

Examining E-Government Enabling of E-Health Service Through the Lens of Structuration Theory

Tiko Iyamu, Cape Peninsula University of Technology, South Africa

ABSTRACT

The concepts of e-government and e-health have usually been separately studied and sparsely implemented in many developing countries. In the few studies where both concepts are combined, the role of e-government is hardly examined in the implementation and practice of e-health. This article offers an exploratory analysis and provides insight on the factors that influence the complementarity of both concepts, with focus on the Africa continent. Existing literature in the areas of e-government and e-health were gathered and used as data, from a qualitative method viewpoint. Dimensions of change from the perspective of the structuration theory was employed as a lens to guide the data analysis, which was conducted by using the hermeneutic approach. From the analysis, the role of the e-government in the implementation and practice of e-health was found to manifest from six main factors, which are source, platforms, collaboration, transparency, heterogeneity, and privacy. Based on these factors, a model was developed, which is intended to guide professionals in their practices. Also, the study might be of interest to academics from theoretical standpoint.

KEYWORDS

Dimension Of Social Change, E-Government, E-Health, Qualitative Methods, Structuration Theory

1. INTRODUCTION

The e-government is a concept enabled and supported by information communication technology (ICT), to transform a government's activities, in improving services (Kurfalı, Arifoğlu, Tokdemir, & Paçin, 2017). The e-government is used to facilitate government agencies' communication with citizens (Mutimukwe, Kolkowska, & Grönlund, 2019). This includes the use of the Thus, the concept has often defined as the application of ICT for better government administration and quality of service delivery (Gio & Lee, 2017; Ahmad & Campbell, 2015). This has innovatively been adopted to enable and support other services, such as healthcare (Cleland-Huang, 2014), but more in developed countries (Frankfurter & Cuervo, 2016) than in developing countries (Venkatesh, Hoehle, & Aljafari, 2017), specifically those in Africa (Fonou Dombey & Rannyai, 2014; Nkoko & Islam, 2013; Lin, Fofanah, & Liang, 2011). The e-government platform is intended to facilitate exchange between health insurance and its citizens. Layne and Lee (2001) suggest that one of the major challenges in the development of e-government is encountered at the horizontal stage, which is the integration

DOI: 10.4018/IJSKD.2020070102

Copyright © 2020, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

of databases from different government agencies, including healthcare (Fath-Allah, Cheikhi, Al-Qutaish, & Idri, 2014). This is a challenge that has, for many years, hampered complementarity of the concepts in studies and practice.

Even though the interest in e-government is increasing, its adoption in developing countries, Africa in particular is still very slow. Countries, such as Nigeria, South Africa, Zimbabwe, and Kenya, experience more challenges than benefits in their attempts to adopt and practice the concept (Ruhode, 2016; Ibrahim, Al-Nasrawi, El-Zaart, & Adams, 2015). Many programs in South Africa have not been effectively leveraged with the e-government platform to enhance service delivery in the country (Mutula & Mostert, 2010). From Bwalya's (2009) empirical study, it was found among other factors that inadequate ICT infrastructure and lack of contextualization affect e-government adoption and practice in Zambia.

The application of e-health is intended to provide a possible remedy for addressing health challenges, including response time and other sociotechnical constraints, which affect many African countries (Leon, Schneider, & Daviaud, 2012; Justice, 2012). However, there has been slow pace in the adoption, and far less satisfactory approach in service delivery through the e-health concept (Landis-Lewis et al., 2015). Hence, the zeal and need to complement both e-health with e-government, to improve service delivery through inclusiveness and concurrent involvement and participation of the main stakeholders: government administration, health practitioners, and patients (citizens). Mouttham et al. (2012) describe e-health as a system that is mainly aimed at providing healthcare personnel with ease of access to information and resources, as well as ensuring security in the course of disseminating patients' information to various service providers. Despite its current function, the e-health can do more if it is applied to enable and support a triangular interaction between its main stakeholders, government, health practitioners and patients instead of a one-way approach (Hao et al., 2016). E-health is not a system that is anticipated to substitute people's actions; however, it is intended to improve or provide support to better healthcare service delivery to the community (Mouttham et al., 2012). Therefore, in order for an e-health system to be effective, services should always be available without interruptions (Leon, 2012; Justice, 2012), which the e-government has the capability to ensure (Gio & Lee, 2017).

Against this background, the objective of this study was to examine the e-government's enabling of e-health in continually improving healthcare services in developing countries. To achieve this objective, qualitative data was gathered from existing related works, and the dimension of social change from the perspective of structuration theory was employed as a lens to guide the analysis.

Structuration theory (ST) is a social theory that focuses on agents (technical and non-technical) and structure (rules and resources) through which actions are produced and reproduced over a period of time (Giddens, 1984). Some key contributions of the ST in information systems (IS) studies are that it helps to examine detailed descriptions of the integration of relevant structures and multiple agents within a social structure (Puron-Cid, 2013). Within a social system, such as the health system, human agents are usually engulfed within complexity, consciously or unconsciously so (Greenhalgh & Stones, 2010). This makes a good case in its use, for examining and understanding the roles of e-government in the deployment of healthcare services.

This paper is divided into seven main sections, which starts with the introduction section and followed by the a review of related works in the areas of e-government and healthcare. In the third section, the methodology that was employed in the study is discussed. The analysis and discussion are presented in the fourth section, which includes a discussion about dimension of social change from the perspective of structuration theory. In the fifth section, the results from the data analysis are presented, and the implications of practice are briefly discussed in the sixth section. Finally, we draw our conclusions about the study in the last section.

2. REVIEW OF RELATED WORKS

Increasingly, healthcare organisations across the world continue to consider and explore how to apply ICT artefacts for the improvement of services that need to be efficient and effective to their citizens (Lai & Wang, 2015), which gave birth to e-health (Shaw, 2017). According to Raghupathi and Raghupathi (2014), the healthcare sector contains massive volumes of critical data, such as patient medical records and medical data. However, there are several factors that influence the implementation of e-health in the healthcare sector; for instance, the adoption of e-health in many African countries is compounded by challenges such as insufficient infrastructure (Ami-Narh & Williams, 2012).

