STUDYING INTERDEPENDENCIES OF E-GOVERNMENT CHALLENGES IN TANZANIA ALONG A PESTEL ANALYSIS

Completed Research

Mkude, Catherine G., University of Koblenz-Landau, Koblenz, Germany, cmkude@uni-koblenz.de

Wimmer, Maria A., University of Koblenz-Landau, Koblenz, Germany, wimmer@uni-koblenz.de

Abstract

E-government challenges are well researched in literature and well known by governments. However, being aware of the challenges of e-government implementation is not sufficient, as challenges may interrelate and impact each other. Therefore, a systematic analysis of the challenges and their interrelationships contributes to providing a better understanding of how to tackle the challenges and how to develop sustainable solutions. This paper aims to investigate existing challenges of e-government and their interdependencies in Tanzania. The collection of e-government challenges in Tanzania is implemented through interviews, desk research and observations of actors in their job. In total, 32 challenges are identified. The subsequent PESTEL analysis studied interrelationships of challenges and identified 34 interrelationships. The analysis of the interrelationships informs policy decision makers of issues to focus on along the planning of successfully implementing the existing e-government strategy in Tanzania. The study also identified future research needs in evaluating the findings through quantitative analysis.

Keywords: E-government, strategic planning, challenges, interdependencies, PESTEL.

1 Introduction

In recognizing the potentials of e-government for sustainable socio-economic development, governments continue to allocate enormous resources to support the implementation of e-government strategies and programs. For example, the European Union invested approximately €9.1 billion for funding e-government initiatives (United Nations, 2012). Denmark invested approx. 36 million Euros to implement its 2007-2010 e-government strategy and further approx. 27 million Euros to implement an ICT security infrastructure for the period 2009-2014 (OECD, 2010).

Benefits and challenges of implementing e-government are well documented in e-government literature as was analysed by (Mkude and Wimmer, 2014). The authors argue reduced administrative burdens, increased efficiency, effectiveness and quality of public services, improved accessibility of public services and increased transparency as examples of benefits. Challenges of governments identified are such as organisational, legal, semantic and technical interoperability challenges, lack of sufficient financial resources, insufficient collaboration and cooperation among public institutions in implementing integrated services, insufficient data protection and privacy laws (Mkude and Wimmer, 2014).

To build good grounds for innovation and modernisation of governments, both developed and developing countries need to formulate sound e-government strategies and implement sustainable solutions. Sound strategies are those that enable governments to successfully implement e-government whilst taking into account challenges of dynamic environments they have to cope with. Governments and other public bodies have invested in e-government to develop solutions that tackle the challenges mentioned before, amongst other objectives. However, while the challenges are well known in literature

and in practice, there is a lack of research investigating and evaluating the interdependency among the challenges. In this paper, we argue that governments are not only required to be aware of the challenges and their impacts to ensure success of e-government strategies. Governments also need to be aware of the existing interdependencies of such challenges and the resulting complexity. This paper reflects interdependencies of challenges and barriers interfering on strategic planning and formulation of e-government strategies.

Studies on interdependencies (and interrelations) on various aspects exist in different research disciplines and fields of study. The main aims of investigating the interdependencies among the elements under investigation are to explore the complex network of interdependencies between the elements and to analyse and evaluate the direct and indirect relationship between the elements and their impact in decision making (Wimmer and Bicking, 2009; Tzeng et al., 2007). Furthermore in his work of analysing a macro-environment of a company using PESTEL, Yüksel argues that it is crucial to consider the interdependencies and relations between the PESTEL factors to achieve a holistic perspective (Yüksel 2009). The aims are of great significance in strategic planning because it is impossible to consider economic conditions in isolation from political conditions.

The aim of this paper is to investigate the existing interdependencies among e-government challenges as an initial phase that requires subsequently sophisticated tools such as DEMATEL (Decision Making Trial and Evaluation Laboratory), AHP (Analytic Hierarchy Process) and ANP (Analytic Network Process) to measure, evaluate and weigh the elements to quantitatively inform decision makers in strategic planning (Yüksel, 2009). To achieve this aim, the paper has two objectives: first to propose a holistic method of analysing e-government challenges and second to conceptualise the interdependencies among the challenges.

The scope of the paper is e-government challenges at the national level. The targeted addressees of this paper are e-government strategic analysts and planners to support them in holistic exploration of e-government challenges on the one hand. On the other hand, researchers are addressed to extend the proposed concept and develop suitable tools to support quantitative evaluation.

The paper is organised as follows: Section 2 reviews methods and tools used for strategic planning hence grounding the choice of method used in this research. Section 3 presents the research approach and methods, then section 4 presents findings of a case study which were used as the basis to achieve the objective of the paper. Section 5 conceptualises the interdependencies of the challenges from the case study. Finally, concluding reflections are provided in section 6.

