of e-government utilization and effective public service delivery in Kaduna State.

H08: Training programs among civil servants does not moderate the relationship between performance expectancy and effective public service delivery in Kaduna State.

H09: Training programs among civil servants does not moderate the relationship between effort expectancy and effective public service delivery in Kaduna State.

H10: Training programs among civil servants does not moderate the relationship between social influence and effective public service delivery in Kaduna State.

2.17 Summary

This chapter established the theoretical foundation of the study by justifying the adoption of the Unified Model of Electronic Government Adoption (UMEGA) as the guiding framework. It explained the relevance of UMEGA to the Nigerian public service

context and highlighted the unique role of training as a moderating variable within the conceptual model. Furthermore, the chapter presented the conceptual framework, illustrating the relationships among the study variables and clarifying how these constructs are operationalized. Finally, the proposed directional hypotheses were formulated to link the independent, dependent, and moderating variables in a structured manner. Building on this theoretical foundation, the next chapter outlines the research methodology, detailing the design, sampling strategies, data collection methods, and analytical techniques employed to investigate these relationships.



CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the specific methods used to conduct the study, which follows a quantitative research design. First, the research philosophy underlying the study is discussed to ensure consistency in obtaining accurate and reliable results. The chapter then presents the research design, which was carefully selected after evaluating all relevant methodological considerations. It then defines the study population and sample size, explains the sampling strategy used to select participants, and describes the data collection process and the instrument used to collect the required data. Finally, this chapter describes in detail the methods used to analyze the data and justify the choices made.

3.2 Research Philosophy

This section examines the philosophical foundations guiding this research, building on the contributions of scholars such as Hanson (1958), Kuhn (1970), and Feyerabend (1978). Social and management sciences emphasize that a researcher's worldview inevitably shapes the research process (Sun & Zuo, 2024). Researchers are therefore expected to articulate their philosophical assumptions, their conception of the social world, and their perspective on how knowledge is generated (Mwita, 2025). These assumptions not only influence methodological choices but also determine how real-world problems are approached and interpreted.

Guba and Lincoln (1994) define a paradigm as a belief system that underpins and directs inquiry, while Sun and Zuo (2024) describe it as a set of values, techniques, and assumptions shared within a research community. In essence, a paradigm is a framework that governs how researchers conceptualize a phenomenon, formulate research objectives, and select suitable methods (Scherer, 2003). By providing a coherent worldview, paradigms ensure methodological consistency and guide researchers toward appropriate strategies for inquiry. Burrell and Morgan's (1979) typology remains influential in this regard, highlighting three interrelated dimensions: ontology (the nature of reality), epistemology (the nature of knowledge), and methodology (the process of acquiring knowledge). Together, these dimensions illuminate the classic debate between objectivism, where reality exists independently of human perception, and subjectivism, where reality is understood as socially constructed by observers.

According to Guba (1990), the paradigm chosen by a researcher answers three fundamental questions: what is the nature of knowledge, how it relates to the knower, and what limitations it carries. These questions are critical in ensuring consistency between a researcher's ontological stance (what exists) and methodological choices (how to study it). Explicitly stating one's paradigm therefore enhances the transparency of research design and allows readers to understand why particular methodological decisions were made (Tavakol & Sanders, 2014).

Various paradigms have been advanced over time. Realism posits that an objective reality exists independent of human perception, whereas nominalism argues that reality is constructed through subjective interpretation. Positivism, associated with empirical observation and quantification, aims to uncover objective laws of social phenomena,

while anti-positivism challenges this by advocating qualitative approaches that emphasize interpretation and meaning (Sun & Zuo, 2024). Other paradigms include interpretivism, which privileges the study of lived experiences and subjective meanings; critical theory, which interrogates power structures and social inequalities; and postmodernism, which questions the existence of absolute truth.

In the field of social and management sciences, positivism and interpretivism have emerged as the dominant paradigms (Tavakol & Sanders, 2014). Positivism emphasizes objectivity, measurement, and statistical analysis to derive general conclusions, while interpretivism focuses on context, lived experiences, and the meanings individuals attach to social interactions. The choice between these paradigms ultimately depends on the research problem, the nature of the phenomenon under investigation, and the researcher's philosophical orientation.

3.2.1 The Positivist Paradigm

This study adopts the positivist paradigm, which assumes that reality is objective, measurable, and can be understood through systematic empirical observation and analysis (Saunders et al., 2019). In line with this orientation, the research seeks to uncover causal relationships by testing hypotheses, identifying statistical patterns, and drawing generalizable conclusions (Collis & Hussey, 2014). Given that the study investigates the determinants of e-government utilization and its impact on effective public service delivery with training programs serving as a moderating factor, the positivist paradigm provides a structured foundation for rigorous analysis.

The adoption of positivism is particularly appropriate since the study focuses on quantifiable constructs such as performance expectancy, effort expectancy, social influence, facilitating conditions, perceived risk, and level of application among public servants in Kaduna State, Nigeria. By employing quantitative methods, the research ensures that findings are statistically validated, replicable, and consistent with UMEGA's emphasis on empirically based constructs. Using structured questionnaires as the primary data collection tool, the study captures relationships between variables and evaluates how training enhances the effectiveness of e-government platforms in improving service delivery.

The Unified Model of E-Government Adoption (UMEGA), which underpins this research, extends established theories such as TAM, TPB, UTAUT, and DOI (Venkatesh et al., 2012). It provides a robust framework for analyzing how public servants in Kaduna engage with e-government platforms, what barriers hinder the utilization, and how training can bridge the gap between intention and actual use. To ensure analytical rigor, Partial Least Squares Structural Equation Modeling (PLS-SEM) is employed, as it is well suited for examining complex relationships and testing moderating effects, particularly the role of training in strengthening the determinants of e-government utilization (Hair et al., 2017; Wong, 2013).

Anchored in the positivist tradition, this study facilitates the generalization of results beyond the sample to the wider population of public servants in Kaduna State. This is especially relevant in a context where infrastructural deficits, limited ICT literacy, and resistance to digital reforms remain significant challenges (Sulaiman et al., 2022; Ogu & Chukwurah, 2023). Hence, the adoption of a positivist paradigm justifies the reliance on

PLS-SEM and hypothesis testing, since these methods align with the paradigm's commitment to objectivity, precision, and generalizability. By quantifying the strength and direction of relationships between variables, the study not only validates UMEGA within the African context but also enables comparison with findings from other regions. This reinforces both the theoretical robustness and the policy relevance of the research, ensuring that conclusions are data-driven and capable of informing evidence-based reforms in Kaduna State's public service sector.

3.3 Research Design

A research design serves as the blueprint for conducting a study, providing a structured plan that guides how data will be collected, measured, and analyzed to answer the research questions (Creswell, 2013). It defines the overall strategy adopted by the researcher to integrate the different components of the study coherently and logically, ensuring that the research problem is addressed effectively.

The choice of design is critical, as it determines the quality, validity, and reliability of the study's findings. In social science research, especially in areas such as public management and technology adoption, a well-defined design ensures that the investigation remains systematic, minimizes bias, and enhances replicability (Saunders et al., 2019). Research design also provides a framework for linking philosophical assumptions, research objectives, and methodological choices, thereby aligning the study's purpose with the means of achieving it.

For the present study, the research design was selected to capture the relationships between multiple variables such as performance expectancy, effort expectancy, social

influence, facilitating conditions, perceived risk, and training in explaining e-government utilization and effective public service delivery in Kaduna State. By structuring the inquiry around these interrelated constructs, the design ensures that the study addresses both theoretical and practical dimensions of the problem. This structured approach provides the foundation upon which the subsequent methodological choices, including the adoption of a quantitative research design, are built.

3.3.1 Quantitative Research Design

This study adopts a quantitative research design, which is widely recognized as appropriate for investigating relationships between measurable variables in social and management sciences (Creswell & Creswell, 2018; Saunders et al., 2019). Rooted in the positivist paradigm, quantitative design assumes that reality is objective, can be measured, and can be systematically analyzed using statistical techniques. It is particularly suited for studies where the goal is to test hypotheses, examine cause-and-effect relationships, and generalize findings to a broader population (Bryman, 2015).

The focus of this research is to assess the determinants of e-government utilization and their impact on effective public service delivery, while also investigating the moderating effect of training programs in Kaduna State, Nigeria. Such objectives require precise measurement of variables such as performance expectancy, effort expectancy, social influence, facilitating conditions, perceived risk, and level of application. Quantitative design makes it possible to capture these constructs using structured questionnaires and to test their interrelationships through statistical models. This approach ensures that the

results are not only empirical and replicable but also capable of supporting evidence-based policy recommendations.

Another advantage of the quantitative design is its ability to handle large samples, thereby enhancing the validity and reliability of findings. By using standardized instruments, the study minimizes subjectivity and bias, ensuring consistency across respondents (Sekaran & Bougie, 2016). In the context of Kaduna State, where public service delivery is a major concern, collecting data from a significant number of public servants provides a clearer picture of how e-government tools are perceived and utilized across different ministries and agencies.

Furthermore, quantitative research is essential for testing the Unified Model of Electronic Government Adoption (UMEGA), which serves as the theoretical underpinning of this study. UMEGA is composed of measurable constructs that lend themselves well to quantitative operationalization. For example, performance expectancy and effort expectancy can be measured using Likert-scale items, while social influence and perceived risk can be quantified through respondents' self-reported assessments. Quantitative design thus ensures alignment between the theoretical framework and the empirical methods employed.

In addition, the design allows the study to move beyond descriptive findings to inferential analysis, where hypotheses about relationships and moderating effects can be statistically tested. This is particularly relevant for assessing whether training enhances the link between e-government determinants and effective service delivery. Such

insights would be difficult to achieve using purely qualitative methods, which are more exploratory in nature.

Hence, the adoption of a quantitative research design ensures that the study generates robust, generalizable, and statistically valid insights into the determinants of e-government utilization in Kaduna State. It provides the methodological rigor necessary for testing complex models such as UMEGA and for offering concrete recommendations to policy makers on how training can improve the effectiveness of digital governance initiatives.

3.4 Operationalization of Variables

In this study, the operationalization of variables involves translating the theoretical constructs of the UMEGA into measurable indicators that can be empirically tested. The independent variables capture the determinants of e-government utilization by public servants in Kaduna State. PE reflects the extent to which employees believe that e-government platforms enhance their efficiency and effectiveness in delivering services. EE refers to the perceived ease of use of digital systems, with higher ease of use expected to drive greater acceptance. SI captures the effect of colleagues, supervisors, and organizational norms on encouraging the use of e-government tools. FC encompass the availability of resources such as ICT infrastructure, internet connectivity, and technical support that enable effective system use. PR relates to concerns about privacy, cybersecurity, and system reliability, which may discourage adoption, while the level of application reflects the extent to which e-government platforms are actively implemented and integrated into administrative practices.

The dependent variable, effective public service delivery, is operationalized across four dimensions: accessibility, efficiency, transparency, and user satisfaction. Accessibility refers to how easily public servants and citizens can obtain services digitally, while efficiency reflects the reduction of bureaucratic delays and improvements in processing speed through online platforms. Transparency measures the degree to which e-government improves openness in government processes and reduces corruption, and user satisfaction captures the perceived reliability, responsiveness, and effectiveness of the services delivered.

In addition, training programs are included as a moderating variable. Training is conceptualized as structured initiatives designed to build the digital capacity of public servants by equipping them with the necessary skills, knowledge, and confidence to effectively use e-government platforms. This moderating factor is expected to strengthen the influence of performance expectancy, social influence, and facilitating conditions on service delivery outcomes, thereby bridging the gap between intention and actual utilization.

All constructs are measured using a structured questionnaire designed with a 5-point Likert scale, ranging from 1 = strongly disagree to 5 = strongly agree. This approach ensures that perceptions of public servants are captured in a standardized and comparable manner, allowing for rigorous statistical testing of the hypothesized relationships. By aligning the operationalization with UMEGA and tailoring it to the study context, the research provides a systematic and evidence-based means of examining how determinants of e-government utilization influence public service delivery in Kaduna State, as well as how training can enhance these relationships.

3.5 Instrument and Measurement

In addition, it is essential to conceptualize and operationalize the study variables in alignment with established research practices to ensure consistency and avoid discrepancies between definitions and measurements (Gravetter & Forzano, 2016). In this study, the independent variables (IVs) represent the factors hypothesized to influence the outcome variable, while the dependent variable (DV) captures the effectiveness of public service delivery. A third category, the moderating variable (MV), refers to a factor that alters the strength or direction of the relationship between the IVs and the DV (Abdullahi, 2023).

As applied here, the study identifies six independent variables: level of application, performance expectancy, effort expectancy, social influence, facilitating conditions, and perceived risk. The dependent variable is effective public service delivery, conceptualized through dimensions such as accessibility, efficiency, transparency, and user satisfaction. The moderating variable is training programs for public servants, which are expected to enhance the relationship between the determinants of e-government utilization and public service delivery. The operationalization of these variables is guided by prior empirical studies, ensuring reliability, validity, and comparability with existing literature.

3.5.1 Effective Public Service Delivery

In this study, the effectiveness of public service delivery was measured using four items adapted from Reddin (2009). The scale consists of four statements rated on a 5-point Likert scale, where 1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, and 5 =

strongly agree. An example item adapted for this study is: “E-government systems have improved the effectiveness and efficiency of public service delivery in Kaduna State.”

The construct of effective public service delivery is operationalized through indicators such as improved efficiency of services, reduction in the time required to deliver services, enhanced quality of public service outputs, and increased citizen satisfaction. Reddin’s (2009) scale was chosen because of its clarity and its comprehensive coverage of performance outcomes, which are central to evaluating the impact of e-government utilization in this study. The scale has been validated in prior management contexts, supporting its methodological reliability and suitability for this research. To fit the study context, minor adaptations such as explicitly referencing “Kaduna State” and “e-government systems” were made, while maintaining the theoretical integrity of the original items.

Table 3.1
Measures of Effective Public Service Delivery

S/No	Effective Public Service Delivery	SA	A	N	D	SD
1	The use of electronic government systems has enhanced the effectiveness and efficiency of public service delivery in Kaduna State					
2	The use of e-government initiatives has reduced the time required to complete public service transactions in Kaduna State					
3	The quality of public services provided in Kaduna State has improved over the past year					
4	The level of accessibility and usability of e-government platforms for public service in Kaduna State satisfies me.					

Source: Prasad, Tiwari, and Jha, (2023); Reddin (2009)

3.5.2 Level of Application of e-government Utilization

In this study, the level of application of e-government was measured using four items adapted from Prasad, Tiwari, and Jha (2023) and Reddin (2009). The items were rated on a 5-point Likert scale, where 1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, and 5 = strongly agree. An example of the adapted item is: “I am satisfied with the current level of e-government services.”

The construct of e-government application is operationalized by examining both the extent of application and the frequency of use of specific digital technologies and platforms provided by government agencies. This includes the degree to which citizens and businesses actively engage with government through online services, the intensity of usage across various functions (such as applications, payments, and inquiries), and the level of satisfaction derived from these interactions. By capturing both usage patterns and user satisfaction, the scale provides a comprehensive measure of how effectively e-government initiatives are being applied in Kaduna State

Table 3.2
Measures of Level of Application

S/No	Level of application of e-government services	SA	A	N	D	SD
5	The implementation of e-government platforms in Kaduna State has improved the efficiency of public service delivery					
6	I am satisfied with the level of services I offered through e-government platforms in Kaduna State					
7	I believe that e-government initiatives in Kaduna State have reduced bureaucratic delays in public service processes					
8	I find e-government tools in Kaduna State to increase transparency and accountability in public service delivery					

Source: Prasad, Tiwari, and Jha, (2023); Reddin (2009)

3.5.3 Performance Expectancy

In this study, four items were adapted from Reddin (2009) to measure performance expectancy, which reflects the extent to which public servants believe that using e-government systems will enhance their job performance. The construct was assessed using a questionnaire consisting of four items rated on a 5-point Likert scale, where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. An example of an adapted item is: “E-government services enable me to complete my tasks faster and more efficiently.”

For this study, performance expectancy was operationalized as the perception of public servants regarding the degree to which e-government services contribute to improved job outcomes. This encompasses beliefs that such systems increase task efficiency, enhance the timeliness of service delivery, promote equitable access to services, and improve the overall quality of public services offered to citizens.

Table 3.3
Measures of Performance Expectancy

	Performance Expectancy	SA	A	N	D	SD
9	Using e-government services enables me to accomplish my task more quickly and more efficiently					
10	Using e-government services increases the equity between disabled and non-disabled citizens					
11	Using e-government services would save citizens' time					
12	Using the e-government services increases the quality of services					

Source: Reddin (2009)

3.5.4 Effort Expectancy

In this study, four items from Reddin (2009) were adapted to measure effort expectancy, which captures the perceived ease of use of e-government services. Each item was measured on a 5-point Likert scale, where 1 = strongly disagree (indicating difficulty of use) and 5 = strongly agree (indicating ease of use). An example of the adapted item is:

“It would be easy for me to familiarize myself with the e-government system.”

For this study, effort expectancy is operationalized as public servants’ perceptions of how easy it is to learn and use e-government tools, the degree to which these tools simplify the completion of administrative tasks, and the extent to which digital systems reduce complexity in service delivery. It emphasizes beliefs that user-friendly e-government systems enhance efficiency, lower barriers to adoption, and ultimately improve the quality and accessibility of public services.

Table 3.4
Measures of Effort Expectancy

S/No	Effort Expectancy	SA	A	N	D	SD
13	Learning to use the e-government services system is easy					
14	Using the e-government services system is easy					
15	It is easy for me to become skillful at using the e-government services system					
16	By using the e-government system, I am able to get government services deliver easily?					

Source: Reddin (2009)

3.5.5 Social Influence

In this study, four items were adapted from Reddin (2009) to measure social influence, which refers to the extent to which public servants perceive that important individuals such as colleagues, superiors, friends, or family expect them to use e-government

services. The construct is measured using a 5-point Likert scale, where 1 = strongly disagree and 5 = strongly agree. An example of the adapted item is: “I would be more willing to use e-government services if my colleagues or friends used them.”

Within the context of this study, social influence is operationalized as the degree to which public servants’ decisions to apply and utilize e-government systems are shaped by the opinions, behaviors, and expectations of people in their professional and social networks. This captures both peer pressure within the workplace and broader societal encouragement, reflecting how collective norms and organizational culture affect the uptake of digital governance tools.

Table 3.5:
Measures of Social Influence

S/No	Social Influence	SA	A	N	D	SD
17	People who are important to me think that I should use e-government services.					
18	People who influence my behaviour think I should use the e-government services					
19	I would use e-government services if my colleagues used them					
20	Government sectors encourage citizens to use the e-government services system					

Source: Reddin (2009)

3.5.6 Facilitating Conditions

In this study, three items adapted from Reddin (2009) were used to measure facilitating conditions, assessed on a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. This construct captures the degree to which public servants feel adequately supported in their use of e-government services, considering factors such as

access to resources, technical knowledge, and institutional support. An example of an adapted item is: “I have the necessary knowledge to use e-government services effectively.”

Within the context of this study, facilitating conditions are operationalized as the availability of essential resources, the adequacy of public servants’ knowledge and skills to operate e-government platforms, the provision of technical support when systems malfunction, and the presence of supportive government policies that enable effective system implementation. Collectively, these factors reflect the structural and organizational environment that either enables or constrains the successful utilization of e-government services.

Table 3.6
Measures of Facilitating Condition

S/No	Facilitating Conditions	SA	A	N	D	SD
21	I have the resources necessary to use e-government services					
22	I have the knowledge necessary to use e-government services					
23	I have access to a specific person or group for assistance with any technical problems I may encounter.					

Source: Reddin (2009)

3.5.7 Perceived Risks

In this study, four items adapted from Featherman and Pavlou (2003) and Fu et al. (2006) were used to measure perceived risk, employing a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. This construct reflects the extent to which public servants believe that using e-government services may expose them to

potential negative outcomes. An example of an adapted item is: “I feel that using e-government services may expose me to cyber threats.”

Perceived risk in this study is operationalized through public servants’ concerns about issues such as cybersecurity threats, breaches of privacy, financial loss, and possible misuse of sensitive information within digital platforms. It captures the degree of uncertainty and apprehension that may discourage the adoption and continued use of e-government services, highlighting the importance of security and trust in shaping user behavior.

Table 3.7
Measures of Perceived Risks

S/No	Perceived Risks	SA	A	N	D	SD
24	Using this e-government services would involve performance risk (i.e., missing deadline due to portal not working)					
25	Using this e-government services would involve financial risk (i.e., losing money when paying online due to transaction errors)					
26	Using this e-government services would involve security risk (i.e., losing my portal's login account by hackers)					
27	Using this e-government services would involve privacy risk (i.e., losing my personal information entered in this e-government portals)					

Source: Featherman and Pavlou, (2003); Fu et al. (2006).

3.5.8 Training Programs

In this study, four items were adapted from Lee and Porumbescu (2018), UNPAN (2011), UNESCO (2014), and NeGP (2014) to measure training programmes, with responses captured on a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. This construct reflects the extent to which ICT-related training initiatives

equip public servants with the skills and knowledge needed to effectively utilize e-government platforms. Examples of adapted items include: “I have received training on the use of hardware and software for e-government services” and “I possess the necessary knowledge and skills to effectively use e-government systems.”

In this context, training programmes are operationalized as structured initiatives that enhance the digital competence of public servants in Kaduna State. By strengthening their technical capacity, such programmes are expected to improve the utilization of e-government tools and, consequently, the effectiveness of public service delivery.

Table 3.8
Measures of Training

S/No	Training Program?	SA	A	N	D	SD
28	I participated in an e-government training program organized by the Kaduna State government.					
29	I participated in a fully government-sponsored e-government training program.					
30	I receive training on e-government-related knowledge and skills to address the competencies required to execute my tasks and responsibilities					
31	I received training on soft skills required to develop the right attitude towards adopting and utilizing e-government services					

Source: Lee & Porumbescu (2018); UNPAN (2011), UNESCO (2014), & NeGP (2014)

3.6 The Study Area

Kaduna State, located in northwestern Nigeria, has a history shaped by both traditional institutions and colonial administration. The area has long been a center of socio-political development, with evidence of early civilizations such as the Nok culture, followed by the Hausa city-states and later the Fulani emirates. The advent of British colonial rule in the early 20th century introduced significant administrative and

infrastructural reforms that continue to influence the governance and cultural identity of the state today (Shafiu, 2021; Ezeamaka et al., 2019).

The state is ethnically diverse, hosting more than twenty-five ethnic groups, including the Hausa, Fulani, Yoruba, Igbo, Nupe, and several minority groups. This diversity is reflected in the state's cultural richness, expressed through language, festivals, religious practices, and traditions. The social life of Kaduna is vibrant, with festivals, dances, and music serving as expressions of identity and cohesion. Traditional practices such as Hausa court music, the spiritual rhythms of *Bori*, and dances like Egungun and Sokaiya highlight the state's cultural dynamism (Ezeamaka et al., 2019). Beyond its cultural significance, Kaduna State is an important political and administrative hub. As the former capital of Northern Nigeria, it continues to host key federal and state government institutions that oversee critical functions in education, health, agriculture, finance, defence, and public administration.

Demographically, Kaduna is the third most populous state in Nigeria, with an estimated population of over 1.2 million (National Bureau of Statistics, 2022). The state has a relatively young population, with more than 60% under the age of 30, which creates both opportunities and challenges for digital transformation. Economically, Kaduna is supported by agriculture, manufacturing, trade, and services, with its capital city serving as a regional hub for commerce and governance.

In terms of ICT infrastructure, Kaduna State has made significant strides, with initiatives such as the Kaduna State ICT Policy and the deployment of e-government platforms in areas like payroll management, tax collection, and educational administration. However,

challenges remain, including inconsistent electricity supply, limited broadband penetration in rural areas, and varying levels of digital literacy among public servants. These conditions make Kaduna a relevant case for exploring how determinants such as performance expectancy, effort expectancy, facilitating conditions, and training programs influence the effective utilization of e-government for improved service delivery. Kaduna State is home to numerous government agencies operating in various sectors. Some of the major agencies are:

- i. (Kaduna State Internal Revenue Service (KDIRS): Responsible for generating revenue for the state through tax collection.
- ii. Kaduna State Urban Planning and Development Authority (KASUPDA): Oversees urban development and infrastructure projects.
- iii. Kaduna State Primary Healthcare Development Agency (KSPHCDA): Provides essential healthcare services to rural communities.
- iv. Kaduna State Investment Promotion Agency (KADIPA): Encourages and facilitates investments in the state.
- v. Kaduna State Geographic Information Service (KADGIS) Administration and Management of Land Matters
- vi. The Kaduna State Bureau for Statistics (KDBS) is the central authority for all official statistics within the state. They oversee the entire statistical system, ensuring its smooth operation. Additionally, the KDBS coordinates the implementation of the state's comprehensive plan for statistical development, known as the State Statistical Master Plan.

- vii. Kaduna State Media Corporation (KSMC) is responsible for disseminating information to the citizens of the State.
- viii. Kaduna State Traffic and Environmental Law Enforcement Agency (KASTELEA): Direct and control traffic on public roads and highways in townships within the State.
- ix. Kaduna State Ministry of Budget and Planning (KADPBC): Serve as a machinery for the formulation, coordination, monitoring and evaluation of government economic policies, plans, and budgets to enhance socio-economic growth and development of the State.

These agencies drive development in various sectors, from healthcare, education to infrastructure and economic growth (Shafiu, 2021). In addition, manufacturing, mining and agriculture are the main economic pillars of Kaduna State. The lush plains are rich in minerals and support the mining of tin, lead and iron ore, while the fertile plains produce abundant crops such as sorghum, maize and groundnuts. The state's industrial sector is also thriving, with factories producing textiles, cement and food (Ezeamaka et al., 2019). The state of Kaduna is a land of contrasts and complexity, blending ancient traditions with modern aspirations. Its diverse people, vibrant culture and unwavering spirit of progress make it a truly captivating destination (Ezeamaka et al., 2019). Below is the diagram showing the map of Kaduna



Source: Ezeamaka, Daful & Umeano (2019).

Figure 3.1 Map of Kaduna State

Figure 3.1 shows the map of Kaduna State, located in the northwestern region of Nigeria. The diagram highlights the geographical boundaries of the state and clearly marks all the 23 Local Government Areas (LGAs). Kaduna, the state capital, serves as the administrative and political hub, while other LGAs reflect the state's diversity in terms of culture, population, and socio-economic activities. This visual representation situates the study area within its territorial context and provides a clear understanding of the spatial coverage relevant to the investigation of e-government utilization and public service delivery.

3.7 Population of the Study

In research, the population refers to the complete set of individuals, objects, or elements that share common characteristics relevant to the study (Saunders et al., 2019). Defining the study population is essential because it sets the boundary of analysis and ensures that the findings are representative of the group being investigated. For research on e-government and service delivery, public servants are the most appropriate population since they are directly responsible for implementing, operating, and utilizing e-government systems in government service delivery.

Kaduna State has a total workforce of over 31,000 employees spread across 54 agencies and 12 ministries. However, not all of these organizations have adopted or fully integrated e-government into their operations, as e-government implementation across Nigerian public institutions remains uneven and largely fragmented (United Nations, 2024; World Bank, 2022). Existing evidence shows that while some ministries and agencies have introduced digital platforms, many MDAs continue to rely on hybrid systems that combine manual procedures with limited automation, largely due to infrastructural deficits, inadequate ICT skills, and insufficient training of public servants (Ogu & Chukwurah, 2023; Omotayo et al., 2025). Consequently, a significant proportion of public organizations in Nigeria, including those at the sub-national level, remain at the early stages of digital transition, characterized by minimal system integration and low levels of staff capacity development (United Nations, 2024).

To ensure focus and analytical relevance, this study therefore concentrates on ministries, departments, and agencies (MDAs) in Kaduna State that have implemented e-government systems in their management activities and have provided training to staff

on the use of these platforms. These organizations offer the most appropriate context for examining the determinants of e-government utilization and their impact on effective public service delivery.

Table 3.9

Population of the Study

S/NO	Name of Bank	Total Population
1	Kaduna State Budget and Planning (KADBP)	209
2	Kaduna State Bureau of Statistics	210
3	Kaduna State Geographical Information Service (KADGIS)	262
4	Kaduna State Internal Revenue Service (KADIRS)	469
5	Kaduna State Media Corporation	224
6	Kaduna State Traffic and Environmental Law Enforcement Agency (KASTELEA)	2,220
7	Kaduna State Urban Planning and Development Authority (KASUPDA)	250
Total		3,844

Source: Administration and Personnel Department of Kaduna State (March 2025)

3.8 Sample Size

Determining an appropriate sample size is a critical step in ensuring that research findings are reliable and representative of the target population. In most cases, it is not feasible to include every member of the population, especially in large organizations such as Kaduna State's public service. Therefore, a sample is selected, which represents a smaller but statistically adequate subset of the entire population (Ahmed, 2024). The strength of this approach lies in its ability to generate valid conclusions about the

broader population without incurring the time and cost of surveying every individual (Bujang et al., 2024; Ahmadisharaf et al., 2024).

For this study, the appropriate sample size was determined using Yamane's (1974) formula, a method widely recognized for its simplicity, practicality, and reliability in population-based studies. The formula requires only the population size (N) and a pre-determined margin of error (e) to calculate a representative sample. This makes it particularly suitable for research in the social sciences and public management, where variance estimates may not always be readily available. Moreover, Yamane's method ensures a balance between accuracy and feasibility, generating a statistically robust sample size while avoiding the challenges of excessively large datasets. This is especially important in a context such as Kaduna State, where logistical constraints and limited access to public servants necessitate an efficient yet reliable approach to sampling.

The credibility of Yamane's formula is reinforced by its widespread application in empirical research across Nigeria. For example, Akinwale and Kazeem (2018) applied it in their study on public sector reforms, highlighting its effectiveness in stratified populations, while Okafor et al. (2020) used the method in their survey of health workers in Lagos State, underscoring its practicality in resource-constrained environments. By adopting Yamane's formula, the present study aligns with established methodological practices in Nigerian public management research, ensuring rigour, reliability, and comparability of results.

$$n = \frac{N}{1+N(e)^2}$$

Where,

n = sample size,

N = total population size,

e = error term or tolerable level of significance, and

1 = unity

$$\text{Thus, } n = \frac{3,844}{1+3,844(0.05)^2}$$

$$n = \frac{3,844}{1+3,844(0.0025)}$$

$$n = \frac{3,844}{1+9.61}$$

$$n = \frac{1,190}{10.61}$$

$$n = 362.2997$$

$$n = 363 \text{ approx}$$

According to the Yamane formula, a population of 3,844 civil servants requires a sample of 363 respondents to adequately test the study's model. However, to account for potential non-responses and damaged questionnaires, 30% of the calculated sample size ($0.3 \times 363 = 109$) was added, resulting in an adjusted sample of approximately 472 respondents (Israel, 2016). Expanding the sample size not only compensates for possible attrition but also enhances the precision of estimates, reduces the likelihood of Type I and Type II errors, and improves the overall reliability of the findings. Consequently, the study employed a final sample of 472 public servants in Kaduna State, proportionally distributed across the selected MDAs to ensure representativeness. Increasing the sample

in this way is consistent with best practices in public management research, where robust and generalizable conclusions are required to inform policy and practice. The distribution of the study sample size is shown below:

Table 3.10

Sample Size of the Study

S/NO	Name of Bank	Total Population	Proportion
1	Kaduna State Budget and Planning (KADBP)	209	$[209/3844] * 472 = 26$
2	Kaduna State Bureau of Statistics	210	$[210/3844] * 472 = 26$
3	Kaduna State Geographical Information Service (KADGIS)	262	$[262/3844] * 472 = 32$
4	Kaduna State Internal Revenue Service (KADIRS)	469	$[469/3844] * 472 = 58$
5	Kaduna State Media Corporation	224	$[224/3844] * 472 = 27$
6	Kaduna State Traffic and Environmental Law Enforcement Agency (KASTELEA)	2,220	$[2220/3844] * 472 = 272$
7	Kaduna State Urban Planning and Development Authority (KASUPDA)	250	$[250/3844] * 472 = 31$
Total		3,844	472

Source: Administration and Personnel Department of Kaduna State (March 2025)

3.9 Sampling Technique

A sampling technique refers to the method or strategy a researcher uses to select a subset of individuals from a larger population so that the findings from the sample can be generalized to the whole population (Saunders, Lewis, & Thornhill, 2019). In social science research, sampling techniques are critical because they determine the accuracy, reliability, and validity of the data collected. By choosing the right sampling method,

researchers ensure that participants reflect the characteristics relevant to the study, thereby enabling meaningful insights and robust conclusions.

In this study, purposive sampling was employed, a method widely used in public management and technology adoption research (Bryson et al., 2013; Ojo et al., 2013). Purposive sampling allows the deliberate selection of participants who meet specific criteria directly related to the research objectives (Obilor, 2023). Accordingly, public servants in Kaduna State who are directly involved in e-government initiatives were chosen because they possess the expertise necessary to validate the applicability of UMEGA in a sub-national African context. This approach ensures that the respondents have the knowledge, experience, and skills required to answer the questionnaire objectively and provide data that are both rigorous and trustworthy (Campbell et al., 2019). In addition, practical considerations such as accessibility, geographical location, resource availability, and participants' willingness to engage in the research were factored into the process to maximize participation and feasibility (Etikan et al., 2016).

To further enhance reliability, a homogeneous purposive sampling strategy was applied, ensuring that the study focused specifically on public servants within ministries that had already adopted and utilizing e-government services. This narrow selection ensured that only individuals with relevant experiences contributed to the study. At the same time, elements of simple random sampling were integrated to give every eligible participant within the targeted ministries an equal chance of selection (Obilor, 2023). The combination of purposive and random sampling was deliberate. purposive sampling guaranteed that participants had direct experience with e-government, while simple random sampling reduced potential bias and improved representativeness. This hybrid

approach strengthened both the relevance and generalizability of the study's findings (Campbell et al., 2019).

3.10 Sources of Data

This study relies primarily on primary data collected through a structured survey questionnaire, complemented by secondary data from relevant literature, official documents, and government reports. The primary data were obtained directly from public servants working in ministries, departments, and agencies (MDAs) in Kaduna State that have fully implemented e-government systems in their management activities. These include the Kaduna State Budget and Planning Commission (KADBP), the Kaduna State Bureau of Statistics, the Kaduna State Geographical Information Service (KADGIS), the Kaduna State Internal Revenue Service (KADIRS), the Kaduna State Media Corporation, the Kaduna State Traffic and Environmental Law Enforcement Agency (KASTELEA), and the Kaduna State Urban Planning and Development Authority (KASUPDA). These agencies were purposively selected because of their direct involvement in e-government activities, provision of digital services, and critical role in administrative decision-making processes.

Secondary data were drawn from published academic studies, reports from the National Bureau of Statistics (NBS), documents from the National Information Technology Development Agency (NITDA), and international sources such as the United Nations E-Government Survey. The integration of both primary and secondary sources enhances the validity of the study by ensuring that findings are grounded in empirical data and contextualised within broader academic and policy discussions.

3.11 Reliability and Validity

Accurate measurement is fundamental in research, as it ensures that the concepts under investigation are properly captured and represented (LoBiondo-Wood & Haber, 2014). When measurement instruments are inconsistent or fail to reflect the constructs they are intended to assess, the findings may become biased and misleading (Aida et al., 2024). Such inaccuracies reduce the credibility of the study and limit its contribution to evidence-based practice. For this reason, reliability and validity are regarded as essential qualities that must be carefully evaluated when selecting or designing research instruments (DeVellis, 2016; LoBiondo-Wood & Haber, 2014).

The quality of a measurement tool directly influences the validity of research outcomes. Inaccurate measures can distort the observed relationships between variables, thereby undermining both internal validity whether the instrument truly measures what it is intended to measure and external validity, whether the results can be generalized to a wider population. Establishing validity and reliability is therefore a critical step in ensuring the trustworthiness of research findings. It enables scholars to evaluate the rigor of the study design, the accuracy of the results, and the extent to which these results can inform practice and policy. Whether using newly developed or previously validated instruments, demonstrating sound validity and reliability remains indispensable for producing meaningful and reliable evidence (DeVellis, 2016).

3.11.1 Validity Test

The validity of a research instrument refers to the extent to which it accurately measures the concepts it is intended to measure and ensures that the findings are both credible and

applicable (DeVellis, 2016). In this study, the questionnaire was carefully developed based on constructs adapted from Reddin (2009) and further aligned with the Unified Model of Electronic Government Adoption (UMEGA). Particular care was taken to design the instrument in a clear, simple, and unambiguous manner, avoiding complex or potentially sensitive items that might discourage honest responses (Aida et al., 2024). This ensured that the instrument was accessible to civil servants of varying levels of ICT literacy in Kaduna State.

To establish content validity, the draft questionnaire underwent expert review. The researcher consulted the academic supervisor as well as specialists in e-government, public service delivery, measurement, and evaluation (Gelissen et al., 2024). These experts were provided with the study's title, objectives, research questions, and the draft instrument. They evaluated the questionnaire in terms of relevance, coverage, clarity, and alignment with the study's objectives. Their feedback led to refinements in wording, sequencing, and the inclusion of items to ensure comprehensive coverage of all relevant constructs.

Face validity was also considered, as experts assessed whether the items appeared to measure what they were supposed to measure from the perspective of potential respondents (William, 2024). This step was critical to ensure that public servants, as the target respondents, would interpret the items in the intended way. The incorporation of expert feedback enhanced the precision, reliability, and applicability of the instrument, ensuring consistency between the research questions, objectives, and the operationalization of study variables.

Thus, the validity test process not only confirmed that the questionnaire was an appropriate tool for data collection but also strengthened the overall methodological rigor of the study. By aligning with established validation practices in social science research, the instrument was positioned to generate reliable evidence for examining the determinants of e-government utilization and its impact on public service delivery in Kaduna State.

3.11.2 Reliability Test

Reliability refers to the extent to which a research instrument consistently produces stable and dependable results when administered under similar conditions (DeVellis, 2016). In this study, the reliability of the questionnaire was evaluated using the test–retest method, a widely recognized approach in social science research for assessing measurement stability over time (Aida et al., 2024). Following Ajayi (2013), the same questionnaire was administered to the same group of participants on two different occasions, separated by an appropriate time interval, to determine whether the instrument yielded consistent responses.

The results from both administrations were systematically compared item by item, and the Pearson Product Moment Coefficient was applied to quantify the degree of consistency (Gelissen et al., 2024). In addition, the internal consistency of the questionnaire was assessed using Cronbach’s alpha, with 0.70 adopted as the acceptable benchmark for reliability in social science research. Items with coefficient values below this threshold were revised or excluded, while those meeting or exceeding 0.70 were retained for the main study.

Through this rigorous procedure, the questionnaire was confirmed to be both internally consistent and stable over time. This validation provided confidence that the instrument could reliably capture data on the determinants of e-government utilization and their impact on effective public service delivery in Kaduna State.

3.12 Pilot Test

A pilot study, also known as a pretest, was conducted with a subset of respondents outside the main study population to ensure that the research instrument was valid, reliable, and capable of meeting the core objectives of the study (Soori, 2024). Pilot studies are generally smaller, less time-consuming, and less costly than full-scale surveys, yet they are essential for evaluating the feasibility, clarity, and suitability of the research method (Bujang et al., 2024). They also allow the researcher to assess how long it takes to complete the questionnaire and to identify potential problems with item wording or structure before large-scale administration.

In this study, the pilot was designed to test both the validity and reliability of the instrument. A total of 60 questionnaires were distributed to staff of the ICT department at Kaduna State University, of which 56 were successfully completed and returned, yielding a response rate of 93.33%, which is considered adequate for pilot testing (Gorondutse & Hilman, 2012). To strengthen content and face validity, the instrument was reviewed by experts in e-government, public service delivery, and measurement and evaluation, as well as by the researcher's supervisor. Based on their feedback, several items were reworded to improve clarity, contextual relevance, and alignment with the study's objectives. This ensured that the questionnaire adequately reflected the

constructs under investigation and was easily comprehensible to potential respondents (Bujang et al., 2024).

