



Revolutionization of Revenue Collection with Government E-Payment Gateway System in Tanzania: A Public Value Creation Perspective

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Abstract

Through the Ministry of Finance and Planning, the Government of Tanzania implemented the Government Electronic Payment Gateway (GePG) system to provide an e-payment gateway platform in order to improve government revenue collection in the country. As of July 2020, the system was implemented in 660 public institutions and is integrated into 28 commercial banks and 6 mobile money operators. While the system has been widely accepted, evaluation on its adequacy and performance is necessary as many similar initiatives implemented in Africa have failed to deliver the desired outcomes. This study evaluated the performance of the system by drawing success measures based on public value: efficiency, effectiveness, and social value. The study adopted a concurrent mixed research design where the questionnaire was integrated within interviews in a single investigation involving 442 respondents from 271 public institutions in 11 regions in Tanzania. The study found that the use of the system increased revenue collection by 44.28% while reducing the cost associated with revenue collection by 27.10% between 2015/2016 and 2019/2020 in the surveyed institutions. Moreover, the use of the system enhanced the trust between citizens and government, increased transparency and traceability in the process of revenue collection. Nonetheless, the lack of integration of the GePG system with institutional billing systems and the lack of self-service facility in some institutions were found to be challenges. The findings from this study contribute to an understanding of the effectiveness of e-government systems based on public value.

Keywords: *Electronic government; E- Government; GePG; public value; revenue collection*

Cite as: *Sausi and Mtebe, (2021). Revolutionization of Revenue Collection with Government E-Payment Gateway System in Tanzania: A Public Value Creation Perspective. East African Journal of Science, Technology and Innovation 2(3).*

Received: 04/11/20
Accepted: 12/04/21
Published: 25/06/21

Introduction

In the last few years, many developing countries have been taking advantage of the development of ICT infrastructure and the proliferation of mobile telephone to implement various e-government initiatives in order to improve the quality of public services. The e-government initiatives can reduce cost, improve data access, increase accountability, and improve decision processes (Goh & Arenas, 2020). They can also

allow the government to interact with its citizens via the Internet and lower operation costs (Kondoro & Mtebe, 2018).

Given these benefits, developing countries have been investing heavily in e-government initiatives despite their limited budget (Lessa, 2019). The government of Tanzania, for instance, has been investing heavily in improving Information and Communication Technologies

(ICT) infrastructure and increasing the speed of the Internet as part of creating conducive environment for implementing e-government initiatives. As of 2015, the country had a high capacity broadband connection to the rest of the world through the Eastern Africa Submarine Cable System (EASSy), with 4.72Tbps, SEACOM with a capacity of 1.28 Tbps, and National ICT Broadband Backbone Optic Fibre Cable with a capacity of 4.8Tbps (MWTC, 2016). The National ICT Broadband Backbone and submarine cables have reduced backhaul transport bandwidth cost by 99%. These initiatives formed a backbone necessary for speeding up implementing various e-government initiatives across the country (Lupilya & Jung, 2015).

Against this backdrop, many institutions have been implementing e-government initiatives to enhance various public services. The most notable successful e-government initiatives include the National Payment System, Electronic Clearing House, Integrated Financial Management System, and Retail Payment System (MWTC, 2016; Sæbø, 2012). Other notable systems include an integrated Human Resource and Payroll system, Land Management System, Geographical Information System, and the adoption of a Government web portal. For instance, the prepaid metering system used by the Tanzania Electricity Supply Company has enabled citizens to pay electricity bills through mobile phones (Ishengoma *et al.*, 2019). The land ownership system has allowed citizens to obtain necessary information about their surveyed plots online and avoid multiple allocations of plots and reduce citizens' complaints about plot allocations (Lupilya & Jung, 2015).

Recently, through the Ministry of Finance and Planning, the government implemented the Government Electronic Payment Gateway (GePG) system to provide an e-payment gateway platform to improve government revenue collection and ensure that revenue information is visible in real-time. The system connects all stakeholders involved in revenue collection to provide a single gateway to increase efficiency, transparency, and visibility of the revenue collection process. The system is integrated with electronic payment channels such as commercial banks, mobile financial services, and other

stakeholders that direct funds to government accounts. In this case, citizens all over the country can pay for government services through a single point given they are provided with the control number with the amount of bill need to be paid. On the other hand, the GePG system is connected to institutional billing systems enabling institutions to generate invoices, reports, and viewing collected revenue in real-time. As of July 2020, the system was implemented in 660 public institutions and integrated into 28 commercial banks and 6 mobile money operators.

Since the adoption of the system, few studies have evaluated its effectiveness in meeting the expected benefits. It should be noted that many e-government initiatives implemented in Africa have failed to deliver the desired outcomes (Gichoya, 2005; Gunawong & Gao, 2017; Hughes *et al.*, 2016; Kamau & Wausi, 2015; Mukoya, 2009). In Tanzania, for instance, the e-government initiatives such as Dodoma Urban Water Supply and Sanitation Authority, and the UTUMISHI portal failed to meet the expected benefits (Ishengoma *et al.*, 2019). Worldwide, 80% of the government transformation efforts do not translate to value for citizens (Allas *et al.*, 2018).