2 Methods for strategic planning: insights from literature

Globalisation and technology advancements have increased opportunities for organisations in public and private sectors to grow beyond national boundaries. Nevertheless, organisations have challenging tasks to manage the dynamic processes and their internal and external environments, in which they operate (Yüksel, 2009). In this regard, strategic planning is proven crucial for sustainable growth of the organisations. The same perspective is valid when governments formulate e-government strategies that are expected to sustain the dynamic advancements and unstable internal and external environments such as political stability, e-government acceptance and adoption, financial fluctuations, environmental protection, accountability etc. As a result, governments must increasingly take into account the changing environment and adopt strategic approaches in planning and formulating their e-government endeavours. Strategic planning is defined as "a long-term, future-oriented process of assessment, goal-setting, and decision-making that maps an explicit path between the present and a vision of the future….relying on careful consideration of an organisation's capabilities and environment" (Shahkooh et al., 2009). This definition highlights key activities and factors in strategic planning that are significant in this study namely "assessment", "decision-making", "organisation's capabilities" and "environment". These key activities are significant in this research because governments are required to assess the macro-environmental factors – internal and external – to carefully make decisions when

formulating e-government strategic objectives. Literature research reveals methods and tools used for strategic planning in public and private sectors. Four methods and tools are reviewed in this section, including PESTEL analysis, Scenario planning, Foresight and SWOT.

PESTEL (Political, Economic, Socio-cultural, Technological, Environment and Legal) analysis is a method used in strategic planning to analyse macro-environmental factors within which an organisation operates (Yüksel, 2009). The method is recognized in different fields as being suitable for strategic analysis of the dynamic parameters in long-term planning (Osborne and Brown, 2005; Yüksel, 2009). PESTEL was first conceived as ETPS (economic, technical, political and social) by Aguilar (1967) and has been modified since. For example, Richardson (2006) used a modified version called STEPE where another 'E' was added to include a scanning of environmental changes in other parameters to identify barriers and constraints in developing libraries. Katko (2006) used PESTEL to analyse political, economic, social, technical, ecological and legislative factors to assess the development of traffic safety in Finland, where an 'E' was added to the ETPS to analyse ecological factor and an 'L' was added to analyse legislative factor.

Scenario planning is a strategy analysis technique that is used to depict alternatives of future developments and to highlight crucial uncertainties and interdependencies that have impacts on strategic decisions (Codagnone and Wimmer; 2007; Mietzner and Reger, 2005). Uncertainties of changes, especially economic and socio-cultural, that impact e-government implementation endanger the long-term sustainability of solutions. In this regard, Aichholzer proposes the use of macro-level scenario planning in e-government to assess the sustainability of e-government strategies in uncertain future developments (Aichholzer, 2004). The significance of scenario analysis in e-government strategic planning is its ability to draw on different alternatives and unexpected future developments. This way, policy makers are enabled to aggressively assess e-government strategies with a particular focus on their sustainability (Aichholzer, 2004). Scenario analysis of e-government strategies depicts the sustainability of e-government in uncertain situations such as availability and assignment of resources, attitudes towards adoption of e-government, trust, data security and privacy and digital divide (Aichholzer, 2004).

Foresight is a method used to systematically assess future developments in subject domains with the use of experiences, knowledge and expert skills when solving strategic planning and decision making problems (Shahkooh et al., 2009; Zgurovsky and Pankratova, 2007). The dynamic internal and external parameters of an environment are influenced by changing positive and negative interdependencies and interactions of processes, and situations for potential contribution of useful knowledge while developing a strategy (Markus and Mentzer, 2014; Zgurovsky and Pankratova, 2007). Shahkooh et al (2009) propose foresight as a method for analysis of long-term benefits and costs in e-government strategic planning based on evolving socio-economic needs and threats, emerging research opportunities, advantages and weaknesses associated with economic resources and scientific strengths and technological capabilities. Foresight uses scenario planning techniques to generate future prospects, visions and alternatives to strategy planning (Shahkooh et al., 2009; Zgurovsky and Pankratova, 2007).

SWOT (Strengths, Weaknesses, Opportunities and Threats) is a tool used in strategic planning to identify alternative options based on factors categorised in SWOT (Srdjevic et al., 2012). In addition to identification of the SWOT factors, various modifications or improvements of the tool have been suggested. One of the modifications is the use of SWOT/PESTEL where the SWOT factors are grouped into political, economic, social, technological, legal and environment for "an extensive and more accurate analysis of a complex system" (Srdjevic et al., 2012). Another modification is the use of AHP to evaluate the SWOT factors to determine the priority (or importance) of the factors (Srdjevic et al., 2012). In strategic planning, the use of AHP in SWOT is significant especially in the phase of extracting strategies among the alternatives presented by the SWOT analysis (Kahraman et al., 2008).

3 Research design

The introductory section argued that the complexity and interdependencies of e-government challenges are insufficiently researched. Hence, assessing the impact of the interdependencies in strategy planning, formulation and implementation remains difficult. To achieve the objective of this paper (to explore the potential interdependencies of e-government challenges), the research approach selected is qualitative, because it is most suitable when a researcher aims at exploring and establishing a detailed understanding of a phenomenon (Creswell, 2012, p. 48). By adopting this approach, it is possible to investigate e-government challenges in a country, with a focus at the national level, and analyse the challenges with regard to the existing interdependencies. Methods used in qualitative research are action research, case study research, ethnography and grounded theory (Creswell, 2012). Each of the methods has distinct objectives, strengths and weaknesses that require researchers to assess when selecting an appropriate research method (Creswell, 2012; Oates, 2006).

The authors adapted a case study protocol by Maimbo and Pervan to guide the research process and increase the validity of the research (Maimbo & Pervan, 2005). Figure 1 depicts the protocol with the four main phases including general, procedures, research instruments and data analysis guidelines on one side, and brief descriptions of the contents on the other side.

