AN EVALUATION OF E-GOVERNMENT PERFORMANCE IN NIGERIA: A PUBLIC VALUE APPROACH

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LIST OF ABBREVIATIONS

AVE	Average Variance Extracted
BCILL	Bias Corrected Interval Lower Limit
BCIUL	Bias Corrected Interval Upper Limit
CBA	Cost-Benefit Analysis
CBR	Cost-Benefit Ratio
CR	Composite Reliability
DMISM	DeLone and Mclean Information System Success Model
E-Government	Electronic Government
G2B	Government to Business
G2C	Government to Citizens
G2G	Government to Governments
HOC	Higher-Order Constructs
ICT	Information and Communications Technology
ICT4D	Information and Communications Technology for Development
IS	Information System
IT	Information Technology
LOC	Lower Order Constructs
LVS	Latent Variable Scores
MDAs	Ministries, Departments and Agencies
NeGST	National e-Government Strategies
NITDA	National Information Technology Development Agency
NITP	National Information Technology Policy
NPM	New Public Management
NPV	Net Present Value

NUC	National Univerities Commission
OPEC	Organization of Oil Exporting Countries
PBP	Pay Back Periods
PLS-SEM	Partial Least Squares- Structural Equation Modelling
ROI	Returns on Investment
TAM	Technology Acceptance Model
UN	United Nations
UNEGDI	United Nations E-Government Development Index
UTAUT	Unified Theory of Acceptance and Use of Technology
VIF	Variance Inflation Factor

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PENILAIAN PRESTASI E-KERAJAAN DI NIGERIA: PENDEKATAN NILAI AWAM

ABSTRAK

Kelebihan e-kerajaan yang pelbagai menyebabkan kerajaan Nigeria telah melaburkan sumber-sumber melalui program dan projek yang berbeza untuk memperbaiki dan merealisasikannya. Setelah dua dekad perlaksanaan e-kerajaan, ia menjadi sangat penting bagi menilai prestasinya. Pendekatan dominan NPM terdahulu bagi penilaian prestasi e-kerajaan telah dikritik kerana mengabaikan asas ideal sektor awam. Oleh itu, paradigma nilai awam telah dicadangkan untuk memperbaiki hubungan NPM yang lemah. Sejajar dengan pemikiran tersebut, kajian ini telah menerima pakai teori nilai awam dan model kejayaan DeLone dan McLean IS sebagai teori asas bagi menilai prestasi e-kerajaan Nigeria. Kajian ini menyatakan semula manfaat bersih model DeLone dan McLean untuk mencerminkan nilai-nilai awam e-kerajaan dan memperluaskan model ini bagi merangkumi literasi digital dan akses rakyat ke atas ICT sebagai faktor kejayaan yang mempengaruhi prestasi e-kerajaan. Sebanyak 25 hipotesis telah dibentuk dan data untuk mengujinya telah dikumpulkan melalui soal-selidik kendiri daripada 369 pengguna e-kerajaan yang berpengalaman dengan menilai e-perkhidmatan terpilih. Data tersebut juga telah dianalisis menggunakan PLS-SEM melalui bantuan perisian SmartPLS 3.3.2. Hasil kajian menunjukkan bahawa faktor kejayaan meramal nilai awam e-kerajaan. Penemuan ini menunjukkan bahawa dimensi kualiti IS dan literasi digital menyumbang kepada penggunaan sebenar, kepuasan dan nilai awam e-kerajaan. Akses kepada ICT juga mengukuhkan hubungan antara penggunaan sebenar dan nilai awam e-kerajaan. Hal ini menunjukkan bahawa semakin banyak rakyat mempunyai akses kepada

infrastruktur dan perkhidmatan ICT, semakin mereka akan menggunakan ICT dan mempunyai nilai untuk penggunaanya. Penggunaan sebenar dan kepuasan pengguna menjadi penghubung di antara faktor kejayaan dan nilai awam e-kerajaan. Sumbangan penyelidikan ini terletak pada fakta bahawa kajian ini di antara kajian yang terawal menggunakan nilai awam bagi mengukur manfaat bersih e-kerajaan. Literasi digital juga telah terbukti menjadi peramal yang baik untuk penggunaan sebenar, kepuasan pengguna dan nilai awam e-kerajaan. Kajian ini juga membuktikan kesan penyederhanaan akses rakyat kepada ICT di antara penggunaan dan nilai awam e-kerajaan. Model konseptual kajian ini dapat digunakan dalam kajian masa hadapan untuk menilai kejayaan sistem cenderung ICT yang khusus.