Previous studies have described low Internet connectivity, shortage of computers, technological capabilities of end-users, and lack of electricity as challenges that hinder the success of e-government systems (Frost & Lal, 2019). The majority of these challenges have been addressed due to the continued development and improvement of ICT infrastructure and proliferation of mobile phones in Africa. Yet, many e-government initiatives implemented in Africa have failed to deliver the desired outcomes. Therefore, evaluating the performance of GePG system after years of use was not only necessary but essential.

This study aimed to measure the success of the GePG system by drawing together a comprehensive set of Net Benefits measures based on Public Value theory. The public value was assessed in terms of system efficiency, effectiveness, and social value. The study adopted a concurrent triangulation design whereby quantitative and qualitative data were collected and analyzed at the same time. Specifically, in a single investigation, closed-

ended question was supplemented by an open-ended question to provide a more comprehensive understanding of the users' view on the performance of the GePG system. A total of 442 respondents from 271 public institutions in 11 regions completed the data collection instrument. The findings from this study contribute towards an understanding of evaluating the performance of information systems implemented in the public sector by drawing success measures based on public value.

The Government Electronic Payment Gateway System

The Government of Tanzania, through the Ministry of Finance and Planning (MoFP) in collaboration with Tanzania e-government Authority and other Government institutions, implemented the Government Electronic Payment Gateway (GePG) in order to facilitate the collection of government revenue. The development of the system was driven by the Public Financial Act 2001 statutory requirements and recommendations from two studies conducted by Price Waterhouse Coopers (PWC) in 2009 and by Tanscott Associates (T) Limited in 2014, which observed various weaknesses in revenue policy and the collection systems. The amendment of the Financial Act 2017 included the provisions that direct accounting officers to ensure public funds collected through the GePG system as per the regulations developed under the Act.

This e-government initiative was driven by the previous practices where there were no standard procedures for revenue collection. As a result, some institutions had information systems to facilitate revenue collection, while other institutions used agents, and some institutions collected revenue through physical cash. During this time, there were several challenges in collecting revenues, including high costs associated with service offered by revenue collection agents, complicated procedures for paying for government services, limited payment options, and lack of real-time visibility of the revenue. Other challenges included the difficulty

in performing reconciliations, poor records keeping, and the low quality of reports.

These challenges signified the need for an electronic payment solution that would streamline the revenue collection processes, guarantee transaction visibility, and ensure accountability and modest government revenue collection costs. The development of GePG started in June 2016 and was completed in June 2017 and was put into use during the 2017/2018 fiscal year with 7 government institutions. As of July 2020, more than 660 government institutions (Service Providers) were using the GePG system.

The GePG system has centralized payment of government dues by using a control number that is centrally generated. The control number is issued to a payer of government dues who need to make payment to the government. GePG system takes advantage of number integrations done from the central bank, commercial bank, aggregators, and mobile money operators enabling control numbers to be settled in a wide range of payment outlets. Once payment transaction is completed, GePG system generates an electronic receipt sent to the taxpayer via Short Message Service (SMS). To ensure an easy collection of revenue by institutions, the system has been integrated with the institution's billing systems. On the other hand, the generic billing system was developed as a temporary solution for institutions without proper billing systems.

The GePG system consists of various loosely coupled components that work collectively to connect Payment Service Providers, Ministry of Finance and Planning, and institutions. Some of GePG system use cases include the secure exchange of payment information between government, payers, and payment service providers or institutions. The exchange of information is done in real-time to increase control, monitoring, and revenue flow visibility. Other use cases are generating revenue reports, performing reconciliation, and the timely transfer of the collection to the central government collection accounts at the Bank of Tanzania. Figure 1 shows the description of the implementation of the GePG system.