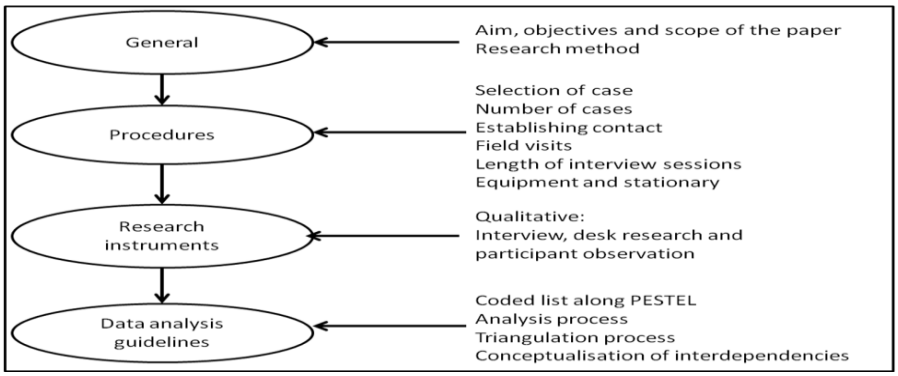

Figure 1. Adapted case study protocol

To achieve the objective of the paper, Tanzania was selected as the country of study. Tanzania is among the developing countries that presents a struggling environment for successful implementation of e-government. The implementation of ICT in the public sector in Tanzania dates back to the 1980's when the first policy on ICT was published in 1985 followed by a reviewed policy in 1996 (MSTHE, 1996). However, ICT initiatives at the national level particularly regarding coordination and collaboration in developing and implementing solutions have been isolated and existed mostly at organisational level. This prompted the government to turn towards nationally driven e-government initiatives evidenced by establishment of an e-government agency in 2012 and an e-government strategy in 2013.

An in-depth research on Tanzania's challenges in implementing e-government was required. Based on this and an assessment of objectives, strengths and weaknesses of research methods, case study research was selected as the most appropriate method, as this method is regarded as "useful in the study of 'why' and 'how' questions" (Benbasat, et al., 1987). By applying case study research, researchers develop rich insights into particular case(s) and its complex relationships (Creswell, 2012; Oates, 2006). Case study research is one of the well-established research methods in a variety of fields and domains (e.g. Kelley and Sternberg, 2009; Decker-Maurer, 2012).

Three data collection methods were used to investigate the challenges. Data triangulation – the use of more than one data collection method – is a common practice in case study research particularly when researchers aim to corroborate findings, enhance validity of their findings, obtain richer data, synthesize multiple theories and uncover contradictions (Collins, et al., 2006; Creswell, 2012; Oates, 2006). Data triangulation is one of the techniques recommended for construct validity (Jorgensen, 1989; Mar-

shall and Rossman, 1989). The first method was interviews. Ten interviewees were carefully selected. It was imperative for the authors to interview stakeholders who are well aware of the recent developments and who were involved in national e-government strategic planning and/or cross-organisational implementation. All the interviewees are based in Dar-Es-Salaam which is the most developed city and a commercial capital. The interview consisted of open-ended questions to allow the interviewees to identify and express the challenges in their perceptions (Oates, 2006, pp. 187,188). The interviewees were contacted via E-mail, phone and personal acquaintances. The questions were arranged along the PESTEL categories. Each interviewee was required to mention not less than 5 challenges in each category. Discussions on challenges were permitted during the interview to allow clarification. Each interview lasted in minimum of 30 minutes. The responses were recorded during the interview, with consent from the interviewees and the transcribed interviews were sent to the interviewees for accuracy and additional comments to ensure accuracy and reliability of the findings (Riege, 2003).

The second data collection method was desk research. The authors sought and analysed e-government related documents including the national e-government strategy of Tanzania (PO - PSM, 2013), Tanzania e-waste management (TCRA, 2012), the country's statistics in ICT and economy (NBS 2013) as well as information published on public organisations' websites. The authors studied the documents for new e-government challenges not mentioned by the interviewees on the one hand, and for cross-checking information provided by the interviewees on the other hand. The third data collection method was participant observation, where one of the authors spent three months in Tanzania for the interviews and site visits. In addition to conducting the interviews, that author visited public offices and engaged in the use of electronic public services. In this time, notes concerning observations and experiences were taken for further analysis. It is important to note here that only e-government challenges were extracted for this study; other observations are not subject of this paper.

The data obtained from the research were then analysed using the PESTEL analysis method. The PESTEL definition used in this study is that defined by Yüksel (2009). Yüksel outlines three factors that describe PESTEL and are significant for this study: (i) an integrated approach to analyse the external and internal environment of an organisation; (ii) a suitable method for analysis of dynamic political, economic, socio-cultural, technological, environmental and legal parameters in long-term planning; and (iii) a holistic approach to assess relations, interactions and interdependence among the PESTEL factors and sub-factors. A scan of the internal and external environment is considered as an important part of the strategic planning process (Kahraman C et al, 2008). Revisiting the objective of this paper, PESTEL is identified as the most suitable analysis method for a systematic categorisation of the challenges. Six codes were first established along PESTEL upon which the challenges were analysed in consistent with the six categories defined in the interviews. The analysis process then followed with the authors analysing the categorising the challenges from each of the three data collection methods separately. The triangulation process then followed in which the challenges were synthesised and finally the interdependencies among the challenges were identified and conceptualised. The following section presents the findings of the case study.