In many African countries, the adoption of e-government has not been beneficial to its citizens (Rowley, 2011), and has been besieged by challenges such as usability problems (Verkijika & De Wet, 2018). Other challenges of the e-government include its one-way interactive approach (Hao et al., 2016) and lack of privacy regulations (Mutimukwe et al., 2019). Despite these challenges, the e-government can be used to enable and support e-healthcare, which many developing countries strive to accomplish (Hossain, Quaresma & Rahman, 2019). Venkatesh et al. (2014) argue that only few studies focus on e-government adoption in developing countries, and that most of the studies were unfortunately narrow in scope, and generic in nature. Similarly, very few studies have been carried out on e-health adoption in developing countries (Bawack & Kamdjoug, 2018).

In Bawack and Kamdjoug's (2018) explanation, these challenges are fueled by the fact that many developing countries still depend on the traditional healthcare systems. This is instead of employing the e-government to promote national culture, and improve service delivery to its citizens (Nam, 2018). Electronic health systems are intended to advance health practices, through improved interaction between health personnel and patients (Dasuki & Zamani, 2019).

The challenge can be linked to lack of understanding of drivers for e-government adoption in developing countries (Ruhode, 2016; Mutula & Mostert, 2010; Dada, 2006). An understanding of the drivers for e-government promotes complementarity, which can enhance healthcare service delivery to communities. In some parts of the world, many countries primarily adopt e-government to address the challenges of corruption in the healthcare sector, through its transparency and accountability functions (De Rosis & Vainieri, 2017). Moreover, in some developing countries, patients are vulnerable to being victims of corruption when they had to pay cash for health services (Mkude & Wimmer, 2013). In the Africa continent, these challenges persist in healthcare, thereby hampering service delivery. Corruption within the healthcare sector results in escalating the prices of products and services, and waste of resources, which ultimately reduces the quality of health services to the community, and sometimes increases mortality rates (Lio & Lee, 2016), as in many African countries, such as Kenya (Mutuku & Machyo, 2017) and Cameroon (Bawack & Kamdjoug, 2018). According to Nam (2018), e-government can be used to fight corruption by increasing citizens' access to information, and empowering citizens to track government's activities.

In Nigeria, the adoption of e-government was found to be low and at slow pace (Olatokun & Adebayo, (2012), which conspicuously hinders attempt to integrate other services, such as e-health, with the platform. Bwalya (2009) argues that the provision of content in English rather than local languages, and the lack of proper change management procedures, contribute to slow-paced and inappropriate adoption of e-government in Zambia. According to Justice (2012), the main stakeholders of e-health or healthcare are not structurally ready for the concept, which by implication, have impact on its integration and services such as the e-government platform (Olatokun & Adebayo, 2012; Asogwa, 2013). Mutula and Mostert (2010) explain that the South African government has implemented many programs and initiatives, such as the poverty alleviation programmes, ICT infrastructures, and regulatory frameworks, which are yet to benefit from the concept of e-government.

Some of the challenges of e-health manifest from inequalities within context (Justice, 2012) as well as the application of framework that is enabled by ICT (Leon, Schneider & Daviaud, 2012), such as the adoption of e-government in Kenya (Mutuku & Machyo, 2017). Other major challenges

of both e-government and e-health are security and privacy, which are due to the extreme sensitivity of patients' information. Based on this ontological fact, until e-health itself provides a high level of security, the system will not be fully distributed and integrated into many health facilities (Gole, Sharma & Misra, 2017). Another challenge in some African countries is authentication, which is demanded in order to avoid illegal users or compromise of confidentiality of patients' and government's information (Jiang et al., 2016; Fonou et al., 2014; Dada, 2000).

3. METHODOLOGY

The qualitative methods were employed based on the objective of the study, which was primarily to examine the role and factors that influence e-government enablement of the e-health in developing countries. The qualitative methods were considered suitable for this study mainly because of its focus and concern with gaining an in-depth understanding of the phenomenon being studied. This enables achieving the objective of the study through understanding of human interaction on how e-government can enable e-health towards improving health service delivery. In addition, qualitative methods are often considered most suitable in cases where the researcher has little knowledge about the phenomenon being studied (Creswell & Poth, 2017), as in this study, where the complementarity of e-government and healthcare is rarely used, or does not exist within the Africa continent. Therefore, by using qualitative methods, the researcher is able to further extend views and draw richness from documentations across a spectrum of the phenomena being studied.

The study focuses on the Africa continent. Existing documentations which include journal articles, conference articles, and books were gathered as data, in the areas of e-government and e-health. As shown in Table 1, the documentations were concise to adoption and integration of the e-government

Table 1. Material as data

Scope	e-Health	e-Government
Adoption and practice including challenges and benefits within context.	11	17
Integration with databases and systems in an environment.	9	14
Sub-total	20	31
Total	51	

and e-health concepts. The use of the documentations analysis approach was suitable for this study mainly because documentation encompasses pertinent information related to the phenomenon being studied as describe in Lethbridge, Sim and Singer (2005). Peer reviewed articles were gathered from the two primary areas under study: e-government and e-health. The sources used for the gathering of the articles included Google scholar, EBSCOhost and IEEE databases.

The keywords used in the search were e-government, e-health, and a combination of both concepts. Developing countries was the main associated phrase in searching for the documentations (literature). Year of publication was also important, to gain historical perspectives on how things within the phenomena have developed over the years. Thus, articles published between 2008 and 2019, were considered enough to understand the transformation that has happened within the spaces of e-government and e-health within the Africa continent. The slow pace of practice has affected theorisation, and vice versa of the concepts in the continent, as reflected in the articles that were gathered. The search for the documents was conducted between May and June 2019. From the search, a total of 47 articles were considered relevant and appropriate for this study.