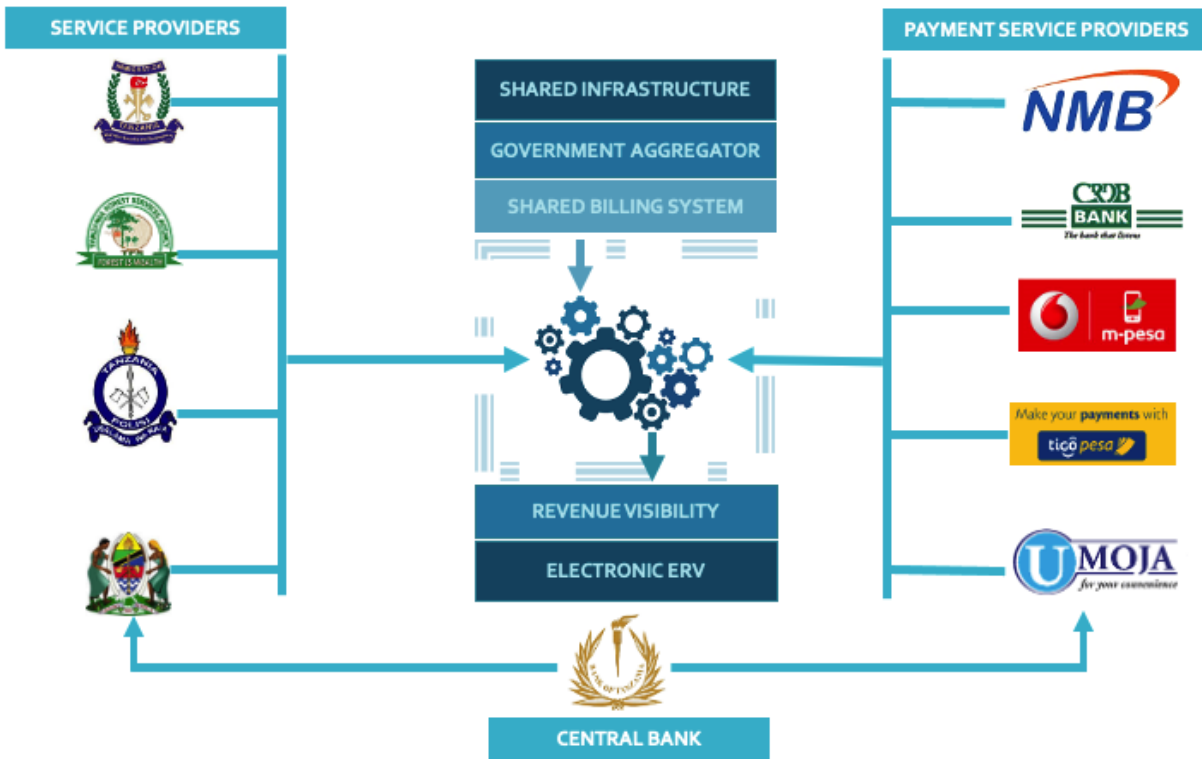


Figure 1. Description of implementation of GePG system

Measuring public value

Measuring e-government systems success is a difficult task (DeLone & McLean, 2016) as it involves multiple perspectives while difficulties in quantifying the benefits (Alshawi & Alalwany, 2009). Studies exist that provide some insight on metrics and dimensions that can be used to measure the performance of e-government systems in various contexts. The majority of studies have called for a broadening and deepening of scholarly perspectives on e-government success and mainly focusing on “Public Value” as a theoretical framework in understanding e-government success (DeLone & McLean, 2016).

Public value can be defined as citizens' collective expectations concerning government and public services (Moore, 1995). It helps connect what citizen belief is valuable and requires public resources, with an improved understanding of what ‘publics’ value and how we connect to them (Lessa & Tsegaye, 2019). Public value provides a new way of thinking about the evaluation of government activity and a new conceptualization

of the public interest in the form of efficiency, effectiveness, and social value (Bryson *et al.*, 2014). In the context of this study, e-government systems can provide improved efficiency, services, and social values (e.g., democracy, transparency, and participation) (Twizeyimana & Andersson, 2019). Therefore, the public value is an essential measure for e-government performance in any context (Scott *et al.*, 2016).

Despite the adoption and use of public value as a performance measurement of e-government systems, dimensions and metrics are still diverse, and some are not empirically examined. For instance, Agbabiaka (2018) integrated updated DeLone and McLean Information systems success model and public value to propose democracy, reflexivity, and productivity as the three dimensions for measuring e-government systems. Karunasena *et al.*, (2011) evaluated the public value of e-government initiative in Sri Lanka using four major dimensions: delivery of public services, the achievement of outcomes, the development of trust, and the effectiveness of public organizations.

Chen, Hu, Tseng, Juang, and Chang (2019) drew from the fields of e-government, collaborative public management, and information system success to develop a conceptual framework for evaluating the performance of the e-government system. This framework consists of efficiency, effectiveness, and accountability as key performance dimensions. Similarly, Suri and Sushil (2017) proposed efficiency, transparency, interactivity, and decision support as dimensions of measuring the performance of the e-government system. Scott *et al.*, (2016) proposed efficiency, effectiveness, and improved democracy as dimensions for measuring e-government success through redefining the Net Benefits in the DeLone & McLean information system success model. The authors extended these dimensions to include: cost, time, convenience, personalization, communication, information retrieval, trust, well-Informed, and participation.

Twizeyimana & Andersson (2019) described improved public services, administrative efficiency, ethical behavior and professionalism, social value and well-being, and open government capabilities as dimensions of measuring the public value of e-government initiatives. Finally, Deng *et al.*, (2018) described the delivery of quality public services, quality of information, functionalities of the electronic services, and user orientation as public value measurements. The diverse nature of dimensions of public value as a measure of e-government performance shows that these are dimensions are still at the infant stage, and more work need to be done (Mellouli *et al.*, 2020). In addition, what is publicly valued depends on the needs and desires of the public and on the social and environmental in which the system is implemented (Alshawi & Alalwany, 2009).

Consequently, assessing these benefits also varies according to the stakeholders' different perspectives on these benefits (Alshawi & Alalwany, 2009; DeLone & McLean, 2016).