4 Case study findings

This section presents the findings of the case study carried out in Tanzania with a focus on e-government challenges. The first sub-section briefly introduces the Tanzanian context outlining the location, population, economic and political status. The second sub-section presents analysis of e-government challenges based on the PESTEL model.

4.1 Tanzania: overview of context and e-government implementation

Tanzania – formally known as The United Republic of Tanzania – is located in the East African region. The country has an area of 845,087 km² including 61,000 km² of inland water. There are 26 administrative regions, with the capital Dodoma located 309 km west of Dar-Es-Salaam (MFAIC, n.d.).

The population of Tanzania is 44.9 million according to the 2012 census (NBS, 2013). Tanzania is among the least developed and heavily indebted countries, with 17% of the population living below food poverty line and 34% of the population living below basic needs poverty line (NBS, 2013).

The benefits of ICT application in the public sector are well recognised by the government, and they are evidenced by the presence of ICT policies (published in 1985, 1996 and 2003). The term e-government was first mentioned in formal documents in 2003, where it was regarded as a tool to achieve good governance (MCT, 2003). The efforts of promoting ICT in the public sector led to the establishment of the first e-government strategy in 2004. However concerning the strategy, one interviewee noted that "*the strategy was not comprehensive enough to provide an understanding of the importance of e-government*". Subsequently, the second strategy was formulated in 2009. The efforts to implement the strategy revealed an imperative need to establish an e-government agency. The agency was formed in April 2012 "*with the mandate of coordination, oversight and provision of e-government and enforce the use of standards to government sectors*" (Dewa and Zlotnikova, 2014). Upon the formulation of the agency, a survey and situational analysis were carried out by the agency, which led to the formulation of the third and the current e-government strategy 2013 – 2018.

The survey results grounding this paper revealed challenges that highly hamper the efforts of the agency and public institutions to cooperatively implement e-government initiatives as will be evidenced along the PESTEL analysis. Furthermore results from this study highlight the underlying interdependencies of the challenges and calls for a need of further research to evaluate and quantify the challenges as stated earlier.

4.2 Analysis of e-government challenges

The analysis of the challenges is based on PESTEL's hierarchical model (Yüksel, 2012). The model consists of three levels: The first level is the objective function of the model followed by the six PESTEL factors and sub-factors, which detail the main factors. Figure 2 presents the PESTEL model of e-government challenges in Tanzania. The main objective of the model (that is the first level) is the analysis of the challenges. The second level contains the six PESTEL factors followed by 32 sub-factors clustered together within the main factors. The sub-factors are the challenges identified during the case study. Seven challenges are political, seven challenges are economic, seven challenges are socio-cultural, six challenges are technological, two challenges are environmental and four challenges are legal. The bent arrow at the second level illustrates the potential relationships between the PESTEL factors. For example, certain political situations might influence economic and legal contexts; the bent arrow reflects these relationships and interdependencies.

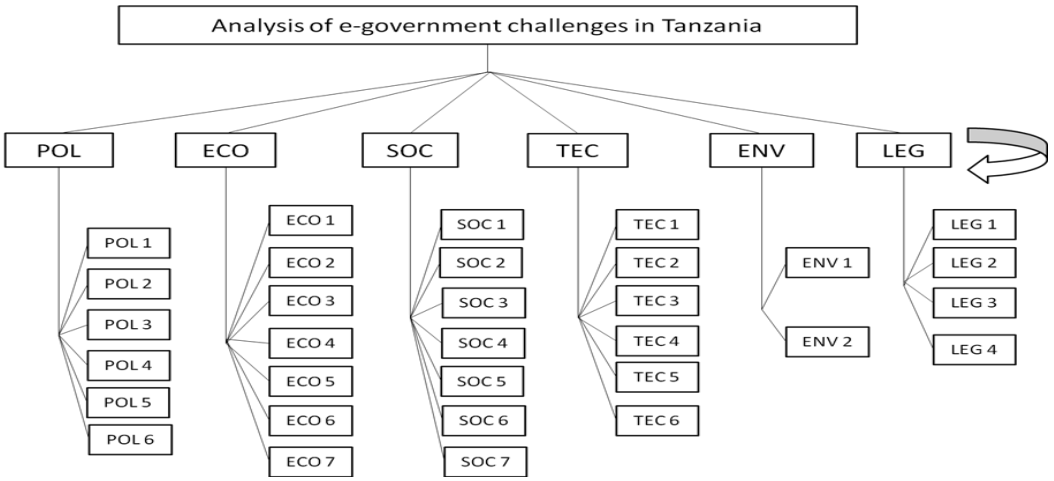

Figure 2. A PESTEL model of e-government challenges in Tanzania

The challenges were coded according to the main six factors of the model: POL for political, ECO for economic, SOC for social-cultural, TEC for technological, ENV for environment and LEG for legal. Coding of the challenges enabled the authors to easily refer to the challenges and illustrate the interdependencies. Here below, the 32 challenges are described, categorised along PESTEL's six factors. It should be noted that the authors aimed to understand the challenges that impede successful implementation of e-government in the country hence the interdependencies among them. Therefore the following categorisation synthesises general and specific challenges.

