Adoption of Big Data Technologies for the Digital Transformation of Public Agencies in the Global South (GS)

Andrew Ozumba, Titus Olaniyi, Syed Mohammed
Glasgow Caledonian University, UK

Abstract

This paper discusses the adoption of big data technologies for the digital transformation of public agencies in the Global South (GS). Digital transformation used to be just a technological change but has recently metamorphosed into the way of life of people. It has changed everybody's experience, not only in products they use, but also interactions and interconnectedness between people. It creates information from data to support and enhance the decision making; it also fosters the creation of new, collaborative and more efficient service delivery models. Digital Transformation also enhances effectiveness and efficiency, and lead to outcomes, such as transparency and accountability, cost savings, better governance and, eventually, better quality of life for citizens Big data technologies have been found suitable in the discussions around digital transformation of both private and public corporations, this paper will therefore discuss pertinent issues surrounding big data technologies: its applicability and adaptability, implementation opportunities and challenges.

1. Introduction

Digital transformation, defined as the process of implementing ICT-enabled innovations which includes changing structures, documents and the way services are provided in an Organisation [1], as well as the overall policy and governance systems. Digital transformation is changing the way of lives of people around the globe as has been proven empirically in medicine, education, communication and productivity globally; enabling governments to transform and adapt to this change [2]. Digital transformation creates information from data to support and enhance the decision making: it fosters the creation of new, collaborative and more efficient service delivery models [3]. The changes brought about by digital transformation can come in different forms: to the corporation it might come in form of change in customers' needs and demand while to the management of the corporation, it might be changes in the operations, processing and connecting with customers [4]. In public agencies, digital transformation can be in form of services rendered to the citizens or access of information by the citizens. These transformations have enabled countries and corporations achieve different levels of digital

maturity [5]. The sole purpose of this transformation is to make business and process digital thereby improving efficiency, transparency, accountability and productivity [6]. Digitisation helps organisations remain competitive, achieve meaningful growth and sustainability [7]. Regrettably, whereas governments and public agencies in the Global North are almost at the maturity stage of digital transformation, most of their counterparts in the Global South are in the early or developing stages. The starting point is to have the right digital culture and strategy in place. The public agencies of the Global South still grapple with low productivity, lack of transparency and accountability, increased cost of production and ineffective governance [8]. Big data technologies can be used as a potential instrument to explore the digital transformation in public agencies [9]. There should be an adoption and acceptance of technology by the agencies for the benefits to be derived. The research therefore discusses the adoption of big data technologies for the digital transformation of public agencies in the Global South using Nigeria as a case study.

2. Literature Review

The quest to remain afloat and competitive in this digitalised world and advancement in Information & Communication Technology have made digital transformation a hot debate topic [7]. The end products of the transformation are improvements in digital technology namely: transformation of customer experiences, operational processes and, ultimately, a company's business model. Digital transformation is a necessity for the modern enterprise, whether public or private, due to the strength and vertiginous speed with which digitalization has entered and has taken over our lives [10]. Digital transformation in public agencies serves to provide essential services to the public from different corners which includes societal equity and inclusiveness, safety of the citizenry, productivity, service quality, transparency and accountability, public access, and citizen engagement and participation [11].

Ziyadin et al. characterize digital transformation as the process through which organizations meet numerous new digital innovations, upgraded with universal network, with the expectation of achieving predominant execution and managed upper hand, by

changing various business measurements, including the business model, the client encounter and tasks (containing processes and basic leadership), and all the while affecting individuals and systems [12]. Digital transformation is way beyond the provision of online services and e-portals, but rather also delves into the broader business of organisations and government and their agencies [13]. According to the authors, public agencies always try to find feasible ways to reduce costs and solve organizational problems by developing new methods through adoption of proper and consistent technical methods. That is the power of digital transformation.

