

Data-Driven E-Government: Exploring the Socio-Economic Ramifications

Ebenezer Agbozo* and Benjamin Kwesi Asamoah**

*Ural Federal University, Yekaterinburg, Russian Federation. eagbozo@urfu.ru

** Ural Federal University, Russian Federation, lipsy165@gmail.com

Abstract: The evident benefits of big data, artificial intelligence and machine learning in society have begun to influence the transition towards a data-driven public sector. Decision-making in the public sector is in an infancy phase of a revolution owing to the inclusion of these new technological innovations. Research has revealed that data-driven e-government policies improve socio-economic development in some nations. Despite the immense opportunities data-driven e-government models have for governments, similar to every system, there are ramifications. This study explores the concept of data-driven e-government as well as investigates the socio-economic implications such an e-government model can have on society. Findings of this exploratory study add insight into a field which is in its early days and still unfocused, as well as making recommendations for policymakers.

Keywords: Data-Driven e-Government, Data-Driven Decision Making, Big Data, Data Analytics, Value Creation

1. Introduction

The data-driven concept has been adopted in a number of fields of endeavor such as education (Marsh et al., 2006), sports and business (Jank, 2011). The ultimate aim of the data-driven approach is improved decision making – which has given birth to the term ‘data-driven decision making’ (DDDM). According to Wohlstetter et al. (2008), DDDM in the educational sphere has the potential to increase student performance. In recent years, the concept has been prevalent in the business sphere. In the area of sports, Jank (2011) highlighted successful use-cases such as sports teams (baseball and American football) that are known for using data-analytics in deciding the composition of their teams. This involves the assessment of player performance during training sessions and matches in order to strategize for the next game. In the business sphere, examples of successful cases include the prediction of customer/consumer behavior as well as debit and credit card companies employing automated analytic techniques and data-driven strategies in detecting fraudulent activities (Jank, 2011). Today, the aims of research aspirations as far back as 1998 in the area of data-driven marketing are being fully realized and overachieved. This refers to a study where data mining was proposed as a technique to analyze large, distributed and heterogeneous databases

on which internet retailers would store transactional, behavioral and other data (Mulvenna et al., 1998). Researchers foresaw the boom in the e-commerce industry and envisioned a time where data would be the lifeblood of the economy.

Presently, the proliferation of big data and data science is driving the use of data in decision-making (Provost and Fawcett, 2013; Alcaide-Muñoz et al., 2017). Data has been defined as the new oil of the age, since enterprises and individuals alike have become more reliant on it as a major driver of economic and social development (Humby, 2006; Medvedev and Medvedev, 2015). From social media data generated by billions of users, to consumer data, to open data made available by governments, the availability of data in our world today cannot be underestimated. 21st century organizations seek to critically probe data and metadata so as to identify meaningful patterns (Van Dijck, 2014). Businesses rely on customer data in making decisions on which product to push more into the market, withdraw, or modify to suit consumer needs. DDDM is used in marketing, supply-chain management, and customer relationship management to maximize expected customer value, drive business value and gain a competitive advantage (Provost and Fawcett, 2013).

Discussing the advantages of DDDM, Provost and Fawcett (2013) point out that it has been proven statistically that a firm which is more data-driven is more productive. Data which is analyzed with the right tools and techniques equips executives and management with the necessary information on the health of the firm, the decisions to take, and the potential trajectory of said firm.

Janssen et al. (2017) categorized the factors that influence data-driven innovation in all forms, as strategic and political; organizational; data governance; and technical. These categories encompass factors such as resources and budgets, the societal problem in question, targeted public values, data availability and ability to share, data and privacy regulations, technology readiness, and infrastructure, just to mention a few.

Despite the general acceptance of data as the driving force in today's world and the near future, little has been said about the data-driven public sector. The next section explores this topic.