Political challenges (POL)

POL 1: Insufficient organisational leadership commitment to implement e-government. The progress of e-government in Tanzania highlights the overall commitment of the government. However, the interviewees revealed that high commitment is also required at the organisational level, which is currently low, to facilitate successful transformation.

POL 2: Lack of collective acceptance of e-government related policies is a challenge to ensure sustainability of the initiatives that are already in place particularly in a situation when there is change of political and organisational leadership. The interviewees revealed that political differences impede the continuity of the initiatives at the national and organisational levels.

POL 3: Biased decisions undermine the role of research in implementing e-government. The interviewees revealed that biasness arises from political interests of individuals. E-government is, thus, insufficiently realised due to poor planning that is not based on robust research. One interviewee commented that e-government in Tanzania is not yet fully regarded as a necessary instrument in national development.

POL 4: Transparency in government processes is on the one hand among the benefits of e-government (Mkude and Wimmer, 2013). Visits to public offices and engagement in the use of public services revealed that transparency is among the significant e-government challenges. E-government implementation enables the public to be more aware of government processes and how their service requests are handled hence motivating transparency. Consequently, public officials become resistant in adopting e-government because the physical encounters in traditional service delivery provide more loopholes for corruption. This was observed during the field research in the processes engaged for example in the renewal of a driving licence. When asked about automating the processes, one of the officials commented that "*it will be great because the process will be easier and consequently reduce the processing time by more than half. But I also receive up to 20,000 TShs per person to perform the processes manually because customers are tired of the current long processes which requires them to travel from one office to another*" (20,000 TShs confers to approx. 9.34 Euro).

POL 5: Tanzania is supported by donors such as the World Bank and grants from developed countries to implement e-government initiatives. However interviewees revealed that the proper spending of the funds is impeded by corruption which hinders the effective use of funds for intended purposes.

POL 6: The presence of competition in ownership of e-government projects among public institutions. The application of ICT in Tanzania dates back to 1980's. Therefore there are existing projects that are isolated and under different ownership. Challenges arise in this regard because of the current inevitable need of joining efforts and resources when implementing e-government.

Economic challenges (ECO)

ECO 1: National poverty. The economy of Tanzania has low GDP per capita and increasing inflation rates which are challenges when considering high investments required in implementing e-government. Despite the 7% growth rate in the annual GDP in the period 2010-2013 (NBS, 2013), Tanzania is still among the least developed and heavily indebted poor countries. Interviewees indicated that the poor economy of Tanzania is the "*biggest challenge in implementing e-government*".

ECO 2: The presence of other overarching development responsibilities in sectors such as education and health that "stretches the availability of funds" in an already poor economy.

ECO 3: Poor allocation of funds for better provision of ICT education. Interviewees indicated that education on ICT in public universities, institutes and colleges is poorly invested on.

ECO 4: High cost of suitable ICT devices is a challenge to most Tanzanians where 17% live below food poverty line and 34% live below basic needs poverty line (NBS, 2013). Few of the population are able to own sophisticated ICT devices which are able to provide them with better access to online services.

ECO 5: Low pace to cope with the rapid rate of technological obsolescence. Due to low standard of living, the affordability of upgraded technology devices, example smart phones, is very low as the devices tend to be very costly.

ECO 6: High costs of reliable internet connectivity. The authors' observations revealed that most Tanzanians rely on mobile broadband and internet cafes for internet connectivity. The current crisis on availability and high costs of electrical power highly contribute to the situation. This is because the alternative widely-used source of electricity is petrol, which is also highly expensive. Subsequently mobile operators and owners of internet cafes are prompted to increase their service charges.

ECO 7: Lack of specified budget on e-government implementation in most public organisations. The study observes that most ICT departments in the public sector are underdeveloped compared to other departments such human resource and finance.

Socio-cultural challenges (SOC)

SOC 1: Site visits and interviews reveal that there is a low understanding of public organisations on the impacts and roles of e-government in national development. Organisational leaders with higher level of the understanding promote the adoption of ICT in their business processes more than those with a rather less understanding. The latter contributes to lack of sufficient budget for ICT innovations as presented in ECO 7.

SOC 2: Lack of sufficient IT skills in the public sector for designing, implementing and maintaining e-government projects. Interviewees revealed that this is highly caused by poor incentives and salary scale adopted in the public sector which prompts ICT graduates to prefer employment in private sectors. Consequently, the public sectors are forced to outsource, an option which is relatively more costly than having in-house capacity.

SOC 3: Poor IT skills of citizens in the use of computers and advanced mobile technologies. There is a wide gap between ICT elite and the general community. The most affected are rural areas which have low exposure to ICT accessibility.

SOC 4: Organisational inertia towards application of ICT. Implementing e-government requires cross-organisational coordination and changes in bureaucracies and organisational structures. These change the "*usual way of doing things*" as pointed out by one interviewee hence triggering resistance of public officials to fully adopt e-government processes.

SOC 5: Lack of awareness of the intangible benefits of e-government. Interviewees and site visits reveals that aspects such as increased efficiency, effectiveness, transparency and quality of public services are not recognised by many as among the benefits of e-government. One interviewee argued that "*most people are not fully aware of the benefits of e-government that have nothing to do with saving money and time*". Another interviewee commented, "*In my organisation, ICT is highly accepted because employees find it more convenient and easier compared to paper work, but this is different in other organisations where it is seen as a burden requiring many changes*".