For reliability, the internal consistency of the questionnaire was assessed using Cronbach's alpha, the most widely accepted indicator of reliability in social science research (Hair, Sarstedt, Ringle, & Mena, 2012). The responses from the 56 pilot participants were analyzed, and items that fell below the 0.70 threshold were either revised or eliminated, while those meeting or exceeding this benchmark were retained. This process confirmed that the instrument consistently measured the intended constructs and could be relied upon to produce stable results during the main data collection. Hence, the pilot study provided valuable insights that improved the quality of the questionnaire, enhanced its clarity, and established both its validity and reliability. With these refinements, the instrument was confirmed as suitable for the main survey of civil servants in Kaduna State ministries and agencies involved in e-government initiatives. Table 3.11 show the result from the pilot study

Table 3.11
Reliability of the Instrument

Construct	No. of items	Cronbach Alpha	Comment
Level of application	4	0.879	Reliable
Performance expectancy	4	0.876	Reliable
Effort expectancy	4	0.741	Reliable
Social Influence	4	0.909	Reliable
Facilitating Conditions	3	0.897	Reliable
Perceived Risks	4	0.869	Reliable
Training	4	0.932	Reliable
Effective Public Service Delivery	4	0.918	Reliable

Source: Field Survey (2024)

The results show high reliability with Cronbach's alpha values of 0.879 for application level, 0.876 for performance expectancy, 0.741 for effort expectancy, 0.909 for social influence, 0.897 for facilitating conditions, 0.869 for perceived risk, 0.932 for training, and 0.918 for effective public service delivery. These findings support Hair, Sarstedt, Ringle, and Mena (2012), Hair, Black, Babin, and Anderson (2010), and Zikmund, Babin, Carr, and Griffin (2013), who suggest that an instrument is considered reliable if its reliability coefficient is between 0 and 1, with values closer to 1 indicating higher reliability. The instruments were considered reliable as they exceeded the threshold of 0.7 for Cronbach's alpha, confirming that the data collection instrument used was appropriate and reliable for this study

3.13 Data Collection Procedure

Data collection refers to the systematic process of gathering information from selected respondents to answer the research questions and achieve the study objectives (Creswell & Creswell, 2018). In this study, data were collected using a structured questionnaire distributed to civil servants in Kaduna State. Prior to distribution, an official cover letter was obtained from the Graduate Shafie School of Government (GSGSG), which explained the aim and objectives of the research. This letter was presented to the seven selected agencies in Kaduna (see p.195) and was also attached to all questionnaires.

The questionnaires were distributed through two main methods: (1) personal administration during visits to ministries and agencies, and (2) by post. To motivate respondents, questionnaires were enclosed in individual envelopes labeled with the UUM logo and the respondent's details, and each envelope also contained a pen with the UUM logo as a token of appreciation. Data collection was carried out over one and a half months. During this period, 293 questionnaires were completed and classified as early responses. After several follow-up telephone calls and personal visits, an additional 102 questionnaires were returned as late responses. In total, 395 of the 472 questionnaires distributed were successfully retrieved, representing a response rate of 83.7%.

The process was not without challenges. Some respondents initially displayed reluctance, delaying completion of the questionnaire despite reminders, while others misplaced their copies, requiring replacements. A small number refused outright to

participate. Moreover, some questionnaires sent by post were not returned and had to be collected in person by the researcher and assistants.

Nevertheless, the overall response rate of 83.7% is considered strong in social science research, as it exceeds the commonly accepted threshold of 70% for survey-based studies (Babbie, 2010; Fincham, 2008). High response rates reduce the likelihood of non-response bias, thereby increasing the representativeness and reliability of the data (Bryman, 2015). This level of participation provides confidence that the findings can be generalized to the wider population of public servants in Kaduna State.

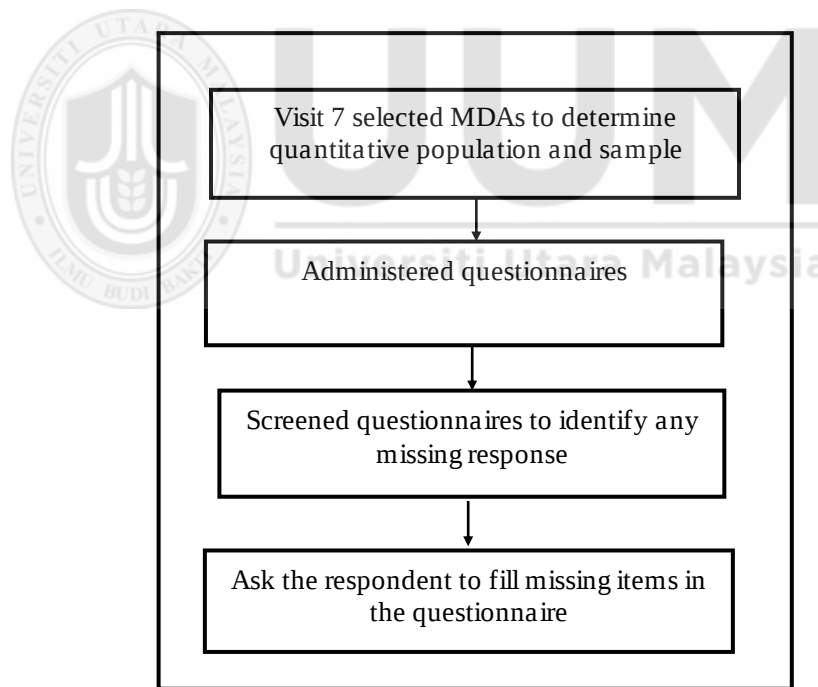


Figure 3.2 Flowchart of data collection Procedures

3.14 Method of Data Analysis

Data analysis refers to the systematic process of organizing, examining, and interpreting collected data in order to provide meaningful answers to research questions (Creswell & Creswell, 2018). In this study, quantitative data analysis was adopted to evaluate the numerical responses obtained from the structured questionnaire. The central aim was to examine how the determinants of e-government utilization influence effective public service delivery in Kaduna State and to assess whether training programs for public servants moderate these relationships. To achieve this, the study employed Partial Least Squares Structural Equation Modelling (PLS-SEM). This technique is particularly suitable for analyzing complex models involving multiple independent variables, a dependent variable, and a moderating variable. PLS-SEM was selected because it simultaneously handles both observed and latent constructs and provides robust insights into cause-and-effect relationships, making it especially relevant for testing the Unified Model of Electronic Government Adoption (UMEGA) framework in the Nigerian context (Hair et al., 2017).

Before conducting the main PLS-SEM analysis, several preliminary checks were performed to ensure the suitability and quality of the data. The Kaiser–Meyer–Olkin (KMO) criterion was applied to confirm sampling adequacy, with values above the 0.6 threshold regarded as acceptable (Kaiser & Rice, 1974). Multicollinearity among variables was tested using the Variance Inflation Factor (VIF), where values below 4 indicated the absence of collinearity problems (Hair et al., 2010). The study also addressed the possibility of common method bias (CMB), which arises when the method of data collection influences responses regardless of content. Correlation-based analysis

confirmed that this bias did not significantly affect the dataset, thereby strengthening the credibility of the results.

The PLS-SEM analysis itself proceeded in three interconnected phases. The first phase involved the evaluation of the measurement model, where reliability was assessed using Cronbach's Alpha and Composite Reliability, convergent validity was confirmed through factor loadings and Average Variance Extracted (AVE), and discriminant validity was examined using the Fornell–Larcker criterion and HTMT ratios. The second phase focused on the structural model by estimating path coefficients to determine the strength and direction of relationships between independent variables such as performance expectancy, effort expectancy, social influence, facilitating conditions, perceived risk, and level of application, and the dependent variable, effective public service delivery. In this stage, the predictive accuracy of the model was measured using the R^2 value, while effect sizes (f^2) and predictive relevance (Q^2) were also evaluated to test the robustness of the model. The third phase centered on hypothesis testing, where bootstrapping with 5,000 resamples was conducted to generate t-values and p-values for each hypothesized relationship. Particular attention was given to the moderating effect of training programs, with interaction terms tested to determine whether training significantly strengthened the relationship between the determinants of e-government and service delivery outcomes.

Through this structured procedure, the study ensured that the analysis was both rigorous and transparent. The results derived from PLS-SEM not only validated the reliability and validity of the measurement instrument but also provided robust insights into how public servants' utilization of e-government systems influences the effectiveness of public

service delivery. Importantly, the inclusion of training programs as a moderating variable allowed the study to highlight their critical role in enhancing the impact of e-government adoption, thereby contributing both to theoretical advancement and to practical policy recommendations for e-government in Kaduna State.

3.15 Ethical Considerations

Ethical considerations are an essential component of any research process, ensuring that participants are treated with fairness, dignity, and respect, and that the integrity of the research is maintained (Saunders, Lewis, & Thornhill, 2019). In social science research, particularly when working with human participants, researchers are expected to adhere to recognized ethical principles such as informed consent, confidentiality, voluntary participation, and the avoidance of harm (Creswell & Creswell, 2018). This study, which investigates the determinants of e-government utilization and effective public service delivery in Kaduna State, Nigeria, followed these principles closely to ensure that the rights and welfare of participants were safeguarded throughout the research process.

First, informed consent was obtained from all participants prior to their involvement in the study. A cover letter, attached to each questionnaire, explained the purpose of the research, its objectives, and the role of participants. It also highlighted that participation was entirely voluntary and that respondents could withdraw from the study at any point without penalty. Only those who provided consent participated in the study. Second, confidentiality and anonymity were assured. Participants were not required to provide personal identifiers such as names, positions, or contact details on the questionnaires. All responses were treated with strict confidentiality, and data were reported in aggregate

form to ensure that no individual or institution could be identified. The data collected were stored securely and accessible only to the researcher and academic supervisors for analysis.

Third, the study adhered to the principle of non-maleficence (not harm) by ensuring that participation did not pose any physical, psychological, or professional risks to respondents. The survey questions were designed to be neutral, non-invasive, and free from sensitive or embarrassing content. Fourth, participants were informed of their right to withdraw at any stage of the data collection process without having to provide a reason. This ensured that respondents-maintained control over their participation and that their autonomy was respected. Finally, the study was conducted in line with the ethical guidelines of the Graduate Shafie School of Government (GSGSG), Universiti Utara Malaysia, and followed international standards for research in the social sciences. By complying with these ethical principles, the research ensured that the process and outcomes remained credible, trustworthy, and respectful of the rights of participants.

3.16 Summary

In summary, this chapter outlined the research methodology adopted for the study, which is anchored in a positivist paradigm and a quantitative research design. The study variables were clearly defined and operationalized in line with the Unified Model of Electronic Government Adoption (UMEGA), ensuring conceptual clarity and consistency throughout the study. The population, sample size, and sampling techniques were presented to justify representativeness, while the data collection instruments and procedures were described in detail. To enhance the quality of the findings, measures such as pre-testing and a pilot study were conducted, thereby strengthening the validity

and reliability of the instrument. Ethical considerations, including informed consent, confidentiality, voluntary participation, and adherence to institutional research guidelines, were also addressed to safeguard the integrity of the study and the rights of participants. Finally, the data analysis methods, particularly the use of Partial Least Squares Structural Equation Modelling (PLS-SEM), were highlighted as the basis for testing the study's hypotheses and examining the relationships among the variables. The next chapter presents the results of this analysis.



CHAPTER FOUR

DATA ANALYSIS AND RESULT

4.1 Introduction

This study aims to determine the effects of e-government based on six dimensions (level of application, performance expectancy, effort expectancy, social influence, facilitating conditions and perceived risk) on effective service delivery through the moderating effect of training programs among public servants in Kaduna State. Additionally, a structured questionnaire was the main instrument used to collect data for the study. In the same vein, the questionnaire was administered to the respondents who constituted the sample for the study. PLS-SEM was used for the analysis.

4.2 Data Presentation

The data presentation in this study included a comprehensive analysis of the six dimensions of e-government utilization, namely level of application, performance expectancy, effort expectancy, social influence, facilitating conditions and perceived risk. Quantitative data was collected through surveys of users of e-government services in Kaduna State. The responses were analyzed using statistical software to identify trends and relationships. Visual aids such as charts, graphs and tables were used to effectively communicate the results to compare and contrast the influence of each dimension on effective service delivery. In addition, the moderating effect of training programs was highlighted to illustrate how they improve the relationship between e-government utilization and service delivery outcomes.

4.2.1 Response Rate

Table 4.1

Administration of Questionnaire and Response Rate

Response	Copies retrieved	%
Copies of questionnaire distributed	472	100
Copies of questionnaire not returned	77	16.3
Copies of questionnaire returned	395	83.7
Copies of questionnaire with defect	4	0.85
Usable copies of questionnaire	391	82.8

Source: Compiled by the Researcher (2024)

Table 4.1 shows the response rate of the distributed questionnaires and provides information on the distribution and response rate. Of the 472 questionnaires distributed, 395 were completed and returned, which corresponds to a high response rate of 83.7%. However, 77 copies were not returned, which corresponds to 16.3% of the total number of questionnaires distributed. In addition, 4 copies were classified as incorrect, leaving 391 usable responses, which corresponds to 82.8% of the total number of questionnaires distributed. These data indicate a high level of respondent participation, which enhances the reliability and validity of the findings of the study on e-government utilization and service delivery in Kaduna State.

4.3 Data Screening and Preliminary Analysis

Screening data is a crucial step in multivariate analysis as it helps to identify potential violations of key assumptions and ensure that the data are suitable for further analysis (Hair et al., 2010). In this study, the 391 returned and usable questionnaires were coded and entered into SPSS version 26.0 before the main analysis was conducted. Preliminary screening was conducted to ensure that the data met the requirements for descriptive and PLS-SEM analysis. This included checking for missing values, assessing outliers,

checking for normality and checking for multicollinearity, as recommended by Hair et al. (2019) and Tabachnick and Fidell (2007). This process increases the reliability and accuracy of the subsequent analysis by ensuring that the data set is clean and free from violations of the analytical assumptions.

4.3.1 Missing Value Analysis

The SPSS dataset revealed that only four (4) elements of the dataset were missing by chance, which corresponds to 0.00037% (see Table 4:2). Nevertheless, there is no acceptable percentage of missing values in a dataset to draw a valid statistical conclusion. Hair et al. (2014) argued that missing values can be replaced with the mean substitution method if they are random and account for less than 5% of the missing values per indicator. Therefore, in this study, random missing values were replaced by the mean substitution method. The result is therefore shown in Table 4.2 below.

Table 4.2

Total and Percentage of Missing Values

Constructs	Number of Missing Values
Performance Expectancy	1
Social Influence	1
Perceived Risk	1
Training Program	1
Total	4 out of 10,557 data points
Percentage	0.00037%

Note: Percentage of missing values is obtained by dividing the total number of randomly missing values for the entire data set by total number of data points multiplied by 100.

Table 4.2 summarizes the total number and percentage of missing values in the different constructs of the study and shows that a total of four data points out of 10,557 entries

were missing. Specifically, one missing value was reported for each of the constructs performance expectancy, social influence, perceived risk, and training program. This results in an exceptionally low percentage of missing data of 0.00037%, indicating a high level of data completeness and reliability for the analysis. The minimal missing values mean that the integrity of the data set is largely intact, allowing for robust statistical analysis and increasing the overall credibility of the findings of the study on e-government utilization in Kaduna State.

4.3.2 Assessment of Outliers

The study carefully considered the potential impact of outliers on the path coefficient estimates in the PLS-SEM analyses by performing a comprehensive initial frequency distribution analysis for all variables using minimum and maximum statistics. The results showed no values outside the expected range, confirming that there were no outliers in the data set. To further improve the robustness of the analysis, all loadings that fell below the specified threshold were excluded from the composite reliability and average variance extracted calculations to ensure that only significant and reliable indicators were used.

In addition, factor analysis was used as a data reduction technique, which not only simplified the data set but also served to identify anomalies that could bias the results. As ordinal data, such as those collected in this study using Likert scales, are generally structured within defined ranges, the results suggest that outliers are unlikely, which underlines the validity of the data set. The analysis also emphasizes the importance of careful data entry, as inaccuracies or misstatements can lead to outliers, which could

affect the reliability and validity of the study results. Hence, the rigorous methods used to detect and mitigate the influence of outliers underscore the study's commitment to providing reliable and valid results on the utilization of e-government in Kaduna State.

4.3.3 Normality Test

Although PLS-SEM does not require the data to be normally distributed, research has shown that extreme non-normality can still affect the accuracy of model estimates, particularly by inflating bootstrapped standard error estimates and underestimating the statistical significance of path coefficients (Hair et al., 2014; Tabachnick & Fidell, 2019). Hernandez (2021) emphasizes the traditional assumption that PLS-SEM can handle non-normal data well, but Hair, Sarstedt, Ringle, and Mena (2012) recommend performing a normality test to avoid potential problems. In line with this, a graphical method of testing normality was used in the present study. Researchers such as Lakens (2022) recommend that for large samples (200 or more), it is more effective to visually assess the distribution rather than relying on the skewness and kurtosis values, as larger samples tend to inflate these statistics (Blanca et al., 2013). As the sample of this study includes 391 respondents, the graphical method using histograms was deemed appropriate to ensure that the normality assumption was not violated.

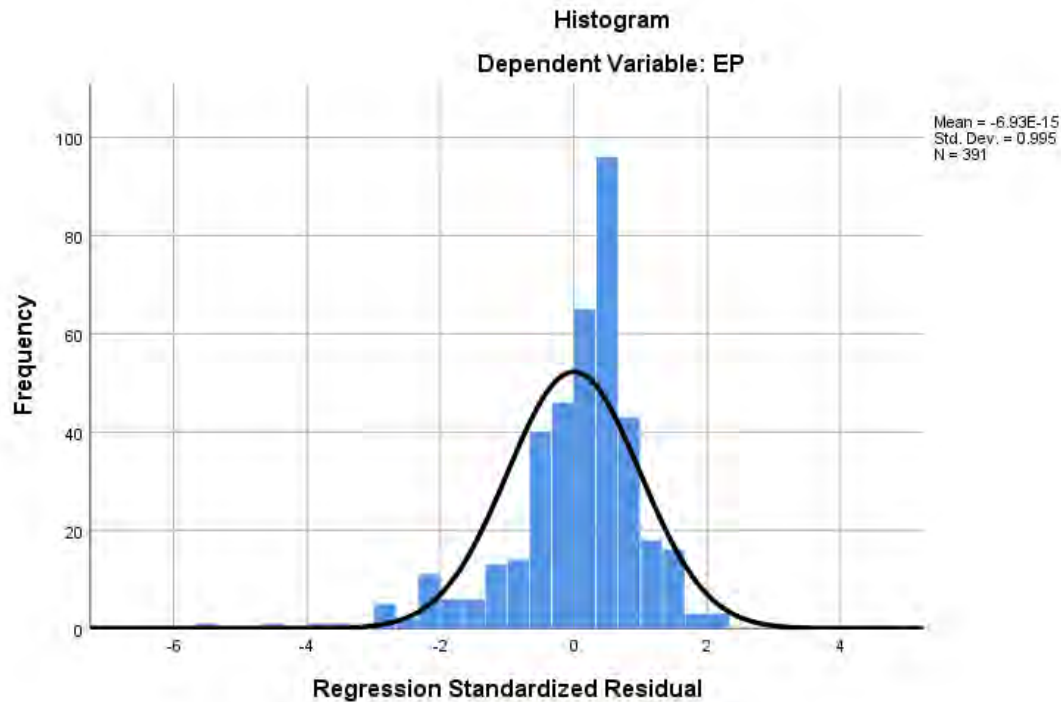


Figure 4.1: Histogram.

Figure 4.1 clearly shows a normal pattern, as all bars of the histogram approach a normal curve. This shows that the normality assumption was not violated in this study.

4.3.4 Multicollinearity Test

Multicollinearity occurs when one or more exogenous latent constructs in a model are highly correlated, which can bias the estimates of the coefficients and their statistical significance (Hair et al., 2019). This problem increases the standard errors of the coefficients and makes them statistically insignificant (Tabachnick & Fidell, 2007). In this study, two methods were used to detect multicollinearity (Peng & Lai, 2012). First, a correlation matrix of the exogenous latent constructs was examined, with a correlation coefficient of 0.90 or more signaling multicollinearity (Hair et al., 2019). Secondly, the tolerance and variance inflation factor (VIF) values were analyzed, with Hair et al.

(2019) noting that a tolerance value below 0.10 and a VIF above 10 indicate multicollinearity. The results of the VIF and tolerance values for the exogenous latent constructs are shown in Table 4.3 and confirm the absence or presence of multicollinearity problems in the data.

Table 4.3
Tolerance and VIF for Latent Variables

Variables	Collinearity Statistics	
	Tolerance	VIF
Level of Application	0.714	1.131
Performance Expectancy (PE)	0.652	1.533
Effort Expectancy (EE)	0.309	3.231
Social Influence (SI)	0.749	1.334
Facilitating Condition (FC)	0.899	1.112
Perceived Risk (PR)	0.382	2.612
Training Program (TP)	0.272	3.667
Effective Services Delivery (ESD)	0.491	2.036

Table 4.3 shows the collinearity statistics for the latent variables in the study, focusing on the values for the tolerance and the variance inflation factor (VIF). The tolerance values indicate the proportion of the variance of a particular predictor variable that is not explained by other predictors, while the VIF value indicates how much the variance of a regression coefficient is increased due to collinearity. In this analysis, all variables have tolerance values above 0.1, with performance expectancy (PE) having a tolerance value of 0.652 and effective service provision (ESD) having a value of 0.491, indicating a moderate degree of collinearity. The level of application of e-government, the social influence, the facilitating conditions and the perceived risk are also within an acceptable range. However, Effort Expectancy (EE) and Training Program (TP) have VIF scores of 3.231 and 3.667, respectively, indicating major collinearity issues that may require

attention. In particular, VIF values greater than 5 are usually considered problematic. Thus, the observed values suggest that while some variables have some degree of multicollinearity, these do not represent significant problems that could affect the reliability of the model (Hair et al., 2019). The results suggest that multicollinearity is present but within acceptable limits for analyzing the determinants of e-government utilization for effective public service delivery in Kaduna State.

4.3.5 Common Method Bias

Common method bias (CMV) is a methodological problem in which the measurement procedure, rather than the constructs themselves, causes the variance and potentially distorts the relationships between the variables. This study, which used self-reported data, is susceptible to CMV because both the predictive and moderating variables came from the same source. Procedural and statistical remedies were implemented to address these concerns. Procedural controls, such as the use of reverse-worded questions, elimination of ambiguity, anonymity of respondents, and improved clarity of scale items, were employed to minimize potential bias. In the study, Harman's one-factorial test was used as a statistical measure for the detection of CMV.

Harman's one-factorial test involved conducting an exploratory factor analysis (EFA) for all items in the study. The results showed that the first factor accounted for only 31.23% of the total variance, well below the majority threshold, meaning that no single factor dominated the variance. The remaining 68.77% of the variance was explained by the subsequent factors, indicating that CMV was not a significant problem in this study. These procedural measures, together with the statistical results, provide reassurance that

CMV was effectively contained and the reliability and validity of the data used for further analysis. The results are consistent with existing research findings, such as those of Podsakoff et al. (2003), which suggest that procedural remedies and statistical controls, such as Harman's one-factor test, are effective in managing CMV problems.

4.4 Demographic Variables Analysis.

The demographic variables of the respondents were analyzed using frequencies and percentages to describe the characteristics of the sample (see Table 4.4).

Table 4.4
Demographic Profile of Respondents.

Characteristics	Category	Frequency	Percent
Gender	Male	275	70.3
	Female	116	29.6
Age	21-30	99	25.3
	31-40	197	50.4
	41-50	72	18.4
	51 and above	23	5.9
Years in Services	1-5	115	29.4
	6-10	189	48.3
	11-15	56	14.3
	16years above	31	7.9

Source: Field Survey, 2025

Table 4.4 provides a comprehensive demographic profile of the respondents who participated in the study, highlighting key characteristics such as gender, age and years of service. Among the respondents, a proportion of 70.3% are male (275 people), while the proportion of women is 29.6% (116 people), indicating a gender imbalance in the sample. In terms of age distribution, the largest group falls into the 31-40 age group at 50.4% (197 respondents), followed by the 21-30 age group at 25.3% (99 respondents). The 41-50 age group comprises 18.4% (72 respondents), and those aged 51 and over

account for only 5.9% (23 respondents). In terms of years of service, the majority (48.3% or 189 respondents) have been in service for 6-10 years, while 29.4% (115 respondents) have 1-5 years of experience. Fewer respondents are represented in the other categories of 14.3% (56 respondents) have 11-15 years of service, and 7.9% (31 respondents) have more than 16 years. This demographic profile shows a relatively young and experienced workforce which could influence perceptions and experiences related to the utilization of e-government in Kaduna State.

4.5 Descriptive Analysis of the Latent Constructs

This section deals with the descriptive statistics for the latent variables used in this study. The descriptive statistics were calculated in the form of means and standard deviations for the latent variables. All latent variables used in this study were measured on a five-point scale from 1 = strongly disagree to 5 = strongly agree. The results are shown in Table 4.5.

Table 4.5
Descriptive Statistics

Variable	N	Mean	Std. Deviation
Performance Expectancy	391	3.82	0.91
Effort Expectancy	391	3.74	0.88
Social Influence	391	3.69	0.94
Facilitating Conditions	391	3.98	0.86
Perceived Risk	391	3.21	1.02
Level of Application	391	3.65	0.90
Effective Public Service Delivery	391	3.89	0.87

Source: Field Survey, 2025

Table 4.5 presents the descriptive statistics of the study variables based on responses from 391 public servants in Kaduna State. All constructs were measured using a five-

point Likert scale, with mean values ranging between 3.21 and 3.98, indicating a generally positive perception of e-government utilization and its contribution to public service delivery. Among the variables, Facilitating Conditions recorded the highest mean score ($M = 3.98$, $SD = 0.86$), suggesting that respondents largely agreed that the availability of supporting infrastructure, technical resources, and organizational support plays a critical role in enabling the effective use of e-government systems. This finding indicates that respondents perceive institutional and technological support as relatively strong compared to other determinants.

This was followed by Effective Public Service Delivery with a mean score of 3.89 ($SD = 0.87$), reflecting respondents' positive assessment that e-government contributes to improved efficiency, timeliness, and quality of services provided by government institutions. The relatively low standard deviation further indicates consistency in respondents' perceptions. Performance Expectancy also recorded a high mean value of 3.82 ($SD = 0.91$), implying that most respondents believe the use of e-government systems enhances their job performance and productivity. Similarly, Effort Expectancy showed a mean score of 3.74 ($SD = 0.88$), indicating that respondents generally perceive e-government platforms as easy to use and not overly complex.

Social Influence reported a mean score of 3.69 ($SD = 0.94$), suggesting that colleagues, supervisors, and organizational norms moderately influence public servants' decisions to use e-government systems. Level of Application recorded a mean of 3.65 ($SD = 0.90$), indicating that while e-government platforms are available, their depth of integration into routine administrative processes remains moderate. In contrast, Perceived Risk recorded the lowest mean score of 3.21 ($SD = 1.02$), indicating that concerns relating to

data security, system reliability, and potential misuse still exist among public servants. The relatively higher standard deviation suggests some variation in respondents' perceptions of risk.

Hence, the results indicate that respondents hold favourable perceptions toward e-government utilization, particularly in terms of facilitating conditions and service delivery outcomes. However, the comparatively lower mean for perceived risk and moderate level of application suggest areas where targeted interventions, such as enhanced training and stronger institutional safeguards, are necessary to improve utilization and effectiveness.

4.6 Assessment of PLS-SEM Path Model Results

This study followed a two-step procedure to evaluate the results of Partial Least Squares Structural Equation Modeling (PLS-SEM), as recommended by Henseler, Ringle and Sarstedt (2016). The first step, called measurement model evaluation, involved assessing the reliability and validity of the measurement instruments used to operationalize the latent constructs. In this phase, the reliability of internal consistency, convergent validity and discriminant validity of the constructs were examined. Internal consistency was measured using Cronbach's alpha and composite reliability to ensure that the latent variables were reliably represented by their indicators. Convergent validity was assessed using factor loadings and average variance extracted (AVE), which confirmed that the indicators indeed reflect the constructs they are intended to measure. Discriminant validity was assessed using the Fornell-Larcker criterion and cross-loadings to ensure that the constructs were empirically distinct and to reduce the risk of multicollinearity or overlap between variables (Hair et al., 2019).

4.6.1 Assessment of Measurement Model

This assessment includes testing internal consistency (Cronbach's alpha), convergent validity (e.g. factor loadings, average extracted variance) and discriminant validity (e.g. Fornell-Larcker criterion, cross-loadings). Ensuring a robust measurement model is crucial as it forms the basis for the accurate assessment of the relationships between the constructs in the subsequent structural model.

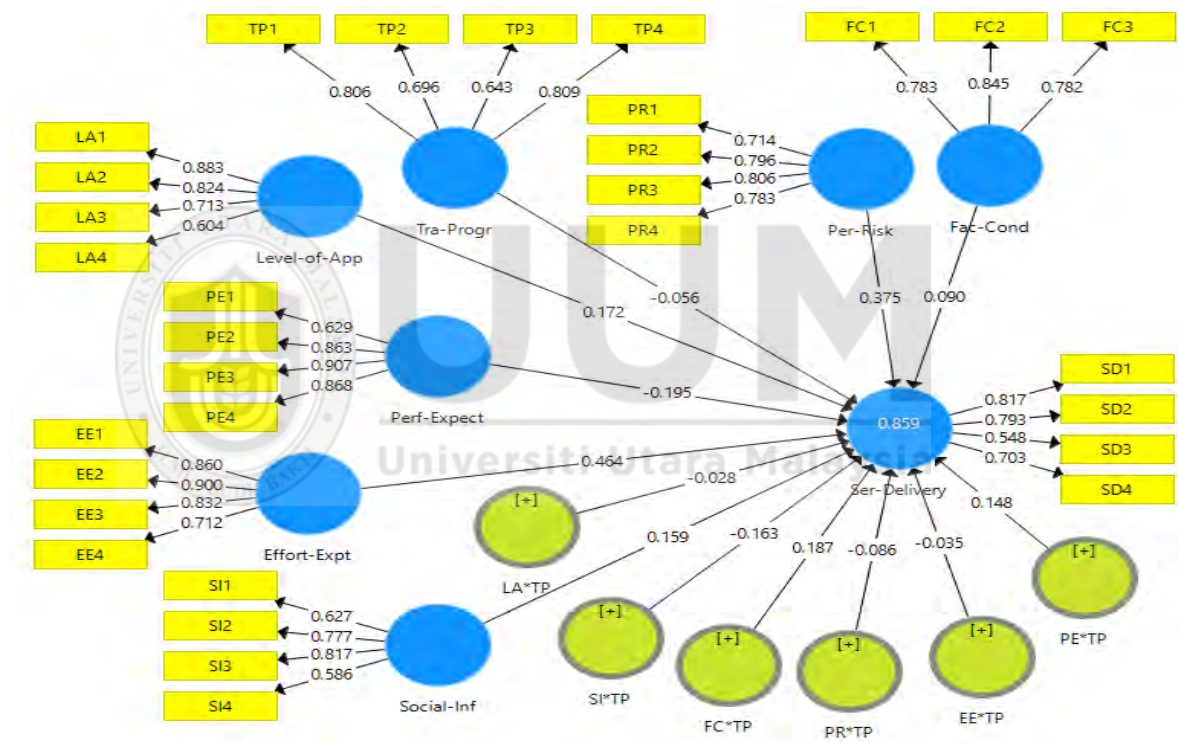


Figure 4.2 Measurement Model for Main Effect

As indicated above, the first step in evaluating the measurement model involved assessing the reliability of the study constructs by examining the outer (indicator) loadings of each measurement item. Indicator reliability was assessed following the guidelines proposed by Hair et al. (2019), which recommend that standardized loadings should preferably exceed 0.70. However, Hair et al. (2014) further argue that in

exploratory and theory-driven research, indicators with loadings between 0.40 and 0.70 may be retained, provided that their inclusion contributes to content validity and does not adversely affect composite reliability (CR) and average variance extracted (AVE).

In this study, although a small number of items recorded loadings below the ideal threshold of 0.70, all retained items exceeded the minimum acceptable value of 0.50 (see Table 4.6). These items were theoretically grounded in the Unified Model of Electronic Government Adoption (UMEGA) and captured important contextual dimensions of e-government utilization in the public-sector environment of Kaduna State. Moreover, the retention of these indicators did not compromise construct reliability or convergent validity, as all constructs achieved CR values above 0.70 and AVE values above the recommended threshold of 0.50. Consequently, the items were retained to preserve the conceptual completeness of the constructs and to ensure that the measurement model adequately reflects the multidimensional nature of e-government utilization and effective public service delivery.

Table 4.6
Loadings of the indicators

Items	Loadings	CA	CR	AVE
LA1	0.883	0.832	0.812	0.646
LA2	0.824			
LA3	0.713			
LA4	0.604			
EE1	0.860	0.845	0.897	0.688
EE2	0.900			
EE3	0.832			
EE4	0.712			
FC1	0.782	0.729	0.846	0.647
FC2	0.845			
FC3	0.783			
PE1	0.629	0.834	0.893	0.679
PE2	0.863			
PE3	0.907			
PE4	0.868			
PR1	0.714	0.778	0.858	0.601
PR2	0.795			
PR3	0.807			
PR4	0.783			
SD1	0.817	0.708	0.81	0.523
SD2	0.793			
SD3	0.548			
SD4	0.703			
SI1	0.627	0.758	0.798	0.501
SI2	0.777			
SI3	0.817			
SI5	0.586			
TP1	0.806	0.725	0.829	0.55
TP2	0.696			
TP3	0.643			
TP4	0.809			

4.6.2 Internal Consistency Reliability

Table 4.6 presents the factor loadings of the measurement items for the constructs related to e-government utilization, providing insight into the indicator reliability and convergent validity of the measurement model. Indicator loadings represent the strength of the relationship between each observed item and its corresponding latent construct. As recommended in the literature, loadings of 0.70 and above indicate strong indicator reliability (Hair et al., 2019).

The results show that most indicators recorded loadings above the recommended threshold, demonstrating strong relationships with their respective constructs. For instance, the Effort Expectancy (EE) construct exhibited high indicator reliability, with EE2 (0.901) and EE1 (0.860) showing particularly strong loadings. These values contributed to satisfactory composite reliability (CR = 0.897) and average variance extracted (AVE = 0.688), exceeding the recommended minimum thresholds of 0.70 and 0.50, respectively. Similarly, Facilitating Conditions (FC) and Performance Expectancy (PE) demonstrated solid measurement properties, with CR values of 0.846 and 0.893, confirming adequate internal consistency and convergent validity.

However, a small number of indicators, specifically SD3 (0.540) and SI4 (0.586), recorded loadings slightly below the recommended threshold of 0.70. While higher loadings are preferred, methodological guidelines caution against the automatic removal of indicators solely based on statistical thresholds. According to Hair et al. (2019; 2021), indicators with loadings between 0.40 and 0.70 may be retained if their removal does not

lead to a meaningful improvement in composite reliability or AVE and if they are theoretically important for capturing the full domain of the construct.

In this study, the retention of SD3 and SI4 did not adversely affect the CR and AVE values of their respective constructs, all of which remained above the acceptable thresholds. More importantly, these items capture context-specific dimensions of service delivery and social influence that are particularly relevant within the Nigerian public sector environment. In bureaucratic and collectivist settings such as Kaduna State, informal influence, hierarchical norms, and uneven service experiences are salient factors shaping e-government utilization. Removing these items would risk narrowing the conceptual coverage of the constructs and undermining content validity.

4.6.3 Discriminant Validity

Discriminant validity refers to the degree to which a latent construct differs from other latent constructs (Rönkkö & Cho, 2022). In this study, discriminant validity was assessed using the average variance extracted (AVE) method as recommended by Fornell and Larcker (1981). To establish adequate discriminant validity, the square root of the AVE for each construct was compared with the correlations between the latent constructs. Fornell and Larcker's (1981) criterion states that the square root of the AVE should be greater than the correlations between the constructs to ensure that the constructs are empirically distinct. As shown in Table 4.7, the AVE values for each construct exceeded the threshold of 0.50, indicating an acceptable level of variance explained by the constructs. Furthermore, in Table 4.7, the square roots of the AVE (in bold) were greater than the correlations with other latent constructs, confirming that each

construct is sufficiently distinct. In addition, Chin's (1998) criterion was met, as the indicator loadings for each construct were higher than the cross-loadings with other constructs, further supporting the adequate discriminant validity of the model.

Table 4.7

Fornell-Larcker Criterion

Variables	Effort-Expt	Level-of-App	Fac-Cond	Per-Risk	Perf-Expect	Ser-Delivery	Social-Inf	Tra-Progr
Effort-Expt	0.829							
Fac-Cond	0.597	0.804						
Level-of-App	0.445	0.334	0.803					
Per-Risk	0.579	0.703	0.443	0.775				
Perf-Expect	0.638	0.542	0.612	0.641	0.824			
Ser-Delivery	0.445	0.638	0.338	0.272	0.596	0.723		
Social-Inf	0.630	0.587	0.184	0.390	0.630	0.642	0.708	
Tra-Progr	0.287	0.368	0.321	0.456	0.692	0.696	0.694	0.742

Note: Diagonal elements (figures in bold) are the square roots of the Average Variance Extracted (AVE) shared between the constructs and their measures. Off diagonal elements are the correlations among constructs

Table 4.7 shows the Fornell-Larcker criterion that was used to assess the discriminant validity of the constructs in the study. The diagonal elements of the table represent the square root of the average variance extracted (AVE) for each construct and indicate the extent to which each construct explains its indicators compared to other constructs. For example, Effort Expectancy (Effort-Expt) has a square root AVE of 0.829, which is higher than the correlations with other constructs, such as Facilitating Conditions (Fac-Cond) at 0.597 and Perceived Risk (Per-Risk) at 0.579, indicating its distinctiveness. The constructs Facilitating Conditions (Fac-Cond), Performance Expectancy and Social Influence also have diagonal values that are greater than their respective correlations with other constructs, which confirms their discriminant validity. Conversely, some constructs, such as training program (Tra-Progr) and Performance Expectancy (Perf-Expect), have correlations that approach or exceed their AVE square roots, particularly

with Social Influence and Performance Accomplishment, indicating a closer relationship that may require further investigation. The results of the Fornell-Larcker criterion indicate satisfactory discriminant validity between the constructs, which underpins the robustness of the measurement model to assess e-government utilization in Kaduna State. The HTMT (Heterotrait-Monotrait) ratio is a measure used to assess discriminant validity in structural equation modeling (SEM). It compares the relationships between constructs of different characteristics (heterotrait) with those within the same characteristic (monotrait). This is also illustrated by the HTMT in the following Table 4.8

Table 4.8

Heterotrait-Monotrait HTMT

Variable	Effort-Expt	Fac-Cond	Level-of-App	Per-Risk	Perf-Expect	Ser-Delivery	Social-Inf	Tra-Progr
Effort-Expt								
Fac-Cond	0.764							
Level-of-App	0.667	0.344						
Per-Risk	0.361	0.424	0.555					
Perf-Expect	0.758	0.393	0.454	0.796				
Ser-Delivery	0.259	0.873		0.184	0.770			
Social-Inf	0.850	0.836	0.223	0.099	0.842	0.132		
Tra-Progr	0.497	0.071	0.178	0.135	0.605	0.103	0.009	

Table 4.8 illustrates the Heterotrait-Monotrait Ratio (HTMT) for the various constructs in the study, which allows further investigation of discriminant validity. The HTMT values, which measure the correlation between the constructs, should ideally be below the threshold value of 0.85 to confirm discriminant validity. The results show that effort

expectancy (Effort-Expt) and social influence (Social-Inf) have a relatively high HTMT value of 0.85, indicating a possible overlap between these constructs that may require further investigation. Similarly, the correlation between Facilitating Conditions (Fac-Cond) and Service Delivery (Ser-Delivery) is remarkably high at 0.873, indicating a strong relationship that could influence their distinctiveness. Other pairs, such as Perceived Risk (Per-Risk) with Performance Expectancy (Perf-Expect) at 0.796, also show considerable correlation, suggesting that these constructs may have commonalities that should be investigated further. While many HTMT values remain within acceptable limits, the highlighted cases signal potential areas for refinement of construct definitions or measurement approaches to ensure clear differentiation between variables in the context of determinants of e-government utilization for effective public service delivery in Kaduna State.

4.7 Assessment of the Significance of the Structural Model

Once the validity of the measurement model was confirmed, the structural model was assessed using the bootstrapping technique, which is essential in partial least squares (PLS) analysis to test the significance of the path coefficients (Chin, Kim, & Lee, 2013). Bootstrapping is a non-parametric replicate sampling procedure in which repeated samples are drawn from the original dataset with replacement to approximate the sampling distribution of an estimator, which enables the evaluation of the significance of the paths and the estimation of the standard error (Memon et al., 2021). In this study, a bootstrapping procedure with 5000 bootstrap samples and 210 cases was used to assess the significance of the structural relationships, as recommended by Hair et al. (2014) and Henseler et al. (2016). Figure 4.3 illustrates the structural model with indicator loadings

and path coefficients, which were subsequently used to generate t-values. The bootstrapping results provided standard error estimates and probability values, which were then used to test the study's hypotheses, as shown in Table 4.9. This rigorous approach ensures the robustness and statistical significance of the structural relationships in the model.