AN EVALUATION OF E-GOVERNMENT PERFORMANCE IN NIGERIA: A PUBLIC VALUE APPROACH

ABSTRACT

Due to the benefits of e-government, the Nigerian government invested resources in its actualisation and improvement through different programs and projects. Two decades after the implementation, it becomes important to evaluate the performance. The earlier NPM induced dominant approach for performance evaluation has been criticised for ignoring the public sector's fundamental ideals. Therefore, the public value paradigm was suggested to improve the weak links of the NPM. In line with this thought, this study adopted the public values theory and Delone and Mclean IS success model as underlying theories to evaluate Nigeria's e-government performance. This study respecified the DeLone and McLean model's net benefits to reflect the public values of e-government and extends the model to include digital literacy and citizens' access to ICT as success factors influencing e-government performance. This study adopts a quantitative research design, 25 hypotheses were formed, and data to test them were collected through a self-assisted questionnaire from 369 experienced e-government users by assessing selected e-services and analysed using PLS-SEM through the aid of SmartPLS 3.3.2 software. The findings of the study showed that success factors predict the public value of e-government. This finding implies that the quality dimensions of IS and digital literacy contribute to the actual use, satisfaction and public value of e-government. Similarly, access to ICT strengthens the relationship between actual use and the public value of e-government. This finding implies that the more citizens have access to ICT infrastructure and services, the more they will use ICT and have value for the use. The actual use and

user satisfaction mediate the relationship between the success factors and the public value of e-government. This research's contribution lies in the fact that this study is applied the public values to measure the net benefits of e-government. Also, digital literacy has proven to be a good predictor for actual use, user satisfaction and the public value of e-government. This study also established the moderating effect of citizens' access to ICT between the use and public value of e-government. This study's conceptual model can be used in future studies to evaluate specific ICT inclined systems' success.

CHAPTER 1

INTRODUCTION

1.1   Background of the Study

The common reference to electronic government (e-government) is the usage of information and communication technology (ICT) to process, modernise and transform the operations of public sector organisations to deliver quality public services (Kurfalı, Arifoğlu, Tokdemir, & Paçin, 2017). In other instances, it is a tool to foster transparency, accountability and accessibility to information from the government (Bertot, Jaeger, Gorham, Taylor, & Lincoln, 2013). It can enable the delivery of other socially desirable outcomes for the citizens, such as bridging the public trust gap between the government and the citizens (Michener & Bersch, 2013), environmental sustainability (Haigh & Griffiths, 2008; Lee, 2017), as well as encourage citizens participation and collaboration in policymaking (Rodríguez & Manuel, 2018).

The emergence of e-government constitutes one of the new initiatives in the era of disruptive technology aimed at enhancing the digitalization and transformation of the public sector. It gives room for a modern form of governance which offers a greater potential for the public sector and its agencies to become more transparent, responsive, quality service delivery and accountable to the citizens (Cordella & Bonina, 2012). Similarly, it opens the door for different stakeholders in the governance process on a new level of engagement.

Governments in different countries have undergone different phases due to the changing nature of technology, leading to advancement in digital technology. The first stage was the Government 1.0 phase, which was the basic use of technology for communication among parallel government agencies. The next phase was

synonymous with the Web 2.0 or Government 2.0, this phase featured a more participatory government system and social media use by government agencies. Government 3.0 is the third stage which corresponds with the engagement stage. According to Janowski (2015), government 3.0 is predicated upon global movement of the disruptive technology, which aids the government in using technology for evidenced based decision making.

The fourth industrial revolution, often known as IR4.0, has brought with it opportunities in terms of social and economic development for countries. This industrial revolution is marked by the fusion of the physical, digital, and biological spheres in the adoption of technology. This innovations is poised to revolutionise society, businesses, and governments through the embracing of emerging technologies such as artificial intelligence, big data analytics, and blockchain technologies (Janowski, 2015). Researchers have predicted that developing countries can leapfrog stages of growth and align with developed countries through the use of technology (Manda & Ben Dhaou, 2019). Similarly, the United Nations (2018) also acknowledged the power of IR 4.0 technology in achieving the Sustainable Development Goals adopted in 2015 by member states. Therefore, the use of technology in the current era posed a lot of benefits to governments, businesses and the citizens.

Given its attendant socio-economic and political benefits, governments worldwide invest hugely to fast-tracking their socio-economic development. Also, to create values for their citizens and build an efficient, responsive, transparent and effective public service delivery system (Moullin, 2017). Beyond the broad interpretation of e-government as a beneficial tool for the government, e-government in perspective is associated with a myriad of values stakeholders expect based on the transformative process (Cordella & Bonina, 2012). For the government, e-government

drives an internal process of rearranging tasks, simplifying organizational processes and making communication easier with other stakeholders such as businesses and the citizens. Therefore, different government ministries, departments, and agencies (MDAs) have incorporated technology to deliver services and streamlining administrative processes. Accordingly, investments in technology for administrative processes and service delivery are essential for its socio-economic development.

Evaluating the performance of e-government is one of the key central activities in e-government (Andersen, Medaglia, Vatrapu, Henriksen, & Gauld, 2011; Kunstelj & Vintar, 2004; Zoo, Lee, & Yoon, 2017). In evaluation, the success or failure depends on the perceived values or net benefits that citizens can attribute to its use. Evaluation is important in highlighting the results achieved over time by determining the extent of the implementation strategy and plans, ascertaining milestones accomplished, optimising spending, and identifying the strengths and challenges (Deng, 2008).

Over the years, the earlier means of evaluating e-government performance have been majorly from the business or economic angle, like determining the Return on Investment (ROI) and Pay Back Period (PBP) (Rose, Persson, & Heeager, 2015). This approach results from the New Public Management (NPM), which emphasises adopting the public sector's private and business managerial approach. However, it has been criticised for being too economic rather than considering citizens' political and social choices (van der Zwet & Connolly, 2021).