SOC 6: Lack of public trust in e-government. This is contributed by a low understanding of the importance of citizens' privacy by public officials in handling and sharing confidential information. Consequently citizens become reluctant in using e-government services with concerns over current inefficiencies in handling their personal information such as bank details and addresses.

SOC 7: Most academic institutions in Tanzania offer ICT related courses and trainings in English which is a primary language in higher education and commerce and not in Swahili which is a national

language. 81% of the population attain primary education but only 14% attain secondary education with only 2.3% enrolled in university (NBS, 2014). Despite the efforts of the government offering information on websites in Swahili and English, English is widely used at the functional level which is a challenge for citizens with less knowledge in understanding English. To address this challenge, the e-government agency ensures that the contents of the national portal are in both Swahili and English for easy access to all citizens.

Technological challenges (TEC)

TEC 1: Lack of government-wide standardisation and interoperability frameworks was the most referenced technological challenge by the interviewees. The lack of the frameworks in an environment characterised with vendor-lock in standards, legacy technologies and uncoordinated organisation processes poses a significant hindrance in realizing e-government implementation.

TEC 2: Lack of consistency in ICT applications and business processes due to vendor-locked systems which are difficult to integrate at technical and organisational levels. Different vendors have more responsibility in developing e-government systems than in-house capacity. Site visits revealed that in some public organisations, ICT staff has limited knowledge on ICT projects due to high dependence on out-sourcing. One staff member commented that "*there are private companies that are contracted for main project development processes. Our main jobs are during implementation phase including training and ensuring proper maintenance*".

TEC 3: The presence of numerous legacy systems which are isolated and not interoperable. Many recent e-government implementations are highly challenged with the legacy systems that operate in silo.

TEC 4: Lack of sufficient measures to ensure security and privacy. Interviewees reported that application of measures to ensure security and privacy is still immature. Security measures in place are especially catered at organisational and agency levels hence insufficient for cross-organisational services.

TEC 5: Poor availability of reliable network connectivity. This results in slow adoption of electronic services by the institutions and users. Rural areas are more affected than urban areas due to exclusion of the first from ICT development initiatives. However current efforts are in palace to ensure that all ministries, departments and agencies are connected to a government-wide network (PO - PSM, 2013).

TEC 6: A huge gap in the public sector in adopting ICT in their business processes. Implementation of e-government involves cross-organisational processes. This is difficult in most cases in Tanzania because some organisations are well matured in using ICT while others are not hence a difficulty in reaching consensus on how to implement cross-organisational projects. The author observed high maturity in very few organisations in which almost every office has a computer in contrast to other organisations where there is one computer in 5 offices for example in one of the organisations responsible for processing land records. The authors learned that the maturity of an organisation in using ICT highly depended on the interests and awareness of ICT of the top management.

Environmental challenges (ENV)

ENV 1: Scarce availability of reliable electrical power. This was reported by the interviewees and also observed by the authors as one of the biggest challenges of e-government implementation. Sources of energy available in Tanzania include gas, fuel, biomass, wind and coal. However, the sources are not effectively utilised due to extreme dependence on hydro-production which is prone to changes in weather. Electrical power has continued to be in shortage and more expensive over the years. Developing, functioning and using e-government systems depend on reliable electricity. During site visits, the researcher found public officials unable to use computers in their offices due to lack of electrical power which might take from a few hours to the whole day. This is also a challenge for citizens because all telecommunication devices need electricity to function.

ENV 2: Lack of proper government-wide electronic waste (e-waste) handling mechanisms (TCRA, 2012). This is due to uncoordinated efforts in handling e-waste, lack of a legal framework that addresses disposal of e-waste, unavailability of reliable sources of information concerning statistics of imported and exported electronic devices, lack of disposal facilities for e-waste, lack of infrastructure

for "formal" collection, disposal and recycling procedures for e-waste, lack of public awareness on the magnitude of e-waste problem and associated dangers (TCRA, 2012).

Legal challenges (LEG)

LEG 1: Lack of a clear legal framework to support implementation of e-government initiatives. Cross-organisational e-government projects require a high level of coordination at technical, managerial and strategic levels. Thus, a robust legal ground is important to ensure proper regulations surrounding the sharing and handling of information across different platforms. The importance of a legal framework was reported by an interviewee as "*frequently undermined as far as e-government implementation is concerned comparing to technological developments….the processes and required organizational changes have to be governed by firm laws and regulations*".

LEG 2: Lack of government-wide laws and regulations that describe acceptable standards when procuring ICT.

LEG 3: Lack of laws and regulations to ensure sustainable use of technologies in the public sector.

LEG 4: Lack of laws and regulations to enforce adoption of e-government standards and implementation frameworks in the public sector.

5 Conceptualising interdependencies of e-government challenges

This section presents an analysis of e-government challenges in Tanzania. The literature presents numerous e-government challenges (see Mkude and Wimmer, 2013, for a summary), many of which are also encountered in Tanzania. However, none of the literature studies analyses the existing interdependencies among the challenges. This section puts forward the concept of analysing interdependencies of e-government challenges and stimulates further research into measuring and evaluating the interdependencies and their influence in successful implementation of e-government. The authors studied the sub-factors of PESTEL (the challenges) in-depth with a focus of identifying existing interdependencies. Table 1 outlines a three phased model that was applied to identify the interdependencies. First the interdependencies within each factor of the PESTEL model were identified in phase 1, followed by identification of interdependencies among the six sub-factors. In the last phase, the authors assessed probable interdependencies arising from phase 2. Letters A, B and C in the table depict different factors of the PESTEL model.