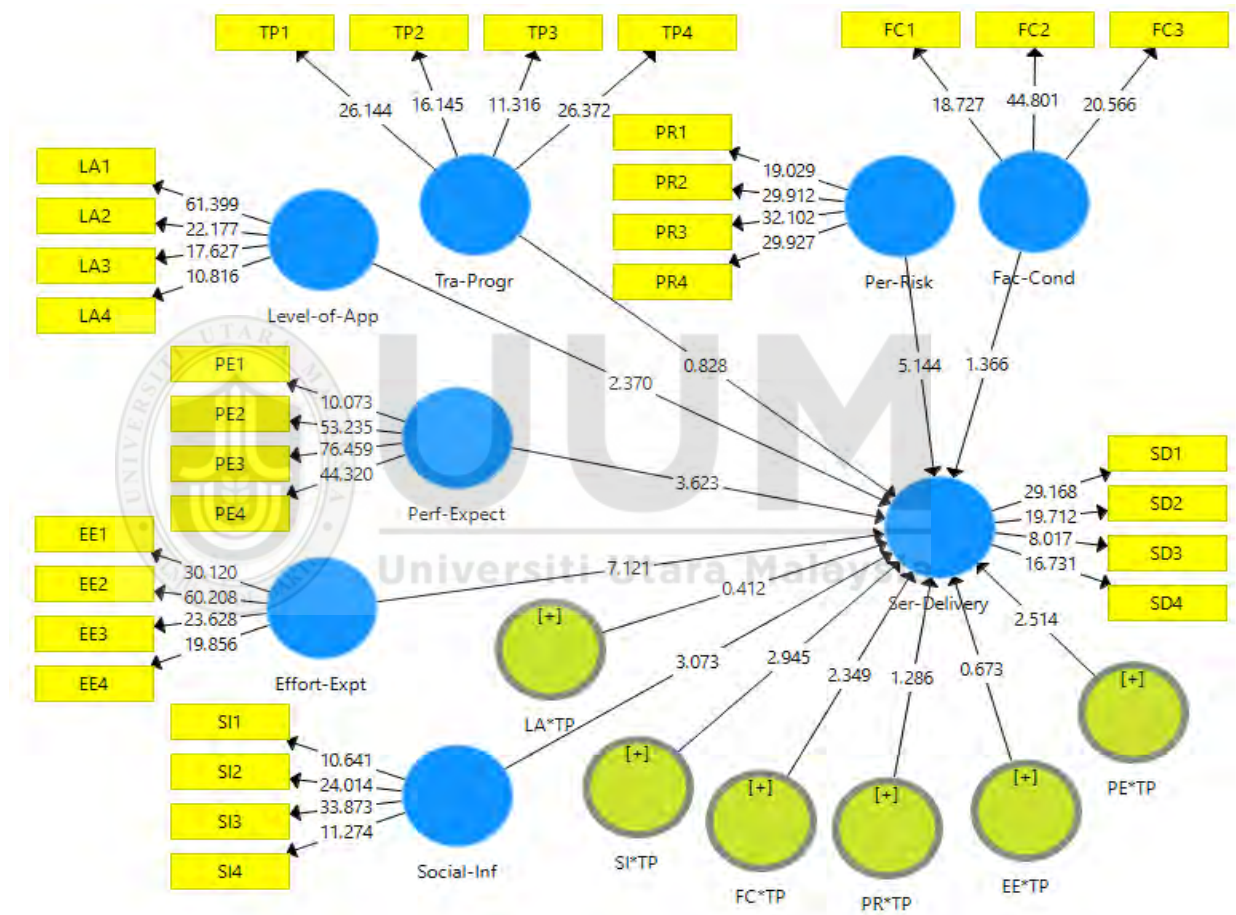


Figure 4.3: Structural model for main effect

From the figure 4.4 the study tests the hypotheses and report in table 4.9

4.7.1 Test of Hypotheses

Table 4.9
Test of Hypotheses

	Beta	Mean	STDEV	T Stat	P Values	Decision
Level-of-App -> Ser-Delivery	0.172	0.158	0.072	2.370	0.018	Reject
Perf-Expect -> Ser-Delivery	0.195	-0.195	0.054	3.623	0.000	Reject
Effort-Expt -> Ser-Delivery	0.464	0.458	0.065	7.121	0.000	Reject
Social-Inf -> Ser-Delivery	0.159	0.160	0.052	3.073	0.002	Reject
Fac-Cond -> Ser-Delivery	0.090	0.094	0.066	1.366	0.173	Fail to Reject
Per-Risk -> Ser-Delivery	0.375	0.385	0.073	5.144	0.000	Reject
LA*TP -> Ser-Delivery	0.028	0.024	0.068	0.412	0.680	Fail to Reject
PE*TP -> Ser-Delivery	0.148	0.125	0.059	2.514	0.012	Reject
EE*TP -> Ser-Delivery	0.035	0.029	0.052	0.673	0.501	Fail to Reject
SI*TP -> Ser-Delivery	0.163	0.155	0.055	2.945	0.003	Reject
FC*TP -> Ser-Delivery	0.187	0.175	0.080	2.349	0.019	Reject
PR*TP -> Ser-Delivery	0.086	0.068	0.067	1.286	0.199	Fail to Reject

Source: SmartPLS Output

The examination of the hypotheses in this study provides crucial insights into the relationships between various constructs that influence service delivery in the context of e-government utilization in Kaduna State. Each hypothesis was rigorously tested with emphasis on the direct effects of key dimensions such as level of application, performance expectancy, effort expectancy, social influence, facilitating conditions and perceived risk on effective service delivery as well as the moderating role of training programs. The results show significant findings, with several hypotheses rejected due to statistically significant effects, highlighting the complexity of these relationships. The analysis highlights areas where training programs may not effectively improve service delivery, particularly in the interactions between application level, effort expectancy, and perceived risk. Hence, these tests contribute to a deeper understanding of how these

constructs interact to influence effective public service delivery outcomes and provide guidance for future strategies to improve service delivery in this context.

H01: Level of Application (Level-of-App) → Service Delivery

The hypothesis test revealed a positive and significant relationship between the level of application and service delivery ($\beta=0.172$, $p=0.018$). This result indicates that the effective implementation and application of e-government platforms positively influences service delivery outcomes. Significance suggests that users with higher levels of application experience better service quality, reflecting the importance of consistent and reliable e-government applications in achieving desired outcomes.

H02: Performance Expectancy (Perf-Expect) → Service Delivery

Performance expectancy showed a significant but negative relationship with service delivery ($\beta=-0.195$, $p=0.000$). This result suggests that while users have high expectations of e-government platforms, unfulfilled expectations can have a negative impact on service delivery. This underscores the need to align system capabilities with user expectations to avoid dissatisfaction and ensure that platforms achieve their intended goals.

H03: Effort Expectancy (Effort-Expt) → Service Delivery

Effort expectancy demonstrated a strong positive and significant relationship with service delivery ($\beta=0.464$, $p=0.000$). This underlines the importance of user-friendly systems that require minimal effort to navigate and use. When eGovernment platforms are easy to use, they significantly improve service delivery, making accessibility and simplicity among the top priorities for system developers.

H04: Social Influence (Social-Inf) → Service Delivery

Social influence has a positive and significant effect on service delivery ($\beta=0.159$, $p=0.002$), suggesting that peer recommendations, social norms and influential actors encourage the adoption and use of e-government platforms. This implies that increasing awareness and creating social advocacy for e-government systems can improve service delivery outcomes.

H05: Facilitating Conditions (Fac-Cond) → Service Delivery

Facilitating conditions were found to have a positive but non-significant relationship with service delivery ($\beta=0.090$, $p=0.173$). This result suggests that while infrastructure and support systems are important, they may not directly lead to improved service delivery in the context studied. Additional efforts are needed to ensure that enabling conditions are effectively utilized for improved outcomes.

H06: Perceived Risk (Per-Risk) → Service Delivery

Perceived risk showed a strong positive and significant relationship with service delivery ($\beta=0.375$, $p=0.000$). This suggests that addressing security and privacy concerns significantly increases user trust and satisfaction, thereby improving service delivery. Mitigating risks associated with e-government platforms is critical to promoting trust and acceptance.

H07: Level of Application * Training Programs (LA*TP) → Service Delivery

The interaction between the application level and the training programs showed a positive but non-significant effect on service delivery ($\beta=0.028$, $p=0.680$). This suggests that the training programs do not significantly improve the relationship between

application level and service delivery, which could be due to the fact that users are already sufficiently familiar with the system.

H08: Performance Expectancy * Training Programs (PE*TP) → Service Delivery

The interaction between performance expectancy and training programs was significant and positive ($\beta=0.148$, $p=0.012$). This result underscores the importance of training programs in aligning user expectations with system capabilities to improve performance delivery. Training programs provide users with the skills to use the platform effectively, bridging the gap between expectations and actual performance.

H09: Effort Expectancy * Training Programs (EE*TP) → Service Delivery

The interaction between effort expectancy and training programs was positive but not significant ($\beta=0.035$, $p=0.501$). This suggests that while training programs may support ease of use, their influence on effort expectancy in performance is limited. This could mean that the platform is already user-friendly, which reduces the additional value of training.

H010: Social Influence * Training Programs (SI*TP) → Service Delivery

The interaction between social influence and training programs was significant and positive ($\beta=0.163$, $p=0.003$). This suggests that training programs enhance the role of social influence by fostering a supportive environment that encourages the adoption and use of e-government platforms. Peer learning and advocacy through training can further improve service delivery outcomes.

H011: Facilitating Conditions * Training Programs (FC*TP) → Service Delivery

The interaction between facilitating conditions and training programs had a significant positive effect on service delivery ($\beta=0.187$, $p=0.019$). This finding suggests that training improves the ability of users to utilize the existing infrastructure and supporting systems, thereby improving the overall effectiveness of e-government services.

H012: Perceived Risk * Training Programs (PR*TP) → Service Delivery

The interaction between perceived risk and training programs was positive but not significant ($\beta=0.086$, $p=0.199$). While training can help users better understand and manage risk, the lack of significance suggests that additional measures, such as improved safety protocols and communication strategies, are needed to fully address users' risk concerns. These findings highlight the multi-layered nature of service delivery when using e-government and the role of training programs in moderating important relationships.

4.7.2 Coefficient of Determination

The R-squared value (R^2), also known as the coefficient of determination, is a decisive criterion for evaluating the structural model in Partial Least Squares Structural Equation Modeling (PLS-SEM). It indicates the proportion of variation in the dependent variable(s) that can be explained by the predictor variable(s). In the context of this study, the acceptable level of R^2 value depends on the research context. According to Hair et al. (2019), an acceptable minimum R^2 value is 0.10. However, Chin (1998) suggested that R^2 values of 0.67, 0.33 and 0.19 in PLS-SEM can be considered substantial, moderate and weak, respectively. Table 4.10 therefore shows the R^2 value of the

endogenous latent variable e-government and provides information on the extent to which the predictor variables explain the variability of this important outcome variable.

Table 4.10
Variance Explained in the Endogenous Latent Variable

Latent Variable	Variance Explained (R²)
Services Delivery	.859 (86%)

Source: SmartPLS Output

Table 4.10 illustrates the variance explained by the endogenous latent variable, in particular by the area of service delivery, which accounts for 85.9% of the variance in the model. This high R² value indicates that a significant proportion of the variance in service delivery can be explained by the factors considered in the study, which underscores the effectiveness of the model in capturing the complexity of the determinants of e-government utilization in Kaduna State. The significant variance that could be explained indicates that the analyzed constructs such as level of Application, performance expectancy, effort expectancy, social influence, facilitating conditions and perceived risk collectively play a central role in influencing the outcomes of service delivery. This finding underscores the importance of these dimensions for users' perceptions and experiences of e-government and suggests that targeted interventions in these areas could lead to improved service delivery and higher user satisfaction.

4.7.3 Assessment of Effect Size (f²)

The effect size indicates the relative effect of a particular exogenous latent variable on the endogenous latent variable(s) based on changes in R² (Chin, 1998). It is calculated as the increase in R² of the latent variable with which the path is associated relative to the proportion of unexplained variance explained by the latent variable (Chin, 1998).

Cohen (1988) describes f^2 values of 0.02, 0.15 and 0.35 as weak, moderate and strong effects respectively. Table 4.11 shows the respective effect sizes of the latent variables of the structural model of the study.

Table 4.11
Effect Size of the Latent Variables (f^2)

Endogenous	Exogenous	R ² Included	R ² Excluded	f^2	Effect size
Services Delivery	Level-of-App	.859	.736	.123	Weak
	Perf-Expectancy	.859	.375	.047	Weak
	Effort-Expectancy	.859	.744	.411	Strong
	Social Influence	.859	.627	.068	Moderate
	Fac-Condition	.859	.778	.051	Weak
	Perceived Risk	.859	.334	.198	Moderate
	Training Program	.859	.695	.151	Moderate

Source: SmartPLS Output

Table 4.11 shows the effect sizes (f^2) of the exogenous latent variables on the endogenous variable service delivery, which provides valuable insights into the strength of the effects of the individual predictors. The effect size for level of application and performance expectancy is weak ($f^2=0.123, 0.047$), which means that their contribution to explaining the variance in service delivery is minimal. In contrast, effort expectancy has a strong effect size of 0.411, indicating a significant positive influence on service delivery outcomes. The other variables, including social influence, facilitating conditions, and perceived risk, have moderate effect sizes of 0.068, 0.051, and 0.198, respectively, indicating that these constructs have notable effects but are less influential compared to effort expectancy. Training program also has a moderate effect size of 0.151, suggesting that training initiatives can effectively improve service delivery but may need further optimization. Overall, these effect sizes underscore the varying influence of different factors on service delivery and highlight the importance of

prioritizing the factors with the strongest impact in future interventions to improve e-government services in Kaduna State.

4.7.4 Assessment of Predictive Relevance

The predictive relevance of the model was evaluated using the Stone-Geisser test for predictive relevance. The blindfolded procedures proposed by Geisser (1974) and Stone (1974) were applied. This test serves as an additional measure of goodness of fit in PLS-SEM (Chin, 2010). In this study, the blindfolding procedure was applied to the latent variable performance, which follows a reflective measurement model as recommended by Wong (2016). Specifically, the cross-validated redundancy measure (Q^2) was used to assess the model's ability to predict data from omitted cases (Chin, 2010; Hair et al., 2019). According to Chin (1998) and Hair et al. (2014), a Q^2 value greater than zero indicates predictive relevance, with higher positive Q^2 values indicating greater predictive power (Henseler et al., 2016). The results of the Q^2 test are presented in Table 4.12 and show that the model has adequate predictive power.

Table 4.12
Cross-Validate Redundancy (Q^2 Value)

Total	SSO	SSE	1-SSE/SSO
Services Delivery	1544.000	889.197	.424

Source: SmartPLS Output

Table 4.12 shows the cross-validated redundancy value (Q^2) for the endogenous variable service delivery, which provides information about the predictive power of the model. The total sum of squares (SSO) is given as 1544,000, which represents the total variance of the observed data. The sum of squared errors (SSE) is 889.197 and indicates the variance that the model could not explain. The Q^2 value is calculated as $1 - (SSE/SSO)$

and yields a value of 0.424. This positive Q^2 value indicates that the model has moderate predictive relevance, meaning that approximately 42.4% of the variance in Service Delivery can be predicted by the constructs included in the model. This predictive power underscores the effectiveness of the model in capturing the key dynamics influencing service delivery in the context of determinants of e-government utilization in Kaduna State and supports the notion that the identified factors contribute significantly to improving service delivery outcomes.

4.7.5 Importance-Performance Matrix (IPMA)

This study also assesses the IPMA for the variables figure below show the outcomes

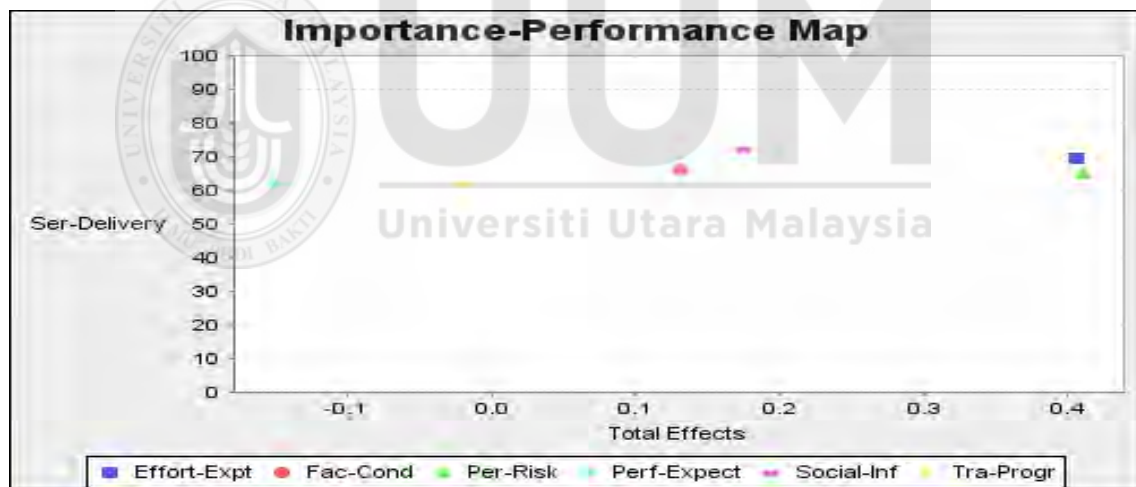


Figure 4.4 IPMA

The analysis of the meaning and performance indicators for the various constructs reveals important insights into their respective contribution to the delivery of services in the e-government context. Performance expectancy has a negative importance score of -0.13 despite a performance rate of 62, indicating that this construct does not effectively improve service delivery and may even hinder it. In contrast, the training program has a

low importance score of 0.03 with a 61-performance rate, suggesting that its current implementation may need to be improved to significantly impact service delivery. Facilitating conditions, with an importance score of 0.14 and a success rate of 63, show a moderate contribution but could benefit from targeted improvements. Social influence stands out with an importance score of 0.17 and a success rate of 72%, indicating its strong positive role in service delivery. Effort expectancy and perceived risk both have an importance score of 0.41, with effort expectancy achieving a success rate of 70% and perceived risk of 68%. These results suggest that while effort expectancy and perceived risk are important, their influence on service delivery needs to be improved. This analysis highlights the need for strategic interventions that focus on improving constructs with lower importance and performance in order to optimize overall e-government service delivery.

4.8 Summary of Findings

In summary of findings the study tabulates the direct and moderated relationship and its effect on the dependent variable. Below in Table 4.13 is the summary of findings of this study.

Table 4.13
Summary of findings of the study

Hypothesis	Hypothesis Statement	Decision
H ₀₁	Level of Application does not significantly affect effective service delivery	Rejected
H ₀₂	Performance expectancy does not significantly affect effective service delivery	Rejected
H ₀₃	Effort expectancy does not significantly affect effective service delivery	Rejected
H ₀₄	Social influence does not significantly affect effective services delivery	Rejected
H ₀₅	Facilitation condition does not significantly affect effective services delivery	Fail to Reject
H ₀₆	Perceived risk does not significantly affect services delivery	Rejected
H ₀₇	Training Program does not moderate the effect of Level of application on effective services delivery	Fail to Reject
H ₀₈	Training Program does not moderate the effect of Performance expectancy on effective services delivery	Rejected
H ₀₉	Training Program does not moderate the effect of effort expectancy on effective services delivery	Fail to Reject
H ₀₁₀	Training Program does not moderate the effect of social influence on effective services delivery	Rejected
H ₀₁₁	Training Program does not moderate the effect of facilitation condition on effective services delivery	Rejected
H ₀₁₂	Training Program does not moderate the effect of perceived risk on effective services delivery	Fail to Reject

4.9 Summary of the Chapter

This chapter presents the most important results of the data analysis with SPSS and Smart-PLS software. Initial checks confirmed the quality of the data, including tests for missing values, outliers and reliability. The analysis began with the measurement model,

which confirmed the reliability and validity of the constructs, followed by the structural model to examine the relationships between the variables. However, performance expectancy and perceived risk showed no direct effect. In particular, the training programs proved to be a strong moderator that strengthened the most important relationships, even if not all factors benefited equally. The findings highlight the critical role of e-government adoption and targeted training in improving service delivery but also point to existing challenges such as infrastructure gaps and digital illiteracy. The next chapter looks in depth at these findings and offers practical implications, recommendations and areas for future research.



CHAPTER FIVE

DISCUSSION AND RECOMMENDATIONS

5.1 Introduction

The main purpose of research is to objectively investigate, understand and report on a particular phenomenon (William, 2024). In line with this, the final chapter of this study provides a thoughtful discussion of the findings and addresses the research questions that guided the investigation (Gelissen et al., 2024). Given the quantitative nature of the study, all research questions were answered through rigorous statistical analysis of the data collected. Additionally, the chapter provides a concise synthesis of the study's aims and critically interprets the findings in light of the proposed research questions. It examines the theoretical and practical implications of the findings, particularly in relation to the use of e-government and its impact on the effective delivery of public services. In addition, the chapter recognizes the limitations of the study and helps the reader to interpret the findings in the right context. It concludes by making recommendations for future research and identifying key areas where further research could improve the utilization of e-government systems. The structure of this chapter is illustrated in Figure 5.1.

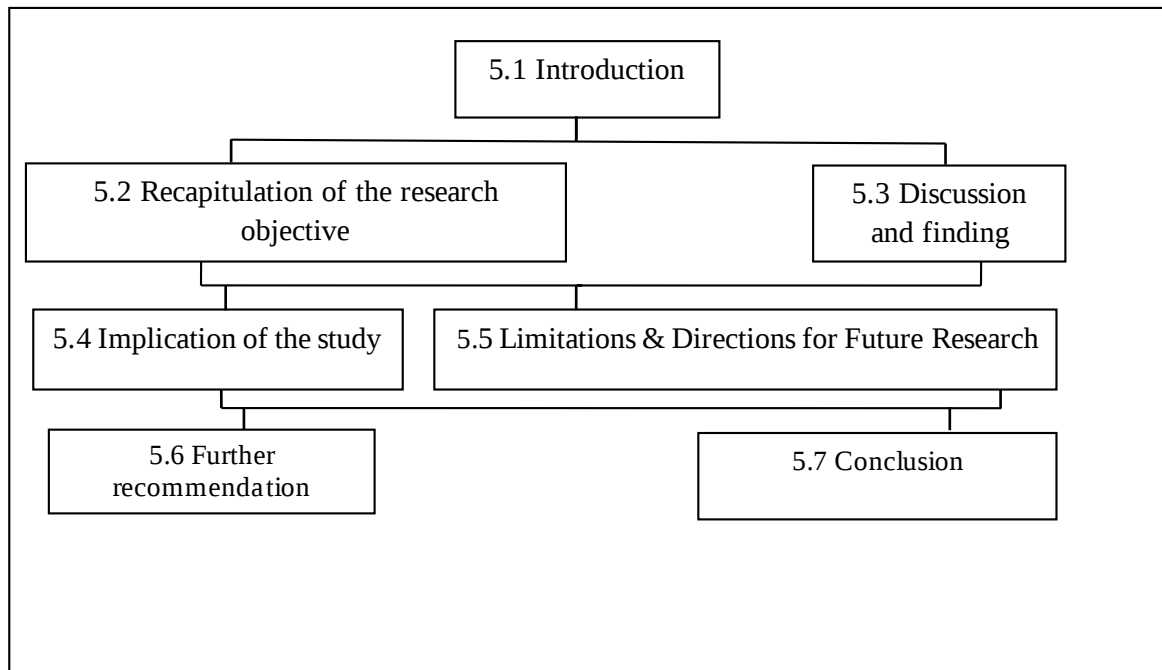


Figure 5.1 The Organization of Chapter five

5.2 Recapitulation of the Research Objectives

This study was conducted to examine the impact of determinants of e-government utilization on effective public service delivery, focusing on the moderating role of training programs for public servants in Kaduna State, Nigeria. The study first examines the direct relationships between the key determinants of performance expectancy, effort expectancy, social influence, facilitating conditions, perceived risk, level of application and their effects on public service delivery. In addition, the moderating role of training programs in improving the utilization of e-government services among public servants was investigated. To achieve the desired objectives of this study, three research questions were posed and answered:

1. What is the level of application of e-government in enhancing effective public service delivery in Kaduna State, Nigeria?

2. To what extent do the determinants of e-government utilization enhance effective public service delivery in Kaduna State, Nigeria?
3. How do training programs moderate the relationship between the determinants of e-government utilization and effective public service delivery in Kaduna State, Nigeria?

These research questions were investigated using a quantitative research approach in which structured questionnaires were administered to public servants in selected Ministries, Departments and Agencies (MDAs) in Kaduna State, Nigeria. Partial Least Squares Structural Equation Modeling (PLS-SEM) was used for data analysis as explained in chapter three.

To answer the research questions, a thorough literature review was conducted on the key variables of the study as outlined in chapter two. The theoretical framework was built on the Unified Model of Electronic Government Adoption (UMEGA), which depicts the direct relationships between e-government determinants (independent variables) and public service delivery (dependent variable) and the moderating role of training programs in influencing these relationships.

Based on this framework and in line with the research questions and objectives, several hypotheses were formulated to test the relationships between the variables of the study.

The results of the PLS-SEM analysis showed that some of the determinants of e-government utilization that is, performance expectancy, social influence and level of application, have a significant direct influence on public service delivery. However, performance expectancy, facilitating conditions and perceived risks had varying degrees

of influence. More importantly, the results show that training programs significantly moderate the relationships between performance expectancy, social influence, and facilitating conditions for effective public service delivery. However, the moderating effect was not significant for other variables.

Furthermore, the study highlights that while e-government has the potential to improve service delivery, challenges such as digital infrastructure deficits, low digital literacy and resistance to change exist. Addressing these challenges through structured training programs and improved digital policies will significantly increase the efficiency of public service delivery in Kaduna State. These findings provide valuable insights into the determinants of e-government utilization and underscore the importance of training programs for successful digital governance.

5.3 Discussion of Findings

In this section, the results of the study are discussed in the light of appropriate theories and documented findings from previous research. The discussion is structured according to the research hypothesis and ensures that the main findings are analyzed with the existing literature and the theoretical framework adopted in this study.

5.3.1 Level of Application Does Not Significantly Affect Effective Service Delivery

The null hypothesis that the level of application (LoA) has no significant influence on effective public service delivery was rejected. The empirical results reveal a positive and statistically significant relationship between LoA and effective service delivery ($\beta = 0.172, p = 0.018$). This finding confirms that the extent to which e-government systems are actively and consistently applied in routine administrative processes plays a decisive

role in improving public service outcomes. Level of application goes beyond the mere availability of digital platforms; it reflects the depth of use, frequency of interaction, and integration of e-government tools into everyday service delivery activities.

The result suggests that in Kaduna State, improvements in service delivery occur when public servants move from symbolic or ceremonial adoption of e-government systems to practical, task-oriented utilization. Where platforms such as e-tax payment systems, e-procurement portals, digital payroll platforms, and online citizen service interfaces are regularly applied, service processes become faster, more transparent, and less susceptible to discretionary manipulation. This finding aligns with the core logic of the Technology Acceptance Model (TAM), which posits that systems only yield performance benefits when users perceive them as useful and easy to use and subsequently integrate them into their work routines (Davis, 1989).

The Kaduna State context provides a clear explanation for this outcome. Historically, public service delivery in the state, as in much of Nigeria, has been constrained by bureaucratic delays, excessive paperwork, and limited accountability. The introduction and effective application of digital platforms have helped to mitigate these challenges by standardizing procedures, reducing face-to-face interactions, and improving record accuracy. However, the positive effect observed in this study reflects MDAs where e-government tools are not only installed but actually used to process transactions, manage records, and communicate with citizens. This explains why the level of application, rather than mere adoption, emerged as a significant predictor of service delivery effectiveness.

This finding is consistent with empirical evidence from comparable contexts. Studies conducted in Nigeria and other developing countries have shown that e-government initiatives yield measurable service improvements only when systems are fully embedded in administrative workflows. For instance, Ogu and Chukwurah (2022) reported that limited application of e-government tools in Anambra State constrained service delivery gains, despite the availability of digital platforms. Similarly, Riany (2021) found in Kenya that e-government improved service performance only in agencies where digital systems were actively used and supported by operational routines. In contrast, studies that reported weak or negative effects of e-government on service delivery, such as Dibia and Quadri (2018), often focused on environments where digital tools existed but were underutilized or poorly integrated.

Comparatively, evidence from more advanced e-government environments further reinforces this interpretation. In European and Asian contexts, where e-government platforms are deeply embedded into service delivery systems, higher levels of application are consistently associated with efficiency, transparency, and citizen satisfaction (Schork et al., 2016; Tannady & Dewi, 2024). The difference between these contexts and Kaduna State lies not in the potential of technology itself, but in the consistency, scale, and institutionalization of its application.

Nevertheless, the relatively moderate effect size observed in this study indicates that while LoA significantly improves service delivery, it is not sufficient on its own to drive transformational outcomes. In Kaduna State, infrastructural constraints, intermittent system downtime, uneven digital skills among public servants, and weak monitoring mechanisms continue to limit the full benefits of e-government application. This

explains why some MDAs still operate hybrid systems that combine digital platforms with manual processes, thereby diluting efficiency gains.

5.3.2 Performance Expectancy Does Not Significantly Affect Effective Service Delivery in Kaduna State

The null hypothesis that performance expectancy has no significant influence on effective public service delivery in Kaduna State was rejected, indicating that performance expectancy is a statistically significant predictor of service delivery outcomes. This finding confirms that public servants' beliefs about whether e-government systems enhance job performance meaningfully shape the effectiveness of public service delivery. Performance expectancy reflects the extent to which users believe that e-government platforms will improve efficiency, accuracy, transparency, and speed in executing official tasks.

This result is theoretically consistent with Expectancy–Confirmation Theory and the Unified Model of Electronic Government Adoption (UMEGA), which posit that individuals are more likely to commit to and effectively utilize digital systems when they expect clear performance gains (Dwivedi et al., 2017; Venkatesh & Bala, 2021). Empirical evidence from both developed and developing contexts supports this position. Studies have shown that when users perceive tangible improvements such as reduced processing time, lower error rates, and improved coordination, they are more inclined to utilize e-government systems, thereby improving service delivery outcomes (Aneke et al., 2019; Lavena et al., 2022).

However, an important nuance in this study is the negative standardized coefficient ($\beta = -0.195$) associated with performance expectancy. While the relationship is statistically significant, the negative direction suggests that higher expectations of performance gains do not necessarily translate into improved service delivery outcomes in Kaduna State. This finding requires careful contextual interpretation rather than being viewed as contradictory.

In the Kaduna State context, this negative effect can be explained by the expectation–reality gap experienced by public servants. Many e-government platforms are introduced with strong reform narratives promising efficiency, transparency, and ease of service delivery. However, when these expectations are not fully realized in practice due to system downtime, poor internet connectivity, inadequate system integration, or limited user support, public servants may become disillusioned. As a result, higher expectations can paradoxically lead to frustration, resistance, or reduced reliance on the system, thereby weakening service delivery outcomes.

This explanation aligns with findings from prior studies in similar developing-country settings. For example, Dibie and Quadri (2018) reported that inflated expectations surrounding e-government reforms in Nigeria often led to disappointment when systems failed to deliver consistent performance improvements. Similarly, Laila et al. (2020) found in Pakistan that when perceived performance benefits were not matched by actual service quality, users' confidence in digital platforms declined, negatively affecting utilization and service outcomes. In Kenya, Riany (2021) observed that performance expectancy positively influenced service delivery only in agencies where systems were reliable and adequately supported; otherwise, unmet expectations reduced effectiveness.

In Kaduna State, this mismatch is particularly evident in MDAs where e-government platforms coexist with manual processes. Public servants may expect digital systems to fully automate workflows, yet in practice they are often required to duplicate tasks manually due to system unreliability or incomplete digital integration. Under such conditions, performance expectancy becomes a source of dissatisfaction rather than motivation. This explains why higher expectations, when unmet, are associated with weaker service delivery performance.

The finding also highlights an important distinction between perceived potential and actual system performance. While public servants may intellectually recognize the potential benefits of e-government, effective service delivery depends on whether those benefits are consistently realized in daily operations. Without adequate infrastructure, system stability, user support, and institutional monitoring, performance expectancy alone cannot drive positive outcomes.

From a policy and governance perspective, this result underscores the need for government authorities in Kaduna State to manage expectations realistically and focus on performance assurance rather than performance promises. Strengthening system reliability, improving inter-platform integration, and ensuring that e-government tools genuinely reduce workload and processing time are critical for converting positive expectations into tangible service delivery gains. Training programs, continuous system upgrades, and performance monitoring mechanisms are also essential to align expectations with actual outcomes.

Hence, while performance expectancy significantly influences effective public service delivery, its negative coefficient in this study reveals a critical implementation challenge. In Kaduna State, high expectations of e-government performance are undermined by practical constraints, leading to dissatisfaction and reduced effectiveness. This finding reinforces the argument that e-government success depends not only on users' expectations but on the institutional capacity to consistently deliver the promised performance benefits. Addressing this expectation–performance gap is therefore essential for strengthening e-government utilization and improving public service delivery outcomes.

5.3.3 Effort Expectancy Does Not Significantly Affect Effective Service Delivery in Kaduna State

The null hypothesis that effort expectancy has no significant influence on effective public service delivery in Kaduna State was rejected, indicating a positive and statistically significant relationship between the two constructs. This finding confirms that the perceived ease of using e-government systems plays a crucial role in shaping how effectively public services are delivered. Effort expectancy reflects the degree to which public servants believe that e-government platforms are easy to learn, operate, and integrate into routine administrative tasks.

This result is theoretically consistent with the Technology Acceptance Model (TAM) and the Unified Model of Electronic Government Adoption (UMEGA), both of which emphasize that perceived ease of use directly influences system acceptance, sustained utilization, and performance outcomes (Davis, 1989; Dwivedi et al., 2017). When

systems are perceived as simple and intuitive, users are more likely to engage with them consistently, thereby improving service delivery efficiency and responsiveness. Empirical studies support this conclusion. For instance, Davis et al. (2020) and Aneke et al. (2019) found that ease of use significantly enhances satisfaction and utilization of e-government platforms, leading to better service outcomes in both developed and developing contexts.

In Kaduna State, this positive relationship can be explained by the practical realities of public sector work. Many public servants operate under conditions of high workload, limited time, and constrained technical support. Under such circumstances, systems that are perceived as complex or difficult to use are often avoided or used superficially. Conversely, when e-government platforms simplify tasks such as record management, payroll processing, procurement documentation, or information retrieval, public servants are more willing to rely on them, resulting in faster service delivery, reduced errors, and improved transparency. This helps explain why effort expectancy emerged as a significant determinant of effective service delivery in the Kaduna context.

However, the importance score of 0.41 combined with a performance rate of 70% suggests that, although effort expectancy significantly influences service delivery, its practical implementation remains suboptimal. This indicates that while users recognize the relative ease of using some e-government systems, there are still usability challenges that limit their full potential. These challenges may include inconsistent system interfaces across MDAs, inadequate system integration, limited user guidance, and insufficient technical support. Similar patterns have been observed in other developing contexts. For example, Riany (2021) found in Kenya that effort expectancy positively

influenced service delivery only when systems were supported by adequate training and user assistance. Likewise, Laila et al. (2020) reported that in Pakistan, ease of use improved adoption in urban areas but remained a challenge in settings with limited digital literacy.

In Kaduna State, these findings suggest that the positive impact of effort expectancy is constrained by uneven system design and varying levels of user competence across MDAs. Public servants who have received prior ICT exposure or training tend to find e-government platforms easier to use and are more likely to integrate them into daily operations. In contrast, those with limited digital skills may still perceive the systems as burdensome, even when the platforms are technically functional. This partially explains why effort expectancy, although significant, does not yet translate into optimal service delivery outcomes.

From a governance and policy perspective, this result highlights the importance of usability-focused reforms in strengthening e-government effectiveness. Improving effort expectancy requires more than deploying digital platforms; it demands deliberate attention to system design, user experience, and institutional support. Comprehensive and continuous training programs are essential to enhance users' confidence and competence. In addition, the establishment of support mechanisms such as help desks, on-site ICT officers, and online tutorials can reduce user frustration and promote consistent utilization.

Furthermore, simplifying interfaces, standardizing system designs across MDAs, and minimizing unnecessary procedural steps can significantly improve perceived ease of

use. By doing so, the Kaduna State Government can convert the recognized importance of effort expectancy into stronger performance outcomes. This approach aligns with international best practices, where successful e-government systems prioritize user-centric design as a foundation for effective service delivery.

Hence, the significant positive relationship between effort expectancy and effective service delivery confirms that ease of use is a critical enabler of e-government success in Kaduna State. However, the moderate performance level indicates that usability challenges persist. Addressing these challenges through improved system design, structured training, and robust user support will not only enhance effort expectancy but also strengthen the overall effectiveness, sustainability, and public trust in e-government initiatives.

5.3.4 Social Influence Does Not Significantly Affect Effective Service Delivery in Kaduna State

The null hypothesis that social influence has no significant effect on effective public service delivery was rejected, indicating a positive and statistically significant relationship in Kaduna State. This finding confirms that the perceptions, behaviors, and expectations of colleagues, supervisors, and professional networks play a crucial role in shaping public servants' utilization of e-government systems and, by extension, the effectiveness of service delivery. Social influence reflects the extent to which individuals perceive that important others believe they should use a particular system, a construct that is well established in UTAUT and UMEGA-based studies (Dwivedi et al., 2017).

The result aligns strongly with social influence theory, which posits that individuals' decisions are shaped by normative pressures, peer behavior, and institutional expectations. Empirical evidence supports this view. Hu and Alvi (2022) demonstrate that when individuals observe peers or supervisors using digital services successfully, they are more likely to perceive such services as legitimate, useful, and trustworthy. Similarly, Aneke et al. (2019) and Maharjan et al. (2025) found that social norms and peer endorsement significantly influence e-government adoption in collectivist and hierarchical societies, including many developing countries.

In the context of Kaduna State, the strength of social influence can be explained by the nature of public sector culture and administrative structure. The civil service operates within a hierarchical system where directives, norms, and behaviors are strongly shaped by senior officials, departmental heads, and informal peer leaders. When senior officers actively use e-government platforms such as IPPIS, e-procurement systems, or digital reporting tools they implicitly signal approval and legitimacy, encouraging subordinate staff to follow suit. Conversely, where senior officials rely on manual processes, resistance to digital platforms tends to persist. This hierarchical dynamic helps explain why social influence emerged as a significant determinant of effective service delivery in Kaduna.

The high performance rate of 72% for social influence further underscores its central role. This suggests that peer behavior, leadership endorsement, and shared experiences are already exerting a substantial positive effect on the utilization of e-government systems. Comparable findings have been reported in other developing contexts. For example, Riany (2021) found in Kenya that social influence significantly enhanced

service delivery when digital reforms were championed by departmental leaders. Likewise, Kenenissa (2019) observed in Ethiopia that public servants were more willing to adopt e-government platforms when their peers and supervisors demonstrated visible commitment to digital practices.

However, the Kaduna case also reveals a critical nuance. While social influence is strong, its positive effect depends on what behaviors are being modeled. If influential actors promote compliance without competence using systems only ceremonially or alongside manual workarounds, social influence may reinforce superficial adoption rather than deep utilization. This partially explains why, despite strong social influence, some MDAs in Kaduna still operate hybrid systems that limit efficiency gains. Similar contradictions were observed by Dibie and Quadri (2018), who reported that social pressure alone does not guarantee effective service delivery unless supported by institutional capacity and accountability mechanisms.

From a governance and policy perspective, this finding has important implications for strengthening e-government oversight. Social influence can be strategically leveraged by formalizing digital leadership roles, appointing “digital champions” within MDAs, and integrating e-government utilization into performance appraisal systems. When compliance and effective usage are visibly rewarded, positive norms are reinforced across the organization. Additionally, peer-learning forums and inter-departmental knowledge-sharing platforms can institutionalize social influence in a constructive manner, reducing misinformation and resistance.

Hence, the significant positive relationship between social influence and effective service delivery indicates that e-government success in Kaduna State is not driven by technology alone, but by the social and institutional environment in which it is embedded. Social influence operates as a powerful catalyst, shaping attitudes, reducing uncertainty, and normalizing digital practices. However, for its full benefits to be realized, it must be aligned with strong leadership commitment, adequate training, and effective oversight mechanisms. When social influence is combined with accountability and capacity building, it becomes a critical driver of sustainable e-government utilization and improved public service delivery.

5.3.5 Facilitation Condition Does Not Significantly Affect Effective Service Delivery in Kaduna State

The hypothesis that facilitating conditions have no significant influence on effective public service delivery was not rejected, indicating that facilitating conditions exert a statistically significant and meaningful influence on service delivery outcomes in Kaduna State. Facilitating conditions refer to the availability of technical infrastructure, institutional support, training opportunities, and organizational resources that enable public servants to effectively utilize e-government systems. This result confirms that even when users possess positive attitudes or intentions toward e-government, the absence of enabling conditions can constrain actual utilization and service outcomes.