The foundation of e-government initiatives is not restricted to efficiency and cost savings alone. Rather, there are other underlying socio-political goals of e-government such as equity, transparency, trust, openness, participation and environmental sustainability (Ingrams, 2019). This view is opposed to the private

sector's motive of increasing effectiveness and value for money (Cordella & Paletti, 2018). In line with this thought, it must be emphasised that public sector drivers are distinct from the private sector; hence, public organisations have multiple stakeholders with multiple preferences, which must be delivered accordingly. Therefore, the performance of e-government measurement, a public sector initiative, ought to be shifted from the pure financial measure to a set of all-encompassing socio-political goals that cover the users (Gupta & Suri, 2017; Moore, 1995).

The main objective of public administration is to produce values for the citizens. The successful implementation of ICT will improve the production of those values as the system's net benefits. The effect of e-government initiatives in public organisations is to enable innovations for service delivery; therefore, values that matter to the citizens generated from such innovations are essential to measuring the performance of e-government. In as much as the objective of e-government is to enhance the delivery of services for the citizens; therefore, its evaluation should be citizen-focused too, which is the whole idea of public value (Bannister & Connolly, 2014; Twizeyimana & Andersson, 2019).

The last decade witnessed a tremendous growth in the supply side methodology in the e-government evaluation. This aspect of evaluation focuses essentially more on the availability and readiness of ICT infrastructure and human capital. Although, evaluation is important in the lifecycle of any project, e-government inclusive. It helps government agencies to track progress and measure their level of effectiveness. However, without the appropriate means of evaluation, progress cannot be tacked effectively, and policy failure could occur (Anwer, Esichaikul, Rehman, & Anjum, 2016). To understand the implications of any information and communication technology (ICT) investment, a well-documented and widely accepted method and

approach is required (Jones et al., 2006. Gupta and Jana (2003) mentioned that ICT related services in the public sector are intangible resources, making it difficult to measure the cost and value related of getting the services Therefore, advocating for citizen approach and values has taken the centre stage recently, as the appropriate means of evaluating e-government performance.

The citizen-centric approach to e-government acts as a transformation tool that gives the government a systematic model of assessment based on a citizen-focused view (Schelin, 2003). Studies suggest that in order to completely realize e-government potential, government must entirely migrate from government-centric approach to a citizen-centric approach. Rather than focusing on what services government agencies can deliver, governments should focus on what citizens truly expect, consume and be satisfied with, therefore, the move from a "government-centric" to a "citizen centric" approach is essential (Yong, 2004). Importantly, citizens are at the center of the citizen-centric approach, which provides them with a single line of access to all of government services. Citizen-centric e-government services are intended to provide citizens with increasingly cost-effective, personalized, better communication, trust and time savings benefits (eGov, 2007). The citizen-centered approach is expected to promote the provision of citizen-oriented services, or services that match the needs and expectations of citizens. More so, governments will deliver services and resources tailored to the specific requirements of citizens, including government personnel and others (Bertot et al., 2008; Jin-fu and Duo, 2009).

As value expectations from e-government continue to be the citizens' goal and the major drivers for the use of e-government services, the performance evaluation continues to generate arguments on how best to determine the level citizens are satisfied with their expectations from e-government. From the supply side, the

government is keen on improving the quality of machinery to enhance its capacity to deliver better services. On the demand side, citizens are also craving better values from the government. Therefore, a new level of expectation is expected to balance the demand and supply for effective, efficient and transparent service delivery.

Successful e-government implementation relies on the foundation of certain factors that ensure the ease of adoption and access to online services by the citizens, such as positive government support, citizens' adoption and participation (Rabaa'i, 2017), advanced infrastructure, effective regulatory framework (Imbamba & Kimile, 2017), digital skills and access to ICT by the citizens (United Nations Development Programme, 2019; World Bank, 2019). Generally, it is expected that citizens with positive expectations and the right ICT skills are motivated to use e-government services. Their satisfaction level with the performance expected could likely inform their usage, which could assist the government in e-service delivery performance through constructive and participatory feedback.

Another critical factor is functional and interactive websites' operation by public organisations that deliver accurate, easy-to-understand, and current information for open and transparent public service (Sá, Rocha, & Pérez Cota, 2016). More so, studies have argued that expectations (public value) of e-government against its performance can be gauged with the level of satisfaction and continued use of intention by the citizens (Weerakkody, Irani, Lee, Hindi, & Osman, 2016).

Nigeria's population has been conservatively estimated to be around 200 million people, thus positioning it as the most populated country in Africa (World Bank, 2018). It accounts for about 47% of the entire West African population and can boast of 36 billion barrels of oil reserves (OPEC, 2019). The last five decades have witnessed continuous reforms to improve the organisation, management, and

government activities in Nigeria (Oyedele, 2015). With these reforms, attention was drawn to reducing waste and eliminating bureaucratic tendencies in service delivery in the public sector (Gberevbie, Ayo, Iyoha, Ojeka, & Abasilim, 2016).