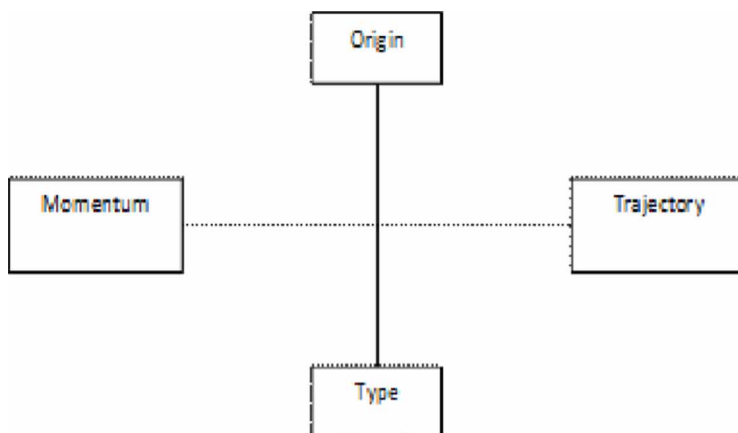
The dimension of social change from structuration theory (ST) was used as lens to guide the analysis of the data, mainly because the theory emphasises on the interaction between agents and structure, and the production and reproduction of social systems (Chang, 2014). The elements of structuration theory include agents (technical and non-technical), structures (rules and resources), duality of structure, and dimension of change. Dimension of change originates from episodic characterisation, one of Giddens' concepts for analysing social change (Giddens, 1984). Within the social life context, Giddens (1984, p. 244) argues that an "episode is a number of acts or events, having a specified beginning and ending thus involving a particular sequence". In order to evaluate the nature of different types of episodes, Giddens classified the modes of social change in four dimensions of change (Figure 1), namely, origin, type, momentum, and trajectory.

The ST has been used in studies surrounding healthcare and e-government for many years. Scenarios of security prompted Groves, Meisenbach and Scott-Cawiezell (2011) to examine both individuals' actions and organisational structures in the health sector through the lens of structuration theory. From the use of structuration to analyse the healthcare environment, due to the complex socio-cultural nature of human agents, it is essential to instantiate technology in social practices (Greenhalgh & Stones, 2010). Over the years, different structuration theory (ST) models have been employed in separate studies to gain better understanding of various phenomenon, such as e-government (Puron-Cid, 2013) and healthcare (Greenhalgh & Stones, 2010). The dimension of social change was employed in this study to view and understand how the e-government can enable and support healthcare service in developing countries.

4. ANALYSIS AND DISCUSSION

In achieving the objective of this study, which was to examine and provide insight on how the e-government can enable e-health, to improve service delivery in the developing countries, the analysis was carried out with an interpretive hermeneutic approach, and guided by the dimension of change from the perspective of structuration theory as lens. The dimension of change was preferred primarily because it focuses on regionalisation. Giddens (1984) refers to regionalisation as episodes whose factors include modes, such as form, establishment, duration, and characteristics. The interpretive approach refers to the subjective meaning that people apply as a result of their social interaction (Barnes et al., 2010). This technique enables an individual to make sense of the existing documentations toward achieving the objective of the research. The dimension of social change consists of four main components, which are: origin, type, momentum and trajectory, as shown in Figure 1.

Figure 1. Dimension of social change (Giddens, 1984)



The dimension of change was used to guide the analysis, which employs the hermeneutic approach, in the following purposes and ways:

1. **Origin:** In structuration, origin is concerned with investigating and evaluating the source of an episode, including the historical components of a phenomenon or an event (Giddens, 1984). Through this component, the sources of healthcare data (of e-health) that are used by practitioners to provide medical services to patients were examined. This was to gain better understanding on how the e-government concept can be used to complement the e-health systems for healthcare service delivery in an environment.
2. **Type:** was used to focus on various types of data that are accessed by both the e-government and e-health systems. This was to examine how integration can happen in the quest of enabling e-health by e-government towards improving service delivery. This includes understanding the distinctive and sensitive healthcare information as they are deployed in the e-government platform.
3. **Momentum:** was used to guide understanding about the speed of change in efficiency of healthcare as the e-government enables e-health systems in an environment. This includes response time and the rate at which patients' data manifests in the course of providing and receiving services.
4. **Trajectory:** was used to examine how direction can be provided towards gaining a better understanding of healthcare service delivery, from e-government enablement of e-health perspective, through its different programmes and strategic operations.

4.1 Dimension of Social Change: Origin

Generally, the healthcare sector is driven by data. The data comes from various sources, such as a patient's consultation with medical personnel, results from diagnoses, surgical procedures, and laboratory tests. Patient's information is captured through manual, online (electronic), and telephonic approaches for healthcare services (Venkatesh et al., 2016; Kettani & Moulin, 2014). Only through an understanding of the sources of health data, can the e-government effectively be employed as a platform to enable and support e-health systems. The support and enablement include channels of communication, processes of stages in information dissemination, and resource (human and facilities) management. The sources of the data and its originality can be traced and monitored through the assistance of e-government, to promote quality of healthcare service (Ruhode, 2016), and thereby improving service delivery.

The e-government enables more integrated services through synergy among healthcare facilities in accessing and using the same source of patient data for service delivery. Additionally, the e-government is a tool that can help to maintain the authenticity of health data in its originality, thereby improving security in an environment that is considered highly sensitive. The origin of the data is influenced by the origin of the patients, who often implore their tradition and culture even while soliciting care. In Namibia, a group of patients refused care and examination by health practitioners of opposite sex on cultural basis (Hamunyela & Iyamu, 2016).

4.2 Dimension of Social Change: Type

Patients' health records are primary sources of data types. The records transitioned from different types of patients' health conditions. The records change rapidly, which occasionally accentuate and determine quality of service. This is attributed to the fact that some healthcare practitioners are often challenged when it comes to mapping different types of conditions against various services. This type of social change is an indication of the depth which both negative and positive impacts of change have on existing alignment of an institution (Iyamu, 2014). Thus, e-government can either disrupt or reshape the operations of the healthcare sector, depending on the implementation and practice.

The transmutation of health conditions, from its intensity to extensity stage distinct the data types, as changes are frequently made to the patient's record. In the constitution of the society, Giddens

(1984) explains how the intensive and extensive types of change can disrupt and reshape an existing alignment. Such alignment include change to an episode, which requires the e-government to enact and automate workflow, and differentiation as patients' data are generated, stored and used. According to Larosiliere and Carter (2016), one of the objectives of the e-government is primarily to increase the efficiency of government services through the use of available ICT artefacts. This includes the use of mobile technologies and internet platforms, through which government provides services such as healthcare to its citizens (Abu-Shanab, 2017).