Majority of governments in the Global North are moving towards the digital transformation often called e-government [14]. These governments or their agencies are revising their systems to provide increasing access to online services to the public, or their constituency, and to increase the interconnectivity of their offices or segments. This interconnectivity and collaborations among the various agencies make for improved services, transparency and accountability, according to the author. These forms of collaborations and integrations are lacking in the Global South public agencies, including Nigeria thereby creating a gap which this research intends to bridge. This research therefore centres on the adoption of big data technologies for the digital transformation of public agencies in the Global South using Nigeria as a case study.

Big data has been found as a suitable and useful instrument for digital transformation in the area of processing, organizing and analyzing data in healthcare, finance, transportation, cybersecurity, energy and utilities [15]. Potential of big data can also be found in government agencies by employing sufficient method through the collection, transformation, and processing information that are generated from various sources. Furthermore, big data provides a big opportunity for government agencies to process information accurately which helps to take a proper decision, identifying corruption, crimes and challenges and threats and taking a future decision. Firms, government and academia have started to discover new value in data and therefore they are treating it like a tangible asset [16]. According to the authors, they are benefiting from this revolutionary means of knowledge discovery. They argued that big data is a new revolution on the internet and will change the way we think about business, health, politics, education and innovation in the years to come.

Several organisations especially the public agencies (including Nigeria) are still grappling with lots of challenges towards digitalizing their operations due to lack of knowledge, trained personnel, inability to manage data volume and lack of infrastructure. Other identified challenges in

literature include lack of interoperability of existing IT systems, lack of data governance and legal framework [17]. Another limiting factor affecting the productivity of public agencies, as identified by literature, is the limited integration of processes and collaboration among government agencies especially in the Global South which was as a result of lack of digitalisation [18]. For the corporations and agencies of government to benefit from digital transformation, they will first of all accept and adopt the technology.

Adoption and use of technologies in public agencies of Global South will no doubt project the agencies in a limelight for smart governance which has been evidently seen as an important tool for a smart government in the 21st century. There is no known literature about the adoption of big data for the digital transformation of public agencies in Nigeria and this creates a gap. The study therefore intends to bridge the gap by developing a conceptual framework for the adoption of big data technologies for the digital transformation of public agencies in Global South. Many models or frameworks of adoption and use of technology have been developed by different scholars in literature. The technology adoption models refer to the theories and frameworks that explain the "how" and "why" people accept and utilize modern technology in communication, business, health, education, and other sectors [19]. It therefore implies that technology adoption means accepting and utilizing modern technology confidently. Adoption and use of Technology models and frameworks like Technology Acceptance Model (TAM), Theory of planned behaviour (TPB), the motivational model (MM), the Innovation Diffusion Theory (IDT), among others are some of the early theories. Venkatesh et al. synthesised about eight existing theories to arrive at what the authors called the Unified Theory of Acceptance and Use of Technology (UTAUT model) [20]. The unified model was tested empirically and validated using data. The four prime constructs of UTAUT are: 1) Performance Expectancy, 2) Effort Expectancy, 3) Social Influence, and 4) Facilitating Conditions. The first three constructs (Performance Expectancy, Effort Expectancy, Social Influence) determine user intention and behaviour. However, the fourth element (Facilitating Conditions) directly determines user behaviour. Besides the four moderate variables are Gender, age, experience, and voluntariness. The UTAUT model has been over used and over stretched. The factors considered in the adoption of technology reflect only the organizations but no consideration of the public. In this research, the researcher intends to consider such factors as public trust, perceived transparency, accountability and responsiveness as they relate with perceived e-governance or digital transformation. The above factors will be combined with the UTAUT model to arrive at a more comprehensive model of adoption

and use of big data technology for the digital transformation of public agencies in the Global South.