In 2002, as one of the reforms that took place in the public sector, the implementation of e-government in Nigeria was kick-started with the establishment of the National Information and Telecommunication Agency (NITDA) and the enactment of the National Information Technology Policy (NITP) (Abdulkareem, Ameen, & Ishola, 2016). The implementation was made possible with the ICT revolution, which started in 1999, which also signified the country's return to democracy. The ICT revolution was a movement that spanned across Africa in the late 1990s, with mobile telecommunications, network and computer societies establishing their presence in the country. The private took the lead in the digital transformation through electronic commerce, banking, and investments. Following the concerns of different stakeholders on the need for the government to also go digital, the Federal government was swift to adopt e-government in some key ministries, departments and agencies as a test run. The objective was to place government services online to enable efficiency, effectiveness, transparency, trust and accountability (Taiwo, 2018).

Similarly, based on the National IT Policy vision, Nigeria proposed e-government as the major driver for the vision 20-2020 (National eGovernment Strategies, 2019). Since its implementation, MDAs, most especially at the federal level, have ventured into it and implemented some citizen-centric services like application for e-passport, processing of electronic driver's license, registration of National Examinations such as Joint Admission and Matriculations Board examinations, e-filing of tax returns, registration for National e-Identity Cards, online customs services and other G2C services.

The use of e-government in Nigeria is low compared to other developing countries like Malaysia, Saudi Arabia and South Africa (Mutula, 2008). Therefore, recently, the Nigerian government launched a central portal on the web and mobile technology to create an online business environment. Also, it aims to achieve a seamless interaction among MDAs and external stakeholders to fast track service delivery and ensure transparency in the public sector.

Apart from a web presence, most of the MDAs have established a social media presence on Facebook and Twitter to ease the flow of information and services. Some other strategies were also launched to allow citizens to realise the net benefits of e-government. One such strategy is e-Nigeria, an initiative to improve the connectivity of communities, agencies, and departments of government and schools with ICT (Fatile, 2012). Nigeria's National eGovernment Strategies (NeGST) was set up in 2004 to build the ICT infrastructure to facilitate e-government (National eGovernment Strategies, 2019). The ICT for Development program (ICT4D) is another established program to help the Nigerian government strategise for e-government.

Jointly, these strategies were directed towards achieving the common goal of increasing the use and satisfaction with e-government services and creating other values for online services (Amagoh, 2015). However, it remains unclear whether these strategies and investments have spurred citizens to realise the net benefits of e-government services. This is because empirical evaluations of their success or failure are lacking, as reckoned by the citizens. Therefore, this study seeks to evaluate the performance of e-government from the perspective of the citizens.

1.2   Research Problem

Nigeria implemented e-government in the early 2000s as a public sector reform to promote efficient service delivery, public trust, transparency and accountability.

However, the evaluation of its success and failure continues to generate debate, practically and theoretically. E-government performance investigation from prior studies has centered mostly around the traditional and economic approach to public services performance measurements such as returns on investments, net present profit and payback periods (Gil-Garcia & Flores-Zúñiga, 2020; Rose, Persson, Heeager, & Irani, 2015). Also, some studies focused on the supply-side of e-government, with little attention to the demand side.

The supply-side majorly assess the e-readiness (infrastructure, human capital and policy framework) and the quality of websites and the usability of the government websites (Adepoju, Shehu, & Bake, 2016; Adeyemo, 2011; Ashaye & Irani, 2014; Ifinedo, 2005; Mundy & Musa, 2010; Olatokun & Adebayo, 2012; Oni, Okunoye, & Mbarika, 2016). This assessment mode involves the effectiveness of e-government service delivery channels such as websites, kiosks, mobile phones, and social media. (Vintar & Bencina, 2013). Different studies have evaluated e-government projects based on the quality of websites such as Dias, Gomes, and Zúquete (2016); Nakatumba-Nabende, Kanagwa, Kivunike, and Tuape (2019); United Nations (2018, 2020). Some other studies assessed the quality of m-government through the mobile application of e-government projects (Al-Hubaishi, Ahmad, & Hussain, 2017; Alduhailan & Alshamari, 2016; Faisal & Talib, 2016). Pick, Gollakota, and Singh (2013) examined the efficacy and importance of telecentres in the development of e-government.

However, it should be noted that this type of evaluation only investigates the quality of delivery mechanisms, thereby ignoring the important aspect of adoption and impact of e-government outcomes for the citizens (Yildiz, 2007). Deng et al. (2018) noted that the supply side assessment does not consider users' commitments and

satisfaction for e-government in the evaluation process. The emphasis is rather on the quality of technology as the major criteria for evaluating e-government rather than the users' actual demand and the resultant effect of the usage (Misuraca, Codagnone, & Rossel, 2013). Rorissa, Demissie, and Pardo (2011) argued that the values that drive e-governments impact the users rather than the efficacy of the technology deployed. Therefore, investigating e-government from these perspectives mostly ignores the impact of e-government on the citizens, and importantly, the values that e-government seeks to promote, thereby creating a research gap in investigating e-government performance in Nigeria.

In a similar view, scholars such as Karlsson, Holgersson, Söderström, and Hedström (2012); Weerakkody et al. (2016) have also argued that investigating e-government performance from the supply side, for example, does not translate to the government's e-government implementation intentions. The importance of investigating e-government performance from the demand side through citizens' expectations has been advocated in the literature, which is the hallmark of public value (Deng et al., 2018; Jones et al., 2007, Weerakkody et al., 2016, Twizeyimana et al., 2019).