Thus, the e-government can be used as a host, 'cup-holder', for the categorisation of health condition as detailed and aligned by the e-health. This is to ultimately trace, monitor and be transparent, for the purposes of efficient and effective services. In addition to those functions, security is critical. Only then the e-government can be used as a two-way interactive platform between health professionals and patients; and patients and government within the healthcare environment (Hao et al., 2016).

4.3 Dimension of Social Change: Momentum

From the perspective of structuration, momentum refers to the speed at which change occurs in an episode (Çam & Kayaoğlu, 2014). This is critical in that health conditions are usually unpredictable, and can change rapidly. As a result, some health conditions, especially severe cases, often require speedy medical response. The adoption of e-government in Kenya was intended for speedy transformation and transparency of healthcare services delivery to its citizens (Mutuku & Machyo, 2017).

The rapidity of change in a health condition deserves differentiation between processes, procedures, diagnoses, as well as practice in response and management of episode for closure purposes. Giddens (1984) describes differentiation as an approach that is employed for social closure. A closure of an episode revolutionises its new beginning, which loopily accumulates patients' data. However, decentralisation of such data has little or no value to service delivery, which therefore require enabling platform, such as the e-government for centralisation purposes. Such data can therefore be accessed and used concurrently, at real-time by multiple stakeholders: the healthcare facilities (practitioners), citizens (patients), and government (representatives of the Ministry of Health). The interaction between healthcare facilities through e-health enhances service delivery (Landis-Lewis et al., 2015). According to Ogunleye and Belle (2014), e-government is an approach and strategy purposely for response to the increasing demand for quality of service delivery to the citizens. Significantly, e-government has been improving government services, such as access to information, transactions, online scheduling of appointment, and implementation of healthcare services (Venkatesh et al., 2016; Kettani & Moulin, 2014).

The complementarity of the e-government and e-health improves interaction through two-directional communication approach in accessing, using, and managing of patients' data for services. This enhances the relationship among the three primary stakeholders, namely, government administration, health facilities (including practitioners), and citizens.

4.4 Dimension of Social Change: Trajectory

Trajectory refers to the social changes which point in a particular direction (Boje et al., 2017). In recent decade, healthcare service delivery has taken a whole new dimension, which many developing countries strive to comprehend through the enablement and support of the ICT solutions. The changes in the government operations, from manual to technological (e-government) solution dictates the success or failure of service delivery. E-government brings government administration closer to both citizens and health professionals in a rectangular approach. It therefore accelerates the transition and transformation of healthcare service delivery into knowledge-based economy. The transformation can manifests in a governments' governance, health professionals' responsiveness, and citizens' access to healthcare in African countries that suffer from service delivery the most.

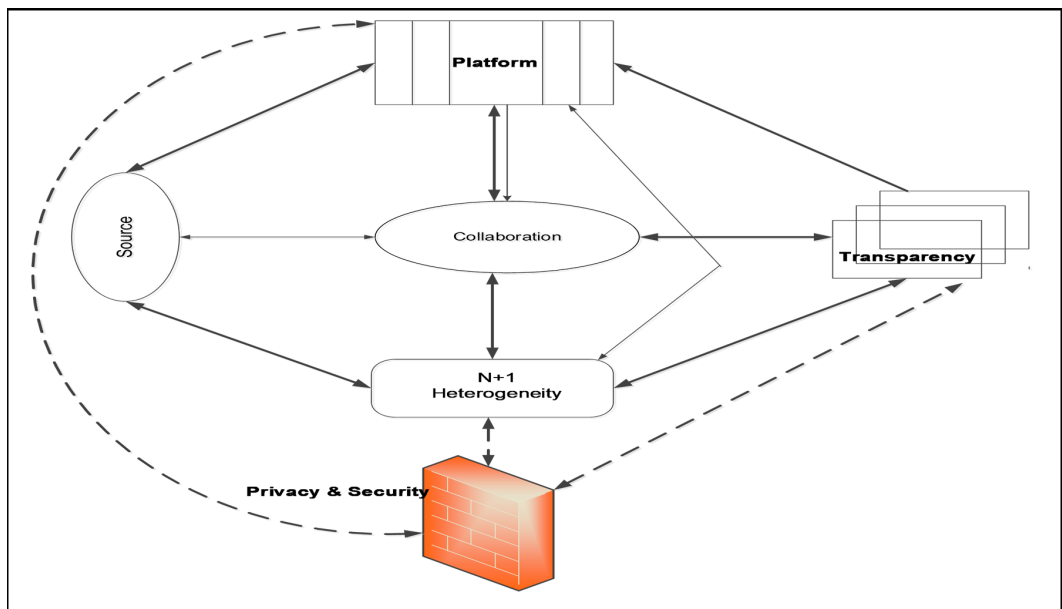
However, complementary adoption and practice of the e-government and e-health is slow in developing countries (Venkatesh et al., 2014), which is attributable to lack of strategic planning and

proper direction in its focus. Thus, in the pursuit of gaining better understanding of the e-government adoption, some researchers employ theories, such as the Technology Adoption Model (TAM) and Roger's Diffusion of Innovation theory (DOI) (Rowley, 2011).

5. RESULTS AND INTERPRETATION

Based on interpretivist, subjective view, guided by the dimension of change as a lens, it was found from existing works that the e-government can be used as a platform to enable and support the e-health through six factors: source of information, platform for solutions, transparency of activities, heterogeneity of agents, collaboration among agents, and privacy of patients' information. As shown in Figure 2, the factors are interconnected as they socially influence the activities and processes of healthcare within the e-government system.

Figure 2. Roles of e-government in healthcare service delivery



4.5 Source of Information

Healthcare data originates from patients through various sources, such as registration with a health facility and diagnoses. On each visitation to a health facility, whether through physical presence or an online consultation, patient is either registered (as a first-time user) or the patient's health condition (purpose of visit) is updated against the existing record. E-health is used to gather, store, access, and retrieve such patient data, including management of health processes and activities (Iyamu, 2014). Many governments globally have in recent years adopted e-government to support the enablement of e-health for quality and effective healthcare service delivery (Anthopoulos et al., 2016). Patient information collected by healthcare practitioners is stored in a repository so that other healthcare practitioners in other facilities can access and make intelligent use of it (Rahmani et al., 2015).