Dimensions for measuring public value of GEPG system

DeLone & McLean (2016) indicated that the choice of the impact measures depends on the systems to be evaluated and their purposes. This study focused on the success of the GePG system from employees' perspective through adopting efficiency, effectiveness, and social value as critical dimensions for measuring the public value. The efficiency was measured on the extent to which the use of the system has reduced the cost associated with revenue collection, simplified payment procedures, and reduced the time required for processing invoices and revenue collection. At the same time, the effectiveness was measured on how the system has increased revenue collection while enabling users to personalize payment process and revenue collection based on their own needs and institutional requirements.

The social value was measured to the extent to which the system increased transparency, trust, traceability, and clarity in revenue sources. The dimensions of each factor have been extracted from various studies, as shown in Table 1, and they are shown in Figure 2.

Table 1. Dimensions and Items Adopted for Measuring the Public Value of GePG System

Dimension	Items	Source
Efficiency	Cost reduction	(Gilbert <i>et al.</i> , 2004; Karunasena <i>et al.</i> , 2011; Scott <i>et al.</i> , 2016; Suri & Sushil, 2017; Tan & Pan, 2003)
	Saving time	(Gilbert <i>et al.</i> , 2004; Kolsaker & Lee-Kelley, 2008; Scott <i>et al.</i> , 2016; Tan & Pan, 2003)
	Simplification of procedures	(Karunasena <i>et al.</i> , 2011; Scott <i>et al.</i> , 2016; Suri & Sushil, 2017)
Effectiveness	Self-service	(Chan <i>et al.</i> , 2010; Gilbert <i>et al.</i> , 2004; Scott <i>et al.</i> , 2016)
	Enhanced core service	(Scott <i>et al.</i> , 2016)
	Convenience	(Chan <i>et al.</i> , 2010; Gilbert <i>et al.</i> , 2004; Scott <i>et al.</i> , 2016)
	Personalization	(Gilbert <i>et al.</i> , 2004; Kolsaker & Lee-Kelley, 2008; Scott <i>et al.</i> , 2016; Tan & Pan, 2003)
Social value	Increased Trust	(Karunasena <i>et al.</i> , 2011; Lessa & Tsegaye, 2019; Scott <i>et al.</i> , 2016)
	Perceived usefulness	(Lessa & Tsegaye, 2019).
	Transparency	(Karunasena <i>et al.</i> , 2011; Scott <i>et al.</i> , 2016; Suri & Sushil, 2017)
	Traceability	(Karunasena <i>et al.</i> , 2011; Lessa & Tsegaye, 2019)

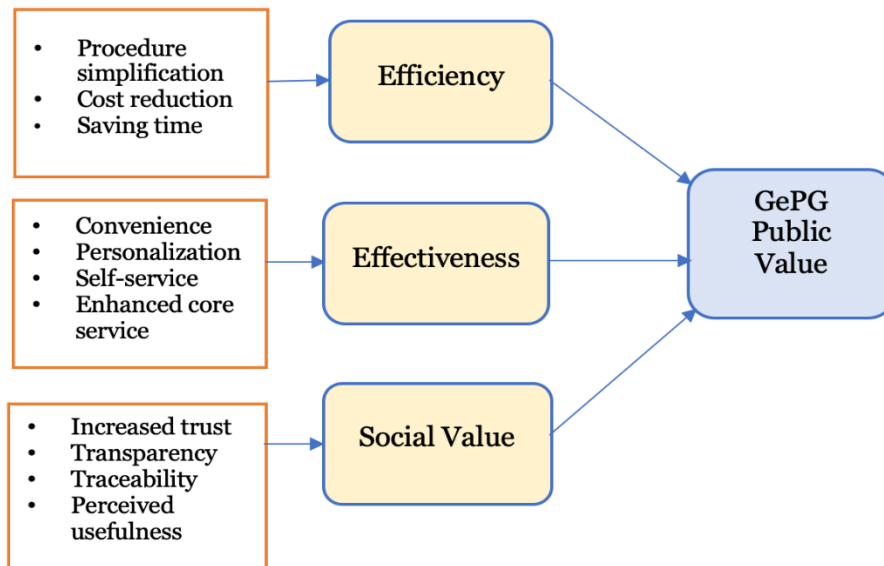


Figure 2. Representation of dimensions and items for measuring public value for the GePG system

Materials and Methods

In concurrent triangulation designs whereby quantitative and qualitative data were collected and analyzed at the same time. Specifically, in a single investigation, closed-ended question was supplemented by an open-ended question to provide a more comprehensive understanding of the users' view on the performance of the GePG system. In this design, priority is usually equal and given to both forms of data while data analysis is usually separate, and integration usually occurs at the data interpretation stage (Hanson *et al.*, 2005). The adoption of mixed research design provides better understanding of research problem when compared with single approach (Creswell & Plano, 2007).