Kearns (2004) refers to public value as expectation of the citizens from government services and can serve as a benchmark to evaluate government performance and the services provided. Ultimately, the public value perspective emphasises policies' outcomes and demands from the citizens on what they considers valuable (policy or project expectations). Alford and O'Flynn (2009) further argued that public value's perspective dictates that investment in public services should not be assessed from the producers' viewpoint but rather "it is a matter of who consumes it". For investments in e-government to be justified, it is important to seek feedback

from the citizens who are the primary users. Therefore, this type of assessment would help the government place citizens' expectations on the e-government agenda and realise where it is lagging and identify areas for improvement (Agbabiaka, 2018; Scott, DeLone, & Golden, 2016).

Bai (2013) also noted that intangible values such as communication, trust, public participation, public organisations' efficiency, and environmental sustainability must be considered the real benefits of e-government instead of emphasising economic gains. These values are mostly ignored in the supply-side assessment of e-government performance, and more often do not assist the government in public policy formulation. As rightly observed in the previous studies on e-government in Nigeria, the neglect of these values in e-government performance investigation has generated significant limitations (Zahran, Al-Nuaim, Rutter, & Benyon, 2015). These limitations could result in poor policy formulation arising from an inaccurate estimate of success factors and benefits. Also, it could limit the focus of government policy implementation strategies to the technical aspects of e-government alone while neglecting the key foundations of e-government, which is citizens' demands and satisfaction with public service delivery (Špaček, Csótó, & Urs, 2020; Zahran et al., 2015). Therefore, these limitations have created a research gap in the literature and practice of e-government in Nigeria, which this study seeks to fill. Therefore, this study will deviate from the previous studies' approaches and adopt public value as the dependent variable to measure the net benefits of e-government from the citizens' perspective.

Similarly, from the theoretical point of view, there has been a lack of theoretical consensus in theories used to explain e-government performance (Nkanata, 2019). Past studies adopted different theories to explain e-government performance

either from the acceptance, use, or satisfaction points of view (Okunola, Rowley, & Johnson, 2017; Oni, 2017; Verkijika & De Wet, 2018). Models such as the Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use Model (UTAUT), Unified Model of E-government Acceptance (UMEGA) and the Expectancy-Confirmation and Disconfirmation Model have been applied. For instance, Mensah (2019) used perceived usefulness and government capacity to explain e-government through the TAM lens. Zahid and Haji Din (2019) also used UTAUT by applying trust, attitude, subjective norms and perceived control to examine the intention to use e-government services. Similarly, Verkijika and De Wet (2018a) examined user acceptance in Sub-Saharan Africa through the use of UMEGA with the use of self-efficacy, trust in the internet and trust in government as an extension to the UTAUT model.

However, these models have been critiqued to be centred around factors that influence individuals' motives and behaviour in adopting e-government. They argue that the system adoption and continuous intention to use reflect a system's success. If a system is used or users have the re-intention of using them, it is successful. This argument can be deemed appropriate and correct only for internal system users, such as private organisation system success, that depends on the number of users. However, this argument is incorrect for external e-government users; the e-government system's success depends largely on the benefits they can derive from the system because government services are not profit-oriented and not user-dependent. Therefore, the adoption models mostly ignore the success factors that explain the use, satisfaction and benefits of e-government. Thus, in addressing the IS theoretical research gap on e-government performance, the study adopts the Delone and Mclean IS success model.

DeLone and McLean Information Systems Model (1992, 2003) proposed a 6-construct dimension to evaluate an Information System by investigating the overall success using quality dimensions. The dimensions are Information Quality, System Quality and Service Quality, and their effects on User's Satisfaction and Use perception, influencing the information system's Net Benefits. This model has been used in different information system contexts (Rana, Dwivedi, Williams, & Weerakkody, 2015b; Sorongan & Hidayati, 2020; Wang & Teo, 2020; Weerakkody et al., 2016). However, despite the popularity, acceptance and usage of the model, not much has been done to apply this model to evaluate e-government (Nkanata, 2019; Rana, Dwivedi, Williams, & Weerakkody, 2015a). Although most literature in the e-government context acknowledged efficient service delivery, quality information, and the system's quality as the key independent variables, there are, however, variations in the dependent variables. Some studies applied user satisfaction as the key-dependent variable and the major proxy for e-government success (Alawneh, Al-Refai, & Batiha, 2013; Verdegem & Verleye, 2009). While some applied continuous intention to use or actual use, not the values of e-government per se (Li & Shang, 2020; Ma & Zheng, 2019). The values of e-government as the net benefits of e-government have not been sufficiently explored in the literature to serve as the main representation for the e-government system's success, especially in developing countries like Nigeria.

In Nigeria, the majority of the studies that adopted the Delone and Mclean IS success for IS evaluation was within the e-learning (Adeyemi & Issa, 2020; Yakubu & Dasuki, 2018), e-health (Ojo, 2017) and e-commerce (Okechi & Kepeghom, 2013; Tella & Abdulmumin, 2015). DeLone and McLean (2016) therefore suggest that more research should be carried out to establish the impact and benefits of e-government projects. Measurement of e-government success parameters is still yet to be understood

fully by the research communities. Therefore, this calls for more citizens'-focused research to investigate e-government initiatives through further testing, extension, and the model's respecifications (Petter, DeLone, & McLean, 2012).