Phase	Logic applied	Description
1	A(1) – A(2) ,....., A(n)	Is there an interdependency between A1 and A2, A(n) is a challenge in factor A
2	A(1) – B(1), A(2) – B(2),....., A(n) – B(n)	Is there an interdependency between A1 and B1, A(n) is a challenge in factor A and B(n) is a challenge in factor B
3	If A – B is true ∩ B – C is true, then A – C	If there is an interdependency between challenge A and B and challenge B and C, is there an interdependency between A and C

Table 1. A phased model to identify interdependencies among the challenges

The authors identified the interdependencies based on a logic that the outcome of challenge A potentially leads to the conditions that either wholly or partly contributes to the outcome of challenge B. Quantification of the level or degree of the interdependencies forms part of proposed future research.

A total of 34 interdependencies were identified following a qualitative analysis of the challenges. The interdependencies are illustrated in Table 2. The first column of the table illustrates the existing interdependencies between challenge A and challenge B. The second column describes the respective interdependency. The keywords "has an influence on" and "is influenced by" (in bold format) are used to present the interdependency between the challenges.

The existence of the interdependencies informs e-government strategic planners of the possible interferences when developing e-government strategies and, most importantly, when devising solutions for the challenges. For example it is impossible to find a solution for high costs of reliable internet connectivity (ECO 6) without considering scarce availability of electrical power (ENV 1) which highly contributes to the costs. Furthermore it is impossible to consider availability of electrical power (ENV 1) without considerations of the country's economy (ECO 1). These examples highlight the complexity of the interdependencies among the challenges hence requiring holistic analysis of the challenges.

Out of 32 challenges, no interdependencies between 5 challenges and other challenges could be found; these are POL 2, POL 3, SOC 7, ENV 2 and LEG 3. This translates to an independency of the 5 challenges and the possibility of the planners to seek solutions without interference with the other challenges. However, the 5 challenges are independent only within the scope of challenges identified during the case study. This does not necessarily mean that they are independent of any other challenge.

Existing interdependencies	Descriptions
POL 1 – POL 4	Lack of committed organisational leadership **has an influence on** the level of resistance in e-government adoption caused by higher available loopholes of corruption in traditional service delivery than e-service delivery
POL 1 – ECO 7	Lack of committed organisational leadership **has an influence on** a lack of sufficient budget for well-developed ICT departments
POL 1 – SOC 1	Lack of committed organisational leadership **is influenced by** the leaders' low understanding of the impacts and roles of e-government in national development
POL 1 – SOC 2	Lack of committed organisational leadership **has an influence on** poor availability of IT skills in the public sector caused by poor incentives and salaries in the sectors
POL 1 – SOC 4	Lack of committed organisational leadership **has an influence on** existing organisational inertia
POL 1 – SOC 5	Lack of committed organisational leadership **is influenced by** lack of awareness of the intangible and tangible benefits of e-government
POL 4 – SOC 4	Resistance towards adoption of e-government caused by presence of loopholes in current services and processes **has an influence on** existing organisational inertia
POL 5 – SOC 1	Ineffective use of donors' funds **is influenced by** the organisational leaders' low understanding of the impacts and roles of e-government in national development
POL 6 – SOC 5	The presence of competition in ownership of e-government projects among public institutions resulting into difficulties in joining efforts and resources **is influenced by** a lack of awareness of the intangible and tangible benefits of e-government
ECO 1 – ECO 2	National poverty **has an influence on** insufficient availability of funds for e-government implementation
ECO 1 – ECO 5	National poverty **has an influence on** a low standard of living, the latter resulting in low pace to cope with the rapid rate of technological obsolescence
ECO 1 – SOC 2	National poverty **has an influence on** poor salary scale in the public sector hence lack of insufficient IT skills in the sectors
ECO 1 – TEC 5	National poverty **has an influence on** poor availability of reliable network connectivity in the country
ECO 1 – ENV 1	National poverty **has an influence on** scarce availability of reliable electrical power
ECO 2 – TEC 5	The presence of other overarching development responsibilities **has an influence on** poor availability of reliable network connectivity due to insufficient funds to cater for all the needs of socio-economic developments
ECO 3 – SOC 3	Poor allocation of funds for better provision of ICT education **has an influence on** poor IT skills of citizens particularly in rural areas