This finding is theoretically supported by the Resource-Based View (RBV), which emphasizes that organizational performance depends on the availability and effective deployment of valuable, rare, and well-supported resources. In the context of e-

government, ICT infrastructure, reliable electricity, internet connectivity, and technical support constitute critical organizational resources. Empirical studies reinforce this argument. Alshehri et al. (2022) and Dwivedi et al. (2017) demonstrate that facilitating conditions significantly influence not only technology usage but also the quality and consistency of public service delivery, particularly in developing country contexts.

The Kaduna State outcome reflects the structural realities of public administration in Nigeria. While Kaduna has introduced several digital platforms such as KADGIS, e-procurement systems, and electronic payment platforms their effectiveness is uneven due to infrastructural gaps, inconsistent system reliability, and limited institutional support across MDAs. This explains why facilitating conditions show a positive but relatively modest effect size ($\beta = 0.14$). The relationship is significant, yet its magnitude suggests that existing support structures are insufficiently developed to fully translate digital platforms into optimal service delivery outcomes.

Comparative evidence supports this interpretation. Studies in Kenya (Riany, 2021) and Ethiopia (Kenenissa, 2019) similarly found that facilitating conditions significantly influenced service delivery, but their effects were weakened by unreliable infrastructure and limited technical support. In contrast, studies from developed contexts such as Denmark and Estonia show much stronger effects of facilitating conditions because digital infrastructure, technical assistance, and institutional readiness are already well established. This contrast highlights that facilitating conditions function as a threshold variable: once basic conditions are met, other factors such as performance expectancy and innovation drive outcomes; where they are weak, they constrain the entire system.

In Kaduna State, facilitating conditions are further undermined by uneven training provision and weak institutionalization of ICT support. Many public servants rely on informal troubleshooting, peer assistance, or manual workarounds when systems fail. This limits confidence in e-government platforms and reduces consistency in service delivery. The persistence of hybrid systems where digital platforms coexist with paper-based processes illustrates how inadequate facilitating conditions dilute the transformative potential of e-government.

From a governance and oversight perspective, this finding carries important implications. Strengthening facilitating conditions requires more than ad hoc investments; it demands institutionalized monitoring mechanisms to ensure that infrastructure, support services, and training are sustained over time. Dedicated ICT units within MDAs, routine system audits, service-level agreements with technology providers, and centralized oversight of e-government infrastructure can significantly enhance reliability. Moreover, integrating facilitating conditions into performance benchmarks for MDAs would improve accountability and incentivize proper system maintenance.

Hence, the significant relationship between facilitating conditions and effective service delivery confirms that e-government success in Kaduna State is contingent upon the availability of robust infrastructural and institutional support. Although current facilitating conditions contribute positively to service delivery, their relatively low effect size reveals substantial room for improvement. Strengthening infrastructure, expanding technical support, and institutionalizing oversight mechanisms are therefore essential for converting digital initiatives into consistent, high-quality public service outcomes.

Without such enabling conditions, even well-designed e-government platforms risk remaining underutilized and falling short of their transformative potential

5.3.6 Perceived Risk Does Not Significantly Affect Effective Service Delivery in Kaduna State

The rejection of the null hypothesis regarding perceived risk indicates that perceived risk has a significant influence on effective public service delivery in Kaduna State. This finding confirms that concerns about potential negative consequences such as data breaches, privacy violations, system failures, and misuse of personal information, play a decisive role in shaping public servants' and citizens' engagement with e-government platforms. The result aligns with risk–return trade-off theory, which posits that individuals evaluate expected benefits against perceived risks before committing to the use of a system. When perceived risks outweigh expected benefits, utilization declines, thereby weakening service delivery outcomes.

Empirical evidence strongly supports this relationship. Alhassan et al. (2023) demonstrate that high perceived risk significantly reduces user trust and engagement with digital government services in developing countries. Similarly, Carter and Bélanger (2005) and Bélanger and Carter (2008) argue that perceived risk is a major inhibitor of e-government adoption, particularly in contexts where institutional trust and cybersecurity frameworks are weak. In Nigeria, repeated reports of data breaches, payroll errors, and system downtimes such as those associated with IPPIS and other national platforms have reinforced public skepticism toward digital systems, making perceived risk a particularly salient factor.

The effect size of perceived risk ($\beta = 0.41$) observed in this study is relatively strong, indicating that risk perceptions are not marginal concerns but central determinants of service delivery effectiveness in Kaduna State. This helps explain why some e-government platforms in the state, despite being technically available, are underutilized or used only superficially. Public servants may comply with system usage requirements while simultaneously maintaining parallel manual records as a form of risk avoidance, a behavior widely documented in developing-country e-government studies (Gichoya, 2005; Zubir et al., 2024). Such practices dilute efficiency gains and undermine the transformative promise of digital governance.

Compared with findings from developed countries, where perceived risk tends to have a weaker effect due to strong data protection laws and institutional trust, the Kaduna outcome reflects a context-specific reality. Studies from Estonia, Denmark, and the United Kingdom show that perceived risk becomes less influential once robust cybersecurity frameworks, transparent data governance policies, and responsive redress mechanisms are institutionalized (OECD, 2022). In contrast, in Kaduna State and similar settings, weak enforcement of data protection regulations and limited public awareness of digital safeguards intensify risk perceptions, thereby constraining service delivery effectiveness.

From a governance and oversight perspective, this finding has critical implications. Reducing perceived risk requires more than technical fixes; it demands institutionalized oversight mechanisms. These include the enforcement of data protection standards, regular system audits, clear accountability structures for data misuse, and visible sanctions for breaches. Establishing dedicated cybersecurity units within MDAs,

strengthening compliance with Nigeria's Data Protection Act, and integrating risk management indicators into e-government performance evaluations would significantly enhance user confidence.

In addition, transparent communication plays a crucial role. Clearly articulated privacy policies, user education on data handling practices, and accessible complaint-resolution mechanisms can bridge the trust gap between citizens, public servants, and digital platforms. Training programs also serve as a critical risk-mitigation tool by improving users' understanding of system security features and reducing fear arising from uncertainty or misinformation.

Hence, the significant influence of perceived risk on effective service delivery highlights that trust and security are foundational to successful e-government implementation in Kaduna State. While digital platforms offer efficiency and transparency benefits, these advantages cannot be fully realized unless users feel confident that their data and interactions are secure. Addressing perceived risk through stronger governance oversight, institutional accountability, and transparent communication is therefore essential for improving utilization levels and achieving sustainable improvements in public service delivery.

5.3.7 Training Program Does Not Moderate the Effect of Level of Application on Effective Service Delivery in Kaduna State

The hypothesis that training programs do not moderate the relationship between the level of application (LoA) of e-government and effective service delivery in Kaduna State was not rejected ($\beta = 0.028$, $p = 0.680$). This finding indicates that, within the

context of this study, training programs did not significantly strengthen or weaken the effect of application level on service delivery outcomes. In other words, although the level of application of e-government platforms directly enhances service delivery, the presence of training programs as currently implemented does not significantly alter this relationship.

This outcome suggests that training, while conceptually important, may not yet function as a strategic enabler capable of amplifying the benefits of e-government application in Kaduna State. One plausible explanation is that the existing training programs are largely generic, introductory, or compliance-driven, focusing on basic system awareness rather than on deep operational competence, process redesign, or advanced system utilization. As Halland et al. (2016) argue, training only improves performance when it is closely aligned with users' actual job tasks and system complexity; otherwise, its impact remains marginal.

Empirical evidence on the moderating role of training is mixed, particularly in developing-country contexts. While Kumar et al. (2023) demonstrate that targeted and skills-intensive training significantly enhances technology utilization and performance in Industry 4.0 environments, studies in public-sector settings suggest that training often fails to produce measurable performance gains when institutional constraints persist. For example, Gichoya (2005) and Zubir et al. (2024) note that in many African public administrations, training is delivered independently of system redesign, infrastructural readiness, and accountability mechanisms, thereby limiting its practical relevance. This pattern appears consistent with the Kaduna State experience.

Another important explanation relates to the stage of digital maturity in Kaduna State. It is possible that many public servants have already acquired basic operational familiarity with e-government platforms through routine use, peer learning, or informal exposure. In such cases, additional training especially if repetitive or theoretical adds limited incremental value. This supports arguments by Dwivedi et al. (2017) and Alshehri et al. (2022) that training effects tend to diminish once baseline competence is achieved, unless programs evolve toward advanced, role-specific, and problem-solving-oriented formats.

Contextual factors also help explain why training does not moderate the LoA–service delivery relationship in Kaduna State. Persistent infrastructural challenges, such as unstable electricity supply, intermittent internet connectivity, and system downtime, may overshadow the benefits of training. Even well-trained users cannot fully apply their skills when systems are unreliable. This finding aligns with studies from Nigeria and Kenya, which show that infrastructural and organizational constraints often neutralize the expected benefits of capacity-building initiatives (Riany, 2021; Omotayo et al., 2025).

Comparatively, evidence from countries such as Estonia, Denmark, and Singapore shows that training significantly enhances e-government outcomes only when embedded within strong governance frameworks, continuous system upgrades, and performance-based accountability structures (OECD, 2022). In these contexts, training is not a standalone intervention but part of an integrated digital governance ecosystem. The absence of such systemic integration in Kaduna State helps explain why training does not yet function as a meaningful moderator.

From a policy and governance oversight perspective, this finding carries important implications. It suggests that simply increasing the number of training sessions or workshops is unlikely to improve service delivery outcomes unless training is redesigned to be strategic, adaptive, and performance-oriented. Training programs should move beyond basic system navigation to focus on advanced application features, real-life service scenarios, data use, risk management, and process innovation. Moreover, training effectiveness should be monitored through clear performance indicators linked to service outcomes, rather than treated as a procedural requirement.

In addition, feedback mechanisms should be institutionalized to allow public servants to report operational challenges encountered during system use. This would enable training content to evolve dynamically in response to actual user needs. Embedding training within broader e-government oversight structures such as internal audit units, digital governance committees, and service performance reviews, would further enhance its relevance and impact.

Hence, while training programs are theoretically expected to strengthen the relationship between e-government application and service delivery, the findings from Kaduna State indicate that this potential remains largely unrealized. Training, as currently implemented, does not significantly moderate the LoA–service delivery relationship due to limitations in content, targeting, institutional integration, and infrastructural support. Strengthening the strategic design of training programs and embedding them within robust governance and accountability frameworks is therefore essential if training is to play a meaningful role in enhancing the effectiveness of e-government implementation in Kaduna State.

5.3.8 Training Program Does Not Moderate the Effect of Performance Expectancy on Effective Service Delivery in Kaduna State

The rejection of the hypothesis that training programs do not moderate the relationship between performance expectancy and effective service delivery in Kaduna State indicates that training plays a meaningful moderating role in translating expected performance benefits into actual service delivery outcomes. This finding suggests that when public servants receive relevant training, their belief that e-government systems will enhance job performance is more likely to materialize into improved service effectiveness. The result aligns with Social Cognitive Theory, which emphasizes that individuals' behavior is shaped by learning experiences, skill acquisition, and self-efficacy developed through observation and practice.

Empirical evidence supports this interpretation. Tsai et al. (2023) demonstrate that training enhances users' confidence, competence, and perceived usefulness of digital systems, thereby strengthening the link between performance expectancy and actual outcomes. In the e-government context, this implies that training does not merely improve technical skills but also reinforces users' cognitive evaluation of system benefits, enabling them to leverage digital tools more effectively. Similar findings have been reported in studies from Rwanda and Malaysia, where structured training programs significantly improved public servants' ability to convert expected efficiency gains into measurable service improvements (Nkundabagenzi et al., 2022; Omotayo et al., 2025).

The moderating effect observed in Kaduna State can be explained by the fact that performance expectancy is inherently perception-driven. Public servants may initially

believe that e-government systems can improve speed, transparency, or accuracy, but without training, these expectations often remain abstract. Training serves as the critical mechanism through which expected benefits are demonstrated, practiced, and validated in real work settings. This explains why training strengthens the performance expectancy–service delivery link, even in an environment characterized by infrastructural and institutional constraints.

However, the relatively modest importance score (0.148) indicates that although training moderates this relationship, its full potential has not yet been realized. This suggests that existing training programs in Kaduna State may be uneven in quality, scope, or targeting. Prior studies in developing-country contexts show that training is most effective when it is continuous, task-specific, and linked directly to performance metrics, rather than delivered as one-off or generic capacity-building exercises (Halland et al., 2016; Dwivedi et al., 2017). Where training focuses mainly on basic system navigation without demonstrating tangible performance gains, its moderating influence tends to remain limited.

Comparatively, evidence from high-performing e-government environments such as Estonia and Singapore shows that training significantly amplifies performance expectancy when it is embedded within broader digital governance frameworks, including performance monitoring, user feedback loops, and institutional accountability mechanisms (OECD, 2022). In contrast, Kaduna State's training initiatives appear to operate largely as supportive interventions rather than as strategically integrated components of e-government reform. This contextual difference helps explain why training moderates performance expectancy but does not yet exert a stronger effect.

From a policy and governance oversight perspective, this finding has important implications. It suggests that training should be repositioned from a peripheral support activity to a strategic enabler of performance realization. Training programs should explicitly demonstrate how e-government platforms improve work outcomes, such as reducing processing time, minimizing errors, or enhancing transparency. Incorporating real-world use cases, performance dashboards, and problem-solving exercises would further strengthen the link between expected and actual performance.

Moreover, integrating user feedback into training design and offering multiple delivery formats such as workshops, online modules, peer mentoring, and on-the-job coaching can improve relevance and effectiveness. When training is aligned with users' daily responsibilities and supported by institutional incentives and oversight mechanisms, it becomes a powerful tool for reinforcing confidence in digital governance systems.

Hence, the findings indicate that training programs do moderate the relationship between performance expectancy and effective service delivery in Kaduna State, confirming their role in converting perceived benefits into tangible outcomes. However, the modest strength of this moderating effect highlights the need for more targeted, performance-oriented, and strategically integrated training initiatives. Strengthening training design and embedding it within robust e-government governance structures will enhance its impact, ultimately improving service delivery effectiveness and citizen satisfaction in Kaduna State.

5.3.9 Training Program Does Not Moderate the Effect of Effort Expectancy on Effective Service Delivery in Kaduna State

Accepting the hypothesis that training programs do not moderate the relationship between effort expectancy and effective service delivery in Kaduna State indicates that existing training initiatives do not significantly alter how ease of use translates into service delivery outcomes. This finding suggests that, in this context, training alone is insufficient to meaningfully shape users' perceptions of effort expectancy. The result is consistent with the Technology Acceptance Model (TAM), which posits that perceived ease of use is primarily determined by system design and interface simplicity rather than by post-implementation training (Davis, 1989). In other words, if digital platforms are inherently complex or unintuitive, training may improve familiarity but will not substantially reduce the perceived effort required to use them.

Empirical evidence supports this interpretation. Almarashdeh et al. (2022) found that while training increases users' awareness and basic operational competence, it does not necessarily enhance perceptions of ease of use unless the system itself is designed to be intuitive. Similar findings have been reported in developing-country contexts such as Pakistan and Ethiopia, where users continued to perceive e-government platforms as cumbersome despite repeated training interventions, largely due to poor interface design, system instability, and complex workflows (Laila et al., 2020; Kenenissa, 2019). These studies suggest that effort expectancy is more sensitive to usability, system reliability, and process simplicity than to training intensity.

The Kaduna State context provides further insight into this outcome. Many e-government platforms in the state were introduced by digitizing existing bureaucratic procedures rather than re-engineering them. As a result, users often encounter multiple logins, unclear navigation paths, system downtime, and workflows that replicate manual processes in digital form. In such circumstances, training programs that focus on “how to use the system” do little to reduce the inherent effort required to complete tasks. This explains why the moderating effect of training on effort expectancy is statistically insignificant.

The very low moderating coefficient ($\beta = 0.035$) reinforces this explanation. It indicates that even when training is provided, it does not substantially change the relationship between perceived ease of use and service delivery outcomes. This finding aligns with evidence from Kenya and Nigeria, where studies show that usability challenges, rather than lack of training, are the primary barriers to effective e-government utilization (Riany, 2021; Ogu & Chukwurah, 2022). In contrast, countries such as Estonia and Singapore achieved high ease-of-use perceptions not through extensive user training alone, but through user-centred system design, simplified processes, and strong usability standards (OECD, 2022).

From a governance and oversight perspective, this finding has important implications. It suggests that training programs should not be viewed as a substitute for poor system design. Instead, oversight mechanisms for e-government implementation in Kaduna State should place greater emphasis on usability testing, process re-engineering, and continuous system improvement. Monitoring frameworks should include user-experience indicators, such as task completion time, error rates, and user satisfaction,

alongside traditional training metrics. This would enable policymakers to identify whether challenges stem from user capacity or from system design flaws.

Policy-wise, the findings indicate the need for a dual strategy. First, government agencies should prioritize the redesign of e-government platforms to ensure simplicity, clarity, and reliability, particularly for users with limited digital skills. Second, training programs should be reoriented away from generic instruction toward task-specific, problem-solving support that complements intuitive system design. Evidence from Rwanda and Ghana shows that when simple interfaces are combined with light-touch, targeted training, perceptions of ease of use improve significantly, leading to higher utilization and better service outcomes (Nkundabagenzi et al., 2022; Omotayo et al., 2025).

Hence, the absence of a moderating effect of training on effort expectancy in Kaduna State reflects a structural reality rather than a failure of training per se. Ease of use is largely shaped by system design, workflow simplicity, and reliability, factors that training cannot fully compensate for. Strengthening e-government effectiveness therefore requires shifting oversight and reform efforts toward usability-driven design, supported by focused and adaptive training. Such an approach would reduce perceived effort, enhance user confidence, and ultimately improve the effectiveness of public service delivery in Kaduna State.

5.3.10 Training Program Does Not Moderate the Effect of Social Influence on Effective Service Delivery in Kaduna State

The rejection of the hypothesis that training programs do not moderate the effect of social influence on effective service delivery in Kaduna State indicates that training meaningfully strengthens the role of social dynamics in shaping service delivery outcomes. This finding supports social influence theory, which posits that individuals' attitudes and behaviours are strongly shaped by the opinions, experiences, and behaviours of peers, supervisors, and influential actors within their social environment. In digital governance contexts, especially in developing regions, informal social cues often exert a stronger influence on technology use than formal rules or technical instruction.

Empirical evidence supports this interpretation. Iqbal et al. (2021) demonstrate that social norms and peer endorsement frequently outweigh formal training in shaping users' acceptance and sustained use of digital platforms. Similar findings have been reported in studies conducted in Kenya and Bangladesh, where e-government adoption increased significantly when respected peers and community leaders actively promoted digital services, even in settings with limited formal ICT training (Riany, 2021; Salam, 2017). These studies suggest that training becomes most effective when it operates alongside, rather than independently of, social influence mechanisms.

The Kaduna State context provides a clear explanation for this outcome. Public servants and citizens in Kaduna often rely on peer validation, hierarchical cues, and shared workplace norms when deciding whether to trust and use e-government platforms. In

many MDAs, employees are more likely to adopt digital systems when colleagues, supervisors, or senior officers demonstrate active use and endorse their benefits. Training programs, when delivered collectively rather than individually, appear to amplify this effect by creating shared learning experiences that reinforce group norms and positive perceptions. As a result, training strengthens the social transmission of favourable attitudes toward e-government, thereby enhancing its impact on service delivery.

The relatively high success rate of 72% for social influence further confirms its central role in this study. This finding aligns with evidence from China and Indonesia, where social endorsement and organizational culture were found to be stronger predictors of effective e-government utilization than individual technical competence alone (Zhen et al., 2022; Aritonang, 2017). In contrast, studies in highly digitalized countries such as Estonia show weaker social influence effects, as users rely more on institutional trust and system reliability than on peer behaviour (OECD, 2022). This comparison highlights that in developing and transitional governance systems like Kaduna State, social influence remains a powerful driver of behaviour.

From a governance and oversight perspective, this result has important implications. It suggests that strengthening e-government effectiveness in Kaduna State requires more than technical training; it demands strategic social mobilisation and institutional leadership. Oversight mechanisms should therefore incorporate social diffusion strategies, such as identifying digital champions within MDAs, encouraging senior officials to model active use of e-government systems, and recognising departments that

demonstrate exemplary digital practices. Such measures reinforce positive social norms and enhance accountability by making e-government usage visible and expected.

Policy-wise, the Kaduna State Government can leverage this finding by embedding training programs within broader community- and organisation-based engagement strategies. For instance, training workshops can be designed to include group problem-solving, peer demonstrations, and testimonials from successful users. Public awareness campaigns that highlight positive user experiences and service improvements can further amplify social endorsement. Evidence from Ghana and Rwanda indicates that when training is combined with peer advocacy and leadership support, adoption rates and service delivery outcomes improve substantially (Nkundabagenzi et al., 2022; Omotayo et al., 2025).

Hence, the moderating role of training on the relationship between social influence and effective service delivery underscores the importance of social context in e-government implementation in Kaduna State. Training enhances service delivery not merely by transferring skills, but by reinforcing shared norms, peer learning, and collective confidence in digital platforms. By institutionalising social influence through leadership example, peer advocacy, and community engagement, e-government initiatives in Kaduna State can achieve higher utilization, greater public trust, and more effective service delivery outcomes.

5.3.11 Training Program Does Not Moderate the Effect of Facilitation Condition on Effective Service Delivery in Kaduna State

The rejection of the hypothesis that training programs do not moderate the effect of facilitating (support) conditions on effective service delivery in Kaduna State indicates that training significantly strengthens the relationship between available support resources and service delivery outcomes. This finding is consistent with the Resource-Based View (RBV), which argues that organizational resources such as ICT infrastructure, technical support, and systems only translate into performance advantages when they are effectively deployed through human capabilities, particularly skills and knowledge acquired through training. In this context, training serves as a critical mechanism that enables public servants and citizens to convert facilitating conditions into tangible service delivery improvements.

Empirical evidence supports this interpretation. Al-Sharif and Al-Shammari (2023) demonstrate that targeted training enhances users' ability to leverage organizational resources, thereby improving service effectiveness. Similar conclusions have been reached in studies conducted in Kenya and Ethiopia, where the availability of ICT infrastructure alone was insufficient to improve service delivery until users were adequately trained to operate and integrate these systems into routine administrative processes (Riany, 2021; Kenenissa, 2019). These findings suggest that facilitating conditions and training are complementary rather than independent drivers of effective e-government utilization.

The Kaduna State context provides a clear explanation for this moderating effect. Although several MDAs possess basic ICT infrastructure and support systems, uneven levels of digital competence among public servants and citizens limit the effective use of these resources. Training programs help bridge this gap by enhancing users' confidence, reducing dependency on manual procedures, and improving their ability to navigate digital platforms. Consequently, training amplifies the impact of facilitating conditions by ensuring that available infrastructure, technical support, and digital tools are actually utilized to deliver services more efficiently and transparently.

The importance score of 0.187 further suggests that while training positively moderates the relationship between facilitating conditions and effective service delivery, its potential has not yet been fully realized. This implies that existing training initiatives in Kaduna State may be insufficiently targeted, irregular, or overly generic. Comparable studies in Indonesia and Bangladesh show that training yields stronger moderating effects when it is continuous, task-oriented, and aligned with users' specific operational responsibilities rather than being delivered as one-off or theory-based interventions (Aritonang, 2017; Salam, 2017).

From a governance and oversight perspective, this finding highlights the need for Kaduna State to institutionalize training as part of its e-government support framework rather than treating it as a supplementary activity. Effective oversight mechanisms should ensure that investments in ICT infrastructure are matched with structured capacity-building programs, periodic skills assessments, and performance monitoring to confirm that resources are being effectively utilized. Without such oversight, facilitating

conditions risk becoming symbolic investments that do not yield meaningful service delivery outcomes.

Policy-wise, the Kaduna State Government should redesign training programs to focus on practical applications, real-world service scenarios, and problem-solving tasks that directly relate to existing support systems. Incorporating user feedback into training design, offering blended learning formats (workshops, online tutorials, and on-the-job support), and aligning training content with specific e-government platforms can further strengthen this moderating effect. Evidence from Rwanda and Ghana suggests that when training is embedded within broader institutional support and accountability structures, e-government utilization and service delivery performance improve significantly (Omotayo et al., 2025).

Hence, the moderating role of training in the relationship between facilitating conditions and effective service delivery underscores that infrastructure alone is insufficient to drive successful e-government outcomes in Kaduna State. Training transforms support conditions into productive capabilities by enabling users to fully exploit available resources. Strengthening training initiatives, therefore, represents a strategic pathway for improving e-government utilization, enhancing oversight, and delivering more responsive and efficient public services

5.3.12 Training Program Does Not Moderate the Effect of Perceived Risk on Effective Service Delivery in Kaduna State

The acceptance of the hypothesis that training programs do not moderate the influence of perceived risk on effective service delivery in Kaduna State indicates that training

initiatives, as currently implemented, are insufficient to significantly reduce users' risk-related concerns associated with e-government services. This finding aligns with risk–return trade-off theory, which posits that individuals evaluate perceived risks independently of skill acquisition or procedural knowledge, particularly in environments characterized by uncertainty, weak institutional trust, and past negative experiences. In such contexts, users may acknowledge how to use digital platforms but still refrain from fully engaging with them if concerns about security, privacy, or system reliability persist.

Empirical evidence supports this interpretation. Hsieh and Wang (2022) demonstrate that users' perceptions of risk are shaped more strongly by personal experience, institutional reputation, and contextual safeguards than by formal training programs. Similar findings have been reported in studies conducted in Pakistan and Nigeria, where training improved operational competence but failed to significantly alter concerns related to data misuse, cyber fraud, and system failure (Laila et al., 2020; Dibie & Quadri, 2018). These studies suggest that perceived risk is a structurally embedded concern that extends beyond individual capability and requires systemic and institutional responses.

In the Kaduna State context, this result is particularly revealing. Although public servants and citizens may receive training on how to access or use e-government platforms, such training does not necessarily address deeper anxieties related to data security, privacy protection, system downtime, and the misuse of personal information. Historical experiences with system failures, inconsistent service availability, and broader concerns about governance transparency in Nigeria may further reinforce these

perceptions. Consequently, even well-trained users may remain cautious or disengaged if they believe that e-government platforms expose them to personal or institutional risk.

The relatively low importance value (0.086) further confirms that training plays only a marginal role in moderating perceived risk in this study. This implies that risk perceptions are largely shaped by institutional safeguards rather than human capacity alone. Comparable studies in Kenya and Ethiopia have shown that perceived risk declines more effectively when governments introduce visible security assurances, legal protections, and accountability mechanisms, rather than relying on training interventions alone (Riany, 2021; Kenenissa, 2019).

From a governance and oversight perspective, this finding highlights a critical gap in Kaduna State's e-government strategy. Addressing perceived risk requires stronger institutional mechanisms, including robust cybersecurity frameworks, data protection regulations, system audit trails, and clearly defined accountability structures. Without these safeguards, training initiatives may improve usage skills but will not overcome distrust or fear among users. This supports the argument that perceived risk is fundamentally a governance issue rather than a capacity issue.

Policy-wise, the Kaduna State Government should prioritize the implementation of technical and regulatory safeguards to complement training efforts. These include secure authentication systems, encryption protocols, regular system audits, and transparent incident-response mechanisms. Equally important is clear and proactive communication regarding data privacy policies, how personal information is stored and used, and the remedies available in the event of system breaches. Evidence from Rwanda and Estonia

suggests that visible enforcement of data protection laws and transparent digital governance frameworks significantly reduce perceived risk and enhance public trust in e-government systems (Omotayo et al., 2025).

In addition, establishing accessible helpdesks, complaint-resolution channels, and independent oversight units can further reassure users that their concerns are taken seriously and addressed promptly. Such mechanisms signal institutional commitment to accountability and user protection, which is essential for mitigating perceived risk.

Hence, the non-moderating effect of training on perceived risk in Kaduna State underscores that training alone cannot resolve trust-related barriers to e-government adoption. While training improves competence, perceived risk is shaped primarily by system security, institutional credibility, and governance safeguards. Therefore, strengthening oversight mechanisms, regulatory protections, and transparency practices is essential for reducing perceived risk, enhancing user confidence, and ultimately improving the effectiveness of e-government service delivery in Kaduna State.

5.4 Implications of the Study

The conceptual framework of this study incorporates both direct and moderating relationships to examine the impact of determinants of e-government utilization on effective public service delivery, considering the moderating role of training programs in Kaduna State, Nigeria. The results show that performance expectancy, effort expectancy, social influence, facilitating conditions, perceived risks and level of application have significant influence on e-government utilization and service delivery.

The moderating role of training programs further strengthens the relationship between some of these determinants and service delivery outcomes.

The manifestation of direct relationships suggests that the key determinants of e-government contribute significantly to improving public service delivery, which is consistent with existing theories of digital transformation. The moderating effect of training programs underscores the importance of capacity building activities to ensure that public servants take full advantage of e-government platforms. To enable a clear understanding of the relationships investigated in this study, the specification of the conceptual framework consists of theoretical, methodological and practical implications, which are explained below.

5.4.1 Theoretical Implications

This study makes significant theoretical contributions to the understanding of e-government utilization, public service efficiency, and digital transformation in the public sector, particularly within developing and subnational governance contexts. By applying the Unified Model of Electronic Government Adoption (UMEGA), the study advances existing theory by demonstrating how key determinants performance expectancy, effort expectancy, social influence, facilitating conditions, perceived risk, and level of application, jointly shape the effectiveness of e-government initiatives in public service delivery.

A major theoretical contribution of this study lies in its empirical examination of training programs as a moderating mechanism, an aspect that has received limited scholarly attention, especially in subnational government settings such as Kaduna State. While

prior studies have largely treated training as a background or control variable, this research positions training as a contingent factor that conditions the strength and direction of the relationship between e-government determinants and service delivery outcomes. In doing so, the study responds directly to calls by Venkatesh and Bala (2021) and Dwivedi et al. (2020) for more integrative models that incorporate both institutional structures and human capability factors into technology adoption research.

The findings further extend the explanatory power of UMEGA by demonstrating that its constructs do not operate uniformly across contexts. Although performance expectancy, effort expectancy, social influence, and facilitating conditions were found to significantly influence service delivery, the moderating effects of training varied across these relationships. This nuanced outcome contributes theoretically by showing that capacity-building interventions do not automatically translate into improved outcomes unless they are aligned with specific adoption barriers, thereby refining assumptions embedded in dominant technology adoption models.

In addition, the study provides empirical support for Expectation–Confirmation Theory (ECT) by confirming that public servants’ expectations regarding efficiency, transparency, and service improvement influence their willingness to utilize e-government systems. However, the study also extends ECT by demonstrating that positive expectations do not always culminate in improved service delivery outcomes. This theoretical refinement highlights the role of contextual disruptions, such as bureaucratic rigidity, infrastructural constraints, system unreliability, and uneven digital preparedness, which can weaken the expectation–confirmation process. By identifying

these interruptions, the study offers a more realistic and context-sensitive interpretation of ECT within public-sector digital transformation.

More broadly, this research enriches theoretical debates on e-government adoption in developing country contexts, where much of the existing literature remains underrepresented. Unlike studies conducted in developed economies where stable infrastructure and mature digital institutions are often assumed this study demonstrates that infrastructural deficits, limited ICT literacy, institutional capacity gaps, and trust-related concerns significantly shape adoption outcomes in Nigeria. By embedding these contextual realities into the UMEGA framework, the study contributes a contextualized theoretical model that better explains how technological, human, and institutional variables interact to influence e-government effectiveness in emerging economies.

Overall, this study advances theory by (i) extending UMEGA through empirical testing in a subnational African context, (ii) clarifying the conditional role of training in e-government effectiveness, and (iii) refining expectation-based theories by accounting for institutional and contextual constraints. These contributions provide a stronger theoretical foundation for future e-government research and offer a more adaptable framework for analyzing digital governance reforms in similar developing country settings.

5.4.2 Practical Implications

The findings of this study carry important practical and policy implications for government agencies, policymakers, and public sector managers responsible for the design, implementation, and oversight of e-government initiatives, particularly in

subnational contexts such as Kaduna State. First, the identified moderating role of training programs indicates that the effectiveness of e-government utilization is closely linked to the digital capacity of public servants. In Kaduna State, e-government platforms exist and are increasingly deployed; however, the extent to which these systems translate into effective service delivery depends on whether public servants possess the requisite skills, confidence, and practical competence to use them. This finding helps explain why some e-government outcomes in Kaduna State are weaker than those reported in comparable studies from more digitally mature environments, where training is continuous, role-specific, and embedded within institutional performance systems. It implies that policymakers should move beyond one-off or generic training programs toward structured, continuous, and task-oriented capacity-building initiatives that are aligned with the specific operational demands of different ministries, departments, and agencies (MDAs).

Second, the results show that although performance expectancy strongly influences e-government utilization, gaps between expected benefits and actual user experiences can undermine satisfaction and sustained use. In the Kaduna State context, public servants may expect faster processing, reduced bureaucracy, and improved transparency from e-government systems, yet still encounter system downtimes, incomplete integration across MDAs, or parallel manual procedures. This divergence between expectation and experience helps explain the mixed outcomes observed in this study compared with findings from settings where digital reforms are fully institutionalized. Practically, this implies that governments must not only deploy digital platforms but also re-engineer

underlying administrative processes, eliminate redundant manual steps, and ensure that system outputs visibly improve work efficiency and service outcomes.

Third, the findings highlight the central role of digital infrastructure readiness in shaping e-government effectiveness. The diminished moderating impact of training in the presence of poor internet connectivity, weak technical support, or recurrent system failures suggests that training alone cannot compensate for structural deficiencies. This explains why some e-government determinants yield weaker effects in Kaduna State than in contexts with stable infrastructure. Consequently, policymakers must adopt a sequenced implementation strategy, where investments in broadband connectivity, system reliability, and technical support precede or accompany large-scale training initiatives. Without such foundational infrastructure, the potential of training and user readiness remains constrained.

Fourth, the significant influence of perceived risk underscores the importance of trust, security, and accountability in e-government utilization. In Kaduna State, concerns about data privacy, system reliability, job security, and misuse of information can discourage public servants from fully embracing digital platforms, even when systems are available and training has been provided. This finding suggests that effective e-government implementation requires more than technical functionality; it demands robust governance and oversight mechanisms that reassure users about data protection, system integrity, and accountability. Policymakers should therefore strengthen cybersecurity frameworks, clearly communicate data governance policies, and establish transparent protocols for handling system failures, errors, or breaches.

Importantly, these findings point to the need for stronger e-governance oversight structures within the public sector. Effective monitoring mechanisms such as dedicated e-government oversight units, periodic system audits, performance dashboards, and inter-agency coordination committees can ensure that digital platforms are not only adopted but also consistently used as intended. Clear accountability structures should assign responsibility for system performance, data security, and service outcomes to specific units or officers, thereby reducing implementation gaps and promoting sustained utilization.

Taken together, the study demonstrates that the determinants of e-government utilization cannot be addressed in isolation. Their influence on effective public service delivery is contingent upon a combination of institutional capacity, infrastructural readiness, governance oversight, and trust-enhancing mechanisms. In developing contexts such as Kaduna State, where administrative reforms are ongoing and resource constraints persist, an integrated approach that simultaneously addresses technology, people, processes, and accountability structures is essential for realizing the full benefits of e-government initiatives.

5.4.3 Methodological Implications

This study makes several important methodological contributions to the field of e-government research and digital transformation in the public sector. A central contribution lies in the application of Partial Least Squares Structural Equation Modeling (PLS-SEM), a robust and flexible analytical technique that is particularly well suited for examining complex causal relationships, predictive models, and interaction

effects. By employing PLS-SEM, this study demonstrates its methodological strength in simultaneously testing multiple direct relationships and moderating effects within a single integrated framework. This approach provides a more nuanced understanding of how e-government determinants operate collectively rather than in isolation, thereby advancing methodological rigor in public sector technology adoption research.

Another significant methodological contribution is the explicit integration of training programs as a moderating variable within the research framework. While much of the existing literature on e-government adoption has relied on direct-effect models, this study illustrates the methodological value of incorporating moderators to capture conditional and context-dependent effects. By doing so, the research moves beyond linear explanations and demonstrates how the influence of key determinants varies depending on institutional capacity-building mechanisms. This contributes to methodological advancement by encouraging future studies to adopt more sophisticated modeling strategies that better reflect the complexity of public sector digital transformation.

The study also contributes methodologically through its measurement design and instrument adaptation. Established measurement scales were carefully refined and contextualized to reflect the realities of e-government implementation in Nigeria. This process ensured that the constructs retained their conceptual integrity while remaining sensitive to local institutional, infrastructural, and human capacity conditions. The successful validation of these adapted instruments demonstrates that rigorously tested measurement models can be effectively applied in developing country contexts, thereby enhancing the reliability and validity of empirical findings. Moreover, this approach

provides a replicable methodological template for scholars seeking to examine e-government adoption in similar subnational or emerging economy settings.

Furthermore, by situating the empirical analysis within a developing country context, this study underscores the methodological importance of extending advanced quantitative techniques beyond traditionally studied developed economies. The findings demonstrate that sophisticated analytical methods such as PLS-SEM are not only feasible but also highly informative in environments characterized by infrastructural limitations, institutional constraints, and varying levels of digital literacy. This contributes to broadening the empirical and methodological scope of e-government research, supporting more inclusive and globally representative methodological practices.

Overall, the methodological choices adopted in this study strengthen the robustness of the findings and provide valuable guidance for future researchers. By combining advanced statistical modeling, contextualized measurement design, and moderator analysis, the study contributes to a more comprehensive and context-sensitive methodological foundation for examining e-government utilization and public service delivery in emerging economies.

5.5 Limitations and Directions for Future Research

Like all empirical investigations, this study is subject to certain limitations, which also present meaningful opportunities for future research. First, the analysis focused primarily on individual-level determinants of e-government utilization among public servants in Kaduna State and their effects on effective public service delivery. While this

perspective provides valuable insights into user-level behavior and perceptions, it does not fully capture broader institutional and organizational dynamics, such as inter-agency coordination, funding mechanisms, leadership commitment, and strategic digital infrastructure investments. Future research could adopt a multilevel analytical approach, integrating individual, organizational, and institutional factors to generate a more comprehensive understanding of e-government utilization.

Second, the empirical scope of the study was limited to Kaduna State, a reform-oriented subnational context within Nigeria. Given the substantial variation across Nigerian states in terms of digital maturity, infrastructural capacity, governance quality, and policy implementation, the findings may not be fully generalizable to other regions. Future studies could conduct comparative analyses across multiple states or undertake cross-country studies in developing economies to examine whether the determinants identified in this study remain stable or vary according to contextual conditions.

Third, the study employed a quantitative cross-sectional research design, which is effective for hypothesis testing and establishing statistical relationships but limited in capturing behavioral dynamics and changes over time. A mixed-methods design, incorporating qualitative interviews or focus group discussions, could provide richer insights into the lived experiences, motivations, and challenges faced by public servants in adopting e-government. In addition, longitudinal studies would enable researchers to examine how perceptions, utilization patterns, and service delivery outcomes evolve in response to policy reforms, institutional learning, and technological advancements.

Fourth, although the study examined six key determinants performance expectancy, effort expectancy, social influence, facilitating conditions, perceived risk, and level of application, with training programs as a moderating variable, other contextual and governance-related factors may also influence e-government utilization. Variables such as political will, cybersecurity preparedness, organizational culture, leadership support, and regulatory frameworks were not explicitly included in the model. Future research should consider incorporating these additional moderators and mediators to provide a more nuanced and context-sensitive explanation of e-government adoption and utilization dynamics.

Fifth, the study focused exclusively on public servants as users of e-government systems, without incorporating the perspectives of citizens, who are the ultimate beneficiaries of public service delivery. Future studies should examine citizen-level outcomes such as trust, satisfaction, accessibility, and perceived service quality. Particular attention should be paid to issues related to the digital divide, especially among rural populations, older citizens, and marginalized groups, to ensure that e-government reforms promote inclusiveness and equity in digital governance.

In addition, demographic and contextual variables such as age, educational level, tenure, and type of agency were not explicitly modeled as control variables, despite their potential influence on technology utilization behavior. Future research could integrate these factors to better identify which categories of users are more likely to adopt and effectively utilize e-government systems. Similarly, while this study identified training as a critical facilitator, future work could explore differential training effects, examining

how training outcomes vary across user groups and how they interact with organizational leadership and institutional culture.

Hence, while this study advances theoretical, methodological, and practical understanding of e-government utilization and public service delivery in a developing country context, it also underscores the need for continued research. Future studies should extend the analysis to examine the long-term impacts of e-government reforms, including their effects on transparency, cost efficiency, accountability, and corruption reduction, while drawing comparative lessons from both domestic and international best practices.