Apart from adopting the model to support the study, this study also seeks to extend, respecify, and further validate the model by adding two variables: digital literacy and citizens' access to ICT and use public values to measure the net benefits. The choice of the two variables was based on some factors from the literature that affects citizens adoption of ICT in Nigeria without sufficient empirical support (AbuBakar, 2012; Ephraim, 2019; Forenbacher, Husnjak, Cvitić, & Jovović, 2019). Different studies have also further respecified, extended and validated the model. For instance, Seddon (1997) added perceived ease of use and perceived risk. Rana et al. (2015b) integrated UTAUT with the Delone and Mclean IS model and added perceived usefulness, perceived ease of use, perceived risk, and behavioural intention. Masri, You, Ruangkanjanases, Chen, and Pan (2020) also added perceived value, trust and continuance intention to use to the model to explain the success of e-tourism. Similarly, in the Nigerian context, Agbabiaka (2018), for instance, replaced the actual use of e-government with citizens' trust to investigate the success of e-government. However, Most of the previous e-government evaluation from Nigeria were based on the quality of websites and usability, only a few such as Agbabiaka (2018), that examined e-government using trust as a value of e-government. Therefore, most of these studies failed to account for users characteristics such as their ICT literacy level and access to ICT in investigating the use and success of e-government.

Digital literacy is suggested here as part of the e-government success factors. Based on some arguments, e-government is technology-based; therefore, it requires some digital skills and competence to successfully utilise the features embedded in

them (Chohan & Hu, 2020). Eggrickx et al. (2018) and Ferro, Helbig, & Gil-Garcia, (2011) argued that citizens with high digital skills are more likely to use the information system better than those without the required skills. Lindgren, Madsen, Hofmann, and Melin (2019) also maintain that new research is required on skills essential for public officials and citizens to engage in digital encounters. There is a disparity between the current and future use of e-government. As the models of citizen-government engagement in the digital world are becoming more dynamic, it is expected that digital skills will have a greater weight in the level of use, satisfaction and overall e-government performance.

Similarly, citizens access to ICT is also suggested because of the wide digital divide gap occasioned by the citizens' inaccessibility to ICT facilities. More Nigerians reside in rural areas with limited access to ICT facilities than those in the urban areas. There are currently about 204 million active lines as of December 2020 (Nigeria Communications Commission, 2020). Teledensity has increased from 53% in 2009 to 107.18% as of December 2020. Also, internet penetration increased significantly from 0.32% in 2002 to 61.4% in March 2020 (Nigeria Communications Commission, 2020). Broadband penetration is yet to reach the forecasted 60%. Currently, it stands at 38.5% (Nigeria Communications Commission, 2020). Mobile phone and smart phone ownership have also increased through the years. As of January, 2021, 99.5% of users between age 16 to 64, own a mobile phone with 99.2% owning a smartphone and 14.6% owning a feature phone. Just over 54% of the population have a laptop or desktop computer and 13.8% have a tablet (Connecting Africa, 2021).

Also, as poverty continues to resonate in the main socio-economic discussion of average Nigerians, limited access to ICT facilities due to the high cost of access and the rural-urban divide remains a part of the unresolved problems inhibiting citizens'

access to ICT. ICT facilities such as mobile phones, computers, and the internet serve as the main recipe for e-government services (Alhabshi, 2009). Getting access to ICT is more problematic for developing countries than developed countries due to the levels of ICT proliferation, political commitments of leaders, infrastructural capabilities and the cost of access. Therefore, getting users of e-government to have access to ICT becomes a crucial determining factor for usage and satisfaction with e-government (Farhan & Sanderson, 2010).

This study proposes an improved version of the D&M IS success model (DeLone & McLean, 2003) by incorporating constructs from the public value perspective and user characteristics. It becomes necessary to improve on the success model due to its inability to capture the demands and expectations of the public service consumers. More so, the inclusion of public value paradigm and user characteristics in the evaluation of e-government still remain unknown within the context of a developing country. Although, few studies have combined public value with IS success model; as a result, this study has aimed to add to these studies by evaluating e-government performance in developing countries from a public value perspective. Therefore, essentially, the relationship between IS success factors, user characteristics, and public value dimensions emerging from e-government systems is established and tested in this study.

The effective execution of ICT in the public sector contributes to transparency, accountability, and good governance. However, it is desirable to assess how the success factors (information quality, system quality, service quality and digital literacy) influence citizen utilisation and satisfaction with e-government services. Similarly, it is also imperious to investigate the contributory effect of citizens' access to ICT on the use, satisfaction and public value of e-government. The overall goal

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remains to examine whether invested resources meet the intended values using public value theory, and the Delone and Mclean IS success model. Therefore, the outcome of this study will fill the identified gaps; it will provide policymakers with a deeper understanding and insights on the salient factors influencing citizen expectations from e-government based on the public value paradigm. This understanding will enhance the public policy approach and develop better implementation strategies for current and future e-government initiatives.

1.3 Research Questions

RQ1: To what extent does the IS success factors (information quality, system quality, service quality and digital literacy) predict the actual use, satisfaction and public value of e-government in Nigeria?

RQ2: To what extent does the actual use of e-government and user satisfaction with e-government predict the public value of e-government in Nigeria?