Selection of Institutions

The GePG system was implemented in 643 institutions across the country when the study was conducted. Therefore, it was important to determine the representative sample that will be used for evaluating the performance of the system. In this case, Yamane's' s approach was adopted because this is a finite population whose size is known. Yamane provides a simplified formula to calculate sample size with an assumption of 95% confidence level ($P=0.5$) (Yamane, 1967). The formula is presented below:

$$n = \frac{N}{K + N(e)^2}$$

Where

N = Population of study

K = Constant (1)

e = degree of error expected

n = sample size

Using the Yamane's formula, the minimum number of institutions required for the evaluation study is 247. Therefore, a sample of 306 institutions was selected for evaluation purposes. To ensure that the sample is representative of the institutions in the whole country, the regions were divided into 7 zones. These zones were East Zone, Northern Highlands Zone, Lake Zone, Western Zone, Central Zone, Southern Highlands, and Southern Zone. In each zone, at least two regions were included in the study. In cases where there were only two regions in the zone, one region was selected. In each of the selected regions, one district from a rural area and one district representing urban areas was selected. A total of 306 institutions from 11 regions were included in the study. Of the selected 306 institutions, a total of 271 institutions participated in the study.

Selection of Respondents

In each of 271 institutions, at least 3 users of the system were expected to complete the data collection instrument. This is to say, a total of 813 respondents were expected to complete the data collection instrument. However, of 900 distributed questionnaires, 442 of respondents returned completed usable questionnaires. This is equivalent to 49% response rate.

Questionnaire

The questionnaire was made simple with questions using a 5-Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) with a follow-up question for each answer. The questions were adapted from previous studies (Chan *et al.*, 2010; Gilbert *et al.*, 2004; Scott *et al.*, 2016) then modified in the context of this study. The items in the instrument are presented in Table 2.

Table 2. The Items for Each Dimension Used in the Questionnaire

Dimension	Code	Item
Efficiency	EF1	The use of GePG has simplified payment procedures to clients at your organization. Please explain with examples
	EF2	The GePG system has reduced time for completion of invoice processing and revenue collection. Please explain with examples
	EF3	The GePG system has reduced the cost associated with the processing of payments and revenue collection. Please explain with examples
Effectiveness	ES1	The use of the GePG system has increased revenue collection in your organization. Please explain with examples
	ES2	GePG system enables me to process payment and collect revenue from home, from the office, or at other locations while using various devices. Please explain with examples
	ES3	I can fully personalize the reports generated from the GePG system relevant to the reports required by my institution. Please explain with examples
	ES4	GePG system enables me to process payment and collect revenue for various services from citizens without interacting with anyone. Please explain with examples
Social value	SV1	The use of the GePG system has improved the transparency of the collected revenue information. Please explain with examples
	SV2	The GePG system has increased trust amongst your customers about the services you offer. Please explain with examples
	SV3	I find the GePG system useful in the process of revenue collection. Please explain with examples
	SV4	The GePG system has improved the traceability of collected revenue as well as the payment process. Please explain with examples

Note. Scale labels: 1 - strongly disagree, 2 - disagree, 3 - neither agree nor disagree, 4 - agree, 5 - strongly agree.

Results

Efficiency

Simplification of the revenue collection process

One of the benefits of introducing government initiative is to reduce the procedures citizens follow when acquiring the public service. In this study, we were interested in evaluating the extent to which the GePG system has simplified the process of collecting revenue. More than 80% of respondents (53% strongly agreed, and 34% agreed) indicated that the system simplified the process of collecting revenue compared to the manual system. Some of the reasons that attributed to this were the use of mobile money payments where clients were no longer required to visit physically at the officer to pay for services. A good example was respondents from Vocational Education and Training Authority and Kariakoo Market Corporation. They reported that customers no longer need to physically visit their offices for payment-related issues since they can make payments using various payment channels (via bank, mobile, or agents) given they have price lists and control numbers.

Despite the reported benefits, 5% of respondents indicated that the use of the GePG system has resulted in additional work and administrative work for their staff. These claims were made in institutions where the system was not integrated with the institutional billing system. For instance, respondents at the College of African Wildlife Management, Tanzania Gemological Centre, Mineral Resources Institute, Arusha International Conference Centre, and Dar es Salaam Institute of Technology claimed that the system had increased administrative work for their staff as they must generate control numbers for every individual student separately. Previously, they could pay straight to the account number obtained from joining instructions.

Saving time

Users' perceptions that the time is saved due to using the e-government system compared to the manual system is an important indicator that the system positively impacts (Tan & Pan, 2003). Therefore, it was important to assess whether the use of GePG system enabled users to save time

required for processing the invoices and collecting revenue. Of 442 respondents completed the questionnaire, more than 82% agreed to this question (46% strongly agreed, and 37% agreed).

The respondents' reasons were that paying using control numbers via mobile money or banks eliminated the need to prepare an invoice for clients. In this case, staff no longer waste time dealing with a huge number of customers. On the other hand, staff were no longer required to collect cheques from clients' offices physically. Respondents repeated this view in many institutions, for instance, from Law School, Arusha International Conference Centre, and Tanzania Institute of Education. The time required for institutions to perform reconciliation from various banks and several accounts has been reduced. This was explicitly reported by the Tanzania Bureau of Standards, Musoma District Council, Tropical Pesticides Research Institute, Contractors Registration Board, and National Council for Technical Education.