4.6 Platform for Solutions

In conjunction with available resources, such as data and technology solutions, practitioners draw from their knowledge to change patients' social reality from current state to better health condition. However, the rules that are often employed in the process can enable, and at the same, constrain the efforts that are intended to change patients' health condition. Additionally, the change is influenced by the type of data that was accessed, and how they were applied. In an electronic enabling environment or platform, sources and types of patient data can be better streamlined, traced, tracked, and monitored, to improve healthcare services.

E-government enables automated creation of platform for technology solutions, such as Internet and mobile phones, in key government services, including healthcare (Frankfurter & Cuervo, 2016). Based on the platform, the solutions are used to enhance the collaboration: healthcare-to-healthcare practitioners, patient-to-patient, and patient-to-healthcare practitioner. The platforms also ease the manner for both patients and healthcare practitioners to access and share information (Aveling & Martin, 2013). This viewpoint can be associated with Ahmad and Campbell's (2015) claim that through the e-government platform "citizens also benefit from greater transparency and increased access options to key government services". Solutions created for the implementation of e-government enhance the effectiveness of internal and external government activities, such as facilitating the interaction between government and government officials, agencies, citizens, or business (Ruhode, 2016).

4.6 Transparency of Activities

The transparency that is introduced by e-government simply means that some of the processes and operations of government are open and accessible to the citizens (Mkude & Wimmer, 2013). This includes the healthcare sector where e-government allows for ease of access to documentation, processes and activities that are used by healthcare facilities to facilitate care and services (De Rosi & Vainieri, 2017). As a result, stakeholders can access the performance of healthcare facilities and practitioners, including their heterogeneous state in terms of policy compliance.

E-government brings about transparency, which, in turn, fosters trust in every sector of government administration (Anthopoulos et al., 2016), including healthcare (Raghupathi & Raghupathi, 2014). Arguably, transparency is one of the most challenging aspects of government activities impacting the relationship between government and its citizens (Ochara, 2008). Thus, the government of many developing countries, such as Cameroon and Kenya, benefit from the implementation of e-government as this heightens transparency in the political development of the country (Mutuku & Machyo, 2017; Bawack & Kamdjoug, 2018). As a result, the relationship between government and its citizen improves, the cost and errors in service delivery are reduced, and citizen quality of life also greatly improves (Abu-Shanab, 2017).

4.7 Heterogeneity Of Agents

In the context of this study, *heterogeneity* refers to replication of individual' presence, and agent represents technical (such as data and technology solutions) and non-technical (e.g. human and process) entity. Heterogeneity of agents' therefor refers to an entity' abilities to be involved in different social structures, and able to make a difference to each of the structures. This means that a doctor can serve in more than one healthcare facility. The same applies to a patient who can receive healthcare services from more than one healthcare facility. In addition, the procedures and healthcare conditions can also be heterogeneous in that different healthcare facilities can utilise the same procedures and talk about the same diagnosis. Heterogeneity of agents within healthcare is facilitated by established e-government platform in terms of sharing findings about a diagnosis, procedures, and/or techniques (Cleland-Huang, 2014). However, when not well-monitored, this can open the door for increased corruption within the healthcare sector. Therefore, it can be suggested that e-government not only

facilitate processes but it is also a tool to address and reduce corruption within the healthcare sector by enforcing compliance, transparency and accountability through policies (Lio & Lee, 2016).

Despite the heterogeneous nature of agents, from the origin to direction or destination, the e-government is used to trace and track processes and activities in the application of the e-health system. Through e-government, practitioners' association with multiple facilities (hospitals or clinics) and patients can be traced and their activities coordinated, for various purposes, such as statistical and strategic planning. Additionally, patients' records with multiple facilities can be traced and better managed.

4.8 Collaboration Among Agents

Collaboration is achieved when two or more health organisations work in partnership by sharing information about a patient's health condition, towards providing better care and quality service (Aveling & Martin, 2013). Collaboration is being practiced mostly in developed countries, and many developing countries strive to benefit from collaborative effort (Ami-Narh & Williams, 2012; Justice, 2012); Leon et al., 2012; Landis-Lewis et al., 2015). Through e-government, healthcare sectors can be enabled to support collaborations between healthcare facilities, as well as between healthcare practitioners. Collaboration takes place irrespective of distance, or affiliation to a facility. However, these collaborations can concomitantly jeopardise the privacy and security of patient's information, resulting in information being illegally accessed (Jiang et al., 2016).

One of the objectives of e-government, as highlighted in the literature, is to facilitate fluid communication between various government agencies (Joseph, 2013), depending on the type of circumstance. E-health requires appropriate collaboration and communication, owing to its numerous and critical benefits, which include enabling healthcare organisations and users to exchange and make valuable use of information such as test results, X-rays, and prescription of information, to improve services that are provided to the patients (Nkohkwo & Islam, 2013; Leon, Schneider & Daviaud, 2012). Type indicates how extensive and intensive the change is in a patient's health condition.

4.9 Privacy of Patient's Information

Privacy of patient's information is most prominent and critical in the healthcare sector, and often addressed with caution. This is because healthcare data is considered extremely sensitive as it contains confidential information about patients. This happen to be one of the most challenging aspects of the e-government concept; because citizens *need* to be utterly assured that the information they provide and hosted on the e-government platform is kept secure. There should be more than verbal assurance to citizens; rather, practical solutions should be ensured. According to Layne and Lee (2001:134), "Data should be collected in a secure fashion, privacy notices on web sites will be mandatory and independent auditing groups composed of citizens' representatives will also help in soliciting participation of citizens". When patients or healthcare practitioners share information, they must be cognisant of the standard of privacy that is involved and, most importantly, *how* they are involved.

6. IMPLICATION OF PRACTICE

In practice, there are, and will always be, implications for the main stakeholders, in e-government enabling of e-health within the African countries. Some of the implications might be similar to those of the developed countries, the focus of this study is the Africa continent. Based on the analysis and discussion, as presented above, four factors come across as implications of practice: (1) technology advances, (2) multiple integration, (3) multiplexity of functionalities across government administration, and (4) formative and summative. As shown in Table 2, the factors are listed, and the implications from practice are described and briefly discussed. This is done in the context of guiding the complementarity, that is, e-government enabling and supporting e-health in the developing countries.