5.6 Further Recommendations

Based on the hypotheses tested and the findings obtained, several recommendations are proposed to strengthen the utilization of e-government and enhance effective public service delivery in Kaduna State. First, the Kaduna State Government should prioritize system integration, reliability, and functional consistency across all e-government platforms. While several digital systems exist, their effectiveness depends on seamless interoperability, minimal downtime, and user-friendly interfaces. Investments should therefore focus on consolidating fragmented platforms, improving backend integration across MDAs, and ensuring continuous system availability. Features such as automated workflows, real-time service tracking, mobile compatibility, and simplified navigation should be emphasized to raise performance expectancy and improve user satisfaction. Regular system audits should be institutionalized to monitor functionality and ensure compliance with established digital governance standards.

Second, training programs should be redesigned as a continuous capacity-building mechanism rather than one-off interventions. Training should move beyond basic technical orientation to include problem-solving, advanced system use, data management, and change management skills. Importantly, training effectiveness should be monitored through post-training evaluations, usage analytics, and performance indicators to ensure that capacity-building efforts translate into actual utilization. In addition, peer-learning models and departmental digital champions can be introduced to leverage social influence and reinforce positive norms around e-government usage within MDAs.

Third, the study recommends strengthening facilitating conditions through coordinated infrastructure and support systems. Reliable internet connectivity, adequate digital devices, and responsive technical support units should be guaranteed across all participating MDAs. Strategic partnerships with telecommunications providers, ICT hubs, and private-sector technology firms can help bridge infrastructural gaps, particularly in underserved areas. In parallel, robust cybersecurity frameworks must be enforced, including data encryption, access controls, and routine security assessments. Clear communication of privacy policies and data protection measures will further reduce perceived risk and enhance trust in e-government platforms.

Fourth, the government should intensify public awareness and sensitization campaigns to demonstrate the tangible benefits of e-government, such as reduced processing time, improved transparency, and lower transaction costs. These campaigns should be decentralized and community-focused, engaging traditional leaders, civil society organizations, professional associations, and local influencers to expand reach,

particularly in rural communities. Evidence-based success stories and service performance metrics should be publicly communicated to reinforce confidence in digital platforms.

Fifth, and most critically, the study recommends the establishment of strong e-governance oversight and accountability mechanisms. A centralized e-government coordination and monitoring unit should be empowered to oversee implementation, enforce standards, and evaluate performance across MDAs. This unit should be responsible for setting service-level benchmarks, tracking utilization metrics, monitoring compliance, and publishing periodic performance reports. Transparent reporting structures will enhance accountability and ensure that e-government initiatives contribute meaningfully to service delivery outcomes rather than remaining symbolic reforms.

In addition, structured feedback and grievance-redress mechanisms should be embedded within all e-government platforms to allow users to report challenges, suggest improvements, and assess service quality. User feedback should be systematically analyzed and integrated into system upgrades and policy adjustments. To encourage sustained utilization, incentive-based mechanisms such as reduced service fees for online transactions, recognition of high-performing MDAs, or digital service excellence awards can be introduced.

Finally, effective e-government implementation requires multi-stakeholder collaboration. The Kaduna State Government should actively involve local governments, non-governmental organizations, community-based associations, and development

partners in planning, monitoring, and evaluation processes. Such collaboration will enhance transparency, resource mobilization, and institutional learning. Regular evaluations of e-government initiatives should be conducted to identify gaps, refine strategies, and ensure that digital governance reforms remain aligned with citizens' needs and accountability expectations.

5.7 Conclusion

This study has provided a comprehensive examination of the determinants influencing the utilization of e-government in Kaduna State, grounded in the Unified Model of Electronic Government Adoption (UMEGA). By empirically analysing performance expectancy, effort expectancy, social influence, facilitating conditions, perceived risk, and level of application, alongside the moderating role of training programs, the study offers a nuanced understanding of how technological, human, and institutional factors interact to shape effective public service delivery in Kaduna State, Nigeria.

The findings highlight the central role of effort expectancy, demonstrating that the perceived ease of use and simplicity of e-government platforms significantly enhance public servants' willingness to utilize digital systems. This outcome reflects the operational realities of Kaduna State, where variations in digital literacy and prior exposure to ICT tools mean that complex or poorly designed systems can quickly discourage usage. The result reinforces the argument that usability is not merely a technical concern but a strategic determinant of successful e-government implementation in developing contexts.

Similarly, the importance of facilitating conditions underscores the structural dimension of e-government utilization. Adequate infrastructure, reliable internet connectivity, access to digital devices, and institutional support systems emerged as essential enablers of effective utilization. The Kaduna State context illustrates that even well-designed platforms cannot deliver meaningful outcomes where infrastructural gaps, system downtime, or limited technical support persist. This finding aligns with broader evidence from developing countries, where infrastructural readiness often determines whether digital reforms translate into tangible service delivery improvements.

The study also reveals that social influence plays a decisive role in shaping utilization behaviour. In Kaduna State, peer behaviour, organizational norms, and shared experiences within MDAs significantly influence public servants' attitudes toward e-government. This reflects the collectivist tendencies and hierarchical structures prevalent in many public institutions, where endorsement by colleagues and supervisors can accelerate acceptance more effectively than formal directives alone. Consequently, social validation and organizational culture emerge as powerful levers for strengthening e-government utilization.

Importantly, the study demonstrates that training programs act as a critical moderating mechanism, enhancing the effectiveness of key determinants by equipping public servants with the confidence, skills, and practical competence required to integrate e-government tools into routine administrative processes. However, the mixed moderating effects observed also suggest that training alone is insufficient unless it is well-targeted, continuous, and supported by functional systems and enabling environments. This

finding explains why Kaduna State's results reflect both progress and persistent challenges, mirroring patterns observed in comparable developing contexts.

From a theoretical perspective, this study extends the applicability of UMEGA by validating its relevance in a subnational, developing-country context. While the model demonstrates strong explanatory power, the findings confirm that contextual variables such as infrastructural limitations, institutional capacity, and training quality significantly condition adoption outcomes. By integrating these realities, the study enriches the UMEGA framework and contributes to a more context-sensitive understanding of e-government utilization beyond Western settings.

Practically, the study offers clear policy-relevant insights. For Kaduna State to maximize the benefits of e-government, sustained emphasis must be placed on improving platform usability, strengthening infrastructural and institutional support, fostering positive social dynamics within MDAs, and institutionalizing structured, needs-based training programs. When these elements are jointly addressed, e-government can evolve from a symbolic reform into a transformative instrument for transparency, efficiency, and citizen-centred service delivery.

In conclusion, while this research provides a strong empirical foundation, it also highlights the need for continuous evaluation, adaptive reform, and evidence-based policy learning. Future studies should extend this analysis across other Nigerian states, incorporate organizational- and system-level variables, and employ mixed-methods approaches to capture deeper experiential insights. Ultimately, by building on these findings, e-government initiatives in Kaduna State and Nigeria more broadly can play a

pivotal role in advancing good governance, administrative efficiency, and inclusive digital transformation.



REFERENCES

- Abah, E. O., & Nwokwu, P. M. (2019). Problems and prospects of e-governance in an emerging state: The Nigerian example. *IOSR Journal of Humanities and Social Science*, 24(9), 14-21. <https://doi.org/10.9790/0837-2409091421>
- Abasilim, U. D., Gberevbie, D. E., & Ifaloye, O. R. (2017). Attaining a better public service delivery through e-governance adoption in Nigeria. In *4th Covenant University Conference on E-Governance In Nigeria (CUCEN 2017)*.
- Abbas, Q., Alyas, T., Alghamdi, T., Alkhodre, A. B., Albouq, S., Niazi, M., & Tabassum, N. (2024). Redefining governance: A critical analysis of sustainability transformation in e-governance. *Frontiers in Big Data*, 7, 1349116.
- Abbouti, K., Zouhri, M., & Bouayad, A. (2024). The Contribution of Government to Business (G2B) Online Administration Systems to Investment Attractiveness: A Delphi Method Survey. *African Scientific Journal*, 3(22).
- Abdul Wahi, N. S., & Berenyi, L. (2024). Examining the Effect of Social Influence and Facilitating Conditions on E-government Adoption by Employees in Mandatory Condition. In *Proceedings of the Central and Eastern European eDem and eGov Days 2024* (pp. 104-110)
- AbdulKareem, A. K., & Oladimeji, K. A. (2024). Cultivating the digital citizen: trust, digital literacy and e-government adoption. *Transforming Government: People, Process and Policy*, 18(2), 270-286.
- Abdulkareem, A. K., Oladimeji, K. A., Ishola, A. A., Adejumo, A., & Abdulkareem, Z. J. (2024). Factors influencing the adoption of electronic identity in Nigeria. *JeDEM: eJournal of eDemocracy and Open Government*, 16(1), 108-129. <https://doi.org/10.29379/jedem.v16i1.858>
- Abolade, A. O., Dugeri, T., & Adama, J. U. (2018). Challenges of digitalizing land administration system in Nigeria: The Kaduna State experience. In *Proceedings of the 18th African real estate society (AFRES) annual conference* (pp. 67-82).
- Acar, L., Steen, T., & Verschuere, B. (2025). Public values? A systematic literature review into the outcomes of public service co-creation. *Public Management Review*, 27(5), 1357-1389.
- Adejuwon, D. K., Amodu, A., & Majekodunmi, A. (2024). E-governance, restructuring, and government-citizens interaction in Nigeria.
- Adejuwon, K. D. (2025). Smart cities and digital governance in Africa: Transforming urbanization for a sustainable future. *Journal of Public Administration, Policy and Governance Research*, 3(1), 96-108.
- Adeniran, A., Balogun, K., & Ihezue, E. (2023). Towards digital governance in Africa. In *Handbook of public management in Africa* (pp. 355-373). Edward Elgar Publishing.

- Adeolu-Akande, M. A., Oyedokun, D. M., & Oyedokun, G. E. (2023). Evaluating the influence of electronic governance on public services delivery in Nigeria. *Journal of Public Administration and Social Welfare Research*, 8(1), 1-16.
- Adeolu-Akande, O., Nwosu, I., & Aruomo, K. O. (2023). Open Access E-Governance and Public Service Delivery: Evidence from Nigeria. *Global Journal of Management, Social Sciences and Humanities*, 3(3), 136-150.
- Adetomiwa, F. T., & Gberevbie, D. E. (2022). E-Administration and the G2e interaction in Oto-Awori council development area of Lagos state, Nigeria: A technology acceptance model-based approach. *African Renaissance*, 2022(si1), 285.
- Adeyemi, A. O., & Aigbavboa, C. O. (2021). Determinants of e-government adoption among public sector employees in Nigeria: An UTAUT perspective. *Journal of Good Governance and Sustainable Development in Africa*, 7(2), 1-15.
- Adeyemi, O. O. (2019). Local government administration in Nigeria: A historical perspective. *Journal of Public Administration and Governance*, 9(2), 161–178. <https://doi.org/10.5296/jpag.v9i2.14813>
- Adjei, D. (2013). Innovation leadership management. *International Journal of ICT and Management*, 1(2), 103–106.
- Afierofo, P., Perkins, R., Zhou, X.T., Hoanca, B. & Protasel, G. (2023). Adopting e-government to monitor public infrastructure projects execution in Nigeria: The public perspective. *Heliyon*, 9(8), e18552. doi: 10.1016/j.heliyon.2023.e18552
- Afridi, F. (2017). Governance and public service delivery in India (No. 10856). *IZA Discussion Papers*.
- Ahmad, R. B., Mohamed, A. M. bin, & Manaf, H. B. A. (2017). The relationship between transformational leadership characteristics and succession planning program in the Malaysian public sector. *International Journal of Asian Social Science*, 7(1), 19–30.
- Ahmad, S., & Dhoon, M. (2024). User experience of using e-government applications and its impact on user satisfaction: Case of Jordan. *International Journal of Procurement Management*, 19(3), 386-412.
- Ahmed, S. K. (2024). How to choose a sampling technique and determine sample size for research: a simplified guide for researchers. *Oral Oncology Reports*, 12, 100662.
- Aidinlis, S. (2022). Government-to-Business (G2B) research data sharing and the GDPR: Reconciling the public with the private? In *Research Handbook on EU Data Protection Law* (pp. 115-142). Edward Elgar Publishing.
- Ajibade, O. A., Ibietan, J., & Ayelabola, O. (2017). The effect of e-governance on public service delivery in Nigeria: A study of selected public sector organizations. *Journal of Public Administration and Governance*, 7(3), 180-195.

- Ajibade, P., & Mutula, S. (2021). E-Government Adoption in Nigeria: Barriers and Policy Recommendations. *Government Information Quarterly*, 38(3), 101584.
- Ajibola, O. O., & Ogunmodede, K. (2025). E-Governance and Public Service Delivery: Evidence from Nigeria. *ORGANIZE: Journal of Economics, Management and Finance*, 4(2), 1-17.
- Akida, R., & Kandiri, J. M. (2024). E-Government and Service Delivery at Kenya Revenue Authority Headquarters in Nairobi City County, Kenya.
- Akinwale, A. A. (2020). The role of research assistants in enhancing data quality: Lessons from Nigerian public sector studies. *African Journal of Social Sciences*, 10(2), 45–60.
- Akinwale, A. A., & Kazeem, K. O. (2018). Public Sector Reforms and Service Delivery in Nigeria: A Yamane-Based Sampling Approach. *African Journal of Public Administration*.
- Alao, D. O., Osakede, K. O., & Owolabi, T. Y. (2015). Challenges of local government administration in Nigeria: Lessons from comparative analysis. *International Journal of Development and Economic Sustainability*, 3(4), 61–79.
- Al-Azzam, M., & Abood, H. (2022). E-government services effectiveness: A systematic review of the literature. *Journal of Public Administration Research and Theory*, 32(1), 137-156.
- Alexopoulos, C., Saxena, S., Matheus, R., & Rizun, N. (2025). Artificial Intelligence (AI)-powered public service delivery in smart cities: The case of the Gulf Cooperation Council (GCC) Countries. In *ICT, the business sector and smart cities* (pp. 85-98). Routledge.
- Alraja, M. N. (2016). The effect of social influence and facilitating conditions on e-government acceptance from the individual employees' perspective. *Polish Journal of Management Studies*, 14(2), 18-27.
- Alraja, M. N., Hammami, S., Chikhi, B., & Fekir, S. (2016). The influence of effort and performance expectancy on employees to adopt e-government: Evidence from Oman. *International Review of Management and Marketing*, 6(4), 930-934.
- Alryalat, H., Rana, N. P., & Dwivedi, Y. K. (2021). An Empirical Examination of Factors Affecting E-Government Adoption in Developing Countries: Insights from Middle Eastern Contexts. *Information Systems Frontiers*, 23(4), 897–918.
- Alsaif, M. (2014). *Factors affecting citizens' adoption of e-government moderated by socio-cultural values in Saudi Arabia* (Doctoral dissertation, University of Birmingham).
- Alshehri, M. (2020). The role of training in the adoption of e-government services: A systematic review. *International Journal of Public Administration*, 43(8), 652-663.

- Alshurafat, H., Arabiat, O., & Shehadeh, M. (2024). The intention to adopt metaverse in Islamic banks: an integrated theoretical framework of TAM and religiosity intention model. *Journal of Islamic Marketing*, (ahead-of-print).
- Alvesson, M., & Sköldbberg, K. (2009). *Reflexive methodology: New vistas for qualitative research* (2nd ed.). SAGE.
- Ameen, A. K., Kadir, D. H., Abdullah, D. A., Maolood, I. Y., & Khidir, H. A. (2024). Assessing E-government effectiveness: a structural equation modeling approach. *Aro-The Scientific Journal of Koya University*, 12(2), 52-60.
- Anand, P., & Saraswati, A. K. (2018). Innovative leadership: A paradigm in modern HR practices. *Global Journal of Finance and Management*, 6(6), 497–502.
- Andraško, J., Mesarčik, M., & Hamul'ák, O. (2021). The regulatory intersections between artificial intelligence, data protection and cybersecurity: Challenges and opportunities for the EU legal framework. *AI & Society*, 36(2), 623-636.
- Aneja, A., & Xu, G. (2024). Strengthening state capacity: Civil service reform and public sector performance during the gilded age. *American Economic Review*, 114(8), 2352-2387.
- Anichebe, A. (2019). Effect of integrated personal payroll information system on employee welfare: Evidence from federal ministries in Nigeria. *Australian Journal of Arts and Scientific Research*, 22(1), 1–143.
- Anshari, M., Hamdan, M., Ahmad, N., & Ali, E. (2025). Public service delivery, artificial intelligence and the sustainable development goals: trends, evidence and complexities. *Journal of Science and Technology Policy Management*, 16(1), 163-181.
- Ärleskog, C. (2025). Making Sense of Responsibility in Rural Sustainability Work. *Journal of Organizational Sociology*, (0).
- Arumede, M. U., & EDWIN, E. I. (2025). Assessing The Effectiveness of E-Government Initiatives in Improving Public Service Delivery: A Comparative Study of Developed and Developing Countries. *Journal homepage: <https://gjrbpublication.com/gjrbm>*, 5(01).
- Asaju, K., & Ayeni, E. (2021). Public bureaucracy and national development in Nigeria: Issues and challenges. *Nigerian Journal of Administrative and Political Sciences*, 5(1), 69-90.
- Asomba, I. I., Ejim, C. J., Daniel, O. O., & Ogochukwu, O. G. (2024). E-governance and improved public revenue generation in Nigeria: Issues and prospects.
- Aswani, D. R., & Mutua, S. N. (2023). G2C Communication Through Government Service Portals: An Assessment of Kenya's e-Citizen and eFNS Portals. *Multidisciplinary Journal of Technical University of Mombasa*, 2(2), 28-36.
- Atmadja, a. (2025). *Pengaruh performance expectancy, effort expectancy, dan social influence terhadap e-government usage behavior melalui behavior intention*

- sebagai variabel pemediasi (doctoral dissertation, universitas muhammadiyah yogyakarta).
- Australian Public Service Commission. (2023). Australian Public Service Reform: annual progress report 2023.
- Avazov, S., & Lee, S. (2022). E-government services adoption in Uzbekistan: An empirical validation of extended version of the Unified Model of Electronic Government Acceptance (UMEGA). *Journal of Policy Studies*, 37(3).
- Awosanya, Y. (2019). *4 factors hindering Nigeria from fully adopting e-governance, according to Nigerian Internet exchange boss Muhammed Rudman*. Techpoint Africa.
- Ayesha, A.D., Ahlan, A.R., Ibrahim, N.M. & Ahmed, M. (2025). Impact and Challenges of E-Government Implementation in Nigeria: A Systematic Literature Review. *International Journal on Perceptive and Cognitive Computing*, 11(2):42-57
- Ayo, C. K. (2020). The State of E-Government Implementation in Nigeria: A Critical Review. *African Journal of Information Systems*, 12(1), 1–20.
- Aytekin, A., Özköse, H., & Ayaz, A. (2022). Unified theory of acceptance and use of technology (UTAUT) in mobile learning adoption: Systematic literature review and bibliometric analysis. *COLLNET Journal of Scientometrics and Information Management*, 16(1), 75-116.
- Bada, O. O., Agwu, E. C., & Gidado, H. (2019). Challenges of e-government implementation in Nigeria public sector. *International Journal of Advanced Research in Computer Science and Software Engineering*, 9(8), 10-15.
- Balaji, K. (2025). E-Government and E-Governance: Driving Digital Transformation in Public Administration. *Public Governance Practices in the Age of AI*, 23-44.
- Barbera, C., Nabatchi, T., Sancino, A., & Sicilia, M. (2025). Monetary and symbolic rewards: Do they matter for fostering co-commissioning and co-delivery of public services? *Public Management Review*, 27(1), 1-28.
- Barbier, L., & Tengeh, R. K. (2022). The nexus between public administration, knowledge management and service delivery: A literature analysis.
- Barlian, A., Satria, D., Haryanto, J., Faturahman, M. I. A., & Widyawan, B. (2025). E-Government and the Metaverse: Opportunities, Challenges and Digital Innovations. *IJSTIAMI: International Journal of Social, Tax, Information, Administration, Management and Innovation*, 1(1), 27-38.
- Barr, A., Lindelow, M., & Serneels, P. (2009). Corruption in public service delivery: An experimental analysis. *Journal of Economic Behavior & Organization*, 72(1), 225-239.
- Basu, S. (2004). E-government and developing countries: an overview. *International Review of Law, Computers & Technology*, 18(1), 109-132.
- Batley, R. (2004). The politics of service delivery reform. *Development and Change*, 35(1), 31-56.

- Batterham, P. J., Brown, K., Trias, A., Poyser, C., Kazan, D., & Calex, A. L. (2022). Systematic review of quantitative studies assessing the relationship between environment and mental health in rural areas. *Australian Journal of Rural Health*, 30(3), 306-320.
- Bauer, T. (2017). Research Philosophy and Method. In *Responsible Lobbying*. Springer Fachmedien Wiesbaden, 69-84.
- Bawuro, F. A., Danjuma, I., & Wajiga, H. (2018). Factors influencing teachers' innovative behaviour in northeast Nigeria secondary schools. *Path of Science*, 4(3), 1007–1017. <https://doi.org/10.22178/pos.32-9>
- Beardwell, H.L., (2001). *Human resource management: A contemporary approach*. Essex Pearson Education Limited.
- Bekkers, V. J., & Zouridis, S. (1999). Electronic service delivery in public administration: Some trends and issues. *International Review of Administrative Sciences*, 65(2), 183-195.
- Bell, F., & Rogers, J. (2021). 'Fit and proper' coders? How might legal service delivery by non-lawyers be regulated? *Legal Ethics*, 24(2), 111-140.
- Bello, I., Fedus, W., Du, X., Cubuk, E. D., Srinivas, A., Lin, T. Y., ... & Zoph, B. (2021). Revisiting resnets: Improved training and scaling strategies. *Advances in Neural Information Processing Systems*, 34, 22614-22627.
- Bello, M. F., & Mela, K. (2022). IPPIS Policy and the Challenges of its Implementation in the Nigerian Universities: A Conceptual Discourse. *NIU Journal of Social Sciences*, 8(3), 53-62.
- Bertot, J. C., Jaeger, P. T., & Grimes, J. M. (2012). Promoting transparency and accountability through ICTs: Challenges and opportunities for e-government. *Information Technology for Development*, 18(1), 15-25. <https://doi.org/10.1080/02681102.2011.637486>
- Besley, T., & Ghatak, M. (2007). Reforming public service delivery. *Journal of African Economies*, 16(suppl_1), 127-156.
- Bhatia, V., & Bhatia, S. (2025). Evaluating e-governance: a comparative analysis and way forward. *Digital Policy, Regulation and Governance*. Advance online publication. <https://doi.org/10.1108/DPRG-08-2024-0187>
- Bianchi, C., Nasi, G., & Rivenbark, W. C. (2021). Implementing collaborative governance: Models, experiences, and challenges. *Public Management Review*, 23(11), 1581-1589.
- Bloem, J., Doorn, M. Van, Duivestijn, S., Excoffier, D., Maas, R., & Ommeren, E. Van. (2018). The fourth industrial revolution things to tighten the link between IT and OT.
- Blum, J. R., & Rogger, D. (2021). Public Service Reform in Post-Conflict Societies. *The World Bank Research Observer*, 36(2), 260-287.

- Bochel, H., & Bochel, C. (2019). Local political leadership and the modernisation of local government. *Journal of Local Government Studies*, 36(6), 723–737. Retrieved from <http://hdl.handle.net/10419/168760%0AStandard-Nutzungsbedingungen>:
- Borghouts, J., Eikey, E., Mark, G., De Leon, C., Schueller, S. M., Schneider, M., & Sorkin, D. H. (2021). Barriers to and facilitators of user engagement with digital mental health interventions: Systematic review. *Journal of Medical Internet Research*, 23(3), e24387.
- Bourne, H., Jenkins, M. & Parry, E. (2019). Mapping Espoused Organizational Values, *Journal of Business Ethics*, 2019(159), 133–148. <https://doi.org/10.1007/s10551-017-3734-9> (Retrieved on August 29, 2022).
- Breakfast, N. B., Nomarwayi, T., & Dodd, N. (2021). Liberation songs in protest actions: The case of service delivery protests in Nelson Mandela metropolitan municipality, Eastern Cape Province in South Africa. *African Journal of Development Studies*, 2021(si2), 143.
- Bryman, A., & Bell, E. (2015). *Business Research Methods* (5th ed.). Oxford University Press.
- Bujang, M. A., Omar, E. D., Foo, D. H. P., & Hon, Y. K. (2024). Sample size determination for conducting a pilot study to assess reliability of a questionnaire. *Restorative dentistry & endodontics*, 49(1).
- Burrell, G. & Morgan, G. (1979). *Sociological Paradigms and Organisational Analysis: Elements of the Sociology of Corporate Life*. London: Heinemann.
- Bush, T., Ng, A. Y. M., Too, W. K., Glover, D., & Chay, J. (2023). Ensuring acceptability and feasibility: The challenges of educational policy reform in Malaysia. *Leadership and Policy in Schools*, 22(2), 314-329.
- Cagigas, D., Clifton, J., Diaz-Fuentes, D., & Fernández-Gutiérrez, M. (2021). Blockchain for public services: A systematic literature review. *IEEE Access*, 9, 13904-13921.
- Callen, M., Gulzar, S., Hasanain, A., Khan, M. Y., & Rezaee, A. (2025). Personalities and public sector performance: Evidence from a health experiment in Pakistan. *Economic Development and Cultural Change*, 73(3), 000-000.
- Campbell, S., Greenwood, M., Prior, S., Shearer, T., Walkem, K., Young, S., Bywaters, D. & Walker, K. (2019). Purposive sampling: complex or simple? Research case examples. *Journal of Research in Nursing*, 25(8), 652–661. DOI: 10.1177/1744987120927206.
- Carlini, N., Hayes, J., Nasr, M., Jagielski, M., Sehwag, V., Tramer, F., & Wallace, E. (2023). Extracting training data from diffusion models. 32nd USENIX Security Symposium (USENIX Security 23), 5253-5270.
- Cassidy, T. (2023). Revenue persistence and public service delivery. SSRN 3045950.

- Cathala, X., & Moorley, C. (2023). Diffusion of social media in nursing education: A scoping review. *Nurse Education Today*, 127, 105846.
- Cepiku, D., & Meneguzzo, M. (2011). Public administration reform in Italy: A shopping basket approach to the New Public Management or the New Weberianism? *International Journal of Public Administration*, 34(1), 19-25. DOI: 10.1080/01900692.2010.506088. Routledge.
- Chamid, A., Santi, M. W., Rachmawati, E., & Yunus, M. (2022). Evaluasi Penggunaan Sistem E-Posyandu dengan Metode Technology Acceptance Model (TAM) di Posyandu Manggis 15, 15A, dan 18 Dusun Darungan Jember. *Jurnal Penelitian Kesehatan "SUARA FORIKES" (Journal of Health Research "Forikes Voice")*, 13(4), 1105-1112.
- Chan, F. K., Thong, J. Y., Brown, S. A., & Venkatesh, V. (2025). Design characteristics and service experience with e-government services: A public value perspective. *International Journal of Information Management*, 80, 102834.
- Chanasuc, S., Praneetpolgrang, P., Suvachittanont, W., & Jirapongsuwan, P. (2012). The acceptance model for information and communication technology adoption in Thai public organizations. *International*
- Chapman, B. (2024). *The profession of government: The public service in Europe*. Taylor & Francis.
- Chen, L.-D., & Tan, J. (2004). Technology adaptation in e-commerce: Key determinants of virtual stores acceptance. *European Management Journal*, 22(1), 74–86. <https://doi.org/10.1016/J.EMJ.2003.11.014>
- Chen, Y. C., & Kim, S. (2024). Introduction to the special issue: digital transformation of government and the Asia Pacific region. *Asia Pacific Journal of Public Administration*, 46(4), 315-320.
- Chen, Y. C., & Lee, J. (2021). Collaborative data networks for public service: Governance, management, and performance. In *Digital Government and Public Management* (pp. 40-58). Routledge.
- Cheung, J. C. W., Ni, M., Tam, A. Y. C., Chan, T. T. C., Cheung, A. K. Y., Tsang, O. Y. H., & Wong, D. W. C. (2022). Virtual reality based multiple life skill training for intellectual disability: A multicenter randomized controlled trial. *Engineered Regeneration*, 3(2), 121-130.
- Chi, O. H., Jia, S., Li, Y., & Gursoy, D. (2021). Developing a formative scale to measure consumers' trust toward interaction with artificially intelligent (AI) social robots in service delivery. *Computers in Human Behavior*, 118, 106700.
- Chilunjika, A. (2024). From traditional channels of service delivery to e-government: Lessons for Zimbabwe. *Social Sciences, Humanities and Education Journal (SHE Journal)*, 5(2), 291-â.

- Chinelo, n. M. (2025). Effect of e-government on public accountability of federal ministries, departments and agencies (MDAs) in Nigeria. *Anuk College of Private Sector Accounting Journal*, 2(2), 189-205.
- Chinwe, P., & Pius, V. C. (2019). Effects of financial management reforms on financial corruption in Nigeria's public sector. *International Journal of Trend in Scientific Research and Development (IJTSRD)*, 3(6), 839–852.
- Cho, J., DeStefano, T., Kim, H., Kim, I., & Paik, J. H. (2023). What's driving the diffusion of next-generation digital technologies? *Technovation*, 119, 102477.
- Chohan, S. R., & Hu, G. (2022). Strengthening digital inclusion through e-government: Cohesive ICT training programs to intensify digital competency. *Information Technology for Development*, 28(1), 16-38.
- Choiriyah, I. U., UB, A. R., & Sukmana, H. (2023). The Effectiveness of the Government to Government (G2G) Model Through SISKEUDES. *JKMP (Jurnal Kebijakan dan Manajemen Publik)*, 11(1), 48-56.
- Chukwuemeka, E. E. O., Okeke, M. N., & Onwuchekwa, J. C. (2018). Enhancing service delivery in Joint Admission and Matriculation Board (JAMB) Nigeria: The imperative of e-governance. *African Policy Spectrum Development and Public Review*, 1(1), 1-13.
- Chung, M., & Kim, J. (2019). The Internet information and technology research directions are based on the fourth industrial revolution. *KSII Transactions on Internet and Information Systems*, 10(3), 1311–1320.
- Clifton, J., Warner, M. E., Gradus, R., & Bel, G. (2021). Re-municipalization of public services: trend or hype?. *Journal of Economic Policy Reform*, 24(3), 293-304.
- Coker, K. K., & Thakur, R. (2024). Alexa, may I adopt you? The role of voice assistant empathy and user-perceived risk in customer service delivery. *Journal of Services Marketing*, 38(3), 301-311.
- Cortés-Sánchez, J. D. (2018). Innovation in Latin America through the lens of bibliometrics - Noiseless, crammed and fading away. *Scientometrics*, 121(2), 869–895.
- Creswell, J. W. (2013). *Research design: Qualitative, quantitative, and mixed methods approach*. California, U.S.A: Sage Publications, Incorporated.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approach*. Sage Publications.
- Criado, J. I., Alcaide-Muñoz, L., & Liarte, I. (2025). Two decades of public sector innovation: Building an analytical framework from a systematic literature review of types, strategies, conditions, and results. *Public Management Review*, 27(3), 623-652.
- Crotty, M. (1998). *The foundations of social research: meaning and perspective in the research process*. London: SAGE.

- Crous, M. (2004). Service delivery in the South African public service: Implementation of the Batho Pele principles by Statistics South Africa. *Journal of Public Administration*, 39(si-1), 574-589.
- Cuadrado-Ballesteros, B., García-Sánchez, I. M., & Prado-Lorenzo, J. M. (2013). Effect of modes of public services delivery on the efficiency of local governments: A two-stage approach. *Utilities Policy*, 26, 23-35.
- Dahiru, K., Yusuf, Y., & Yerima, H. M. (2022). Nexus between e-governance and service delivery in Nigeria: (Assessing the role of stakeholders). *International Journal of Management Studies and Social Science Research*, 4(4), 144–152.
- Damanpour, F. (1992). Organizational size and innovation. *Organization Studies*, 13(3), 375–402. <https://doi.org/10.1177/017084069201300304>
- Damanpour, F. (1996). Organizational complexity and innovation: Developing and testing multiple contingency models. *Management Science*, 42(5), 693–716. <https://doi.org/10.1287/mnsc.42.5.693>
- Dana, R. A. D., Egerau, A., Roman, A., Dughi, T., Balas, E., Maier, R., ... & Gavril, R. A. D. (2022). A preliminary investigation of the technology acceptance model (TAM) in early childhood education and care. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, 13(1), 518–533.
- Dang, T. C., Van, H. V., & Le Van, D. (2025). E-government and corruption in an emerging country: New perspectives from a spatiotemporal approach. *International Review of Economics & Finance*, 104111
- Dash, B., & Ansari, M. F. (2022, April). An effective cybersecurity awareness training model: First defense of an organizational security strategy.
- Dash, S. B., & Jain, A. (2025). Experience from e-government services: A topic model approach. *IIM Kozhikode Society & Management Review*, 14(1), 61–74.
- David, E. M., & Susan, M. B. (2010). Achieving high organisational performance through servant leadership. *Journal of Business Inquiry*, 9(1), 74–88.
- Davis, F. D. (1989). Perceived usefulness, ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340. <https://doi.org/10.2307/249008>
- Davis, F. D. (1993). User acceptance of information technology: System characteristics, perceptions, and behavioural impacts. *International Journal of Man-Machine Studies*, 38(3), 475–487. <https://doi.org/10.1006/imms.1993.1022>
- Davis, F. D., & Granić, A. (2024). Epilogue: What will the future of TAM be like? In *The Technology Acceptance Model: 30 Years of TAM* (pp. 103–108). Springer International Publishing.
- Davis, F. D., & Granić, A. (2024). Evolution of TAM. In *The technology acceptance model: 30 years of TAM* (pp. 19-57). Cham: Springer International Publishing.

- Davis, F. D., & Venkatesh, V. (2020). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425–478. <https://doi.org/10.2307/30036540>
- Davis, F. D., Bagozzi, R. P., Warshaw, P. R., Richard, B., & Paul, R. W. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35(8), 982–1003. <http://home.business.utah.edu/actme/7410/DavisBagozzi.pdf>
- Degu, G., & Yigzaw, T. (2006). *Research methodology*. Ethiopia Public Health Training Initiative, The Carter Center, The Ethiopia Ministry of Health, and The Ethiopia Ministry of Education.
- Deininger, K., & Mpuga, P. (2005). Does greater accountability improve the quality of public service delivery? Evidence from Uganda. *World Development*, 33(1), 171–191.
- Deloitte. (2023). Public Sector Digital Transformation: A Journey to Cloud and Beyond. Deloitte Insights.
- Denzin, N. K., & Lincoln, Y. S. (2011). The discipline and practice of qualitative research. In N. Denzin & Y. Lincoln (Eds.), *The SAGE handbook of qualitative research* (pp. 1–19). SAGE.
- Dhingra, M., & Mudgal, R. K. (2019). Applications of perceived usefulness and perceived ease of use: A review. In *2019 8th International Conference System Modeling and Advancement in Research Trends (SMART)* (pp. 293–298). IEEE.
- Dibra, M. (2015). Rogers's theory on diffusion of innovation is the most appropriate theoretical model for studying factors influencing the integration of sustainability in tourism businesses. *World Conference on Technology, Innovation and Entrepreneurship*, 195, 1453–1462. <https://doi.org/10.1016/j.sbspro.2015.06.443>
- Dike, E. E. (2018). E-governance and administrative efficiency: Issues and challenges. *International Journal of Innovative Research in Education, Technology & Social Strategies*, 6(1), 184–194.
- Dillon, S., Armstrong, E., Goudy, L., Reynolds, H., & Scurry, S. (2021). Improving special education service delivery through interdisciplinary collaboration. *Teaching Exceptional Children*, 54(1), 36–43.
- Dima, A. M., Begu, L., Vasilescu, M. D., & Maassen, M. A. (2018). The relationship between the knowledge economy and global competitiveness in the European Union. *Sustainability Journal*, 10(2), 1–15. <https://doi.org/10.3390/su10061706>
- Djarmiko, R. G. H., Sinaga, O., & Pawirosumarto, S. (2025). Digital transformation and social inclusion in public services: A qualitative analysis of e-government adoption for marginalized communities in sustainable governance. *Preprints*. <https://doi.org/10.20944/preprints202503.0151.v1>
- Doe, B., & Aboagye, P. D. (2022). The place of subsidy: Affordable sanitation service delivery in slums of Kumasi, Ghana. *GeoJournal*, 87(1), 295–317.

- Du, W., & Liang, R. Y. (2024). Teachers' continued VR technology usage intention: An application of the UTAUT2 model. *Sage Open*, 14(1), 21582440231220112.
- Duan, Y., & Dong, X. (2025). Use intention and behavior in e-government among rural women: An extension of the UTAUT-2 model. *Information Development*, 02666669251316512.
- Dudley, G., Banister, D., & Schwanen, T. (2021). Urban local authorities and the delivery of micromobility strategies: Obstacles in the implementation of bicycle hire in the UK. *Built Environment*, 47(4), 480–498.
- Dwivedi, Y. K., Rana, N. P., Janssen, M., Lal, B., Williams, M. D., & Clement, M. (2017). An empirical validation of a unified model of electronic government adoption (UMEGA). *Government Information Quarterly*, 34(2), 211–230. <https://doi.org/10.1016/j.giq.2017.03.001>
- Dwivedi, Y. K., Rana, N. P., Jeyaraj, A., Clement, M., & Williams, M. D. (2020). Re-examining the unified theory of acceptance and use of technology (UTAUT): Towards a revised theoretical model. *Information Systems Frontiers*, 22(2), 301–338. <https://doi.org/10.1007/s10796-019-09937-1>
- Efthymiou, I. P. (2025). The role of e-government and e-governance in modern societies. In *Public Governance Practices in the Age of AI* (pp. 45–68). IGI Global.
- Ehrenkranz, P., Rosen, S., Boulle, A., Eaton, J. W., Ford, N., Fox, M. P., ... & Holmes, C. B. (2021). The revolving door of HIV care: Revising the service delivery cascade to achieve the UNAIDS 95-95-95 goals. *PLoS Medicine*, 18(5), e1003651.
- El Bakali, I., Brouziyne, Y., Ait El Mekki, A., Maatala, N., & Harbouze, R. (2024). The impact of policies on the diffusion of agricultural innovations: Systematic review on evaluation approaches. *Outlook on Agriculture*, 53(1), 3–14.
- Endeki, D. N., & Minja, D. (2021). Role of new public management practices in service delivery in the public sector: The case of the State Department of Public Works—Kenya. *International Academic Journal of Arts and Humanities*, 1(2), 188–209. http://iajournals.org/articles/iajah_v1_i2_188_209.pdf
- Erlandson, D., Harris, E., Skipper, B., & Allen, S. (1993). *Doing naturalistic inquiry*. SAGE.
- Etikan, I., Musa, S. A., & Alkassim, S. R. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1–4. <https://doi.org/10.11648/j.ajtas.20160501.11>
- Eze, S. C., Chinedu-Eze, V. C., & Bello, A. O. (2021). The role of subjective norms in e-government adoption in Nigeria. *Journal of Science and Technology Policy Management*, 12(1), 134-153.

- Fadelelmoula, A. A. (2022). Exploring the contributing factors of the continuance intention to use the mobile government-to-employees services. *Journal of Information & Knowledge Management*, 21(03), 2250034.
- Fakhruzzaman, M. N., & Dimitrova, V. V. (2020). Factors influencing e-government adoption in Indonesia: The importance of perceived risk. *Journal of Advanced Research in Dynamical and Control Systems*, 12, 125–131.
- Fan, R., Wang, Y., Chen, F., Du, K., & Wang, Y. (2022). How do government policies affect the diffusion of green innovation among peer enterprises? —An evolutionary-game model in complex networks. *Journal of Cleaner Production*, 364, 132711.
- Faqih, K. M., & Jaradat, M. I. R. M. (2021). Integrating TTF and UTAUT2 theories to investigate the adoption of augmented reality technology in education: Perspective from a developing country. *Technology in Society*, 67, 101787.
- Featherman, M. S., & Pavlou, P. A. (2003). Predicting e-services adoption: a perceived risk facets perspective. *International Journal of Human-Computer Studies*, 59(4), 451-474.
- Fedorko, I., Bačik, R., & Gavurova, B. (2021). Effort expectancy and social influence factors as main determinants of performance expectancy using electronic banking. *Banks and Bank Systems*, 16(2), 27–34.
- Feeney, M. K., & Porumbescu, G. (2021). The limits of social media for public administration research and practice. *Public Administration Review*, 81(4), 787–792.
- Ferdous, J., & Das, R. C. (2022). Service delivery performance of urban local government in Bangladesh. *Journal of Governance and Social Policy*, 3(1), 51–65.
- Ferlie, E., & Ongaro, E. (2022). *Strategic management in public services organizations: Concepts, schools and contemporary issues*. Routledge.
- Fetrina, E., Ratnawati, S., Utami, M. C., Mulyani, L. E., Rahajeng, E., & Waspodo, B. (2024, October). Switching Behavior Analysis of E-Government Application Using the Extended UTAUT Model. In *2024 12th International Conference on Cyber and IT Service Management (CITSM)* (pp. 1-6). IEEE.
- Feyerabend, P. K. (1978). *Against method: Outline of an anarchistic theory of knowledge*. Verso.
- Filgueiras, F., Flávio, C., & Palotti, P. (2019). Digital transformation and public service delivery in Brazil. *Latin American Policy*, 10(2), 195–219.
- Firkola, P. (2014). Japanese management practices past and present. *Economic Journal of Hokkaido University*, 35(2006), 115–130.