Finally, the use of the system shortened the time required for clients to wait for government services in different organizations. For instance, respondents at Judiciary Fund pointed out that the system reduced assessment to payment of court services and received payment from 38 days to 1 day while reducing the time to issue license from 14 days to 3 days in the Ministry of Natural Resources and Tourism.

Cost reduction

Cost savings include savings to both the individual and the organization, have been identified as one of the strongest predictors of willingness to use the e-government system (Gilbert *et al.*, 2004). Consequently, it was essential to assess whether or not the use of the GePG system reduced the cost associated with revenue collection. Respondents were also asked to indicate the extent to which the GePG system reduced the cost associated with revenue collection. More than 70% of respondents who responded to this question agreed (36% strongly agreed, and 42% agreed).

Data from the interview revealed that the system reduced the costs of paying agents, printing Estimated Recovery Value (ERV) receipts, cashbooks, and aggregators during revenue collection. For instance, at Kasulu Water Supply and Sanitation Authority, the cost to distribute bills using motorcycles could go as high as Tsh. 1,000,000-1,500,000 per month. TANESCO was spending around 38 Billion per year on facilitating its business in revenue collection. At Mount Meru, Regional Referral Hospital respondents claimed that they reduced the cost incurred for using the payment card due to the GePG system. Many institutions were no longer paying these costs as customers paid directly to the institutions via existing payment channels.

Effectiveness

Increased revenue collection

One of the objectives of the GePG system's introduction was to improve the revenue collection process's effectiveness, which in turn, increase the revenue collection in each of the Institutions involved. Therefore, it was essential to evaluate if the system has facilitated the increase in revenue collection. To do so, first, a Table was prepared for each of the 271 institutions to indicate the revenue collected in the last five years from 2015/16 to 2019/20. Data show that revenue collection increased by 44.28% between 2015/2016 and 2019/2020, as shown in Figure 3.

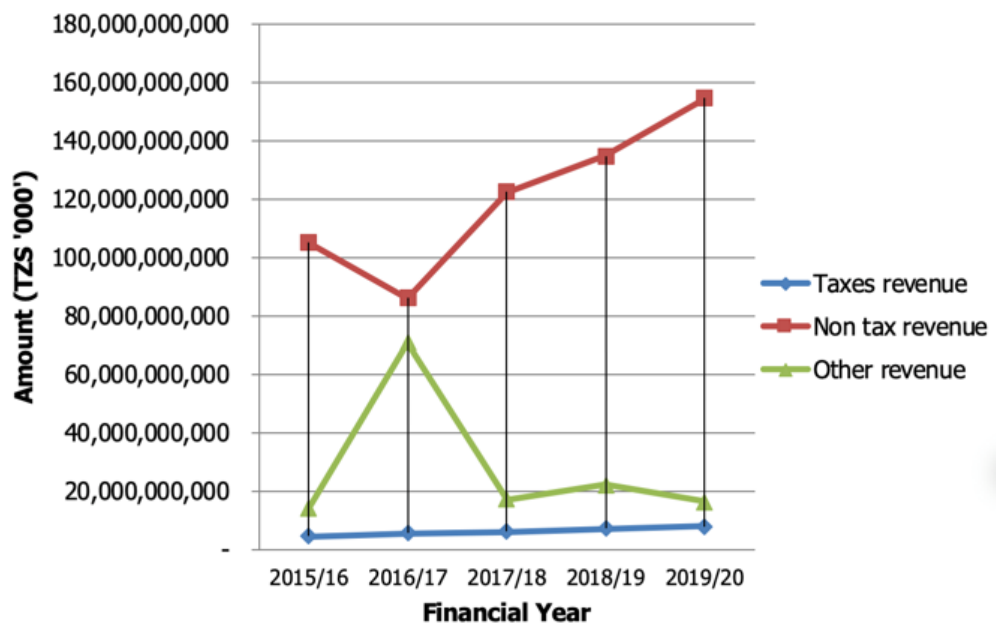


Figure 3. Revenue collected between 2015/2016 and 2019/2020

Giving some examples for specific institutions, Mbeya City Council witnessed an increase in revenue collection from 92% in 2018 to 102.6% in 2019. Ubungo Municipal Council claimed that the revenue collection increased from 48% in 2018/19 to 95% in June 2020. When respondents were asked to rate their perceptions on whether the use of the system increased the collection of revenue in their organizations. Out of 442 respondents, more than two-thirds of respondents agreed (41% Strongly Agreed, and 36% Agreed), while 6% of respondents disagreed, and 16% of respondents were neutral.