Table 2. Implication of practice

Factor	Description and discussion
Technology advances	Technical know-how is potentially a resistant factor to the new advanced approach, complementarity of e-government and e-health. In Kenya and Nigeria, social exclusion, infrastructural, and cultural constraint pose major challenges to the adoption of e-government (Olatokun & Adebayo, 2012; Ochara, 2008). Through the technological advances, interoperability and integration of systems, the security and privacy of information can be ensured (Leon et al., 2012).
Integration	As highlighted in the analysis and discussion section, there are many challenges involved in the adoption of e-government and e-health, separately and complementarily in an environment which many African countries that are interested must brace themselves with. Thus, the integration of the two databases, e-government and e-health can consequently lead to a compromise of privacy of patients' information (Layne & Lee, 2001). Thus, two different types of integration, vertical integration and horizontal integration, should be considered (Fan & Yang, 2012), to enable.
Multiplexity	from the angle of complexity, Gole et al. (2017) explain that the whole purpose is to provide a common platform for all government agencies in executing tasks and mandates. However, this integration can also increase the complexities of management and operation of the systems and technologies solutions, due to the existence of isolated policies and requirements, which government agencies employ in processing data (Ibrahim et al., 2015). For example, there are differences between policies that govern health data and the policies for transportation of data.
Formative and summative	The adoptions and evaluations of e-health systems in some African countries are challenging from formative to it summative points, and require significant resources. According to Ami-Narh and Williams (2012), interests continue to increase, and several studies about technology adoption are conducted, yet, little attention has been given to E-health acceptance decision in many developing countries. Integration of e-health with e-government improves the formative and summative evaluations of healthcare services (Blaya, Fraser & Holt, 2010). Thus, the e-government can be used to enable e-health, to improve service delivery, as well as increase transparency and reduce corruption in the sector (Asogwa, 2013).

7. CONCLUSION

This study reveals the criticality of integration between e-government and e-health towards improving healthcare service delivery. This is crucial in developing countries where mortality rates have been high. From this viewpoint, this paper contributes significantly to both governments, healthcare sectors in developing countries. Also, the paper is intended to be of interest to academics from development viewpoints. In the African context, this paper adds to the growing discourse on advances of technology adoption, to improve service delivery in the continent. From a theoretical viewpoint, the paper adds to the available literature on the integration of e-government and e-health, to increase the theoretical awareness of both concepts for service delivery purposes. Methodologically, the use of the structuration theory has been of particular contribution in its employment in the study, which can obviously be expanded. Practically, the study lays a foundation for the integration of various platforms within e-government and e-health systems in any environment.

Even though this study makes significant contribution to both the practitioner and academic domains, there is still room for further studies. Thus, we suggest that the integration of both e-government and e-health systems should be examined through other lenses such as Actor Network Theory (ANT) and Technology Acceptance Model (TAM), to have an even more thorough understanding of the e-government platform and healthcare environment.

REFERENCES

- Abu-Shanab, E. A. (2017). E-government familiarity influence on Jordanians' perceptions. *Telematics and Informatics*, 34(1), 103–113. doi:10.1016/j.tele.2016.05.001
- Ahmed, K. M., & Campbell, J. (2015). Citizen perceptions of e-government in the Kurdistan region of Iraq. *AJIS. Australasian Journal of Information Systems*, 19.
- Ami-Narh, J. T., & Williams, P. A. (2012). A revised UTAUT model to investigate E-health acceptance of health professionals in Africa. *Journal of Emerging Trends in Computing and Information Sciences*, 3(10), 1383–1391.
- Anthopoulos, L., Reddick, C. G., Giannakidou, I., & Mavridis, N. (2016). Why e-government projects fail? An analysis of the Healthcare. gov website. *Government Information Quarterly*, 33(1), 161–173. doi:10.1016/j.giq.2015.07.003
- Asogwa, B. E. (2013). Electronic government as a paradigm shift for efficient public services: Opportunities and challenges for Nigerian government. *Library Hi Tech*, 31(1), 141–159. doi:10.1108/07378831311303985
- Aveling, E. L., & Martin, G. (2013). Realising the transformative potential of healthcare partnerships: Insights from divergent literatures and contrasting cases in high-and low-income country contexts. *Social Science & Medicine*, 92, 74–82. doi:10.1016/j.socscimed.2013.05.026 PMID:23849281
- Barnes, S. J., Bohringer, M., Kurze, C., & Stietzel, J. (2010). Towards an understanding of social software: the case of Arinia. In *Proceedings of the 2010 43rd Hawaii International Conference on System Sciences (HICSS)* (pp. 1-9). IEEE. doi:10.1109/HICSS.2010.406
- Bawack, R. E., & Kamdjoug, J. R. K. (2018). Adequacy of UTAUT in clinician adoption of health information systems in developing countries: The case of Cameroon. *International Journal of Medical Informatics*, 109, 15–22. doi:10.1016/j.ijmedinf.2017.10.016 PMID:29195701
- Blaya, J. A., Fraser, H. S., & Holt, B. (2010). E-health technologies show promise in developing countries. *Health Affairs*, 29(2), 244–251. doi:10.1377/hlthaff.2009.0894 PMID:20348068
- Boje, D. M., Baca-Greif, H., Intindola, M., & Elias, S. (2017). The episodic spiral model: A new approach to organizational processes. *Journal of Organizational Change Management*, 30(5), 683–709. doi:10.1108/JOCM-06-2016-0118
- Bwalya, K. J. (2009). Factors Affecting Adoption of e-Government in Zambia. *The Electronic Journal on Information Systems in Developing Countries*, 38(1), 1–13. doi:10.1002/j.1681-4835.2009.tb00267.x
- Çam, T., & Kayaoğlu, M. (2014). Social change from the perspective of some prominent contemporary sociologists. *Journal of International Social Research*, 7(34), 628–635.
- Chang, C. L. H. (2014). The interaction of political behaviours in information systems implementation processes—Structuration Theory. *Computers in Human Behavior*, 33, 79–91. doi:10.1016/j.chb.2013.12.029
- Cleland-Huang, J. (2014). Don't Fire the Architect! Where Were the Requirements? *IEEE Software*, 31(2), 27–29. doi:10.1109/MS.2014.34
- Creswell, J. W., & Poth, C. N. (2017). *Qualitative inquiry and research design: Choosing among five approaches*. London, UK: Sage.
- Dada, D. (2006). The failure of E-government in developing countries: A literature review. *The Electronic Journal on Information Systems in Developing Countries*, 26(1), 1–10. doi:10.1002/j.1681-4835.2006.tb00176.x
- Dasuki, S. I., & Zamani, E. D. (2019). Assessing mobile phone use by pregnant women in Nigeria: A capability perspective. *The Electronic Journal on Information Systems in Developing Countries*.
- De Rosis, S., & Vainieri, M. (2017). Incentivizing ICT in healthcare: A comparative analysis of incentive schemes in Italian Regions. *International Journal of Healthcare Management*, 10(1), 1–12. doi:10.1080/20479700.2016.1219808
- Fan, J., & Yang, W. (2015). Study on e-government services quality: The integration of online and offline services. *Journal of Industrial Engineering and Management*, 8(3), 693–718. doi:10.3926/jiem.1405