2. Data-Driven E-Government

Just as data is driving the business ecosystem, the springing up of e-government initiatives all over the world has led to an increase of data stored in government data centers (Prins et al., 2012; Yaqoob et al., 2016) as well as publicly produced data by citizens on the internet. Since governments and citizens are producing and maintaining large amounts of data, Toots et al. (2017) are of the opinion that it must be put to effective use. Janssen et al. (2017) highlighted that big and open data – which they termed as BOLD – play a pivotal role in public-sector innovation, thereby creating value for data which previously would have been redundant. Attaining a data-driven public sector is beginning to surface on the agenda of major regional and governmental organizations. According to Alarabiat et al. (2018), the 'creation of a data-driven culture in the public sector' pillar is an integral part of the Recommendation of the Council on Digital Government Strategies established by the OECD. Chen (2013) identified that the data-driven e-government paradigm is in its early days with an uncertain direction. The author cites the example of Australia, where the increasingly

sophisticated and 'data-driven' public sector impacts the design and implementation of public policy.

Agbozo and Spassov (2018) define data-driven e-government as "a collection of digital public services which channel previously stored data back to citizens as solutions, decisions and reforms for accelerated national growth". Thus, it is a governance model which leverages data to drive the decision-making process. The researchers concluded that Data-Driven e-Government (DDeG) is the next phase of public service modernization which aims at a citizen-centric governance model, characterized by data for decision and policy-making, to ensure the welfare and satisfaction of citizens and users. Prospects of DDeG include, estimating and predicting economic impacts of changes to tax policy; building smart cities by optimizing transportation; preventing and reducing all forms of public service corruption, evaluating potential threats (Agbozo and Spassov, 2018), etc. A data-driven public sector or administration, according to Janssen et al. (2017), has the capacity to drastically transform public sector systems and create societal benefits. The authors outlined socio-economic benefits such as reducing pollution, lowering traffic jams, optimizing public transportation, improved tracking of disease outbreaks, greater energy efficiency, new agriculture services, novel applications to transform citizens' experiences of interacting online with government, and lower costs. All of the above are feasible when a data-driven model is integrated into governance and public sector administration. In summary, the opportunities that come with implementing a data-driven public sector, according to Christodoulou et al. (2018), are increased efficiency in decision-making and services provided; public participation and transparency, which strengthens the sense of cooperation between government and citizens; and innovation being birthed in areas such as smart cities.

Against this backdrop, it is evident that data-driven e-governments' aims are in line with achieving the United Nations' Sustainable Development Goals (SDGs). With a user/citizen centric-focus, data-driven e-government serves as one of the agents in realizing the 17 SDGs. Agbozo (2018a) outlined all 17 goals and indicated how DDeG could potentially resolve each goal. According to the researcher, accountability, capacity building, and transparency are benefits of integrating DDeG, and in order for the SDGs to become a reality, these indicators must be positively significant. Studies have indicated that a smart governance model can serve as a strategic alignment instrument which co-ordinates e-government initiatives with the SDGs (Das and Mishra, 2018). Figure 1 illustrates the main deliverables of a data-driven e-government. Thus, it can be inferred that DDeG ultimately seeks to improve socio-economic development through efficient policies which are user-centric and driven by the need to achieve sustainable development goals. A user-centric system is one which contains a high level of user interaction, and where processes and functions are primarily driven by user input (Löthman & Samuelsson, 2011), as well as the fact that it shields complexity from users (Bush et al., 2006).

Figure 1: Objectives of Data-Driven e-Government



Adopting the line of thought expressed by Hedestig et al. (2018), this study extends the work of Agbozo & Spassov (2018) by including the concept of value co-creation, where open government data (OGD) is made readily available to outside, non-typical, stakeholders, with the purpose of developing public value. Thus, government involves interested institutions and the private sector in the data-driven e-government process, so as to support government through the extraction of knowledge from the data provided. Toots et al. (2017) describes this concept as co-production, where open government data is made readily available to create new services, thus de-monopolizing the creation of public services which deliver public value. This lessens the burden on the shoulders of government as well as creating opportunities for those in society (who understand their environment) to build services for the society they live in.

Despite its relevance, research on data-driven e-government is still in its early stages, since much e-government scholarship has focused on e-government implementation, quality e-service delivery, determining factors of public service implementation, enhancing electronic participation (e-participation), etc. (Alcaide-Muñoz et al., 2017). Thus this paper sheds light on the topic of data-driven e-government and contributes to previous e-government studies, but most importantly it highlights an emerging branch of e-government studies.