Many respondents echoed the increase in revenue due to making it easier for customers to pay for services, which motivated them to pay. Moreover, the use of the system reduced leakages of collected revenue as customers were paying directly to the institution via various payment channels. For instance, respondents at the Tanzania Civil Aviation Authority indicated an increase in revenue collection at a rate of 5.8% every year because of making it easier for customers to pay for services using control numbers. Respondents at the Copyright Society of Tanzania, Ministry of Education, Science and

Technology, Tanzania Rural and Urban Roads Agency, and Musoma District Council pointed out that the use of the system increased revenue because all payments go directly to their banks, and unfaithful accountants cannot steal the money.

Of the 442 respondents, 16% were neutral, while 6% disagreed that the use of the GePG system has increased revenue collection in various organizations. Data from the interview revealed that most of these institutions were those not responsible for collecting revenue directly from customers. For instance, Tanzania Education receives funds from the government, loan repayments, and cooperate with social responsibility funds to distribute to schools and universities. Therefore, they do not directly collect revenue from customers. Similarly, respondents at the Finance of Tanzania Food and Nutrition Centre indicated that a lot of their collections are from donors, and therefore they are cannot be categorized as revenue.

Convenience

The ability of the e-government system to enable users to receive the service how and when the users want is one of the crucial measurements of e-government performance (Gilbert *et al.*, 2004). In this case, the ability of the GePG system to enable users to process payment and collect revenue from home, from the office, or at other locations while using various devices was evaluated. Of 442 respondents, nearly 80% of respondents answered this question agreed (42% Strongly Agreed, and 40% Agreed), while 11% were neutral, and 7% disagreed. Using the generic portal, users can generate invoices and collect revenue anywhere and anytime without necessarily being in the office. Respondents at Tanzania Engineering and Manufacturing Design Organization, Public Service Social Security Fund Voluntary Scheme, Moshi Urban Water Supply and Sewage Authority, and Songea District Council indicated they could login into the system and conduct all activities related to revenue collection such as reconciliation, processing invoices, and generating control numbers without being required to be at their offices physically.

Self-service

The presence of self-service facility that allows users to receive public services without having to interact with staff is a key indicator of the effectiveness of the system (Gilbert *et al.*, 2004). In this study, it was found that 64% of 271 surveyed institutions had implemented the self-service facility that allowed customers to pay for the service without the need to interact with staff or physically visit offices. In these institutions, customers could generate bills and control numbers using institutional portals, which have been integrated with the GePG system. In turn, the institutions could collect revenue in real-time as customers continued to use various government services.

Personalization

The provision of user-centric functionalities to cater to users' service expectations has been advocated for e-government services (Tan *et al.*, 2013). The system should allow users to customize services to fit their specific needs or preferences (Chan *et al.*, 2020). In this study, it was evaluated by asking users to rate the extent to which the GePG system enabled them to personalize data and information relevant to the reports required by institutions. Of 442 respondents who responded to this question, 52% indicated that the data and information obtained from the system did not help prepare institutional reports. The majority of respondents who disagreed with this question were those whose institution have not integrated their billing systems with the GePG system. Respondents from State Mining Corporation pointed out that the system does not show the amount collected from each revenue source, e.g., loyalty from gold, building material, and other minerals. Simultaneously, respondents at Mwanza Urban Water and Sewage Authority indicated that the system does not provide a report summary for some items/aspects such as water, new water connection, and sewage.

Social Value

Transparency

Transparency of an e-government system refers to the level of which an organization reveals its activities, processes, and procedures (Lessa & Tsegaye, 2019) and provide the ability for users

to follow a process (e.g., service request) through its entire life cycle (Chan *et al.*, 2020). We asked users to rate the extent to which the use of the GePG system has improved the transparency of the collected revenue information. More than 90% of respondents agreed (71% strongly agreed, and 26% agreed). Data from the interview indicated that the availability of the dashboard enabled users to view and track the collected revenue in real-time, which was not possible before. For instance, respondents from Arusha Urban Water Supply and Sanitation Authority and Higher Education Loans Board also noted that before the GePG system, it was impossible to know the amount of revenue collected in real-time unless there is a follow-up. The system also enabled users to determine the amount of revenue collected from each source compared to the situation before. For instance, at Malya College of Sports and Development, users indicated that the system helped understand daily and weekly collections without necessarily going to the bank to ask for bank statements.

Trust

Establishing and stimulating high-trust relations between citizens and the government and the society is considered one of the strategic goals of e-government initiative (Agbabiaka, 2018) and has a major impact on the success of the system (Karunasena *et al.*, 2011; Rose *et al.*, 2015). In the same way, users were asked to indicate the extent to which the use of the GePG system has increased trust amongst customers about the services they offer. The study found that 93% of respondents agreed (71% Strongly Agreed, and 22% Agreed), while 7% of them were neutral.

Data from the interview indicates that there were two ways the trust in the collected revenue was increased. First, the system has increased the trust in accountants' office, whereby customers now are confident that the money they are paying for services is paid directly to the government, especially when they receive a notification message from the system. Respondents reported this in Mbeya University of Science and Technology, Mount Meru Regional Referral Hospital, and Dar es Salaam City Council. Moreover, respondents from Tanzania Food and Nutrition Centre, whereby before the GePG system, donors always

requested Financial Act before donating. With the GePG system, donors no longer ask for Financial Act as they are confident that their donations go to the proper place.