- Fitri, H., Latip, M., Omar, A. H., Mei, T., & Shahrom, A. (2017). A questionnaire-based approach on technology acceptance model for integrated multiple ankle technology device on patient psychology. *Sains Humanika*, 2(1).
- Folorunso, O. O., & Simeon, A. O. (2021). The gains and the pains of integrated payroll and personnel information systems (IPPIS) policy implementation in Nigeria. *Journal of Human Resource and Sustainability Studies*, 9(4), 551–569.
- Fussell, S. G., & Truong, D. (2022). Using virtual reality for dynamic learning: An extended technology acceptance model. *Virtual Reality*, 26(1), 249–267.
- Gagné, M., et al. (2022). The impact of training on technology acceptance: A meta-analytic review. *Journal of Applied Psychology*, 107(4), 581-602.
- Galushi, L. T., & Malatji, T. L. (2022). Digital public administration and inclusive governance at the South African Local Government, in depth analysis of e-government and service delivery in Musina Local Municipality. *Academic Journal of Interdisciplinary Studies*, 11(6), 116–126.
- Gansser, O. A., & Reich, C. S. (2021). A new acceptance model for artificial intelligence with extensions to UTAUT2: An empirical study in three segments of application. *Technology in Society*, 65, 101535.
- Gant, J. (2008). Electronic Governance: A New Dawn in Services' Delivery. *Journal of Public Administration and Social Welfare Research*, 8(1), 1-15.
- García de Blanes Sebastián, M., Sarmiento Guede, J. R., & Antonovica, A. (2022). Application and extension of the UTAUT2 model for determining behavioral intention factors in use of the artificial intelligence virtual assistants. *Frontiers in Psychology*, 13, 993935.
- Gartika, D., & Widiyanto, A. (2024). How do local governments implement e-government: A case study from Bali Province, Indonesia. *JeDEM-eJournal of eDemocracy and Open Government*, 16(1), 61–88. <https://doi.org/10.29379/jedem.v16i1.898>
- Gartika, D., Widiyanto, A., Diana, M., Hapiah, Y., & Khotimah, F. K. H. (2024). How does local government implement e-government: A case study from Bali Province, Indonesia. *JeDEM: eJournal of eDemocracy and Open Government*, 16(1), 61–88. <https://doi.org/10.29379/jedem.v16i1.898>
- Gazuda, M., Tyukhtenko, N., Lomachynska, I., Dunai, M., Vernydub, V., & Babich, R. (2025). The impact of digitalization and e-governance on transformation of state management mechanisms of the regional development. *Journal of Theoretical and Applied Information Technology*, 103(3).
- Gberevbie, D., Joshua, S., Excellence-oluye, N., & Oyeyemi, A. (2017). Accountability for sustainable development and the challenges of leadership in Nigeria, 1999–2015. *Sage Open Access Journal*, 7(4), 1–10. <https://doi.org/10.1177/2158244017742951>

- Gelissen, L. M., van den Bergh, R., Talebi, A. H., Geerlings, A. D., Maas, B. R., Burgler, M. M., ... & Darweesh, S. K. (2024). Assessing the validity of a Parkinson's care evaluation: the PRIME-NL study. *European Journal of Epidemiology*, 39(7), 811-825.
- Gesk, T. S., & Leyer, M. (2022). Artificial intelligence in public services: When and why citizens accept its usage. *Government Information Quarterly*, 39(3), 101704.
- Gieske, H., Meerkerk, I. V., & Buuren, A. V. (2018). The impact of innovation and optimization on public sector performance: Testing the contribution of connective, ambidextrous and learning capabilities. *Public Performance & Management Review*, 41(5), 1–42. <https://doi.org/10.1080/15309576.2018.1470014>
- Girth, A. M., Hefetz, A., Johnston, J. M., & Warner, M. E. (2012). Outsourcing public service delivery: Management responses in noncompetitive markets. *Public Administration Review*, 72(6), 887–900.
- Gladys, W. W. (2021). Influence of physical resource infrastructure on health sector service delivery in Nyeri County, Kenya. *African Journal of Education, Science and Technology*, 6(4), 74–87.
- Goldfinch, S., & Halligan, J. (2024). Reform, hybridization, and revival: the status of new public management in Australia and New Zealand. *Public Management Review*, 26(9), 2542-2560.
- Gorji, S. (2025). Comparing the effectiveness of occupational stress training package with mindfulness-based cognitive therapy on job burnout of Tam Kar's employees in order to health promotion. *Journal of Education and Health Promotion*, 14(1), 58.
- Gorondutse, A. H., & Hilman, H. (2012). The influence of Business Social Responsibility (BSR) on organizational performance: A pilot study. *International Journal of Business and Management Tomorrow*, 2(12), 1–6.
- Grassini, S., Aasen, M. L., & Møgelvang, A. (2024). Understanding university students' acceptance of ChatGPT: Insights from the UTAUT2 model. *Applied Artificial Intelligence*, 38(1), 2371168.
- Grigalashvili, V. (2022). E-government and e-governance: Various or multifarious concepts. *International Journal of Scientific and Management Research*, 5(1).
- Grogan-Johnson, S. (2021). The five W's meet the three R's: The who, what, when, where, and why of telepractice service delivery for school-based speech-language therapy services. *Seminars in Speech and Language*, 42(2), 162–176.
- Guadarrama, S., Yue, S., Boyd, T., Jiang, J. W., Songhori, E., Tam, T., & Mirhoseini, A. (2021). *Circuit Training: An open-source framework for generating chip floor plans with distributed deep reinforcement learning*. GitHub.
- Guba, E. (1990). The alternative paradigm dialogue. In E. Guba (Ed.), *The Paradigm Dialogue* (pp. 15–27). Sage.

- Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of Qualitative Research* (pp. 105–117). Sage.
- Guoping, L. I., Yun, H. O. U., & Aizhi, W. U. (2017). Fourth industrial revolution: Technological drivers, impacts and coping methods. *Chinese Geographical Science*, 27(4), 626–637. <https://doi.org/10.1007/s11769-017-0890-x>
- Gupta, V., Singh, S., & Bhattacharya, A. (2017). The relationships between leadership, work engagement and employee innovative performance: Empirical evidence from the Indian R&D context. *International Journal of Innovation Management*, 21(7), 1–30. <https://doi.org/10.1142/S1363919617500554>
- Ha, L. T. (2022). Are digital business and digital public services a driver for better energy security? Evidence from a European sample. *Environmental Science and Pollution Research*, 29(18), 27232–27256.
- Hackman, J. K., Ayarkwa, J., Osei-Asibey, D., Adjei-Kumi, T., & Kissi, E. (2021). Re-examining the benefits of decentralization for infrastructure delivery at the metropolitan municipal and district assemblies (MMDAs) in Ghana. *Advances in Social Sciences Research Journal*, 8(2), 382–397.
- Hadi, B. U., Zainal, V. R., & Hakim, A. (2023). Accountability and transparency of mass organization fund management in Indonesia. *Community Development Journal: Jurnal Pengabdian Masyarakat*, 4(5), 10207–10211.
- Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of partial least squares structural equation modelling in marketing research. *Journal of the Academy of Marketing Science*, 40(3), 414–433.
- Hair, Jr., J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis a global perspective* (7th ed.). Pearson.
- Hakimi, M., Ghafory, H., & Fazil, A. W. (2024). Enterprise Architecture in E-Government: A Study of Integration Challenges and Strategic Opportunities. *International Journal Software Engineering and Computer Science (IJSECS)*, 4(2), 440–452.
- Hamdok, A. (2010). Innovations and best practices in public sector reforms: The case of civil service in Ghana, Kenya, Nigeria and South Africa. *Governance and Public Administration Division of ECA*.
- Han, J. H., & Sa, H. J. (2022). Acceptance of and satisfaction with online educational classes through the technology acceptance model (TAM): The COVID-19 situation in Korea. *Asia Pacific Education Review*, 23(3), 403–415.
- Hanham, J., Lee, C. B., & Teo, T. (2021). The influence of technology acceptance, academic self-efficacy, and gender on academic achievement through online tutoring. *Computers & Education*, 172, 104252.
- Haridy, S. M., Gaber, H. R., & Elsamadicy, A. (2025). Factors Affecting Customers' Attitudes Toward the Intention to Use Electronic Government Services in

- Egypt. *The Academic Journal of Contemporary Commercial Research*, 5(1), 72-90.
- Haris, N. F., Hayati, L. N., & Widyawati, D. (2025). evaluating fikom thesis advisory quality with management by objectives at universitas muslim indonesia. *Jurnal Pilar Nusa Mandiri*, 21(1), 92-99.
- Hasan, I., Amabile, A., & Tam, D. Y. (2025). Robotic mitral valve surgery: Evolving history, techniques, and training paths. *Current Opinion in Cardiology*, 40(2), 72-74.
- Hasan, M. H., Idrus, D. S. Z. B. S., & Nordin, D. N. B. (2025). An Empirical study on E-Government Intentions and Adoption: Mediating effects of Bangladeshi Citizens' Attitudes and Trust in Government. *International Journal of Research and Innovation in Social Science*, 9(1), 762-784.
- Hasan, M. N. (2016). Positivism: To what extent does it aid our understanding of the contemporary social world? *Quality & Quantity*, 50(1), 317-325.
- Hasan, Z. (2016). Culture as a mediator between resilience, empathy and commitment. *International Journal of Innovative Research and Development*, 5(2).
- Hassan, A. O., Ishola, A. A., & Lamidi, K. O. (2024). Transforming Election Management through Information and Communication Technology: The Nigerian Experience. *African Renaissance*, 135.
- Helms, L. (2016). Democracy and innovation: from institutions to agency and leadership. *Democratization*, 23(3), 459–477. <https://doi.org/10.1080/13510347.2014.981667>
- Hendren, K., Newcomer, K., Pandey, S. K., Smith, M., & Sumner, N. (2023). How qualitative research methods can be leveraged to strengthen mixed methods research in public policy and public administration? *Public Administration Review*, 83(3), 468-485.
- Hilal, A., & Varela-Neira, C. (2022). Understanding consumer adoption of mobile banking: Extending the UTAUT2 model with proactive personality. *Sustainability*, 14(22), 14708.
- Hompashe, D. M. (2021). *Essays on accountability and service delivery in education and healthcare in South Africa* [Doctoral dissertation, Stellenbosch University].
- Hong, E., & Park, J. (2024). The effect of technological readiness dimensions on the adoption of autonomous vehicles: Focusing on behavioral reasoning theory. *Transportation research part F: traffic psychology and behaviour*, 100, 101-114.
- Horth, D., & Buchner, D. (2014). *Innovation leadership: How to use innovation to lead effectively, work collaboratively and drive results*. Centre for Creative Leadership.

- Horth, David, M., & Vehar, J. (2015). *Innovation How Leadership Makes the Difference*. Centre for Creative Leadership.
- Horváth, T. M. (2016). From municipalisation to centralism: Changes to local public service delivery in Hungary. In *Public and social services in Europe: From public and municipal to private sector provision* (pp. 185-199). Palgrave Macmillan.
- Hossain, E. (2024, August). User Experience Evaluation Framework for Malaysian E-government Mobile Applications: A Participatory Design-infused approach. In *Proceedings of the Participatory Design Conference 2024: Situated Actions, Doctoral Colloquium, PDC places, Communities-Volume 3* (pp. 87-91).
- Hossan, D., Dato'Mansor, Z., & Jaharuddin, N. S. (2023). Research population and sampling in quantitative study. *International Journal of Business and Technopreneurship (IJBT)*, 13(3), 209-222.
- Hossen, M. D., Abedin, M. Z., Chowdhury, T. M., Islam, Z., & Kabir, M. R. (2025). Unveiling the impact of e-governance on the transformation from digital to smart Bangladesh. *Pakistan Journal of Life & Social Sciences*, 23(1).
- Humphreys, P. C. (1998). *Improving public service delivery* (Vol. 7). Institute of Public Administration.
- Husin, R., Othman, A. A., Othman, Z., & Baharom, N. (2024). E-Government Practices and Organizational Performance in Malaysia Local Governments. *Journal of Technology and Operations Management (JTOM)*, 19(2), 9-19.
- Hwang, I., & Seo, R. (2024). Organizational support for digital transformation in the metaverse: a contingent pathway from user experience to digitalization resistance. *R&D Management*.
- Ibietan, J. (2013). New public management and public service effectiveness in Nigeria: a new pragmatic discourse. *Public Policy and Administration Research*, 3(7), 53-62.
- Ibietan, J., & Ndukwe, P. (2014). Local government administration in Nigeria and the localist theory: Exploring the nexus. *Studies in Social Sciences and Humanities*, 1(4), 130–139. Retrieved from <http://www.rassweb.com>
- ICMA. (2018). *Practices for effective local government leadership*. Retrieved from <https://icma.org/practices-effective-local-government-leadership>
- Iddrisu, I., & Fuseini, I. (2025). The impact of digital technologies on public service delivery: the role of organizational structures and decision-making. *International Journal of Organizational Analysis*.
- IGI Global. (2022). Predicting customers use of electronic government services in Nigeria. Retrieved from: <https://www.igi-global.com/viewtitle.aspx?titleid=274019>

- Ihemadu, M. C., & Anyiam, C. G. (2024). E-governance and service delivery in Nigeria: challenges and prospects. *African Journal of Social and Behavioural Sciences*, 14(1).
- Ilieva, G., Yankova, T., Ruseva, M., Dzhabarova, Y., Zhekova, V., Klisarova-Belcheva, S., ... & Dimitrov, A. (2024). Factors influencing user perception and adoption of e-government services. *Administrative Sciences*, 14(3), 54.
- Iqbal, J., & Sidhu, M. S. (2022). Acceptance of dance training system based on augmented reality and technology acceptance model (TAM). *Virtual Reality*, 26(1), 33-54.
- Irhebhude, M.E., Kolawole, .O. Yashim, M.S. & Uche, A.C. (2022). Cybersecurity Awareness among Public Sector Employees of Kaduna State E-Government System. *NDA Journal of Military Science and Interdisciplinary Studies*, 1(2), 69 - 82
- Isah, I. S., Chiroma, A. A., & Dance, A. M. (2024). Assessment of e-governance implementation on service delivery in Nasarawa State University, Keffi (2017-2021). *AKSU Journal of Administration and Corporate Governance*, 1(1), 89-100.
- Ismail, Z., & Anjum, S. (2021). Privacy Policy, Training and Adaption of Employee Monitoring Technology to Curtail Workplace Harassment in Organizations: An Application of TAM. *Computational Intelligence in Information Systems: Proceedings of the Computational Intelligence in Information Systems Conference (CIIS 2020)* (pp. 85-94). Springer.
- Iyeshim, M. (2023). Information and communication technology and the attainment of sustainable development goals in Nigeria: A digital economy perspective. *Advance Journal of Management and Social Sciences*, 7(4), 1-19.
- Jafree, S. R., Momina, A., Muazzam, A., Wajid, R., & Calib, G. (2021). Factors affecting delivery health service satisfaction of women and fear of COVID-19: Implications for maternal and child health in Pakistan. *Maternal and Child Health Journal*, 25(6), 881-891.
- Jakobsen, M., & Andersen, S. C. (2013). Coproduction and equity in public service delivery. *Public Administration Review*, 73(5), 704-713.
- Jeilani, A., Ahmed, S. A., & Arabow, A. (2025). Understanding e-government adoption among government employees: the mediating role of perceived attitude across key predictors. *Discover Sustainability*, 6(1), 724.
- Jejenywa, T. O., Mhlongo, N. Z., & Jejenywa, T. O. (2024). Conceptualizing e-government initiative: lessons learned from Africa-US collaborations in digital governance. *International Journal of Applied Research in Social Science*, 6(4), 759-769.

- Jidwin, A. P., & Mail, R. (2015). The concept of new public management: The adoption case in Malaysian public sector. *Proceedings of 4th European Business Research Conference*, 9-10.
- Jones, C., & Pimdee, P. (2017). Innovative ideas: Thailand 4.0 and the fourth industrial revolution. *Asian International Journal of Social Sciences*, 17(1), 4–35.
- Joshi, A., & Moore, M. (2004). Institutionalised co-production: Unorthodox public service delivery in challenging environments. *Journal of Development Studies*, 40(4), 31-49.
- Joy, A., Pathak, R., Shrestha, A., Spezzano, F., & Winiecki, D. (2024). Modeling the Diffusion of Fake and Real News through the Lens of the Diffusion of Innovations Theory. *ACM Transactions on Social Computing*, 7(1-4), 1-24.
- Judijanto, L. (2023). Implementation of blockchain technology in improving transparency of public services: A case study on government service delivery in Indonesia. *West Science Information System and Technology*, 1(02), 63-71.
- Kamal, M. M. (2006). IT innovation adoption in the government sector: Identifying the critical success factors. *Journal of Enterprise Information Management*, 19(2), 192-222. <https://doi.org/10.1108/17410390610645085>
- Kamale, M. Y., & Asaju, K. (2025). E-governance Adoption and Service Delivery in Selected Tertiary Institutions in Adamawa State, Nigeria 2010–2024. *Futurity of Social Sciences*, 3(1), 126-153.
- Kanyumba, B. (2022). Training as a tool for service delivery: A case study of health care workers in Gwanda, Zimbabwe. *African Journal of Inter/Multidisciplinary Studies*, 4(1), 384-393.
- Karnsomdee, P. (2025). E-Government Adoption in Thai Public Sector Organizations: Citizens' Perspective. *Journal of Theoretical and Applied Electronic Commerce Research*, 20(2), 103.
- Karunakaran, Z., Kulkarni, P., & Subhashis, B. A. (2022, October). Paper to Cloud: Digitizing the Government-to-Business (G2B) interface in Tamil Nadu, India. In *Proceedings of the 15th International Conference on Theory and Practice of Electronic Governance* (pp. 542-545).
- Kassen, M. (2022). Blockchain and e-government innovation: Automation of public information processes. *Information Systems*, 103, 101862.
- Katebi, A., Homami, P., & Najmeddin, M. (2022). Acceptance model of precast concrete components in building construction based on Technology Acceptance Model (TAM) and Technology, Organization, and Environment (TOE) framework. *Journal of Building Engineering*, 45, 103518.
- Kekez, A., Howlett, M., & Ramesh, M. (2019). Collaboration in public service delivery: What, when and how. In *Collaboration in public service delivery* (pp. 2-19). Edward Elgar Publishing.

- Khalil, S., & Adelabu, S. A. (2012). Model for efficient service delivery in public service. *Journal of Public Administration and Governance*, 2(3), 85-95.
- Khan, S., Ullah, S., & Nobanee, H. (2024). ICT diffusion, e-governance, and sustainability in the digital era. *Sustainable Futures*, 8, 100272.
- Kim, S., & Yoon, G. (2015). An innovation-driven culture in local government: Do senior manager's transformational leadership and the climate for creativity matter? *Public Personnel Management*, 44(1), 22-42. <https://doi.org/10.1177/0091026014568896>
- Kim, Y. J., & Ku, Y. (2022). APSP 2022: Looking beyond periodontology to the digital transformation in the Asia-Pacific region. *Journal of Periodontal & Implant Science*, 52(5), 351.
- Kim, Y., & Lee, J. (2024). Digitally vulnerable populations' use of e-government services: inclusivity and access. *Asia Pacific Journal of Public Administration*, 46(4), 422-446.
- Kraus, S., Breier, M., Lim, W. M., Dabić, M., Kumar, S., Kanbach, D., ... & Ferreira, J. J. (2022). Literature reviews as independent studies: guidelines for academic practice. *Review of Managerial Science*, 16(8), 2577-2595.
- Kuhlmann, S., Wollmann, H., & Reiter, R. (2025). *Introduction to comparative public administration: Administrative systems and reforms in Europe*. Edward Elgar Publishing.
- Kuhn, T. S. (1970). *The structure of scientific revolutions* (2nd ed.). University of Chicago Press.
- Kulal, A., Rahiman, H. U., Suvama, H., Abhishek, N., & Dinesh, S. (2024). Enhancing public service delivery efficiency: Exploring the impact of AI. *Journal of Open Innovation: Technology, Market, and Complexity*, 10(3), 100329.
- Kumasi, T. C., Nyarko, K. B., & Antwi-Agyei, P. (2022). Universal water service delivery: Insights on what it takes from Ghana. *World Water Policy*, 8(1), 9-30.
- Lapuate, V., & Van de Walle, S. (2020). The effects of new public management on the quality of public services. *Governance*, 33(1), 1-15. <https://doi.org/10.1111/gove.12502>
- Lasky-Fink, J., & Linos, E. (2024). Improving delivery of the social safety net: The role of stigma. *Journal of Public Administration Research and Theory*, 34(2), 270-283.
- Latupeirissa, J. J. P., Dewi, N. L. Y., Prayana, I. K. R., Srikandi, M. B., Ramadiansyah, S. A., & Pramana, I. B. G. A. Y. (2024). Transforming public service delivery: A comprehensive review of digitization initiatives. *Sustainability*, 16(7), 2818.
- Lee, J. B., & Porumbescu, G. A. (2019). Engendering inclusive e-government use through citizen IT training programs. *Government Information Quarterly*, 36(1), 69-76.

- Lee, M., Yun, J. J., Pyka, A., Won, D., Kodama, F., Schiuma, G., & Jung, K. (2018). How do we respond to the fourth industrial revolution or the second information technology revolution? Dynamic new combinations between technology, market, and society through open innovation. *Journal of Open Innovation: Technology, Market and Complexity*, 4(3), 1-24. <https://doi.org/10.3390/joitmc4030021>
- Lee-Geiller, S., & Lee, T. (2019). Using government websites to enhance democratic E-governance: A conceptual model for evaluation. *Government Information Quarterly*, 36(2), 208-225. <https://doi.org/10.1016/j.giq.2019.01.003>
- Lenk, K. (2003). Electronic service delivery - A driver of public sector modernisation. *Information Polity*, 7(2-3), 87-96.
- León-Garrido, A., Gutiérrez-Castillo, J. J., Barroso-Osuna, J. M., & Cabero-Almenara, J. (2025). Evaluation of the use and acceptance of mobile apps in higher education using the TAM model. *RIED-Revista Iberoamericana de Educación a Distancia*, 28(1).
- Li, S., Tian, C., Tam, K., Ma, R., & Li, L. (2023). Breaking On-device Training Memory Wall: A Systematic Survey. *arXiv preprint arXiv:2306.10388*.
- Li, W. (2021). The role of trust and risk in citizens' e-government services adoption: A perspective of the extended UTAUT model. *Sustainability*, 13(14), 7671.
- Li, Y., & Shang, H. (2020). Service quality, perceived value, and citizens' continuous-use intention regarding e-government: Empirical evidence from China. *Information & Management*, 57(3), 103197.
- Lim, W. M., Kumar, S., & Ali, F. (2022). Advancing knowledge through literature reviews: 'what', 'why', and 'how to contribute'. *The Service Industries Journal*, 42(7-8), 481-513.
- Liu, H., Tam, D., Muqeeth, M., Mohta, J., Huang, T., Bansal, M., & Raffel, C. A. (2022). Few-shot parameter-efficient fine-tuning is better and cheaper than in-context learning. *Advances in Neural Information Processing Systems*, 35, 1950-1965.
- Liu, Y., He, H., Han, T., Zhang, X., Liu, M., Tian, J., ... & Ge, B. (2024). Understanding LLMs: A comprehensive overview from training to inference. *Neurocomputing*, 129190.
- Loeffler, E., & Bovaird, T. (Eds.). (2021). *The Palgrave handbook of co-production of public services and outcomes* (p. 728). Palgrave Macmillan.
- Lopes, N. V., Soares, D. S., Nielsen, M. M., & Tavares, A. (2017). Research gaps on public service delivery. *Proceedings of the 10th International Conference on Theory and Practice of Electronic Governance*.
- Lowe, T., French, M., Hawkins, M., Hesselgreaves, H., & Wilson, R. (2021). New development: Responding to complexity in public services—the human learning systems approach. *Public Money & Management*, 41(7), 573-576.

- Lynch, J., Ramjan, L. M., Glew, P. J., & Salamonson, Y. (2024). How to embed a conceptual or theoretical framework into a dissertation study design. *Nurse researcher*, 32(1).
- MacLean, D., & Titah, R. (2022). A systematic literature review of empirical research on the impacts of e-government: A public value perspective. *Public Administration Review*, 82(1), 23-38.
- Mahamud, S., Fam, S. F., Saleh, H., Kamarudin, M. F., & Wahjono, S. I. (2021, November). Predicting Google Classroom acceptance and use in STEM education: Extended UTAUT2 approach. 2021 2nd SEA-STEM International Conference (SEA-STEM) (pp. 155-159). IEEE.
- Mahant, R. (2025). Artificial intelligence in public administration: a disruptive force for efficient e-governance. *Artificial intelligence*, 19(01).
- Maharjan, M., Maharjan, S., Shrestha, R., Neupane, B., & Ameen, A. (2025). Critical factors affecting adoption of Nepals e-government services: a literature review. *International Journal of Public Sector Performance Management*, 15(1), 43-51.
- Mahmoud, M., & Othman, R. (2021). New public management in the developing countries: effects and implications on human resource management. *Journal of Governance and Integrity*, 4(2), 73-87.
- Maina, L. W., & Otieno, G. O. (2024). Leveraging Technology for Government Service Delivery: Suggestions for Securing the e-Citizen Service in Kenya. *East African Journal of Information Technology*, 7(1), 81-91.
- Majid, M. N., & Abidin, Z. (2023). Factors Influencing Community Behavior towards SIKER: An Extension of the TAM model. *Journal of Advances in Information Systems and Technology*, 5(1), 23-37.
- Mäkelä, J. (2023). Deterrents of online grocery shopping: a phenomenographic study of Finnish consumer perceptions.
- Maktub, M. A. K., Handayani, P. W., & Sunarso, F. P. (2025). Citizen acceptance and use of the Jakarta Kini (JAKI) e-government: Extended unified model for electronic government adoption. *Heliyon*, 11(2).
- Malodia, S., Dhir, A., Mishra, M., & Bhatti, Z. A. (2021). Future of e-Government: An integrated conceptual framework. *Technological Forecasting and Social Change*, 173, 121102.
- Manaf, H. A. (2012). The influence of knowledge sharing on performance among Malaysian public sector managers and the moderating role of individual personality. The University of Hull. Retrieved from <https://hydra.hull.ac.uk/catalog/hull:6378>
- Manaf, H. A. (2016). Knowledge management and leadership in Malaysia. *Journal of Asian Review of Public Affairs and Policy*, 1(1), 93–117. <https://doi.org/10.1108/JKM-01-2020-0014>

- Manaf, H. A., & Mohamed, A. M. (2013). Assessing public participation initiatives in local governments' decision-making in Malaysia. In KAPS Summer and International Conference (pp. 865–866).
- Manaf, H. A., & Mohamed, A. M. (2014). Malay business leaders' characteristics and their business success. *Journal of Governance and Development*, 10(1), 109–135.
- Manaf, H. A., Harvey, W. S., Armstrong, S. J., & Lawton, A. (2020). Differences in personality and the sharing of managerial tacit knowledge: An empirical analysis of public sector managers in Malaysia. *Journal of Knowledge Management*, 24(5), 1177–1199.
- Manaf, H. A., Zan, Z. M., & Ananthan, S. S. (2017). Measuring the governance of local government from the perspective of community in Malaysia. *International Journal of Development and Sustainability*, 6(11), 1576–1586.
- Maragno, G., Tangi, L., Gastaldi, L., & Benedetti, M. (2023). Exploring the factors, affordances and constraints outlining the implementation of Artificial Intelligence in public sector organizations. *International Journal of Information Management*, 73, 102686.
- Marcellus, L., & Collins, B. (2022). Risk Management in Local Government. *Local Government Studies*, 48(1), 51-60.
- Marchewka, J. T., & Kostiwa, K. (2007). An application of the UTAUT model for understanding student perceptions using course management software. *Communications of the IIMA*, 7(2), 93–104. <http://scholarworks.lib.csusb.edu/ciima>
- Marpaung, F. K., Dewi, R. S., Grace, E., Sudirman, A., & Sugiat, M. (2021). Behavioral stimulus for using bank Mestika mobile banking services: UTAUT2 model perspective. *Golden Ratio of Marketing and Applied Psychology of Business*, 1(2), 61-72.
- Marzano, M., Perotti, P., & Palmirani, M. (2021). Ensuring transparency in public administration: The role of artificial intelligence. *Journal of Public Administration Research and Theory*, 31(3), 529–544.
- Masadeh, S. A., & El-Haggar, N. (2024). Analyzing factors influencing IoT adoption in higher educational institutions in Saudi Arabia using a modified TAM model. *Education and Information Technologies*, 29(5), 6407-6441.
- Masiya, T., Davids, Y. D., & Mangai, M. S. (2019). Assessing service delivery: Public perception of municipal service delivery in South Africa. *Theoretical and Empirical Researches in Urban Management*, 14(2), 20-40.
- Masuku, M. M., & Jili, N. N. (2019). Public service delivery in South Africa: The political influence at local government level. *Journal of Public Affairs*, 19(4), e1935.
- Mc Fadden, S., Flood, T., Shepherd, P., & Gilleece, T. (2022). Impact of COVID-19 on service delivery in radiology and radiotherapy. *Radiography*,

- McIntyre, J., Cleland, K. E., & Ramklass, S. S. (2021). A review of South African public healthcare policies addressing service delivery for wheelchairs through a Primary Health Care lens. *South African Journal of Occupational Therapy*, 51(2), 82-90.
- Medeiros, M., Ozturk, A., Hancer, M., Weinland, J., & Okumus, B. (2022). Understanding travel tracking mobile application usage: An integration of self-determination theory and UTAUT2. *Tourism Management Perspectives*, 42, 100949.
- Meehan, A., & Tien, J. (2022). The impact of leadership on service innovation in public sector transformations. *International Review of Public Administration*, 27(4), 162–181.
- Mehmood, T. (2021). Does information technology competencies and fleet management practices lead to effective service delivery? Empirical evidence from e-commerce industry. *International Journal of Technology, Innovation and Management (IJTIM)*, 1(2), 14-41.
- Meiranto, W., Farlyagiza, F., Faisal, F., Nur Afri Yuyetta, E., & Puspitasari, E. (2024). The mediating role of behavioral intention on factors influencing user behavior in the E-government state financial application system at the Indonesian Ministry of Finance. *Cogent Business & Management*, 11(1), 2373341
- Melendez, M. A., & Frey, J. (2015). "Participation in Sustainable Development: Social Equality, Social Involvement and Bioethics." In *Scientific and Technological Research*, 26.
- Mendez-Rivera, C. A., Patiño-Toro, O. N., Valencia-Arias, A., & Arango-Botero, D. M. (2023). Factors influencing the adoption of e-government services: A study among university students. *Economies*, 11(9), 225.
- Menon, P. (2023). New Approaches to Public Sector Reform: Insights from the COVID-19 Pandemic. *International Journal of Public Administration*, 46(4), 1-14.
- Mensah, I. K. (2022). The effects of effort expectancy and facilitating conditions on e-government adoption in Ghana. *International Journal of Public Administration*, 45(8), 635-647.
- Menzies, D. (2020). The impact of digital transformations on public service delivery: A framework for understanding change. *Journal of Policy Analysis and Management*, 39(1), 118–139.
- Mergel, I. (2021). Open innovation in the public sector: Drivers and barriers for the adoption of Challenge.gov. In *Digital Government and Public Management* (pp. 94-113). Routledge.
- Mete, C. (2021). Social Housing and its Impact on Public Service Delivery: A Case from Urban Turkey. *Journal of Urban Regeneration and Renewal*, 14(3), 213-226.

- Min, S., So, K. K. F., & Jeong, M. (2021). Consumer adoption of the Uber mobile application: Insights from diffusion of innovation theory and technology acceptance model. *Future of Tourism Marketing* (pp. 2-15). Routledge.
- Mirandilla, M. G. P. (2008). Promoting e-government in the context of new public management: The case of the local government of Cebu, Philippines.
- Moffat, A., & Auer, A. (2006). Corporate environmental innovation (CEI): A government initiative to support corporate sustainability leadership. *Journal of Cleaner Production*, 14, 589–600. <https://doi.org/10.1016/j.jclepro.2005.07.010>
- Moon, H., Park, M., Ahn, Y., & Kwon, N. (2023). Moderating effect of project type on the relationship between project delivery systems and cost performance. *Journal of Management in Engineering*, 39(1), 04022066.
- Mphahlele, N. S., Kekwaletswe, R. M., & Seaba, T. R. (2025). Model to explain use of E-Government service change: Use of unified theory of acceptance and use of technology and information systems success model to explain use of E-Government service change: Emerging market case. *Telematics and Informatics Reports*, 17, 100190.
- Msenge, P., & Nzewi, O. (2021). A proposed citizen participation–public trust model in the context of service delivery protests in South African local government. *Journal of Local Government Research and Innovation*, 2, 26.
- Muhammad, M., Arief, A., & Fuad, A. (2024). ANALISIS PENERIMAAN APLIKASI SISTER KEMENDIKBUD DENGAN MODEL UTAUT: STUDI KASUS PENGGUNAAN G2E. *IJIS-Indonesian Journal On Information System*, 9(1), 26-34.
- Mulwa, J. K. (2018). Influence of headteachers' exposure to management training on implementing public procurement regulations in Kenya. *International Journal of Education and Research*, 6(2), 149–156.
- Mulwa, J. K. (2018). Influence of headteachers' exposure to management training on implementing public procurement regulations in Kenya. *International Journal of Education and Research*, 6(2), 149–156.
- Muneer, F., Azam, A., Yang, H., & Saeed, M. (2024). Examining Perceived Privacy, Perceived Security and Technology Anxiety into UMEGA in Improving Adoption Behavior of E-Government Services: An Evidence from Pakistan. *International Journal of Human–Computer Interaction*, 1-13.
- Mustafa, S., Zhang, W., Anwar, S., Jamil, K., & Rana, S. (2022). An integrated model of UTAUT2 to understand consumers' 5G technology acceptance using SEM-ANN approach. *Scientific Reports*, 12(1), 20056.
- Mustafazade, A. (2024). Digital transformation in public sector administration: A case study of e-governance in Halmstad Municipality, Sweden. urn:nbn:se:hh:diva-54708

- Mwita, K. (2025). Understanding research philosophies and designs: A guide for early-career researchers. *Eminent Journal of Social Sciences*, 1(1), 43-52.
- Nanda, W., & Lita, P. S. (2025). A Contextual Analysis and Critical of e-Government as a Form of Public Accountability and Equitable Public Service Delivery. *E Jurnal Akuntansi*, 35(1), 15-31.
- Nasri, W. (2025). Citizens' acceptance and use of e-government services in Tunisia: a UTAUT2-based approach. *Management & Sustainability: An Arab Review*.
- National e-Governance Plan (NeGP, 2014). Master e-governance training plan. A guide to e-governance planning. <http://www.negp.com/article/html>.
- Nel-Sanders, D., & Malomane, A. P. (2022). Challenges and best practices for e-municipalities. *Africa's Public Service Delivery and Performance Review*, 10(1), 646.
- Nerantzidis, M., Pazarskis, M., Drogalas, G., & Galanis, S. (2022). Internal auditing in the public sector: A systematic literature review and future research agenda. *Journal of Public Budgeting, Accounting & Financial Management*, 34(2), 189-209.
- Nguyen, T. T. T. (2023). Citizens' intentions to use e-government during the COVID-19 pandemic: integrating the technology acceptance model and perceived risk theory. *Kybernetes*, 52(7), 2329-2346
- Nhede, N. T., Mazenda, A., & Masiya, T. (2022). The South African public service and the Fourth Industrial Revolution. *Africa's Public Service Delivery and Performance Review*, 10(1), 420.
- Nichols, B. E., Cele, R., Jamieson, L., Long, L. C., Siwale, Z., Banda, P., & Rosen, S. (2021). Community-based delivery of HIV treatment in Zambia: Costs and outcomes. *AIDS*, 35(2), 299-306.
- Nnaji, C., Okpala, I., Awolusi, I., & Gambatese, J. (2023). A systematic review of technology acceptance models and theories in construction research. *Journal of Information Technology in Construction*, 28.
- Nnaji, I. L., Ukeje, I. O., Maduekwe, E., Iteshi, C. V., & Ndukwe, C. (2023). Electronic governance and public service delivery challenges. In A. Farazmand (Ed.), *Global Encyclopedia of Public Administration, Public Policy, and Governance*. Springer. https://doi.org/10.1007/978-3-319-31816-5_4377-1
- Nugraha, Y. M. P., & Susanto, T. D. (2022). Factors influencing government employees to adopt e-government innovation: Systematic literature review. In 2022 International Seminar on Application for Technology of Information and Communication (iSemantic) (pp. 249–256).
- Nugroho, A. A., Rahayu, N. S., & Yusuf, R. R. (2023). The role of e-government to improve the implementation of the merit system in Indonesian local governments. *KnE Social Sciences*, 9(2), 516–542.

- Nurhidayat, N., Nurmandi, A., & Misran, M. (2024). Evaluation of the Challenges of E-Government Implementation: Analysis of the E-Government Development Index in Indonesia. *Jurnal Manajemen Pelayanan Publik*, 8(2), 371-383.
- Nwachukwu, U. S. (2025). E-Government and Staff Performance in Local Government System: A Study of Selected Local Government Areas in Imo State, Nigeria. *Journal of Arts and Sociological Research*.
- Nwokike, C., Udegbunam, P. I., & Okonkwo, E. R. (2022). Electronic government (ICT) and public sector reform in Nigeria: An assessment of Joint Admission and Matriculation Board (Jamb). *International Journal of Academic Management Science Research*, 6(3), 34-37.
- Nwuba, C., & Nuhu, B. (2018). E-Governance and Corruption Reduction in Land Registration in Kaduna State. *The International Journal of Engineering and Science (IJES)*, 7(12), 1-10.
- O'Connell, M., Haase, K., Cammer, A., Peacock, S., Cosco, T., & Holtslander, L. (2021). Older adults' acceptance of technology during the pandemic: The COVID technology acceptance model (TAM). *Innovation in Aging*, 5(Suppl 1), 1012.
- OAMEN, T. E. (2023). Technology acceptance model (TAM) for pharmaceutical marketing executives: Validation and implications for human resource management. *Jurnal Aplikasi Manajemen*, 21(4), 876-891.
- Obike, C. A. (2022). E-governance and fight against corruption in Nigeria: The issues and challenges. *International Journal of Innovative Legal & Political Studies*, 10(2), 1-9.
- Obilor, E. I. (2023). Convenience and purposive sampling techniques: Are they the same? *International Journal of Innovative Social and Science Education Research*, 11(1), 1-7.
- Obodo, N. A. (2018). Challenges of implementing electronic governance in public sector organizations in Nigeria. *International Journal of Applied Economics, Finance and Accounting*, 2(1), 30-35.
- Obohjemu, K. O., Onuorah, A. R., Bo, A. H. S. B., Bewaji, O. A., Abayomi, G., Omoregie, J., ... & Amanze, R. U. (2024). self-comforting behaviours across theoretical frameworks: a 50-year systematic review of patterns, mechanisms, and socio-cultural influences. *The American Journal of Social Science and Education Innovations*, 6(12), 51-177.
- OECD. (2017). *Fostering Innovation in the Public Sector*. Retrieved from <https://www.oecd.org/fostering-innovation-in-the-public-sector>
- Oghuvbu, E. A., Gberevbie, D. E., & Oni, S. O. (2022). E-governance in Nigeria: Challenges and prospects. *Journal of Public Administration*, 9(2), 189-199.
- Ogola, C. (2025). Mediating Effect of Human Resource Capacity and Moderating Effect of Top Management Support on the Relationship between E-government Adoption and Service Delivery in Kenya's Public Sector.
- Ogu, O. A., & Chukwurah, D. C. J. (2023). E-governance and public service delivery in Nigeria: A study of Anambra State Civil Service (2018-2022). *International Journal of Research Publication and Reviews*, 4(8), 299-315.