Fath-Allah, A., Cheikhi, L., Al-Qutaish, R. E., & Idri, A. (2014). E-government maturity models: A comparative study. *International Journal of Software Engineering and Its Applications*, 5(3), 71–91.

Fonou Dombau, J. V., & Rannyai, N. (2014). African e-government research landscape. *The African Journal of Information Systems*, 6(3), 2.

Frankfurter, C., & Cuervo, L. G. (2016). E-Government as tool to advance health. *Pan American Health*, 5, 1–4.

Gao, X., & Lee, J. (2017). E-government services and social media adoption: Experience of small local governments in Nebraska state. *Government Information Quarterly*, 34(4), 627–634. doi:10.1016/j.giq.2017.09.005

Giddens, A. (1984). *The constitution of society: Outline of the theory of structuration*. Berkeley, CA: University of California Press.

Gole, I., Sharma, T., & Misra, S. B. (2017). Role of ICT in Healthcare Sector: An Empirical Study of Pune City. *Journal of Management & Public Policy*, 8(2), 23–32. doi:10.5958/0976-0148.2017.00003.8

Greenhalgh, T., & Stones, R. (2010). Theorising big IT programmes in healthcare: Strong structuration theory meets actor-network theory. *Social Science & Medicine*, 70(9), 1285–1294. doi:10.1016/j.socscimed.2009.12.034 PMID:20185218

Groves, P. S., Meisenbach, R. J., & Scott-Cawiezell, J. (2011). Keeping patients safe in healthcare organizations: A structuration theory of safety culture. *Journal of Advanced Nursing*, 67(8), 1846–1855. doi:10.1111/j.1365-2648.2011.05619.x PMID:21477115

Hamunyela, S., & Iyamu, T. (2016). Healthcare Services for Nomads through a Mobile Framework. In T. Iyamu & A. Tatnall (Eds.), *Maximizing Healthcare Delivery and Management through Technology Integration* (pp. 46–57). Hershey, PA: IGI Global. doi:10.4018/978-1-4666-9446-0.ch004

Hao, X., Zheng, D., Zeng, Q., & Fan, W. (2016). How to strengthen the social media interactivity of e-government: Evidence from China. *Online Information Review*, 40(1), 79–96. doi:10.1108/OIR-03-2015-0084

Hossain, A., Quaresma, R., & Rahman, H. (2019). Investigating factors influencing the physicians' adoption of electronic health record (EHR) in healthcare system of Bangladesh: An empirical study. *International Journal of Information Management*, 44, 76–87. doi:10.1016/j.ijinfomgt.2018.09.016

Ibrahim, M., Al-Nasrawi, S., El-Zaar, A., & Adams, C. (2015). Challenges facing e-government and smart sustainable city: An Arab region perspective. In *Proceedings of the 15th European Conference on e-Government, ECEG* (pp. 396–402). Academic Press.

Iyamu, T. (2014). A guide for enterprise application architecture deployment. *Issues in Information Systems*, 15, 450–463.

Jiang, Q., Khan, M. K., Lu, X., Ma, J., & He, D. (2016). A privacy preserving three-factor authentication protocol for e-Health clouds. *The Journal of Supercomputing*, 72(10), 3826–3849. doi:10.1007/s11227-015-1610-x

Joseph, R. C. (2013). A structured analysis of e-government studies: Trends and opportunities. *Government Information Quarterly*, 30(4), 435–440. doi:10.1016/j.giq.2013.05.006

Justice, E. O. (2012). E-healthcare/telemedicine readiness assessment of some selected states in Western Nigeria. *IACSIT International Journal of Engineering and Technology*, 2(2), 195–201.

Kettani, D., & Moulin, B. (2014). *E-government for good governance in developing countries: Empirical evidence from the eFez project*. London: Anthem Press.

Kurfalı, M., Arifoğlu, A., Tokdemir, G., & Paçin, Y. (2017). Adoption of e-government services in Turkey. *Computers in Human Behavior*, 66, 168–178. doi:10.1016/j.chb.2016.09.041

Lai, J. Y., & Wang, J. (2015). Switching attitudes of Taiwanese middle-aged and elderly patients toward cloud healthcare services: An exploratory study. *Technological Forecasting and Social Change*, 92, 155–167. doi:10.1016/j.techfore.2014.06.004

Landis-Lewis, Z., Manjomo, R., Gadabu, O. J., Kam, M., Simwaka, B. N., Zickmund, S. L., & Jacobson, R. S. et al. (2015). Barriers to using eHealth data for clinical performance feedback in Malawi: A case study. *International Journal of Medical Informatics*, 84(10), 868–875. doi:10.1016/j.ijmedinf.2015.07.003 PMID:26238704