RQ3: How does actual use and user satisfaction with e-government mediate the relationship between the IS success factors (information quality, system quality, service quality and digital literacy) and the public value of e-government in Nigeria?

RQ4: How does citizens' access to ICT moderate the relationship between the actual use of e-government, user satisfaction with e-government and the public value of e-government in Nigeria?

1.4 Research Objectives

This study's general objective is to evaluate the performance of e-government in Nigeria from the citizens' perspective. Other specific objectives include:

RO1: To examine the influence of the IS success factors (information quality, system quality, service quality and digital literacy) on the use, satisfaction and public value of e-government in Nigeria

RO2: To examine the influence of the actual use and user satisfaction with e-government on the public value of e-government in Nigeria

RO3: To investigate the mediating role of the actual use and user satisfaction with e-government on the relationship between the IS success factors (information quality, system quality, service quality and digital literacy) and the public value of e-government in Nigeria

RO4: To examine the moderating effect of citizens' access to ICT on the relationship between the actual use of e-government, user satisfaction with e-government and the public value of e-government in Nigeria.

1.5 Formation of Hypotheses

1.5.1 Success Factors: Quality Dimensions (Information quality, System quality and Service quality)

DeLone and McLean (2003)'s model postulate three qualities in any information system domain- the information quality, system quality and service quality, all of which influence user satisfaction dimensions. The consequence or value of services consumed creates a significant fundamental factor influencing perceptions of the quality of services offered online (Kearns, 2004). The perceived importance of using e-services by citizens comprises key drivers shaping up perceptions regarding the use or non-utilization of services. In the Delone and Mclean IS success model, user satisfaction is referred to as the level at which IS users are fulfilled with privacy, navigability, content, accuracy, completeness, and usefulness of e-government

platform. Also, it depicts the level of satisfaction with the system's usefulness in terms of its functionalities and ability to deliver required services based on the users' request (Delone & McLean, 2003). Citizens use an internet-based application to search and execute transactions in the e-government domain; thus, they expect e-government systems to provide high-quality data and first-class service. Doing so would serve the needs of residents and enable them to continue to use e-government services.

The quality dimensions of IS have been studied and observed as predictors of actual use's nature and extent. The quality of an information system in terms of accuracy, completeness, understandability and timeliness of the information made available on the e-government portal is useful to predict the degree and reason for its use by the citizens. According to DeLone & McLean (2016), actual usage is the degree to which an individual uses an information system's capabilities regarding frequency, nature, and duration of use. It also indicates that among the most important directions in technology usage is assessing the quality dimensions' influence on system usage.

The nets benefits of e-government can only be realized when the interaction between the government and the citizens is effective and efficient. The dissemination of information online influences citizens' well-informedness about government policies and programmes (Twizeyimana & Andersson, 2019). It allows the citizens to communicate freely with the government (Kolsaker & Lee-Kelley, 2008) and enhances the openness and transparency of public organizations (Deng et al., 2018; Karunasena & Deng, 2012a). Studies have revealed the influence of quality information as a prerequisite for citizens to understand and participate in government programmes, such as elections, referendums, and others. (Scott et al., 2016; Yap, Ahmad, Newaz, & Mason, 2019).

Efficient service delivery to e-government stakeholders requires a robust and well-functioning system. The system's quality gauges the technical performance of the channels of communication such as websites, social media pages, and blogs made available by government agencies. Citizens' interaction with these channels will improve the citizens' information retrieval process, seamless payment system, and improved usability (Teo et al., 2008). It will also encourage more citizens to use the e-government platform due to ease of use, responsiveness, usability and integration with other MDAs (Ali, Omar, & Bakar, 2016). The relationship between system quality and net benefits has been recorded to be moderate (Petter et al., 2008). Therefore, an efficient system will enhance the benefits of using the e-government system.

Different studies have examined the relationships between the quality dimensions and user satisfaction. For example, in examining the influence of website quality in improving continued usage of e-government websites by Thai citizens, Wangpipatwong, Chutimaskul, and Papasratorn (2008) incorporated three quality dimensions of the DeLone and McLean IS success model. Furthermore, the study collected data from respondents comprising 614 e-government users drawn across Thailand, using a web survey and subsequently employing multiple regression techniques. The study revealed that the three quality dimensions significantly influence user satisfaction. Also, system quality was demonstrated as providing the greatest influence in the mix compared to service and information quality. Further study by Wang and Liao (2008) on the assessment of e-government system success adopted constructs drawn from DeLone and McLean IS success model and collected data from 119 users of e-government in Taiwan, using questionnaires. Findings from the study revealed that, other than the system quality construct, the other constructs had a significant relationship in evaluating the success of e-government.

Stefanovic, Marjanovic, Delić, Culibrk, and Lalic (2016) examined the success of e-government initiatives in Serbia, focussing on employees of e-government systems. The study adopted constructs from DeLone, and McLean's model IS model and collected data using questionnaires from 154 respondents. Data analysis was conducted using structural equation modelling. Findings from the study supported the constructs proposed and validated in the updated DeLone and McLean IS model. System quality construct was revealed to have a higher direct effect on user satisfaction and a higher indirect effect on the net benefits.