- Ogu, O. A., Abasili, K. N., & Obi, Y. M. (2023). Challenges and measures to enhance the application of e-governance in service delivery in Anambra State civil service. *Irish International Journal of Law, Political Sciences and Administration*, 7(5), 52-71.
- Ojiako, U., AlRaeesi, E. J. H., Chipulu, M., Marshall, A., & Bashir, H. (2024). Innovation readiness in public sector service delivery: An exploration. *Production Planning & Control*, 35(5), 437-460.
- Ojo, A., Janowski, T., & Awotwi, J. (2013). Enabling development through governance and mobile technology. *Government Information Quarterly*, 30(1), S32–S45.
- Ojo, J. S. (2014). E-governance: An imperative for sustainable grassroots development in Nigeria. *Journal of Public Administration and Policy Research*, 6(2), 77-89.
- Ojo, J. S. (2019). e-Governance and Anti-Corruption War in Africa: The Nigeria Experience. In *e-Services*. IntechOpen.
- Ojugo, A. A., & Eboka, A. O. (2021). Empirical Bayesian network to improve service delivery and performance dependability on a campus network. *IAES International Journal of Artificial Intelligence (IJ-AI)*, 10(3), 623-635.
- Okafor, C. E., Nwankwo, T. C., & Adeyemi, B. (2020). Healthcare worker satisfaction in Lagos State: A Yamane Formula application. *Nigerian Journal of Health Systems Research*.
- Okpara, N., & Mamman-Muhammad, A. (2022). Imperatives of anti-corruption initiatives in enhancing public service delivery in Africa. In *Ethics and Accountable Governance in Africa's Public Sector, Volume II: Mapping a Path for the Future* (pp. 105-129). Springer.
- Okwueze, F. O. (2010). E-governance as a tool for public sector development in Nigeria. *International Journal of Research in Arts and Social Sciences*, 2, 493-511.
- Olabimitan, A. O., Ogunmodede, K., & John, S. (2025). E-Governance And Public Service Delivery: Evidence From Nigeria. *ORGANIZE: Journal of Economics, Management and Finance*, 4(1), 110-122.
- Olabimitan, A. O., Ogunmodede, K., & John, S. (2025). E-governance and public service delivery: Evidence from Nigeria. *ORGANIZE: Journal of Economics, Management and Finance*, 4(1), 110-122.
- Oliveira, T., & Martins, M. F. (2010). Understanding e-business adoption across industries in European countries. *Industrial Management & Data Systems*, 110(9), 1337–1354.
- Oliveira, T., & Martins, M. F. (2011). Literature review of information technology adoption models at firm level. *The Electronic Journal Information Systems Evaluation*, 14(1), 110-121.
- Oliveira, T., Thomas, M., & Espadanal, M. (2014). Assessing the determinants of cloud computing adoption: An analysis of the manufacturing and services sectors. *Information & Management*, 51(5), 497–510.
- Omotayo, O. A., Kehinde, O., & Alaba, J. S. (2025). E-governance and public service delivery: Evidence from Nigeria. *Global International Journal of Innovative Research*, 3(1).
- Omotoso, F. (2014). Public-service ethics and accountability for effective service delivery in Nigeria. *Africa Today*, 60(3), 119-139.

- Oosthuizen, R. M. (2020). Sense of coherence, compassionate love and coping in international leaders during the transition into the fourth industrial revolution. *International Journal of Environmental Research and Public Health*, 17(1), 1–18.
- Osborne, S. P., & Brown, L. (2011). Innovation, public policy and public services delivery in the UK. The word that would be king? *Public Administration*, 89(4), 1335-1350.
- Osborne, S. P., & Strokosch, K. (2022). Participation: Add-on or core component of public service delivery? *Australian Journal of Public Administration*, 81(1), 181-200.
- Osborne, S. P., Nasi, G., & Powell, M. (2021). Beyond co-production: Value creation and public services. *Public Administration*, 99(4), 641-657.
- Osborne, S. P., Powell, M., Cui, T., & Strokosch, K. (2022). Value creation in the public service ecosystem: An integrative framework. *Public Administration Review*, 82(4), 634-645.
- Osborne, S. (2020). *Public service logic: Creating value for public service users, citizens, and society through public service delivery*. Routledge.
- Osman, M. A., Omar, A. M., & Mohamed, M. J. M. (2024). Lecturers' adoption of e-learning from the TAM perspective: Transitioning from lecture halls to virtual classrooms. *FWU Journal of Social Sciences*, 56-72.
- Overman, S., & Schillemans, T. (2022). Toward a public administration theory of felt accountability. *Public Administration Review*, 82(1), 12-22.
- Oyedele, S. O. (2015). The Nigerian public service and service delivery under civil rule. *Journal of Public Administration, Finance and Law*, 7, 33-43.
- Palma, J. P. B., Avila, L. S., Mag-iba, M. A. J., Buman-eg, L. D., Nacpil Jr, E. E., Dayrit, D. J. A., & Rodelas, N. C. (2023). E-governance: A critical review of e-government systems features and frameworks for success. *International Journal of Computing Sciences Research*, 7, 2004-2017.
- Palmas, F., Reinelt, R., Cichor, J. E., Plecher, D. A., & Klinker, G. (2021, March). Virtual reality public speaking training: Experimental evaluation of direct feedback technology acceptance. *2021 IEEE Virtual Reality and 3D User Interfaces (VR)* (pp. 463-472). IEEE.
- Panfilova, A. P., & Churilina, I. N. (2015). Innovative management of human resources in educational institutions: Approaches towards training executives of educational organizations. *International Journal of Experimental Education*, 3(1), 1732-1736. <https://doi.org/10.1073/pnas.1115576108>
- Pang, M., Lee, G., & Delone, W. H. (2014). A public-value management perspective. *Journal of Information Technology*, 29(3), 187-205. <https://doi.org/10.1057/jit.2014.2>
- Papakostas, C., Troussas, C., Krouska, A., & Sgouropoulou, C. (2021). Measuring user experience, usability and interactivity of a personalized mobile augmented reality training system. *Sensors*, 21(11), 3888.
- Papakostas, C., Troussas, C., Krouska, A., & Sgouropoulou, C. (2022). User acceptance of augmented reality welding simulator in engineering training. *Education and Information Technologies*, 27(1), 791-817.
- Parker, S., Cluley, V., & Radnor, Z. (2023). A typology of dis/value in public service delivery. *Public Money & Management*, 43(1), 8-16.

- Parris, D. L., & Peachey, J. W. (2013). A systematic literature review of servant leadership theory in organizational contexts. *Journal of Business Ethics*, 113(3), 377-393. <https://doi.org/10.1007/s10551>
- Patergiannaki, Z., & Pollalis, Y. A. (2024). E-government quality from the citizen's perspective: The role of perceived factors, demographic variables, and the digital divide.
- Pathak, K. P., Jamshed, K. M., Arjumond, S., Akter, K., & Fatema, K. (2025). Analysing e-government service adoption in Bangladesh: a study on the Surokkha Vaccination Program. *Electronic Government, an International Journal*, 21(2), 115-136.
- Payowela, J. E. (2024). Challenges facing local government authorities in the use of electronic record keeping for human resource management: a case of Morogoro Municipal Council, Tanzania. *International Journal of Research in Business & Social Science*, 13(2).
- Peng, B., Tu, Y., Elahi, E., & Wei, G. (2018). Extended producer responsibility and corporate performance: Effects of environmental regulation and environmental strategy. *Journal of Environmental Management*, 218(1), 181-189. <https://doi.org/10.1016/j.jenvman.2018.04.068>
- Pepinsky, T. B., Pierskalla, J. H., & Sacks, A. (2017). Bureaucracy and service delivery. *Annual Review of Political Science*, 20(1), 249-268.
- Petkovšek, V., Hrovatin, N., & Pevcin, P. (2021). Local public services delivery mechanisms: A literature review. *Lex Localis-Journal of Local Self-Government*, 19(1), 39-64.
- Polit, D. F., Beck, C. T., & Owen, S. V. (2007). Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Research in Nursing & Health*, 30(4), 459-467.
- Pollitt, C., & Dan, S. (2011). The impact of the new public management in Europe: A Meta-Analysis. *Coordinating cohesion in the public sector of the future*, Working Paper, 3.
- Pramuditha, R., Muhafidin, D., Sumaryana, A., & Susanti, E. (2025). E-Government Implementation and Public Service Quality: Challenges and Opportunities in Indonesian Local Administration. *TEC EMPRESARIAL*, 20(1), 61-70.
- Pribadi, U. (2021). Bureaucratic Reform, Public Service Performance, And Citizens' satisfaction: The Case Of Yogyakarta, Indonesia. *Viešoji politika ir administravimas*, 20(2), 312-326.
- Prisecaru, P. (2016). Challenges of the Fourth Industrial Revolution. *Knowledge Horizons - Economics*, 8(1), 57-62.
- Puplampu, D. A., & Boafo, Y. A. (2021). Exploring the impacts of urban expansion on green spaces availability and delivery of ecosystem services in the Accra metropolis. *Environmental Challenges*, 5, 100283.
- Puspita, D. A., Aufilana, F. S., & Shulthoni, M. (2025). Determinants of the UMEGA model development in the use of the rental payment system. *Journal of Multiperspectives on Accounting Literature*, 3(1), 1-21.

- Puspita, D. A., Aufilana, F. S., & Shulthoni, M. (2025). Determinants of the UMEGA model development in the use of the rental payment system. *Journal of Multiperspectives on Accounting Literature*, 3(1), 1-21.
- Puspitasari, N. B., Aditya, K. A., & Rosyada, Z. F. (2025). Key factors influencing the use of electronic procurement catalog for SMEs In Indonesia through the UMEGA Model. *Multidisciplinary Science Journal*, 7(7), 2025337-2025337.
- Rachmad, Y. E. (2022). Artificial intelligence in action: Transforming public policy and administration. *International Publishing of Professional Book, Special Issue 2022*.
- Rachmad, Y. E. (2022). Governing the virtual world: Integrating artificial intelligence, augmented reality, and virtual reality into public administration. *Education and Training Book Publishing, London Special Issue 2022*.
- Radnor, Z., Osborne, S. P., Kinder, T., & Mutton, J. (2014). Operationalizing co-production in public services delivery: The contribution of service blueprinting. *Public Management Review*, 16(3), 402-423.
- Raga, K., & Taylor, D. (2005). Impact of accountability and ethics on public service delivery: A South African perspective. *Public Manager*, 34(2).
- Rai, S. K., Ramamritham, K., & Jana, A. (2021). Government to government (G2G) framework to strengthen communication among government agencies during disasters: learnings from 2015, Gorkha earthquake, Nepal. *International Journal of Electronic Governance*, 13(1), 73-96.
- Raja Adnan, R. A. B., Abdul Mutalib, M., & Ab Aziz, M. R. (2022). Factors necessary for effective corporate waqf management for Malaysian public healthcare. *ISRA International Journal of Islamic Finance*, 14(1), 73-88.
- Raman, R., Mandal, S., Das, P., Kaur, T., Sanjanasri, J. P., & Nedungadi, P. (2024). Exploring university students' adoption of ChatGPT using the diffusion of innovation theory and sentiment analysis with gender dimension. *Human Behavior and Emerging Technologies*, 2024(1), 3085910.
- Rana, N. P., Dwivedi, Y. K., Williams, M. D., & Weerakkody, V. (2015). Examining the success of the e-government portal: A validation of the Unified Model of Electronic Government Adoption (UMEGA). *Government Information Quarterly*, 32(3), 323-332. <https://doi.org/10.1016/j.giq.2015.05.001>
- Rasoolimanesh, S. M. (2022). Discriminant validity assessment in PLS-SEM: A comprehensive composite-based approach. *Data Analysis Perspectives Journal*, 3(2), 1-8.
- Rasul, I., Rogger, D., & Williams, M. J. (2021). Management, organizational performance, and task clarity: Evidence from Ghana's civil service. *Journal of Public Administration Research and Theory*, 31(2), 259-277.
- Reddy, P. S. (2016). Localising the sustainable development goals (SDGs): The role of local government in context. *African Journal of Public Affairs*, 9(2), 1-15.

- Ren, C., Wang, Q., Xu, Z., Pan, Y., Li, Y., & Liu, X. (2023). Development and validation of a disulfidoptosis and M2 TAM-related classifier for bladder cancer to explore tumor subtypes, immune landscape and drug treatment. *Journal of Cancer Research and Clinical Oncology*, 149(17), 15805-15818.
- Retnowati, N. D., & Nugraheny, D. (2021). G2C (Government to Citizen) Digital Interaction And C2G (Citizen to Government) on The Jogja Smart Service Application. *Sainstek: Jurnal Sains dan Teknologi*, 13(2), 90-96.
- Revaldhi, A., Gaffar, V., & Sofia, A. (2025). Challenges of Integrating Digital Innovation Strategies in Educational Technology to Enhance E-Government Implementation. *QALAMUNA: Jurnal Pendidikan, Sosial, dan Agama*, 17(1), 185-194.
- Riccucci, N. M. (2021). *Managing diversity in public sector workforces*. Routledge.
- Rice, M. F. (2007). A post-modern cultural competency framework for public administration and public service delivery. *International Journal of Public Sector Management*, 20(7), 622-637.
- Rice, M. F. (2007). Promoting cultural competency in public administration and public service delivery: Utilizing self-assessment tools and performance measures. *Journal of Public Affairs Education*, 13(1), 41-57.
- Righi, A. (2013). Measuring social capital: Official statistics initiatives in Italy. *Procedia-Social and Behavioural Sciences*, 72, 4-22.
- Robinson, L. (2009). A summary of diffusion of innovations. https://www.enablingchange.com.au/Summary_Diffusion_Theory.pdf
- Robinson, M. (2007). Does decentralisation improve equity and efficiency in public service delivery provision?
- Rogers, E. M. (1995). *Diffusion of innovations third edition (3rd Edition)*. Collier Macmillan Publishers. <https://teddykw2.files.wordpress.com/2012/07/everett-m-rogersdiffusion-of-innovations.pdf>
- Rosenbloom, D. H., Kravchuk, R. S., & Clerkin, R. M. (2022). *Public administration: Understanding management, politics, and law in the public sector*. Routledge.
- Rouibah, K., Qurban, H., & Al-Qirim, N. (2022). Impact of risk perceptions and user trust on intention to Re-use E-government: a mixed method research. *Journal of Global Information Management (JGIM)*, 30(1), 1-29.
- Rubin, H. J., & Rubin, I. S. (2012). *Qualitative interviewing: The art of hearing data*. SAGE.
- Rudhumbu, N. (2022). Applying the UTAUT2 to predict the acceptance of blended learning by university students. *Asian Association of Open Universities Journal*, 17(1), 15-36.

- Rydén, H. H., Hofmann, S., & Verne, G. (2023). The self-serving citizen as a co-producer in the digital public service delivery. *International Conference on Electronic Government* (pp. 48-63). Springer.
- Sadik-Zada, E. R., Gatto, A., & Niftiyev, I. (2024). E-government and petty corruption in public sector service delivery. *Technology Analysis & Strategic Management*, 36(12), 3987-4003.
- Sae-lim, P., & Jermisittiparsert, K. (2019). Is the fourth industrial revolution a panacea? Risks toward the fourth industrial revolution: Evidence in the Thai economy. *International Journal of Innovation, Creativity and Change*, 5(2), 732-752.
- Sahabi, M. K., & Ootobo, E. E. (2021). Academic library and challenges of service delivery in Nigerian universities in the digital era. *Information Impact: Journal of Information and Knowledge Management*, 12(2), 51-61.
- Saleh, E. A. S., Abd Kadir, M. F. B., & El-Ebiary, Y. A. (2025). A Review of Frameworks for Evaluating the Security Performance of E-Government Systems. *Journal of Applied Artificial Intelligence*, 6(1), 18-23.
- Saliu, O., Oludayo, O., Falola, H., Olokundun, M., Ibidunni, S., & Atolagbe, T. (2018). Integrated datasets on transformational leadership attributes and employee engagement: The moderating role of job satisfaction in the Fast-Moving Consumer Goods (FMCG) industry. *Data in Brief*, 19(3), 2329-2335. <https://doi.org/10.1016/j.dib.2018.06.032>
- Samsor, A. M. (2021). Challenges and Prospects of e-Government implementation in Afghanistan. *International Trade, Politics and Development*, 5(1), 51-70.
- Sanmukhiya, C. (2019). E-governance dimensions in the Republic of Mauritius. *Humanities & Social Sciences Reviews*, 7(5), 264-279. <https://doi.org/10.18510/hssr.2019.7532>
- Sari, N. P. W. P., Duong, M. P. T., Li, D., Nguyen, M. H., & Vuong, Q. H. (2024). Rethinking the effects of performance expectancy and effort expectancy on new technology adoption: Evidence from Moroccan nursing students. *Teaching and Learning in Nursing*, 19(3), e557-e565.
- Saylam, A., & Yıldız, M. (2022). Conceptualizing citizen-to-citizen (C2C) interactions within the E-government domain. *Government Information Quarterly*, 39(1), 101655.
- Schmitz, A., Díaz-Martín, A. M., & Guillén, M. J. Y. (2022). Modifying UTAUT2 for a cross-country comparison of telemedicine adoption. *Computers in Human Behavior*, 130, 107183.
- Schnackenberg, A. K., Tomlinson, E., & Coen, C. (2021). The dimensional structure of transparency: A construct validation of transparency as disclosure, clarity, and accuracy in organizations. *Human Relations*, 74(10), 1628-1660.

- Schomakers, E. M., Lidynia, C., Vervier, L. S., Calero Valdez, A., & Ziefle, M. (2022). Applying an extended UTAUT2 model to explain user acceptance of lifestyle and therapy mobile health apps: Survey study. *JMIR mHealth and uHealth*, 10(1), e27095.
- Schork, S., Heblich, B., & Terzidis, O. (2016). Effective innovation leadership. In *Amsterdam: University Industry Innovation Network* (pp. 1-17). <https://doi.org/10.13140/RG.2.1.4062.9367>
- Schwab, K. (2015). The Fourth Industrial Revolution: What it means and how to respond.
- Scieपुरa, B., & Linos, E. (2024). When perceptions of public service harms the public servant: Predictors of burnout and compassion fatigue in government. *Review of Public Personnel Administration*, 44(1), 116-138.
- Scupola, A., & Mergel, I. (2022). Co-production in digital transformation of public administration and public value creation: The case of Denmark. *Government Information Quarterly*, 39(1), 101650.
- Sehl, A., Simon, F. M., & Schroeder, R. (2022). The populist campaigns against European public service media: Hot air or existential threat?. *International Communication Gazette*, 84(1), 3-23.
- Sekaran, U. (2003). *Research methods for business: A skill-building approach* (4th Edition). John Wiley & Sons.
- Sekaran, U. (2006). *Research methods for business: A skill building approach*. John Wiley & Sons.
- Sekaran, U. (2014). *Research methods for business: A skill-building approach* (4th Edition, J. Marshall Ed.). John Wiley & Sons.
- Sekaran, U., & Bougie, R. (2010). *Research methods for business: A skill-building approach* (5th Edition). John Wiley & Sons.
- Sekaran, U., & Bougie, R. (2013). *Research methods for business: A skill-building approach* (6th Edition). Wiley.
- Sekaran, U., & Bougie, R. (2016). *Research methods for business: A skill-building approach* (7th Edition). John Wiley & Sons.
- Sepasgozar, S. M. (2022). Immersive on-the-job training module development and modeling users' behavior using parametric multi-group analysis: A modified educational technology acceptance model. *Technology in Society*, 68, 101921.
- Shafiu, A. M. (2021). *Innovative leadership practices in public organizations: A study of Kaduna State local governments of Nigeria* [Doctoral dissertation, Universiti Utara Malaysia].
- Shafiu, A. M., Manaf, H. A., & Muslim, S. (2020). Utilization of entrepreneurship for job creation, poverty reduction and national development. *The Journal of Social Sciences Research*, 6(1), 97-102.

- Shah, A. (Ed.). (2005). *Public services delivery*. World Bank Publications.
- Shahbaznezhad, H., Kolini, F., & Rashidirad, M. (2021). Employees' behavior in phishing attacks: what individual, organizational, and technological factors matter?. *Journal of Computer Information Systems*, 61(6), 539-550.
- Shang, L., Heckeleei, T., Gerullis, M. K., Börner, J., & Rasch, S. (2021). Adoption and diffusion of digital farming technologies-integrating farm-level evidence and system interaction. *Agricultural Systems*, 190, 103074.
- Shareef, M. A., Kumar, V., & Dwivedi, Y. K. (2017). Citizen adoption of e-government in metropolitan cities: A UMEGA perspective. *International Journal of Information Management*, 37(5), 476-487. <https://doi.org/10.1016/j.ijinfomgt.2017.04.003>
- Shenkoya, T. O. (2024). Digital transformation: An investigative study of the performance of digitalization in governance. *International Journal of Organizational Analysis*.
- Shenkoya, T. (2023). Can digital transformation improve transparency and accountability of public governance in Nigeria? *Transforming Government: People, Process and Policy*, 17(1), 54-71.
- Shigayeva, A., Gcwensa, N., Ndlovu, C. D., Ntumase, N., Sabela, S., Ohler, L., ... & Van Cutsem, G. (2022). Retention on ART and viral suppression among patients in alternative models of differentiated HIV service delivery in KwaZulu-Natal, South Africa. *PLOS Global Public Health*, 2(12), e0000336.
- Sibonde, A. H., & Dassah, M. O. (2021). The relationship between employee motivation and service quality: Case study of a selected municipality in the Western Cape province, South Africa. *Africa's Public Service Delivery and Performance Review*, 9(1), 499.
- Siddiqi, D. A., Abdullah, S., Dharma, V. K., Khamisani, T., Shah, M. T., Setayesh, H., ... & Chandir, S. (2022). Assessment of vaccination service delivery and quality: A cross-sectional survey of over 1300 health facilities from 29 districts in Sindh, Pakistan conducted between 2017-18. *BMC Health Services Research*, 22(1), 727.
- Singh, G., Pathak, R. D., Naz, R., & Belwal, R. (2010). E-governance for improved public sector service delivery in India, Ethiopia and Fiji. *International Journal of Public Sector Management*, 23(3), 254-275.
- Singh, H., & Singh, B. P. (2025). Bridging e-governance and sustainability: Unveiling synergies for a sustainable future. In *Leveraging Futuristic Machine Learning and Next-Generational Security for e-Governance* (pp. 1-24). IGI Global.
- Sipior, J. C., Ward, B. T., & Connolly, R. (2011). The digital divide and t-government in the United States: using the technology acceptance model to understand usage. *European Journal of Information Systems*, 20(3), 308-328.

- Sitar-Taut, D. A., & Mican, D. (2021). Mobile learning acceptance and use in higher education during social distancing circumstances: An expansion and customization of UTAUT2. *Online Information Review*, 45(5), 1000-1019.
- Sithole, V. E., & Van der Walddt, G. (2016). An e-governance training model for public managers: The case of selected Free State Provincial departments. *Administratio Publica*, 24(1), 137-162.
- Smith, K. (1990). Alternative research paradigms and the problem of criteria. In E. Guba (Ed.), *The paradigms dialogue* (pp. 167-187). SAGE.
- Soni, V., Dey, P. K., Anand, R., Malhotra, C., & Banwet, D. K. (2017). Digitizing grey portions of e-governance. *Transforming Government: People, Process and Policy*, 11(3), 419-455.
- Soori, H. (2024). Study Guide: Pilot, Pre-test, Quality Assurance, Quality Control, and Protocol Modifications. In *Errors in Medical Science Investigations* (pp. 193-204). Singapore: Springer Nature Singapore.
- Sriram, V., Yilmaz, V., Kaur, S., Andres, C., Cheng, M., & Meessen, B. (2024). The role of private healthcare sector actors in health service delivery and financing policy processes in low-and middle-income countries: A scoping review. *BMJ Global Health*, 8(Suppl 5), e013408.
- Stephen John, S. (2025). E-Governance and public service delivery: Evidence from Nigeria. *Global International Journal of Innovative Research*, 3(1), 27-41.
- Sterrenberg, G., & Decosta, P. L. E. (2023). Identifying the crucial factors of e-government success from the perspective of Australian citizens living with disability using a public value approach. *Government Information Quarterly*, 40(3), 101813.
- Stewart, V., McMillan, S. S., Hu, J., Ng, R., El-Den, S., O'Reilly, C., & Wheeler, A. J. (2022). Goal planning in mental health service delivery: A systematic integrative review. *Frontiers in Psychiatry*, 13, 1057915.
- Stewart-weeks, M., & Kastle, T. (2015). Innovation in the public sector innovation infection: Catching the innovation bug in the public sector. *Australian Journal of Public Administration*, 74(1), 63-72. <https://doi.org/10.1111/1467-8500.12129>
- Sudirman, S., Ahmad, K., & Hood, Z. (2025). Strategic Information System Planning Practices in the Public Sector of Developing Countries: The Case of Malaysia. *International Journal of Public Administration*, 1-15.
- Suhail, F., Adel, M., Al-Emran, M., & AlQudah, A. A. (2024). Are students ready for robots in higher education? Examining the adoption of robots by integrating UTAUT2 and TTF using a hybrid SEM-ANN approach. *Technology in Society*, 77, 102524.
- Suliman, A. S. H., Derar, E., & Maan, A. (2022). E-government: Limitations and challenges: A general framework for developed and developing

- countries. *International Journal of Scientific & Technology Research*, 11(1), 97-103.
- Sun, P., & Zuo, X. (2024). Evolution and history of research philosophy. *Journal of Management Research*, 24(1), 28-61.
- Syafei, I. (2025). Authority of the Indonesian National Army in Prevention and Eradication. *Journal of Law, Politic and Humanities*, 5(3), 1520-1529.
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th edition). Pearson. <https://doi.org/10.1037/022267>
- Tagwai, A. (2025). A Critical Examination of Barriers Affecting the Utilization of Government Documents in University Libraries in Kaduna State. *JALINGO INTERNATIONAL JOURNAL OF LIBRARY AND INFORMATION SCIENCE*, 1(1), 27-41
- Taherdoost, H. (2018). A review of technology acceptance and adoption models and theories. *Procedia Manufacturing*, 22, 960-967. <https://doi.org/10.1016/j.promfg.2018.03.137>
- Taherdoost, H. (2019). Importance of Technology Acceptance Assessment for Successful Implementation and Development of New Technologies. *Global Journal of Engineering Sciences*, 1(3), 1-3. <https://doi.org/10.33552/GJES.2019.01.000511>
- Takagi, N., Varajao, J., & Ventura, T. (2024). Implementing success management on government-to-government projects: an integrated perspective with the PMBOK guide. *International Journal of Managing Projects in Business*, 17(1), 153-171.
- Takahashi, C. K., de Figueiredo, J. C. B., & Scornavacca, E. (2024). Investigating the diffusion of innovation: A comprehensive study of successive diffusion processes through analysis of search trends, patent records, and academic publications. *Technological Forecasting and Social Change*, 198, 122991.
- Tam, B. C. M., Tang, S. K., & Cardoso, A. (2024). MTS decomposition and recombining significantly improves training efficiency in deep learning: A case study in air quality prediction over sub-tropical area. *Atmosphere*, 15(5), 521.
- Tam, B. C. M., Tang, S. K., & Cardoso, A. (2025). Multi-level lag scheme significantly improves training efficiency in deep learning: A case study in air quality alert service over sub-tropical area. *Journal of Big Data*, 12(1), 3.
- Tam, D., Menon, R. R., Bansal, M., Srivastava, S., & Raffel, C. (2021). Improving and simplifying pattern exploiting training. *arXiv preprint arXiv:2103.11955*.
- Tam, J. A. (2023). *Enabling large-scale context in low-echelon training with air tasking order generation* (Doctoral dissertation, Naval Postgraduate School).
- Tam, T. T. T., & Thang, D. Q. Determinants influencing the linkage between training and using labour force: The case of Vietnam.

- Tamilmani, K., Rana, N. P., Wamba, S. F., & Dwivedi, R. (2021). The extended Unified Theory of Acceptance and Use of Technology (UTAUT2): A systematic literature review and theory evaluation. *International Journal of Information Management*, 57, 102269.
- Tannady, H., & Dewi, C. S. (2024). Exploring role of technology performance expectancy, application effort expectancy, perceived risk and perceived cost on digital behavioral intention of GoFood users. *Jurnal Informasi Dan Teknologi*, 80-85.
- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53.
- Tavakol, M., & Sandars, J. (2014). Quantitative and qualitative methods in medical education research: AMEE Guide No 90: Part I. *Medical Teacher*, 36(9), 746-756.
- Taylor, S., & Todd, P. A. (1995b). Understanding information technology usage: A test of competing models. *Information Systems Research*, 6(2), 144-176.
- Taylor, S., & Todd, P. (1995a). Decomposition and crossover effects in the theory of planned behaviour: A study of consumer adoption intentions. *International Journal of Research in Marketing*, 12(2), 137-155. [https://doi.org/10.1016/0167-8116\(94\)00019-K](https://doi.org/10.1016/0167-8116(94)00019-K)
- Thabit, A. A., & Yaser, H. H. (2019). The application of electronic tools in controlling government activities. *Journal of Management and Science*, 10(2), 1-10.
- Thach, N. D., Van Hung, N., Tuan, D. A., Khanh, D. H., & Van Tam, L. (2024). The research and design of fire alarm systems using virtual reality technology enhance safety training in the maritime. *Journal of Maritime Research: JMR*, 21(1), 193-200.
- Thani, M. A. I. A., Sakarji, S. R., & Thani, A. K. A. Evaluation of the "E-Kursus" system using the Technology Acceptance Model (TAM): Institute for Rural Advancement (INFRA), Bangi as a case study.
- Tharou, P., Saks, A. M., & Moore, C. (2007). A review and critique of research on training and organizational level outcomes. *Human Resource Management Review*, 17(3), 251-273.
- Thela, B., Zlotnikova, I., Galani, M., & Sigwele, T. (2025). Development of a Service-Oriented Interoperability Framework: The Botswana E-Government System Case Study. *Digital Government: Research and Practice*.
- Thiruchelvam, V., Suresh, S., & Jegatheswaran, R. (2024). Aspects of Digital Transformation Implementation for Marginal Offshore Fields in Southeast Asia (SEA). In *Proceedings of the Future Technologies Conference* (pp. 228-240). Springer Nature.
- Thomas, F. B. (2022). The role of purposive sampling technique as a tool for informal choices in a social sciences in research methods. *Just Agriculture*, 2(5), 1-8.

- Tiika, B. J., Tang, Z., Azaare, J., Dagadu, J. C., & Otoo, S. N. A. (2024). Evaluating E-government development among africa union member states: an analysis of the impact of E-government on public administration and governance in Ghana. *Sustainability*, 16(3), 1333.
- Tobi, A. A., & Oikhala, G. I. (2021). Local government reforms and grassroots development in Nigeria. *Journal of Administrative Science*, 18(1), 113-133.
- Torfin, J., Ferlie, E., Jukić, T., & Ongaro, E. (2021). A theoretical framework for studying the co-creation of innovative solutions and public value. *Policy & Politics*, 49(2), 189-209.
- Torres, L., & Pina, V. (2002). Delivering public services—mechanisms and consequences: Changes in public service delivery in the EU countries. *Public Money and Management*, 22(4), 41-48.
- Totonchi, A., & Mohadis, H. B. M. (2025). E-Government Between Developed and Developing Countries: Key Perspectives from Denmark and Iraq. *Jurnal Ilmu Komputer dan Informasi*, 18(1), 77-93.
- Trischler, J., & Westman Trischler, J. (2022). Design for experience—A public service design approach in the age of digitalization. *Public Management Review*, 24(8), 1251-1270.
- Troitino, D. R. (2024). E-governance and the European Union: Agenda for implementation. *Internet of Things*, 101352.
- Tummers, L. L., Bekkers, V., Vink, E., & Musheno, M. (2015). Coping during public service delivery: A conceptualization and systematic review of the literature. *Journal of Public Administration Research and Theory*, 25(4), 1099-1126.
- UCLG. (2016). *Basic socio-economic indicators*. Retrieved from <https://www.uclg.gov.org/basic-socio-economic-indicators>
- UCLG. (2018). *Towards localization of the SDGs*. Retrieved from <https://www.uclg.gov.org/towards-localization-of-the-sdgs>
- Udoh, H. (2024). *E-governance performance in the context of developing countries* (Doctoral dissertation, University of Leicester).
- Ufua, D. E., Emielu, E. T., Olujobi, O. J., Lakhani, F., Borishade, T. T., Ibidunni, A. S., & Osabuohien, E. S. (2021). Digital transformation: A conceptual framing for attaining Sustainable Development Goals 4 and 9 in Nigeria. *Journal of Management & Organization*, 27(5), 836-848. <https://doi.org/10.1017/jmo.2021.45>
- Uhl-Bien, M., Marion, R., & McKelvey, B. (2007). Complexity Leadership Theory: Shifting leadership from the industrial age to the knowledge era. *Leadership Quarterly*, 18(4), 298-318. <https://doi.org/10.1016/j.leaqua.2007.04.002>
- Umar, A., Isa, D. R., Ibrahim, A., Sani, F. B., & Abubakar, S. U. (2025). Examining Public Servants' Digital Interactions: The Case of e-government in Kaduna State.

- Journal of Political Discourse, 3(3), 67–84. Retrieved from <https://jopd.com.ng/index.php/jopdz/article/view/341>
- Umbach, G., & Tkalec, I. (2022). Evaluating e-governance through e-government: Practices and challenges of assessing the digitalisation of public governmental services. *Evaluation and Program Planning*, 93, 102118. <https://doi.org/10.1016/j.evalprogplan.2022.102118>
- UN EGDI. (2022). *Electronic Government Development Index*. Retrieved from <https://www.un.org/electronic-government-development-index-2022>
- UN EGDI. (2024). *Electronic Government Development Index*. Retrieved from <https://www.un.org/electronic-government-development-index-2024>
- UNDP. (2003). *Human Development Report 2003*. Oxford University Press.
- UNDP. (2018). *National Human Development Report 2018*. Retrieved from <http://www.ng.undp.org/national-human-development-report-2018>
- UNDP. (2019). *Human Development Report 2019: Beyond income, beyond averages, beyond today: Inequalities in human development in the 21st century*. Retrieved from <http://www.ng.undp.org/human-development-report-2019>
- United Nations Educational, Scientific and Cultural Organization (UNESCO). (2014). *Curriculum guide on e-governance for African government institutions: Sector of Social and Human Sciences African Training and Research Centre in Administration for Development*. <http://www.unesco.org/education/articles/pdf>
- United Nations Public Administration Network (UNPAN). (2011). E-government developments: The United Nations delivers online training courses. *Journal of e-governance*, 34, 65-66.
- United Nations. (2020). *E-Government Survey 2020: Digital Government in the Decade of Action for Sustainable Development*. United Nations, Department of Economic and Social Affairs.
- United Nations. (2022). *UN E-Government Survey 2022: The Future of Digital Government*. Department of Economic and Social Affairs.
- Utomo, P., Kurniasari, F., & Purnamaningsih, P. (2021). The effects of performance expectancy, effort expectancy, facilitating condition, and habit on behavior intention in using mobile healthcare application. *International Journal of Community Service & Engagement*, 2(4), 183-197.
- Van der Voet, J., & Van Den Bekerom, P. (2025). Performance information, expectations and satisfaction with public service delivery in the context of co-production initiatives. *Public Management Review*, 27(4), 1157-1178.
- Van Droogenbroeck, E., & Van Hove, L. (2021). Adoption and usage of E-grocery shopping: A context-specific UTAUT2 model. *Sustainability*, 13(8), 4144. <https://doi.org/10.3390/su13084144>

- Varshney, R. K., Bohra, A., Roorkiwal, M., Barmukh, R., Cowling, W., Chitikineni, A., ... & Siddique, K. H. (2021). Rapid delivery systems for future food security. *Nature Biotechnology*, 39(10), 1179-1181. <https://doi.org/10.1038/s41587-021-01079-z>
- Vassilakopoulou, P., Haug, A., Salvesen, L. M., & Pappas, I. O. (2023). Developing human/AI interactions for chat-based customer services: Lessons learned from the Norwegian government. *European Journal of Information Systems*, 32(1), 10-22. <https://doi.org/10.1080/0960085X.2022.2154177>
- Vatsa, V. R., & Chhaparwal, P. (2021). Estonia's e-governance and digital public service delivery solutions. In *2021 Fourth International Conference on Computational Intelligence and Communication Technologies (CCICT)* (pp. 135-138). IEEE. <https://doi.org/10.1109/CCICT53244.2021.00034>
- Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision Sciences*, 39(2), 273-315. <https://doi.org/10.1111/j.1540-5915.2008.00192.x>
- Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, 46(2), 186-204. <https://doi.org/10.1287/mnsc.46.2.186.11926>
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*, 27(3), 425-478.
- Vettriselvan, R., Ramya, R., Sathya, M., Swadhi, R., & Deepan, A. (2025). Service delivery and citizen-centric approaches: Innovating public administration management in higher education. In *Challenges of Public Administration Management for Higher Education* (pp. 113-136). IGI Global. <https://doi.org/10.4018/978-1-7998-XXXX-X.ch006>
- Vinholo, T. F., Do-NGuyen, C. C., Percy, E., Hirji, S., Awtry, J., Kerolos, M., ... & Sabe, A. A. (2024). Cross-sectional study on structural heart training experiences in cardiothoracic residency programs. *JTCVS Structural and Endovascular*, 1, 100005. <https://doi.org/10.1016/j.xjs.2023.100005>
- Voorberg, W., Bekkers, V., Timeus, K., Tonurist, P., & Tummers, L. (2017). Changing public service delivery: Learning in co-creation. *Policy and Society*, 36(2), 178-194. <https://doi.org/10.1080/14494035.2017.1323711>
- Waghid, Z. (2024). Cultivating critical thinking, social justice awareness and empathy among pre-service teachers through online discussions on global citizenship education. *Journal of Creative Communications*, 19(1), 74-93.
- Wamuyu, P. K. (2020). Bridging the Digital Divide in Kenya: A Case for Policy Reforms in E-Government Implementation. *Information Development*, 36(3), 373-389. <https://doi.org/10.1177/0266666919865993>

- Wang, G., & Shin, C. (2022). Influencing factors of usage intention of metaverse education application platform: Empirical evidence based on PPM and TAM models. *Sustainability*, 14(24), 17037. <https://doi.org/10.3390/su142417037>
- Wang, K., van Hemmen, S. F., & Criado, J. R. (2022). The behavioural intention to use MOOCs by undergraduate students: Incorporating TAM with TPB. *International Journal of Educational Management*, 36(7), 1321-1342. <https://doi.org/10.1108/IJEM-10-2021-0406>
- Wang, Y., Chen, C., Nelson, M. R., & Sar, S. (2024). Walk in my shoes: How perspective-taking and VR enhance telepresence and empathy in a public service announcement for people experiencing homelessness. *New Media & Society*, 26(7), 3931-3950.
- Warkentin, M., et al. (2022). The role of perceived risk in citizen adoption of e-government services. *Journal of Strategic Information Systems*, 31(2), 101717.
- Warner, M. E., & Hefetz, A. (2008). Managing markets for public service: The role of mixed public-private delivery of city services. *Public Administration Review*, 68(1), 155-166. <https://doi.org/10.1111/j.1540-6210.2007.00845.x> 117
- Weberg, D. R., Roussel, L., Thomas, P. L., Ratcliffe, C., Locsin, R. C., Purnell, M., & Stare, J. (2013). Complex leadership theory and innovation: A new framework for innovation leadership. *Iranian Journal of Public Health*, 42(9), 25-46. <https://doi.org/10.1017/CBO9781107415324.004>
- West, D. M. (2004). E-government and the transformation of service delivery and citizen attitudes. *Public Administration Review*, 64(1), 15-27. <https://doi.org/10.1111/j.1540-6210.2004.00343.x> 131518
- West, D., & Blackman, D. (2015). Performance management in the public sector. *Australian Journal of Public Administration*, 74(1), 73-81. <https://doi.org/10.1111/1467-8500.12130>
- William, F. K. A. (2024). Mastering validity and reliability in academic research: Meaning and significance. *International Journal of Research Publications*, 144(1), 287-292.
- Wolf, S. (2007). Does aid improve public service delivery? *Review of World Economics*, 143(4), 650-672. <https://doi.org/10.1007/s10290-007-0127-7>
- World Bank. (2024). Digital Government. Retrieved from <https://www.worldbank.org/en/topic/digitalgovernment>.
- World Health Organization. (2021). Action required to address the impacts of the COVID-19 pandemic on mental health and service delivery systems in the WHO European region: Recommendations from the European Technical Advisory Group on the mental health impacts of COVID-19, 30 June 2021.