Thus, the overarching question of this study is; what are the negative socio-economic implications of implementing a data-driven e-government framework or model?

3. The Negative Socio-Economic Implications Associated with a Data-Driven E-Government Ecosystem

By employing socio-economic analysis (SEA) methodology within the context of data-driven e-government, this study explores the consequences – dwelling on the negative aspect – of integrating a data-driven approach into the public sector. The SEA considers collective risks, drawbacks of the introduction of new products, and new technologies in society (Brignon, 2011). Thus, SEA fits as a suitable method for this study where the socio-economic ramifications of DDeG are investigated.

The socio-economic ramifications of a data-driven e-government model are expounded below.

User Privacy and Data Security Breaches: Inasmuch as data is the fuel of the data-driven e-government system, it is also the biggest burden. The larger the concentration of data, the bigger the risk of it being breached, and the greater the impact on users and citizens (Joshi et al., 2016). E-government research has shown that user privacy is crucial to its acceptance (Weerakkody, 2015), hence an important consideration. According to the USA's Federal Information Systems Security Educators' Association (FISSEA)¹, 35% of data breaches are due to human error or negligence. Since DDeG is fully reliant on data, the smallest breach has gross implications on citizen/user integrity and identity, government credibility and trustworthiness, as well as influencing policy decision-making for the worse. A study by Acquisti et al. (2006) reveals a statistically significant impact of data breaches on organizations, cementing the fact that the cost of data and privacy breaches at this scale is costly to all stakeholders of DDeG.

Prejudicial biases and labels: The analysis and visualization of data can lead to the labelling of certain groups, communities or classes of people, thus creating a systematic bias cycle. This is found in the case of predictive policing, where big data and police records play a huge role in preventing future occurrences of crimes, by applying quantitative and analytical techniques in learning and reproducing patterns in data (Agbozo, 2018b; Karppi, 2018; Lum and Isaac, 2016). Lum and Isaac (2016) indicated that where bias in police record data is used in training predictive models, it renders these models ineffective and leads to discriminatory policing. The authors also highlighted that if police regularly focus on certain areas and groups of people, due to the frequency in reported crimes, these records can lead to tactical policing decisions, which may affect innocent people who find themselves unfortunately within that area or group. Such labels and prejudice may contribute to limiting people's employment opportunities or access to certain resources.

DDeG as a façade for legitimizing power: In order to legitimize their credibility so as to stay in power, there is the danger of DDeG becoming a smokescreen. In a study by Maerz (2016) on e-government implementation motives, the researcher indicated that a number of regimes, specifically authoritarian, implement e-government initiatives primarily to gain external legitimization, rather than to focus on the intended goals. Thus, it is known to the outside world that the system works, but internally, it is ineffective.

1 FISSEA serves as a professional forum for the exchange of information and improvement of information systems security awareness, training, and education programs. (URL: <https://www.nist.gov/programs-projects/federal-information-systems-security-educators-association-fissea>) [Accessed 01.10.2018]

From another perspective, for states with low levels of democratization and e-government readiness, such as Sub-Saharan Africa, a major concern arises where e-government may be used as an instrument of control and manipulation (Nour et al., 2008). These governments may implement such initiatives with ulterior motives such as gaining local legitimacy and painting a picture of trustworthy government, but not putting data into action by modelling efficient policies where needed.

The above outlined socio-economic ramifications are a threat to the potential benefits of DDeG to any given state. As such, it is crucial to consider the means by which these consequences can be avoided.

4. Counteracting the Ramifications

In order to curb any foreseeable repercussions, efficient data security infrastructure must be a priority of governments. Technological infrastructure requires protection from numerous targeted threats in order to avoid negative impacts on ICT infrastructure (Von Solms and Van Niekerk, 2013). Putting measures in place will secure user data and preserve the trust that citizens have in their governments.