ECO 4 – ECO 5	High cost of suitable ICT devices **has an influence on** a low pace to cope with the rapid rate of technological obsolescence
ECO 6 – ENV 1	High costs of reliable internet connectivity **is influenced by** a scarce availability of reliable electrical power
ECO 7 – SOC 1	Lack of specified budget for ICT departments **is influenced by** organisational leaders' low understanding of the impacts and roles of e-government in national development
ECO 7 – SOC 5	Lack of specified budget for ICT departments **is influenced by** a lack of awareness of the intangible and tangible benefits of e-government
SOC 1 – SOC 2	Low understanding of the impacts and roles of e-government in national development **has an influence on** a lack of sufficient IT skills in the public sector by lack of required efforts to retain the workforce
SOC 1 – SOC 4	Low understanding of the impacts and roles of e-government in national development **has an influence on** organisational inertia
SOC 1 – TEC 6	Low understanding of the impacts and roles of e-government in national development **has an influence on** organisations with low maturity in using ICT in their business processes
SOC 2 – SOC 5	Lack of sufficient IT skills in the public sector **is influenced by** a lack of awareness of the intangible benefits of e-government in the public sector
SOC 2 – TEC 2	Lack of sufficient IT skills in the public sector **has an influence on** a lack of consistency in ICT applications and business processes due to vendor-locked systems which is a result of insufficient in-house capacity in the public sector
SOC 4 – SOC 5	Organisational inertia **is influenced by** lack of awareness of the intangible benefits of e-government in the public sector
SOC 4 – TEC 3	Organisational inertia **has an influence on** the back-office reorganisation requirements of legacy systems which are isolated and not interoperable
SOC 5 – TEC 6	Lack of awareness of the intangible benefits of e-government **has an influence on** organisations with low maturity in using ICT in their business processes
SOC 6 – TEC 4	Lack of public trust in e-government **is influenced by** a lack of sufficient measures to ensure security and privacy
SOC 6 – LEG 1	Lack of public trust in e-government **is influenced by** a lack of a clear legal framework to support implementation of e-government initiatives
TEC 1 – TEC 2	Lack of government-wide standardisation and interoperability frameworks **has an influence on** a lack of consistency in ICT applications and business processes caused by an outsource of different vendors
TEC 1 – LEG 4	Lack of government-wide standardisation and interoperability frameworks **is influenced by** a lack of laws and regulations to enforce adoption of e-government standards and implementation frameworks in the public sector
TEC 2 – LEG 2	Lack of consistency in ICT applications and business processes caused by an outsource of different vendors **is influenced by** a lack of government-wide laws and regulations that describe acceptable standards when procuring ICT
TEC 4 – LEG 1	Lack of sufficient measures to ensure security and privacy **is influenced by** a lack of a clear legal framework to support implementation of e-government initiatives
TEC 5 – ENV 1	Poor availability of reliable network connectivity to provide and access e-services **is influenced by** scarce availability of reliable electrical power

Table 2. Descriptions of interdependencies among e-government challenges

6 Concluding discussion and outlook

This paper analysed interdependencies among e-government challenges as a significant need for understanding in strategic planning. The authors argue that it is not sufficient for governments to be only aware of the challenges and barriers to the successful implementation of e-government strategies. The

interdependencies among the challenges present a complex environment particularly when governments seek to find solutions for the challenges and develop sustainable e-government initiatives. With this regard, this paper investigated e-government challenges in Tanzania and qualitatively analysed the challenges using the PESTEL analysis method. Thirty two challenges were identified during the study and categorised into political (POL), economic (ECO), social-cultural (SOC), technological (TEC), environmental (ENV) and legal (LEG) challenges.

The analysis of the challenges within and between the categories revealed 34 interdependencies, where one challenge is either influenced by or has an influence on another challenge. The analysis also revealed the potential complexity resulting from the interdependencies; for example it is impossible to find a solution for high costs of reliable internet connectivity (ECO 6) without considering scarce availability of electrical power (ENV 1) which highly contributes to the costs. And it is impossible to consider availability of electrical power (ENV 1) without considerations of the country's economy (ECO 1).Challenges such as ECO 1 and ENV 1 cannot be addressed at the level of e-government unlike challenges such as ECO 6 and SOC 2 therefore requiring a holistic way for an in-depth understanding of the challenges in a wider scope. The holistic analysis of the challenges is argued in this paper as a benefit to formulation of more robust e-government strategies and development of sustainable solutions. For example POL 1 illustrates the importance of holistic analysis of challenges in development of sustainable solutions. Insufficient commitment of organisational leadership is already evidenced in literature as among the factors for sustainability failures (cf. Nurdin et al., 2012). This paper illustrates further that on one hand POL 1 has influences on other challenges including POL 4, ECO 7 and SOC 2, and on the other hand POL 1 is influenced by SOC 1. The interdependencies evidence the need of a holistic perspective towards research in challenges that impede successful implementation of e-government in literature and practice.

With this paper, the authors achieve the first objective by informing e-government strategic planners of a systematic and holistic method of analysing e-government challenges by implementing the PESTEL method; and the second objective by conceptualising the interdependencies among the challenges using the proposed method exemplified in Tanzania. The research presented in this paper stimulates further research of the interdependencies among challenges. Enhancements in identification of interdependencies can be made to increase the credibility of results through a consensus of experts including researchers and strategic planners via methods such as the Delphi.

The results obtained in this paper are based on e-government challenges in Tanzania. Nevertheless, the research process is replicable to analyse similar or specific challenges of any other country and develop the concept further. To achieve reliability and validity of the case study research, the authors relied on data collection techniques and research representation including ensuring accuracy and reliability in the data collected and the use of data triangulation. Further research using quantitative approaches such as AHP and ANP might be helpful to complement and validate the findings and is necessary to measure and evaluate the importance of the challenges and the impact of their interdependencies in successful implementation of e-government strategies.

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