- World Health Organization. (2021). Consolidated guidelines on HIV prevention, testing, treatment, service delivery and monitoring: Recommendations for a public health approach.
- Wu, X., Chong, A. Y. L., Peng, Y., & Bao, H. (2024). Predicting the acceptance of e-government: a systematic review. *Internet Research*.
- Wu, Y. (2024, December). Intelligent dependency cracking path based on Technology Acceptance Model (TAM) and Convolutional Neural Network (CNN) analysis model. In *2024 4th International Conference on Mobile Networks and Wireless Communications (ICMNBC)* (pp. 1-5). IEEE. <https://doi.org/10.1109/ICMNBC60771.2024.10483562>
- Wu, Z., & Liu, Y. (2023). Exploring country differences in the adoption of mobile payment service: The surprising robustness of the UTAUT2 model. *International Journal of Bank Marketing*, 41(2), 237-268. <https://doi.org/10.1108/IJBM-04-2022-0181>
- Xie, B., Liu, H., Alghofaili, R., Zhang, Y., Jiang, Y., Lobo, F. D., ... & Yu, L. F. (2021). A review on virtual reality skill training applications. *Frontiers in Virtual Reality*, 2, 645153.
- Yamin, S., Mavondo, F., Gunasekaran, A., & Sarros, J. C. (1997). A study of competitive strategy, organisational innovation and organisational performance among Australian manufacturing companies. *International Journal of Production Economics*, 52(1-2), 161-172. [https://doi.org/10.1016/S0925-5273\(96\)00104-1](https://doi.org/10.1016/S0925-5273(96)00104-1)
- Yan, X., Li, T., & Zhou, Y. (2022). Virtual reality's influence on construction workers' willingness to participate in safety education and training in China. *Journal of Management in Engineering*, 38(2), 04021095. [https://doi.org/10.1061/\(ASCE\)ME.1943-5479.0001001](https://doi.org/10.1061/(ASCE)ME.1943-5479.0001001)
- Yang, C. C., Liu, C., & Wang, Y. S. (2023). The acceptance and use of smartphones among older adults: Differences in UTAUT determinants before and after training. *Library Hi Tech*, 41(5), 1357-1375. <https://doi.org/10.1108/LHT-01-2022-0034>
- Yang, F., Ren, L., & Gu, C. (2022). A study of college students' intention to use metaverse technology for basketball learning based on UTAUT2. *Heliyon*, 8(9), e10611. <https://doi.org/10.1016/j.heliyon.2022.e10611>
- Yaqub, R. M. S., Manzoor, S. F., Shafique, M., Malik, R., & Shahzad, K. (2025). THE ROLE OF MODIFIED UMEGA MODEL IN PREDICTING E-GOVERNMENT SERVICE ADOPTION IN DEVELOPING COUNTRIES. *Contemporary Journal of Social Science Review*, 3(2), 750-778.
- Yasin, N. M., & Hamid, R. A. (2025). The Evolution of E-Government in Malaysia: Institutional Mechanisms and Public Service Transformation at the Federal and State Levels. *Human Sustainability Procedia*, 5(1), 68-79.

- Yee, C. H., Wong, H. F., Tam, M. H., Yuen, S. K., Chan, H. C., Cheung, M. H., ... & Ng, C. F. (2021). Effect of SARS and COVID-19 outbreaks on urology practice and training. *Hong Kong Medical Journal*, 27(4), 258-263. <https://doi.org/10.12809/hkmj208939>
- Yesilkagit, K., Bauer, M., Peters, B. G., & Pierre, J. (2024). The Guardian State: Strengthening the public service against democratic backsliding. *Public Administration Review*, 84(3), 414-425.
- Yi, H., Berry, F. S., & Chen, W. (2018). Management innovation and policy diffusion through leadership transfer networks: An agent network diffusion model. *Journal of Public Administration Research and Theory*, 28(4), 1-18. <https://doi.org/10.1093/jopart/muy031>
- Yoo, J. W., Park, J. S., & Park, H. J. (2023). Understanding VR-based construction safety training effectiveness: The role of telepresence, risk perception, and training satisfaction. *Applied Sciences*, 13(2), 1135. <https://doi.org/10.3390/app13021135>
- Yusuf, M., Satia, M. R., Bernardianto, R. B., Nurhasanah, N., Irwani, I., Kurniasih, D., & Setyoko, P. I. (2023). Exploring the role of digital leadership and digital transformation on the performance of the public sector organizations. *International Journal of Data and Network Science*, 7(4), 1983-1990. <https://doi.org/10.5267/j.ijdns.2023.6.003>
- Yusuf, Y., Alhassan, K. A., & Adewale, A. T. (2024). Impact of IPPIS on personnel emolument efficiency in Nigeria's federal educational institutions: Pre-and post-implementation analysis (2001-2020). *International Journal of Business Economics and Management Science*, 15(2), 45-62. <https://doi.org/10.32861/jssr.61.97.102>
- Zagorsek, H., Jaklic, M., & Stough, S. J. (2006). Comparing leadership practices between the United States, Nigeria, and Slovenia: Does culture matter? *Cross Cultural Management: An International Journal*, 11(2), 16-34. <https://doi.org/10.1108/13527600610662258>
- Zhang, M., & Kaur, M. (2024). Toward a theory of e-government: Challenges and opportunities, a literature review. *Journal of Infrastructure, Policy and Development*, 8(10).
- Zhang, M., Shu, L., Luo, X., Yuan, M., & Zheng, X. (2022). Virtual reality technology in construction safety training: Extended technology acceptance model. *Automation in Construction*, 135, 104113. <https://doi.org/10.1016/j.autcon.2021.104113>
- Zhu, M., & Peyrache, A. (2017). The quality and efficiency of public service delivery in the UK and China. *Regional Studies*, 51(2), 285-296. <https://doi.org/10.1080/00343404.2015.1119265>
- Zikmund, W. G., Babin, B. J., Carr, J. C., & Griffin, M. (2013). *Business research methods* (9th ed.). Cengage Learning.

- Zindi, B. (2024). Evaluating the impact of digital governance in improving service delivery in Eastern Cape municipalities. *International Journal of Development and Sustainability*, 13(5), 346-366. <https://doi.org/10.5897/IJDS2024.0345>
- Zubir, M. H. H., & Abdul Latip, M. S. (2024). Factors affecting citizens' intention to use e-government services: assessing the mediating effect of perceived usefulness and ease of use. *Transforming Government: People, Process and Policy*, 18(3), 384-399.
- Zuiderwijk, A., Chen, Y. C., & Salem, F. (2021). Implications of the use of artificial intelligence in public governance: A systematic literature review and a research agenda. *Government Information Quarterly*, 38(3), 101577. <https://doi.org/10.1016/j.giq.2021.101577>
- Zulmasyhur, Z., Setiawan, H. D., & LW, N. P. (2024). Enhancing governance through digital transformation. *Jurnal Governansi*, 10(1), 127-136. <https://doi.org/10.30997/jgs.v10i1.5678>



APPENDICES

Appendix A Research Questionnaire

Dear Respondent,

I am Umar Abdullahi, a PhD student at the Ghazali Shafie Graduate School of Government, Universiti Utara Malaysia, currently undertaking research entitled: “Impact of E-Government Determinants on Public Service Delivery: The Moderating Role of Training in Kaduna State, Nigeria”. This is in partial fulfilment of the requirement for the award of Doctor of Philosophy (PhD) in Public Management.

The attached copy of the questionnaire is meant for the collection of data for my dissertation. Given this, I request your voluntary support and cooperation as you respond to the questions in this questionnaire. The information gathered will be used for this academic exercise and will be treated with utmost confidentiality.

Thank you for your anticipated cooperation.

Yours faithfully,

Umar Abdullahi

PhD Candidate (Public Management)

School of Government, UUM College of Law, Government and International Studies

Universiti Utara Malaysia, 06010, Sintok, Kedah

Umardmatt92@gmail.com

Section A: Demographic data

INSTRUCTION: Please you are required to tick (√) as appropriate

1. Sex: Male () Female ()
2. Age: a. 21-30 () b. 31-40 () c. 41-50 () d. 51 and above ()
3. Years in service: a. 1-5 years () b. 6-10 years () c. 11-15 years () d. 16 years and above ()

Section B: Questions relating to the variables of the study i.e., performance expectancy, effort expectancy, social influence, facilitating conditions, perceived risks and effective public service delivery

SD = Strongly Disagree, D= Disagree, U=Undecided, A=Agree, SA=Strongly Agree

S/No	Level of application of e-government services	SA	A	N	D	SD
6	The implementation of e-government platforms in Kaduna State has improved the efficiency of public service delivery					
7	I am satisfied with the level of services I offered through e-government platforms in Kaduna State					
8	I believe that e-government initiatives in Kaduna State have reduced bureaucratic delays in public service processes					
9	I find e-government tools in Kaduna State to increase transparency and accountability in public service delivery					

	Performance Expectancy	SA	A	N	D	SD
10	Using e-government services enables me to accomplish my task more quickly and more efficiently					
11	Using e-government services increases the equity between disabled and non-disabled citizens					
12	Using e-government services would save citizens' time					
13	Using the e-government services increases the quality of services					

S/No	Effort Expectancy	SA	A	N	D	SD
10	Learning to use the e-government services system is easy					
11	Using the e-government services system is easy					
12	It is easy for me to become skillful at using the e-government services system					
13	By using the e-government system, I am able to get government services deliver easily?					

S/No	Social Influence	SA	A	N	D	SD
14	People who are important to me think that I should use e-government services.					
15	People who influence my behaviour think I should use the e-government services					
16	I would use e-government services if my colleagues used them					
17	Government sectors encourage citizens to use the e-government services system					

S/No	Facilitating Conditions	SA	A	N	D	SD
18	I have the resources necessary to use e-government services					
19	I have the knowledge necessary to use e-government services					
20	I have access to a specific person or group for assistance with any technical problems I may encounter.					

S/No	Perceived Risks	SA	A	N	D	SD
21	Using this e-government services would involve performance risk (i.e., missing deadline due to portal not working)					
22	Using this e-government services would involve financial risk (i.e., losing money when paying online due to transaction errors)					
23	Using this e-government services would involve security risk (i.e., losing my portal's login account by hackers)					
24	Using this e-government services would involve privacy risk (i.e., losing my personal information entered in this e-government portals)					

S/No	Effective Public Service Delivery	SA	A	N	D	SD
25	The use of electronic government systems has enhanced the effectiveness and efficiency of public service delivery in Kaduna State					
26	The use of e-government initiatives has reduced the time required to complete public service transactions in Kaduna State					
27	The quality of public services provided in Kaduna State has improved over the past year					
28	The level of accessibility and usability of e-government platforms for public service in Kaduna State satisfies me.					

S/No	Training Program?	SA	A	N	D	SD
29	I participated in an e-government training program organized by the Kaduna State government.					
30	I participated in a fully government-sponsored e-government training program.					
31	I receive training on e-government-related knowledge and skills to address the competencies required to execute my tasks and responsibilities					
32	I received training on soft skills required to develop the right attitude towards adopting and utilizing e-government services					

Appendix B

Data Collection Approval Letter Ghazali Shafie Graduate School of Government



GHAZALI SHAFIE GRADUATE SCHOOL OF GOVERNMENT
UUM Kolej Undang-Undang, Kerajaan dan Pengajian Antarabangsa
Universiti Utara Malaysia
06010 UUM SINTOK
KEDAH DARUL AMAN
MALAYSIA



Tel: 604 - 928 7751/7752
Faks (Fax): 604 - 928 7799
Laman Web (Web): www.gsgsg.uum.edu.my

Ref. No. : UUM/COLGIS/GSGSG/ 907690
Date: October 15, 2024

TO WHOM IT MAY CONCERN

Sir/Madam

SUBJECT: DATA COLLECTION FOR PHD THESIS

I am writing to certify that **UMAR ABDULLAHI (Matric Number: 907690)** is a full-time PhD student at Universiti Utara Malaysia, Sintok, Kedah.

2. As part of his PhD program, he is required to collect data for his research titled *"Examining the Effect of Determinant of E-government Utilization on Effective Public Service Delivery: Moderating Role of Training Among Public Servants in Kaduna State Nigeria."*

3. We would be sincerely grateful if your organization could assist him by providing the necessary information and granting permission for data collection. Please be assured that all data collected will be used strictly for academic purposes.

Thank you in advance for your kind cooperation.

"MALAYSIA MADANI"
"BERKHIDMAT UNTUK NEGARA"
"KEDAH SEJAHTERA - NIKMAT UNTUK SEMUA"
"KNOWLEDGE, VIRTUE, SERVICE"

Yours faithfully,

ASSOC. PROF. DR. KAMARUL AZMAN BIN KHAMIS
Deputy Dean
Ghazali Shafie Graduate School of Government
Universiti Utara Malaysia
Tel : 04-9287760 Fax: 04-9287799
Email : kazman@uum.edu.my

Universiti Pengurusan Terkemuka
The Eminent Management University



Appendix C

Decision on PhD Proposal Defense by the Panel Reviews' Committee



Dear Mr. Abdullah Umar (907690)

Congratulations on your Proposal Defense session on July 15, 2024 with result pass with major correction.

You are given a maximum period of Three (3) month to submit your Correction (last date submit: *14 October 2024).

the evaluation form from your panels will be sent via email.

Appendix D

Approval for PhD Proposal Defense by the Panel Reviewers' Committee



Ghazali Shafie
Graduate School
of Government

Universiti Utara Malaysia

Serving the Global Community

Dear Mr, Abdullah Umar (907690)

This is to confirm that your panel has **approved** your proposed correction.

Please contact the Admissions Unit (Mr. Mohammad Hamiz Haqim Ibrahim 049287755 & Mdm. Noor Azleen/ 049287771) for getting a data collection letter.

Thank you,

Kindest Regards

"MALAYSIA MADANI"

"KEDAH SEJAHTERA - NIKMAT UNTUK SEMUA:

"ILMU BUDI BAKTI"

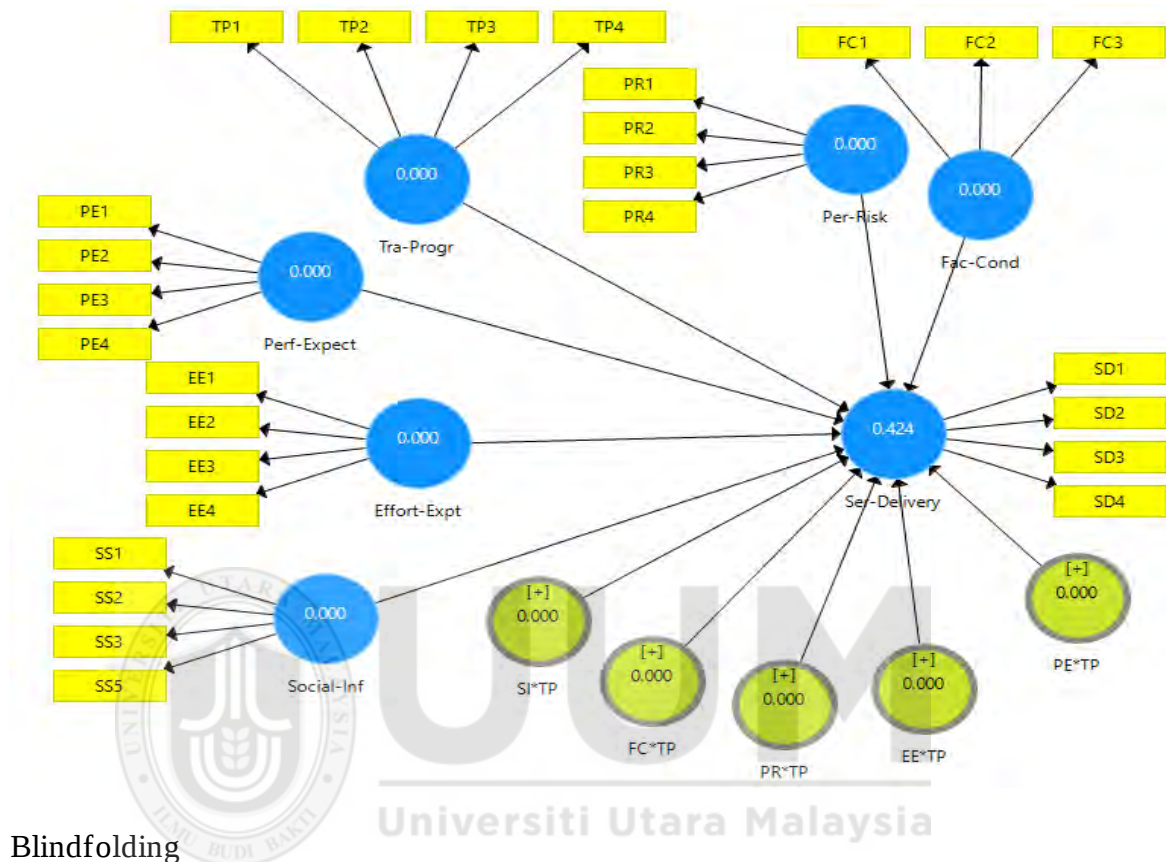
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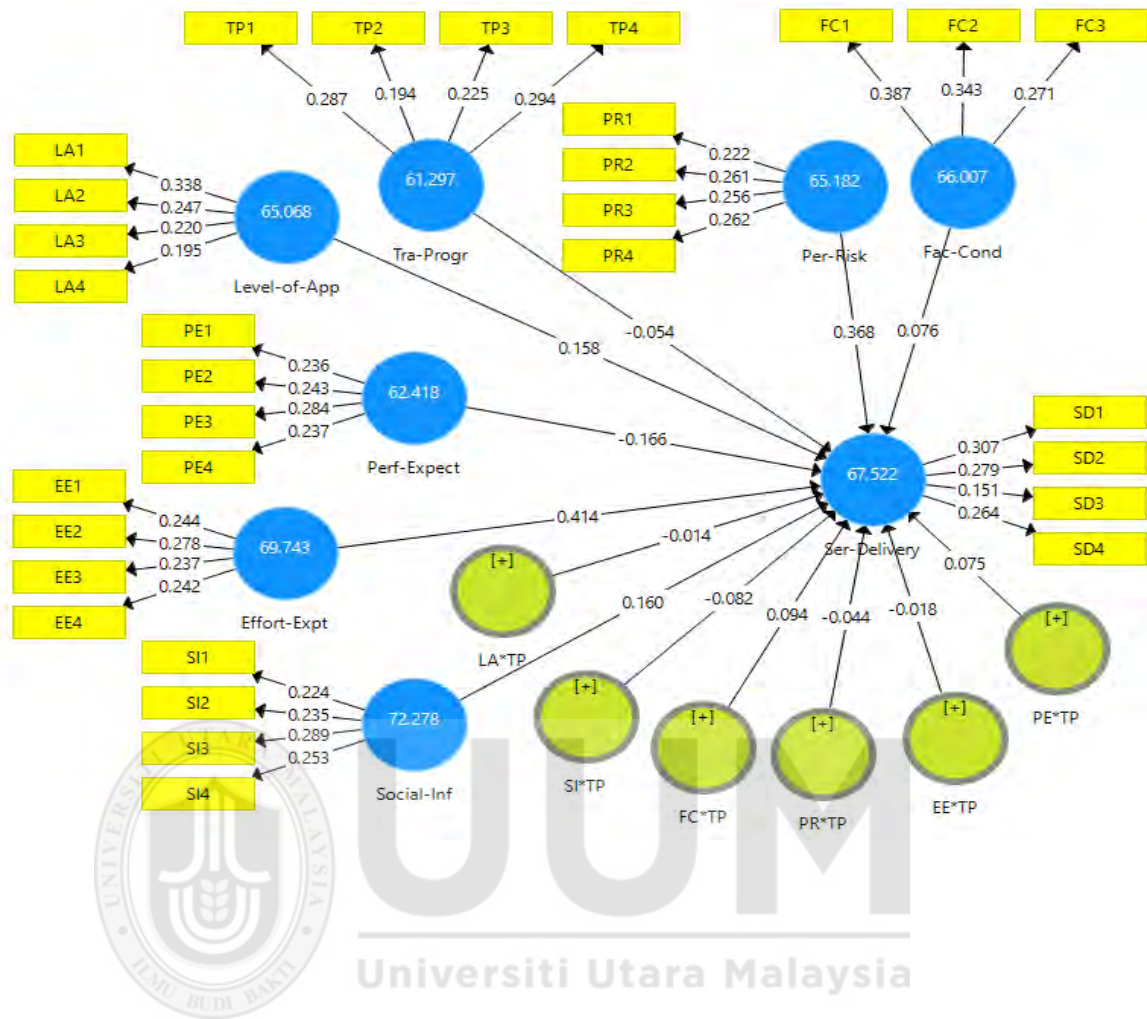
Zaiton Kunhali

Zaiton M Kunhali | Pembantu Tadbir (P/O) | Administrative Assistant |

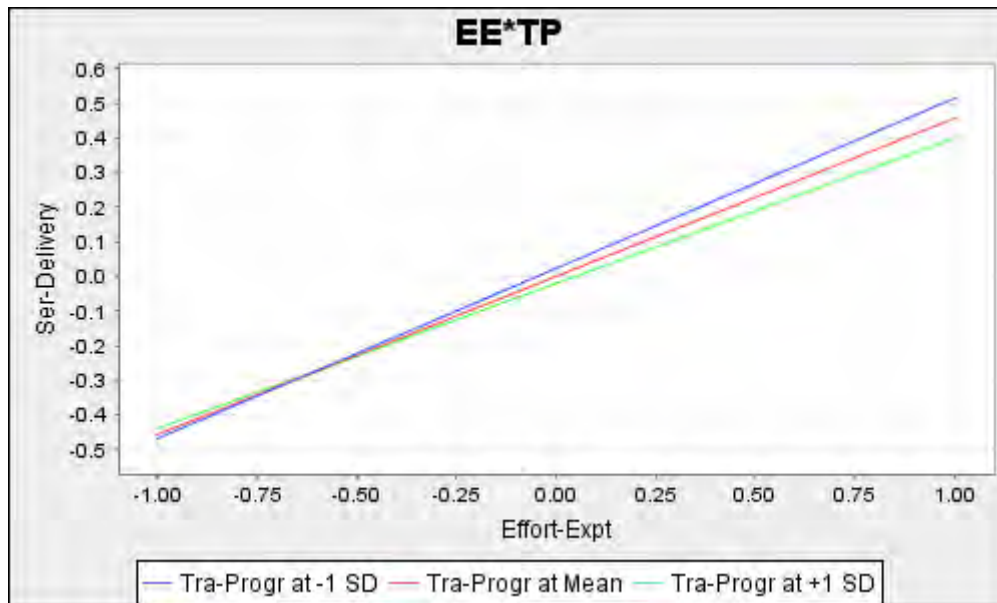
Appendix E

Output from the SPLS 4.0

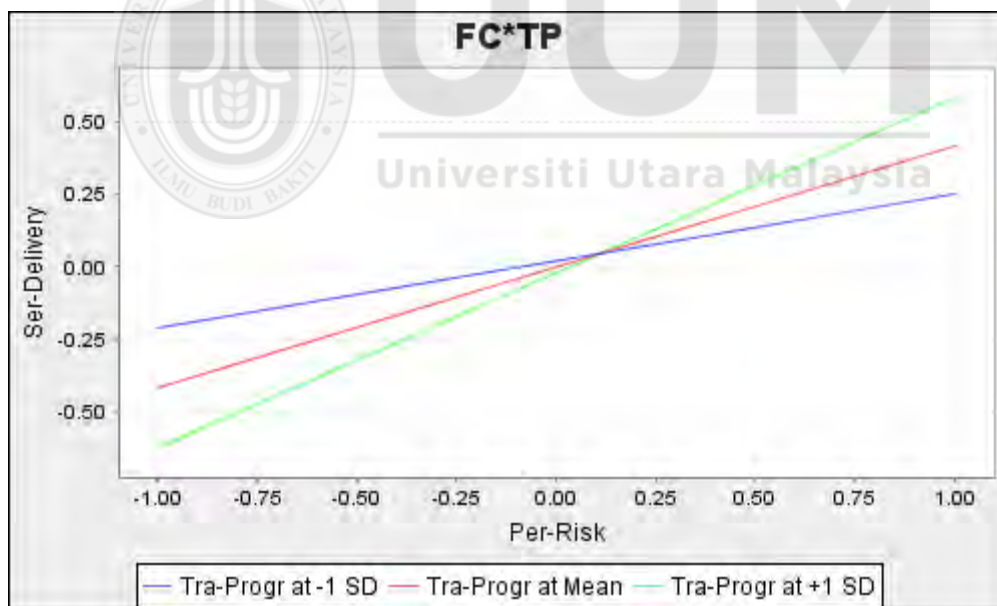




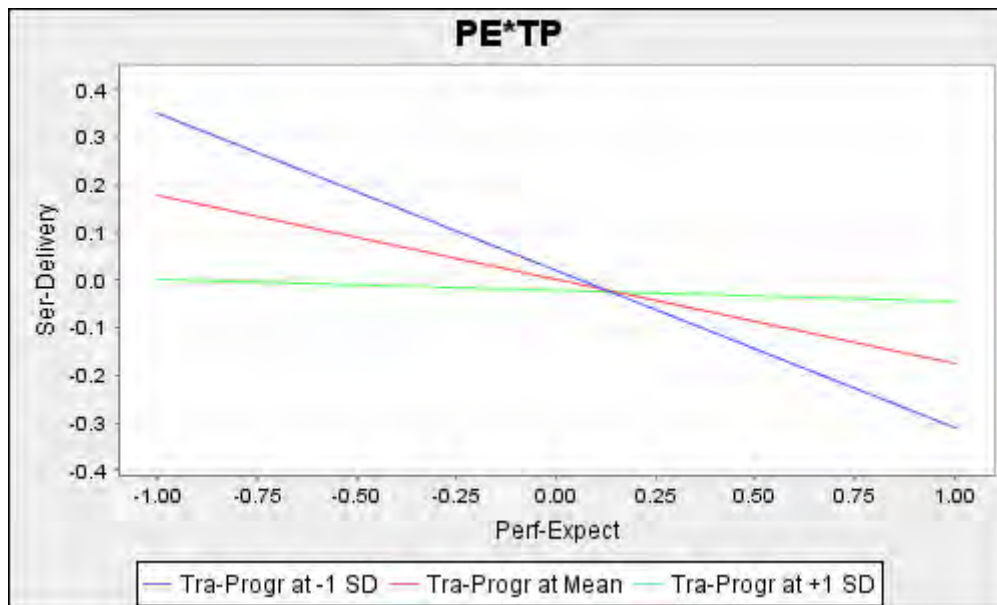
IPMA



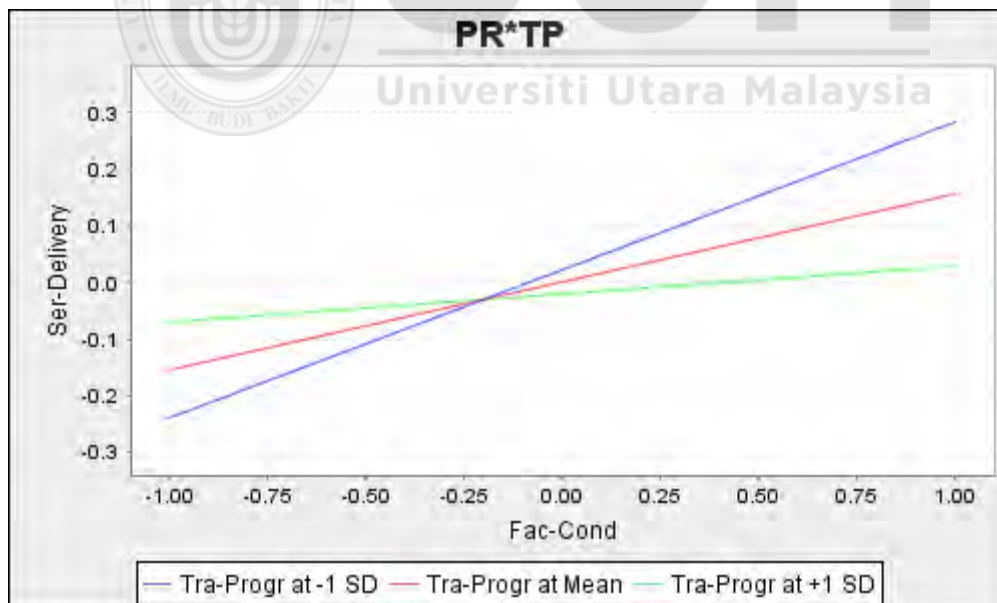
Simple plot EE*TP



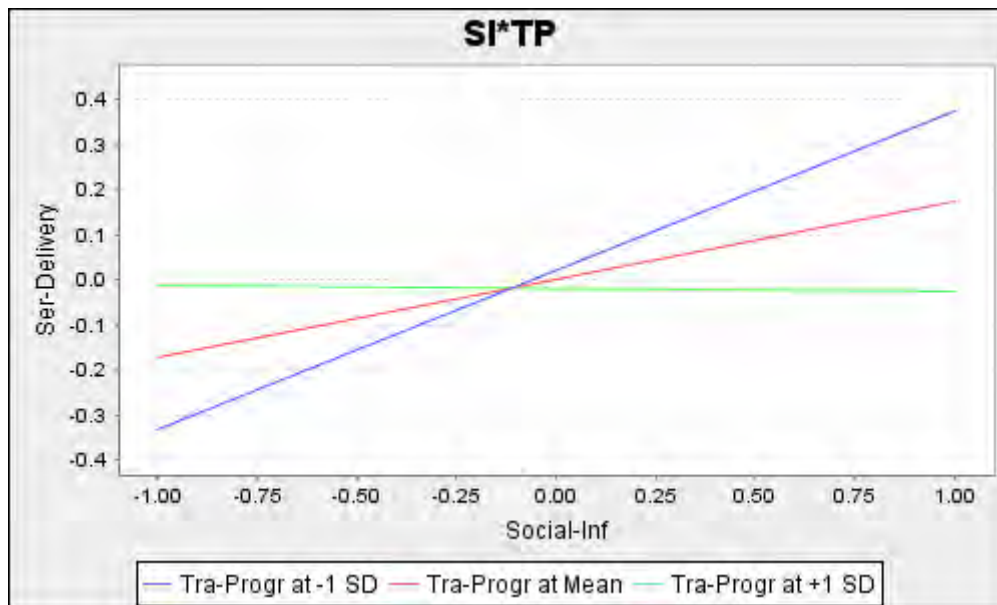
Simple plot FC*TP



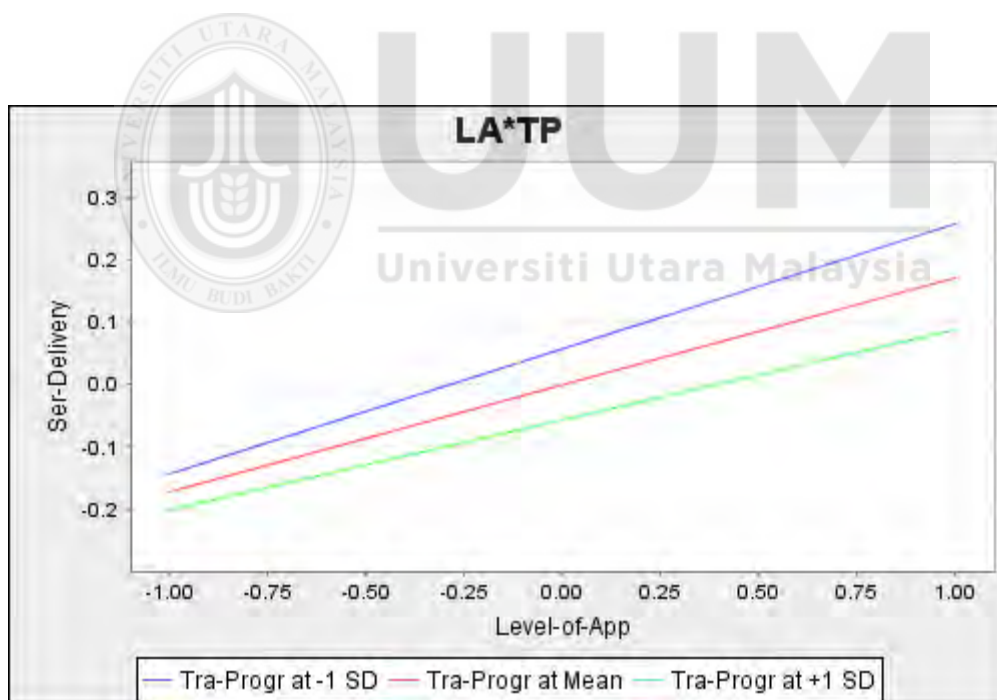
Simple plot PE*TP



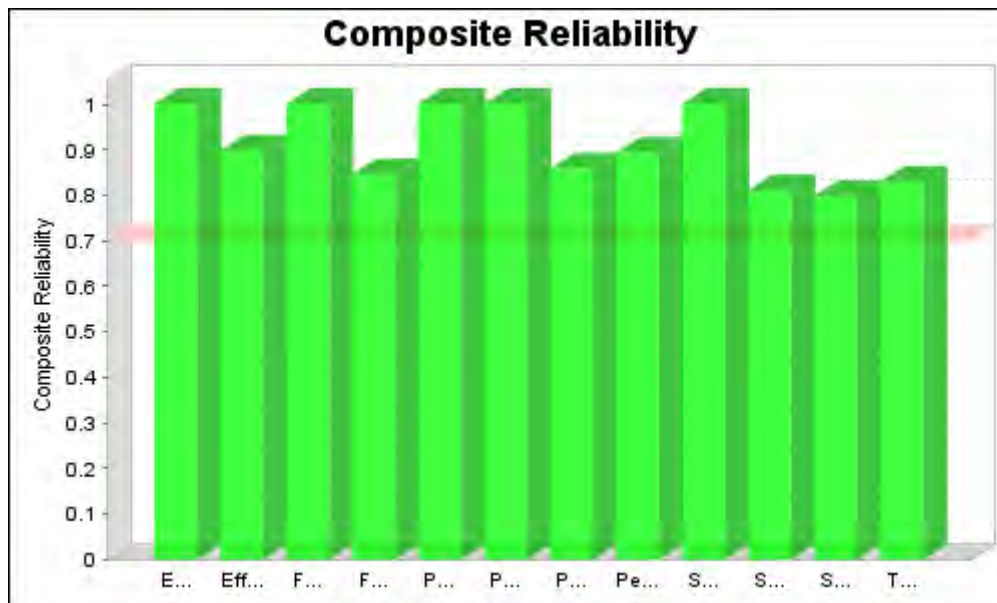
Simple plot PR*TP



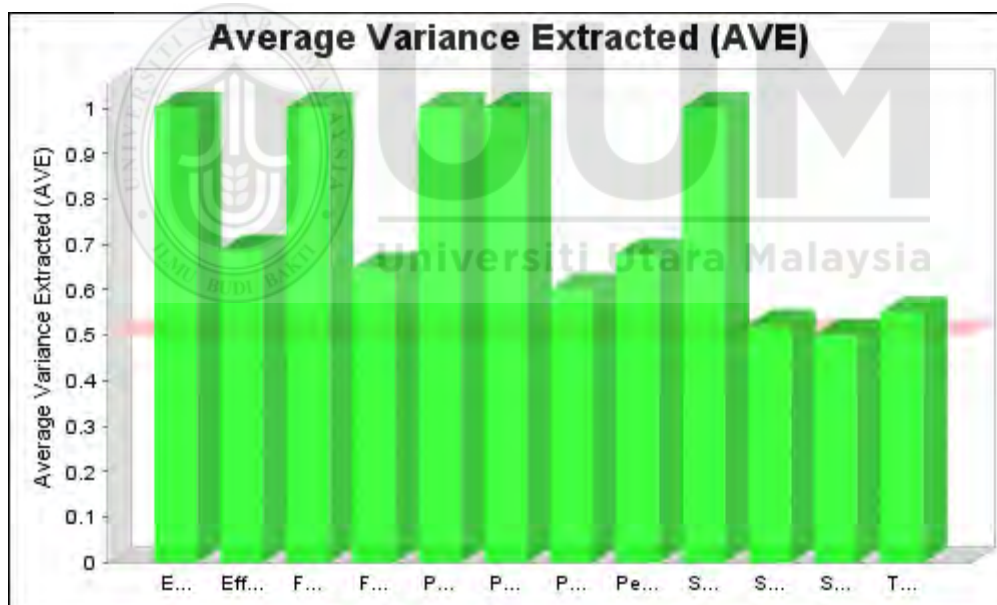
Simple plot SI*TP



Simple plot LA*TP



Composite Reliability



AVE

	EE*TP	Effort- Expt	FC*TP	Fac- Cond	PE*TP	PR*TP	Per- Risk	Perf- Expect	SI*TP	Ser- Delivery	S
EE1	-0.354	0.86	-0.304	0.512	-0.215	-0.184	0.653	0.57	0.281	0.677	-
EE2	-0.313	0.901	-0.274	0.507	-0.171	-0.155	0.655	0.564	0.255	0.759	-
EE3	-0.316	0.833	-0.245	0.51	-0.196	-0.182	0.59	0.58	0.221	0.704	-
EE4	-0.346	0.711	-0.284	0.449	-0.216	-0.207	0.687	0.394	0.233	0.655	-
Effort-Expt *											
Tra-Progr	1	-0.4	0.906	0.186	0.684	0.652	-0.35	-0.203	0.833	-0.347	-
FC1	-0.212	0.447	-0.19	0.782	-0.171	-0.113	0.602	0.575	0.158	0.562	-
FC2	-0.065	0.513	-0.07	0.845	-0.112	-0.061	0.569	0.748	0.063	0.532	-
FC3	-0.174	0.485	-0.143	0.783	-0.178	-0.176	0.512	0.726	0.095	0.425	-
Fac-Cond *											
Tra-Progr	0.652	-0.218	0.739	-0.14	0.867	1	0.207	-0.189	0.663	-0.171	-
PE1	-0.218	0.412	-0.222	0.628	-0.141	-0.183	0.491	0.628	0.139	0.47	-
PE2	-0.07	0.535	-0.088	0.739	-0.087	-0.121	0.521	0.863	0.061	0.484	-
PE3	-0.204	0.61	-0.176	0.681	-0.136	-0.13	0.569	0.907	-0.16	0.538	-
PE4	-0.172	0.524	-0.161	0.715	-0.194	-0.193	0.516	0.868	0.136	0.456	-
PR1	-0.258	0.582	-0.25	0.376	-0.152	-0.092	0.714	0.385	0.238	0.623	-
PR2	-0.267	0.489	-0.272	0.473	-0.159	-0.149	0.795	0.431	0.235	0.701	-
PR3	-0.285	0.771	-0.281	0.625	-0.194	-0.156	0.807	0.577	0.255	0.736	-
PR4	-0.275	0.562	-0.228	0.7	-0.254	-0.247	0.783	0.592	0.174	0.635	-
Per-Risk *											
Tra-Progr	0.906	-0.333	1	0.168	0.722	0.739	0.333	-0.197	0.919	-0.302	-
Perf-Expect *											
Tra-Progr	0.684	-0.239	0.722	0.189	1	0.867	0.244	-0.169	0.757	-0.199	-
SD1	-0.276	0.806	-0.251	0.491	-0.17	-0.122	0.651	0.491	0.252	0.821	-
SD2	-0.3	0.761	-0.233	0.567	-0.207	-0.17	0.657	0.53	0.238	0.799	-
SD3	-0.128	0.269	-0.111	0.324	-0.03	-0.04	0.475	0.273	-0.12	0.54	-
SD4	-0.266	0.491	-0.249	0.432	-0.129	-0.137	0.722	0.388	0.204	0.697	-
SS1	-0.146	0.333	-0.108	0.239	-0.022	-0.003	0.371	0.236	0.132	0.453	-
SS2	-0.262	0.513	-0.259	0.32	-0.162	-0.126	0.611	0.365	0.222	0.498	-

SS3	-0.275	0.425	-0.262	0.376	-0.177	-0.161	0.649	0.396	0.197	-	0.595
SS5	-0.19	0.499	-0.18	0.698	-0.151	-0.154	0.569	0.755	0.129	-	0.53
Social-Inf *				-			-				
Tra-Progr	0.833	-0.299	0.919	0.133	0.757	0.663	0.292	-0.152	1	-	-0.29
TP1	-0.305	0.537	-0.229	0.609	-0.185	-0.174	0.677	0.493	0.181	-	0.649
TP2	-0.212	0.55	-0.145	0.726	-0.138	-0.114	0.531	0.723	0.108	-	0.489
TP3	-0.28	0.411	-0.255	0.411	-0.147	-0.118	0.634	0.358	0.205	-	0.518
TP4	-0.339	0.801	-0.284	0.558	-0.206	-0.157	0.687	0.514	0.255	-	0.678

Cross validation

	SSO	SSE	Q ² (=1-SSE/SSO)
EE*TP	386	386	
Effort-Expt	1544	1544	
FC*TP	386	386	
Fac-Cond	1158	1158	
PE*TP	386	386	
PR*TP	386	386	
Per-Risk	1544	1544	
Perf-Expect	1544	1544	
SI*TP	386	386	
Ser-Delivery	1544	889.197	0.424
Social-Inf	1544	1544	
Tra-Progr	1544	1544	