3. Methodology

The research adopts an abductive approach to collect data and this aligns with critical realism philosophy. That means that the research will apply both qualitative and quantitative approaches. While interpretivism lends its credence to studies that have lots of grey areas, like the problems of digital transformation of public agencies in Nigeria, understanding the 'why' or 'how' cannot be achieved through the analysis of numbers but by drilling down to the causes and effects and if possible, solutions to the problems. However, positivism aligns itself with the methods of the natural sciences. The study will intend to gather factual and empirical data and information on the digital transformation of public agencies in Nigeria This is because the understanding of the problems of digital transformation of public agencies in Nigeria goes beyond subjective interpretations but must be backed up with facts and numbers. Data collection will be through semi-structured interviews and the use of questionnaires. The questionnaires will be administered to both the employees of the agencies and the service users. The aim is to ensure that the expected data will be balanced. In order to understand the issues surrounding the adoption of big data technologies for the digital transformation of public agencies, AMOS (Analysis of Moments Structure) will be employed to analyse the data so collected. AMOS works in conjunction with SEM analytical tool. AMOS is used because it implements the general approach to structural equation modeling (SEM), also known as analysis of covariance structures, or causal modeling. This approach includes, as special cases, many well-known conventional techniques, including the general linear model and common factor analysis. With Amos, you can quickly specify, view, and modify your model graphically using simple drawing tools. Then you can assess your model's fit, make any modifications, and print out a publication-quality graphic of your final model. Amos goes well beyond the usual capabilities found in other structural equation modeling programs as the program can analyse data from different sources at the same time which is suitable for big data.

4. Discussion

In reviewing literatures, the following were the preliminary issues to be discussed in the course of this research:

- Digital transformation for innovations and competitiveness. Digital Transformation at the government level, is defined as a set of acts or concepts to interact with the citizens using information and communication technology to enhance the effectiveness and efficiency of the public services [21]. In other words, it brings improvement in the way organizations and public agencies carry out their operations. This improvement is called innovation.
- Efficiency and productivity in public agencies. When there is an improvement in the operational processes, there will be efficiency, there will be transparency and accountability and there will be improved productivity in the agencies
- Integration of processes and collaboration among public agencies. Since most of the agencies of government perform similar or related functions there is need for collaborations and integration of processes for more efficient delivery of their functions. This collaboration and integrations still lacking in the Global South public agencies.
- Performance evaluation in public agencies. There is every need for the performances of the public agencies to be evaluated at regular intervals. There must be set standards to be followed and upon which evaluation is carried out. These standards must be made known to every employee of the agencies to ensure every staff plays by the rules.

5. Contribution to Knowledge

The paper has synthesized the role of big data technologies in improving operating efficiency, transparency and accountability in public agencies. Little or no literature existed on the digital transformation of public agencies in the Global South using big data and this study therefore intends to bridge the gap. Again, the combined framework of the unified theory of acceptance and use of technology (UTAUT) and that of perceived e-governance effectiveness and public trust is not known in literature. This is yet another contribution of this research work. The knowledge generated by this research would act as a catalyst in propelling the government policy makers and their advisers to take necessary steps towards implementing big data technologies for smart governance, effective and transparent operations in the Global South public agencies. The study will also add to the body of existing literature on the digital transformation of organisations.

6. Conclusion

In this research, efforts have been made to synthesise the concept of digital transformation of

public agencies using big data technologies. The factors facilitating and militating the digital transformation of public agencies in the Global South were also discussed. The research also discussed the uses and applications of big data technologies in different sectors as found in literature. The research found in literature the different theoretical models and frameworks that have been applied in the adoption of technologies and settled for the combination of the UTAUT model and the model of perceived e-governance and public trust. The research also adopts the abductive approach for data collection and analysis is to be done using Analysis of Moments Structures. The contribution of the research to the body of literature for the digital transformation of public agencies using data technologies was also duly noted. It is the hope that further research works will be carried out especially on the many challenges bedeviling the digital transformation in the Global South outside those challenges that were discussed in this research.

7. Recommendations

In this research, many suggestions have been put forward on the way forward for digital transformation of public agencies using big data technologies. Some of the recommendations include but not limited to:

- Investment in training for the employees of the public agencies in the Global South.
- Better integration and collaboration of the agencies in the Global South.
- Increased budget should go into Research and Development.
- There should be stakeholders' inclusiveness in the digital agenda of public agencies to improve the adoption and acceptance of technologies in the public agencies.
- There will be more regular audit in public agencies to ensure more transparency and accountability and improved productivity.