- Larosiliere, G. D., & Carter, L. D. (2016). Using a fit-viability approach to explore the determinants of e-government maturity. *Journal of Computer Information Systems*, 56(4), 271–279. doi:10.1080/08874417.2016.1163995
- Layne, K., & Lee, J. (2001). Developing fully functional E-government: A four stage model. *Government Information Quarterly*, 18(2), 122–136. doi:10.1016/S0740-624X(01)00066-1
- Leon, N., Schneider, H., & Daviaud, E. (2012). Applying a framework for assessing the health system challenges to scaling up mHealth in South Africa. *BMC Medical Informatics and Decision Making*, 12(1), 123. doi:10.1186/1472-6947-12-123 PMID:23126370
- Lethbridge, T. C., Sim, S. C., & Singer, J. (2005). Studying software engineers: Data collection techniques for software field studies. *Empirical Software Engineering*, 10(3), 311–341. doi:10.1007/s10664-005-1290-x
- Lio, M. C., & Lee, M. H. (2016). Corruption costs lives: A cross-country study using an IV approach. *The International Journal of Health Planning and Management*, 31(2), 175–190. doi:10.1002/hpm.2305 PMID:26122874
- Mkude, C. G., & Wimmer, M. A. (2013, September). Strategic framework for designing e-government in developing countries. In *Proceedings of the International Conference on Electronic Government* (pp. 148-162). Springer. doi:10.1007/978-3-642-40358-3_13
- Mouttham, A., Kuziemy, C., Langayan, D., Peyton, L., & Pereira, J. (2012). Interoperable support for collaborative, mobile, and accessible health care. *Information Systems Frontiers*, 14(1), 73–85. doi:10.1007/s10796-011-9296-y
- Mutumukwe, C., Kolkowska, E., & Grönlund, Å. (2019). Information privacy practices in e-government in an African least developing country, Rwanda. *The Electronic Journal on Information Systems in Developing Countries*, 85(2), e12074. doi:10.1002/isd.12074
- Mutuku, J. M., & Machyo, P. (2017). Factors influencing the implementation of e-government policies in Nakuru County, Kenya. *American Journal of Public Policy and Administration*, 1(1), 59–80.
- Mutula, S. M., & Mostert, J. (2010). Challenges and opportunities of e-government in South Africa. *The Electronic Library*, 28(1), 38–53. doi:10.1108/02640471011023360
- Nam, T. (2018). Examining the anti-corruption effect of e-government and the moderating effect of national culture: A cross-country study. *Government Information Quarterly*, 35(2), 273–282. doi:10.1016/j.giq.2018.01.005
- Nkohkwo, Q. N. A., & Islam, M. S. (2013). Challenges to the Successful Implementation of e-Government Initiatives in Sub-Saharan Africa: A Literature Review. *Electronic Journal of E-Government*, 11(1).
- Ochara, N. M. (2008). Emergence of the e-government artifact in an environment of social exclusion in Kenya. *The African Journal of Information Systems*, 1(1), 3.
- Ogunleye, O. S., & Van Belle, J. P. (2014). Mobile government implementation for government service delivery in developing countries: a South Africa context. In *Proceedings of the International Conference on e-Learning, e-Business, Enterprise Information Systems, and e-Government (EEE)* (p. 1). The Steering Committee of The World Congress in Computer Science, Computer Engineering and Applied Computing (WorldComp).
- Olatokun, W. M., & Adebayo, B. M. (2012). Assessing e-government implementation in Ekiti state, Nigeria. *Journal of Emerging Trends in Computing and Information Sciences*, 3(4), 497–505.
- Puron-Cid, G. (2013). Interdisciplinary application of structuration theory for e-government: A case study of an IT-enabled budget reform. *Government Information Quarterly*, 30, S46–S58. doi:10.1016/j.giq.2012.07.010
- Raghupathi, W., & Raghupathi, V. (2014). Big data analytics in healthcare: Promise and potential. *Health Information Science and Systems*, 2(1), 3. doi:10.1186/2047-2501-2-3 PMID:25825667
- Rowley, J. (2011). e-Government stakeholders—Who are they and what do they want? *International Journal of Information Management*, 31(1), 53–62. doi:10.1016/j.ijinfomgt.2010.05.005
- Ruhode, E. (2016). E-Government for Development: A Thematic Analysis of Zimbabwe's Information and Communication Technology Policy Documents. *The Electronic Journal on Information Systems in Developing Countries*, 73(1), 1–15. doi:10.1002/j.1681-4835.2016.tb00532.x

International Journal of Sociotechnology and Knowledge Development

Volume 12 • Issue 3 • July-September 2020

Shaw, T., McGregor, D., Brunner, M., Keep, M., Janssen, A., & Barnet, S. (2017). What is eHealth (6)? Development of a conceptual model for eHealth: Qualitative study with key informants. *Journal of Medical Internet Research*, 19(10), 324. doi:10.2196/jmir.8106 PMID:29066429

Venkatesh, V., Hoehle, H., & Aljafari, R. (2017). A usability study of the obamacare website: Evaluation and recommendations. *Government Information Quarterly*, 34(2), 199–210. doi:10.1016/j.giq.2017.01.003

Venkatesh, V., Sykes, T. A., & Venkatraman, S. (2014). Understanding e-Government portal use in rural India: Role of demographic and personality characteristics. *Information Systems Journal*, 24(3), 249–269. doi:10.1111/isj.12008

Venkatesh, V., Thong, J. Y., Chan, F. K., & Hu, P. J. (2016). Managing citizens' uncertainty in e-government services: The mediating and moderating roles of transparency and trust. *Information Systems Research*, 27(1), 87–111. doi:10.1287/isre.2015.0612

Verkijika, S. F., & De Wet, L. (2018). A usability assessment of e-government websites in Sub-Saharan Africa. *International Journal of Information Management*, 39, 20–29. doi:10.1016/j.ijinfomgt.2017.11.003

Tiko Iyamu holds a PhD in Information Systems. He is currently a Research Professor in the faculty of Informatics and Design, Cape Peninsula University of Technology, Cape Town, South Africa. He was previously with the Tshwane University of Technology, South Africa and the Namibia University of Science and Technology, Windhoek, Namibia. Prior to his fulltime appointment in academic in 2009, Professor Iyamu held several positions in both Public and Private Institutions in South Africa. Professor Iyamu has authored books, and research articles in book chapters, journals, and conference proceedings.