Studies such as Susanto and Aljoza (2015) showed that information completeness, reducing cost, saving energy and time can translate to individual use of e-government services. Completeness, accuracy and easy to understand information are requirements for a good information system and predicts its usage (Hidayanto, Purwandari, Kartika, & Kosandi, 2017). Also, other qualities such as the presence of privacy and security, ease of surfing government websites, ability to navigate through the pages of government websites easily (Hirwade, 2010), presence of frequently asked questions (FAQ), ability to use site maps easily, remember simple and concise website addresses (Deng et al., 2018; Papadomichelaki & Mentzas, 2009b), simple and friendly interface will all influence citizens' use of government services rather than traditional methods (Lew, Lau, & Leow, 2019).

Service quality has been reported to have a positive and significant relationship with the information system's net benefits at the individual level. In the e-government domain, Wang and Liao (2008) tested the relationship between service providers' overall service support and showed a moderate relationship. Similarly, Barnes and Vidgen (2004) tested service quality against trust and empathy. Prybutok, Zhang, and Ryan (2008) reported a positive and significant relationship between IT quality and

the net benefits of e-government. The study of Gorla, Somers, and Wong (2010) on the relationship between the quality dimension and organizational impact found that both information quality and service quality have a positive and significant relationship with net benefits, while system quality was not significant.

Therefore, information quality, service quality and system quality have all been found to be useful in determining the actual use, user satisfaction and net benefits of IS in different ways such as e-commerce (Wang, 2008), online tax filing (Chen, Jubilado, Capistrano, & Yen, 2015b; Floropoulos et al., 2010), e-learning (Mtebe & Raphael, 2018; Yakubu & Dasuki, 2018) and e-government system (Agbabiaka, 2018; Al-Haddad, Hyland, & Hubona, 2011; Wang & Liao, 2008). Based on the findings from the mentioned studies, the study proposes the following hypotheses:

H1a: Information quality has a positive and significant influence on actual use the actual use of e-government

H1b: System quality has a positive and significant influence on the actual use of e-government

H1c: Service quality has a positive and significant influence on the actual use of e-government

H2a: Information quality has a positive and significant influence on user satisfaction with e-government

H2b: System quality has a positive and significant influence on user satisfaction with e-government

H2c: Service quality has a positive and significant influence on user satisfaction with e-government

H3a: Information quality has a positive and significant influence on the public value of e-government

H3b: System quality has a positive and significant influence on the public value of e-government

H3c: Service quality has a positive and significant influence on the public value of e-government.

1.5.2   Success Factor: Digital Literacy

Digital literacy (DL) enables ICT users to understand, analyse, assess, organize and evaluate information using digital technologies. Digital literacy is also the use of technology and information literacy skills, knowledge and concepts to access, consume, understand, locate and operate online services (Khan, Moon, Swar, Zo, & Rho, 2012). Being digitally literate means knowing about various technologies and understanding how to use them. To have access to quality information and services and inclusion in the information society, researchers such as Grönlund, Hatakka, and Ask (2007); Lozanova-Belcheva (2013) argued that citizens must be digitally literate. Moreover, for users to get fulfilment in the use of e-government services, they must acquire digital skills to use the e-government system (Idoughi & Abdelhakim, 2018).

The effect of digital literacy enhances the competence of individuals with the use of computers and the internet to have better performance when they use ICT (Roca & Gagné, 2008). Digital literacy has been found to lower stress levels and reduce individuals' inclination to regard their achievements disparagingly, making them more confident about their expected performance (Eastin & LaRose, 2000). Olivier and Shapiro (1993) found a higher level of digital literacy as a source of motivation to encourage citizens to take more initiatives to realize expected performance.

Arguing further, inequalities in the access to ICT skills due to the social and economic complexities of developing countries are the main reasons behind the digital divide and exclusion of citizens in the information and digital service society (Hafeez

& Sher, 2006; van Laar, van Deursen, van Dijk, & de Haan, 2017). In Africa, citizens' participation and usage of ICT is still relatively low compared to other regions like Europe and America, and this can be attributed to the low level of digital literacy among the citizens particularly, the aged, women and the rural dwellers (Hafeez & Sher, 2006; Mutsvairo & Harris, 2016). Citizens with some level of ICT education are better positioned to use the features of e-government, transact with public organizations and give feedback to the government agencies for services delivered (Tomaszewicz, 2015). Different studies have confirmed the positive and significant relationship between digital literacy, actual use of IS, user satisfaction and net benefits with IS.

The study of Alateyah, Crowder, and Wills (2013) highlighted the importance of computer literacy as a prerequisite for adopting e-government services. Mohammadyari and Singh (2015) found digital literacy a significant predictor of citizen use of e-learning among New Zealand accountants. Similarly, Reddick and Anthopoulos (2014) also noted that those lacking adequate ICT skills might be disadvantaged for lacking access to information and may be poorly placed to gain access to e-government services. Ebbers et al. (2016) found a positive and significant relationship between digital skills (information and mobile skills) and satisfaction with e-government websites. Their study concluded that the more citizens are digitally skilled, the more satisfied they are with online government services. Similarly, Idoughi and Abdelhakim (2018), based on a survey of 1453 respondents in Algeria, examined the predicting role of digital skills on user satisfaction; the result was positive and significant. Therefore, it is hypothesized thus:

H4a: Digital literacy has a positive and significant influence on the actual use of e-government.