Also, the adoption of data protection regulations, such as the European Union's General Data Protection Regulation (GDPR), is important. The aim of the GDPR is to protect all EU citizens from privacy and data breaches in today's data-driven world. Diamantopoulou et al. (2018) elaborated on the essence of adopting GDPR as a privacy preservation strategy in the sphere of electronic participation in e-Government, and lists the rights as: Right of Access, Right to Rectification, Right to Erasure, Right to Restriction of Processing, Right to Data Portability, Right to be Not Subject to Automated Individual Decision-Making, Right to Filing Complaints, and Right to Compensation of Damages. As such this study recommends the adoption of GDPR, tailored to suit a country's socio-economic sphere.

ICT implementation requires a high level of commitment from both the government and citizen (Sharma and Pokharel, 2016). As such, In-depth auditing and assessment is a more inclusive process for decision-making as it involves multiple measures and a wider variety of stakeholders (Gottlieb, 2018). Thus, to curb any negative impact, it is crucial to constantly assess and evaluate all components and infrastructure. Benchmarking any system or initiative aligns the system with the stated goals. According to Choi et al. (2016), e-government evaluation and assessment averts project failure and prioritizes a set of defined factors so as to improve their practical value. Their study indicated that evaluation leads to judicious resource allocation, based on significantly pre-determined priorities that are aimed at contributing to efficient and effective national administration. Also, since humans handle data, Gascó-Hernández et al. (2018) concluded that training public service data experts is essential, and systematically evaluating the short- and long-term impacts of training programs. With respect to evaluation, this study recommends the COBRA (cost; benefit; risk and opportunity) framework Osman et al. (2014), which is an acknowledged holistic evaluation framework that takes the user (citizen) into perspective, since user-satisfaction plays a central role in e-government success. Thus evaluation is an important tool in preventing the negative socio-economic implications outlined above, and in achieving a data-driven e-government ecosystem.

5. Conclusion

Before concluding, it is necessary to outline the limitations to this study. Exploratory research of this nature, despite the study's findings, have limitations because they usually do not intend to provide conclusive evidences but rather, they mainly aim to provide a general insight into a given problem or question (Saunders et al., 2009; Zikmund et al., 2013).

This exploratory study concludes that although it has ramifications, data-driven e-government is capable of building resilient societies. In order to build a viable data-driven e-government ecosystem, it is essential for the regard for citizen privacy, data integrity, transparency and user needs to be at front and center of initiatives. By doing so, a true user-centric value is achieved. This study recommends the VisiOn Privacy Platform (VPP) proposed by Angelopoulos et al. (2017) as a reliable privacy protection framework within the e-government context, due to its value for citizen data by making use of citizen privacy level agreements. The VPP framework allows citizens to understand how valuable their data is through enhanced visualization features, thereby determining their privacy preferences. VPP also identifies and analyses privacy threats for public administrations which enables citizens to indicate their potential privacy mechanisms that can be used to counteract identified threats. In addition, the inclusion of the principles of data minimization and consent will discourage unethical data infringement and provide individuals with the due process opportunity when the need arises (Tene and Polonetsky, 2012).

From a practical standpoint, this research impacts the socio-economic theory aspect of e-government practice and teaching. Scholars are now capable of identifying potential new topics as well as formulating new research questions by exploring research gaps. This study serves as guidance for policy-makers and practitioners in implementing data-driven e-government initiatives with the sustainable development goals in focus.

The study recommends that policy-makers revisit data protection regulations which protect the privacy and integrity of users (citizens), since actions of this nature reassure trust in government.

Also, the study recommends the reevaluation of goals of e-government initiatives, especially in developing economies, so as to effectively get the full benefit of investments into projects of this magnitude and prevent failure over time.

Future research should also investigate more innovative means of ensuring a highly dependent data-driven e-government ecosystem which will support the attainment of sustainable development goals.

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About the Authors

Ebenezer Agbozo

Ebenezer Agbozo is a PhD Candidate at the Ural Federal University in Yekaterinburg, Russia. He also works as a senior lecturer at the department of Systems Analysis and Decision Making of the Graduate School of Economics and Management. His research focuses on e-Government, Information Communication Technology for Development (ICT4D), Web Services, Big Data, Data Mining, and Social Informatics.

Benjamin Kwesi Asamoah

Benjamin Kwesi Asamoah is a master's student of the Ural Federal University. His research focuses on the application of statistical and econometric techniques in the area of socio-economic development in developing economies.