8. References

[1] Charalabidis, Y., Sarantis, D., and Askounis, D. (2009). Knowledge-driven project management in government transformation. In Handbook of Research on ICT-Enabled Transformational Government: A Global Perspective (pp. 213-239), IGI Global.

[2] Singh, V., Srivastava, I., and Johri, V. (2014). Big data and the opportunities and challenges for government agencies. International Journal of Computer Science and Information Technologies, 5(4), pp.5821-5824.

[3] Williams, M., and Valayer, C. (2018). Digital Government Benchmark Study on Digital Government Transformation. DG Joint Research Centre, European Commission.

[4] Shah, B., Roytman, A., and Matteis, P. De. (2014). Digital Transformation. Accenture. Geneva: World Economic Forum.

[5] Vickers, F., Hammerich, K., Landis, D., and Lewis, J.L. (2016). Leaders for a Digital Transformation. Los Angeles: Korn Ferry Digital Publishing.

[6] Bahl, M. (2015). Asia Rising: Digital Driving, Cognizant Centre for the Future of Work.

[7] Ganguly, A. (2015). Optimisation of IT and Digital Transformation: Strategic Imperative for creating a New Value Delivery Mechanism and a Sustainable Future in Organisation. European Journal of Business and Innovation Research, Vol. 3, No. 2, pp. 1-13.

[8] Gole, J., and Kaltenbrunner, R. (2014). How Digital Transformation is Changing Business in CEE, International Data Corporation (IDC).

[9] Meijer, A., and Bolivar, M. (2016) "Governing the smart city: a review of the literature on smart urban governance," Int. Rev. Adm. Sci., vol. 82, no. 2, pp. 392–408.

[10] Westerman, G., Bonnet, D., and Mcafee, A. (2014). Leading Digital: Turning Technology into Business Transformation (Boston, MA: Harvard Business Review Press).

[11] Mayinka, J., and Roxburg, C. (2011). The great transformer: the impact of internet on economic growth and prosperity. Mckinsey Global Institute.

[12] Ziyadin, S., Suieubayeva, S., and Utegenova, A. (2019). Digital transformation in business. In International Scientific Conference "Digital Transformation of the Economy: Challenges, Trends, New Opportunities" (pp. 408-415). Springer, Cham.

[13] Huang, J., and Karduck, A. (2017). A Methodology for Digital Government Transformation. Journal of Economics, Business and Management, Vol. 5, No. 6.

[14] Fang, Z. (2002). "E-government in digital era: Concept, practice, and development," International Journal of the Computer, The Internet and Management, vol. 10, no. 2, pp. 1-22.

[15] Biem, A., Feng, H., Riabov, A., and Turaga, D. (2013). Real-time analysis and management of big

time-series data. IBM Journal of Research and Development 57, 8:1–8:12.

[16] Mayer-Schonberger, V., and Cukier, K. (2013). Big Data: A revolution that will transform how we live, work and think. Boston: Houghton Mifflin Harcourt.

[17] Hassan, S., Dhali, M., Zaman, F., and Tanveer, M. (2021). Big Data and Predictive Analytics in Healthcare in Bangladesh: Regulatory Challenges. Heliyon 7.

[18] Agunbiade, M.E., and Rajabifard, A. (2013). Analysing Inter-agency Integrations for Land delivery in Nigeria: data, process and policy integration. Research gate.

[19] Ram, J., Manoharan, A., and Sun, S. (2020). O2O Adoption Benefits: A Managerial Perspective of Customer-Benefits. The Electronic Journal of Information Systems Evaluation, 23(1), pp. 65-78.

[20] Venkatesh, V., Morris, M. G., Davis, G.B., and Davis, F.D. (2003). User acceptance of information technology: Toward a unified view. MIS quarterly, pp. 425-478.

[21] Mudrifah, M. (2020). "Public governance and financial performance of Indonesian local governments: evidence from multiple stakeholder perspectives", International Journal of Advances in Social and Economics, Vol. 2No. 3.