Second, respondents reported that the GePG system increased trust amongst institutions as it is now impossible for clients to forge receipts or bank cheques. Respondents at Water Institute and Adult Education pointed out that some students used to bring forged bank receipts before introducing the system. The same views were echoed in the Centre for Education Development in Health.

Traceability

One of the objectives of introducing the GePG system was to improve the traceability of payment and the revenue collection process. To do so, users were asked to rate the extent to which the system enhanced revenue collection traceability compared to the manual system. In this question, more than 90% agreed (60% strongly agreed, and 32% agreed), while 8% disagreed. Data from the interview indicated that the system made it easier for institutions to manage and trace collected revenue from various sources. For instance, at the National Museum of Tanzania, users could easily control and record transactions from seven centers scattered all over Tanzania. They pointed out further that before joining the GePG system, each center had its bank account. Therefore, customers were paying services into different bank accounts, making it difficult to trace the payments when ones have claimed to have paid. Likewise, respondents at Small Industries Development Organization indicated that when there is a drop in collected revenue, it is easy to trace and make follow-up and identify specific revenue sources that have caused the decline of revenue collection.

Finally, it was revealed that after the introduction of the GePG system, the revenue streams originating from various sources and/or units could easily be identified in the GePG system. It was revealed in Tanzania Trade Development Authority that revenue that comes from gate entrance fees, exhibition fees, and other services are now easily identified with the GePG system. Before the GePG system, all revenue sources were grouped as fees. Similarly, respondents at the Tanzania Global Learning Agency and

Baraza la Kiswahili Tanzania pointed out that revenue from training and facilities hiring is now grouped per Government Finance Statistics (GFS) codes based on the institutional needs, making it clear to clients.

Discussion

This study aimed to evaluate the performance of the GePG system by drawing success measures based on public value. The efficiency, effectiveness, and social value were adopted as dimensions of measuring the public value through a concurrent mixed research design where quantitative and qualitative data were integrated within a single investigation. A total of 442 respondents from 271 public institutions in 11 regions completed the data collection instrument. The study found that the adoption and use of the GePG system reduced the cost associated with collecting revenue, such as those related to paying agents, printing estimated recovery value (ERV) receipts, and paying third parties in many institutions where the system was implemented. Cost savings have been identified as one of the strongest predictors of e-government systems success in developing countries (Gilbert *et al.*, 2004). The cost saving of e-government relates to the amount of money that users can save through e-government service compared to traditional government services (Karunasena *et al.*, 2011). While the system has managed to reduce the cost associated with revenue collection, the government should continue adding new features and services that will enable the continued reduction of the costs incurred by institutions during the process of revenue collection.

The use of the system also shortened the time to deliver the required services to citizens in many institutions. Time saved due to using the e-government system was an essential early promise of the benefits of using e-government services in several studies such as those in (Scott *et al.*, 2016; Tan & Pan, 2003). In many institutions, the system reduced the time required for citizens to wait for the services. For instance, the time needed to obtain the service was reduced from 38 days to 1 at the Judiciary Fund and 14 days to 3 days in the Ministry of Natural Resources and Tourism. Despite these benefits, there is still a

room for improvement. The government should revisit the business process of services traditionally take a long time to be delivered in the shortest time possible.

It was also found that the system was effective on its core function, i.e., increasing the collection of revenue, whether direct or indirect, in many surveyed institutions. Overall, revenue collection increased by 44.28% between 2015/2016 and 2019/2020. Nonetheless, the lack of functionality to prepare institutions reports was found to be a challenge in some institutions. While the data obtained from the system was accurate, relevant, and update, the preparation of institutional reports required the GePG system to be integrated with institutional billing systems. Therefore, institutions whose billing systems were not integrated with the GePG system could not generate these reports.

The government should also integrate the self-service facility to enable users to pay for services without interacting with staff at a given institution. The facility was missing in some institutions causing citizens to visit offices to obtain and/or pay for the service. The self-service facility, accompanied by the availability of multiple payment channels (i.e., banks, mobile phones, or agents), will simplify the payment process while helping users save time and effort required for paying for public services. The availability of self-service facility was a determinant of e-government system success in several studies (Chan *et al.*, 2010, 2020; Gilbert *et al.*, 2004; Scott *et al.*, 2016).

The study also found that the use of the system increased the trust between citizens and the government. Many citizens were confident that the money they are paying for services was paid directly to the government due to the use of control numbers. At the same time, forged receipts or bank cheques were no longer possible. Such trust between citizens and the government increases the public value of the system (Karunasena *et al.*, 2011; Rose *et al.*, 2015).

Finally, the availability of the dashboard has enabled users to trace and monitor the collected revenue in real-time. This functionality enhanced the transparency of the revenue collection process as the institutions' staff could view the

revenue collection in real-time while determining how much have been collected per day, per week, or per year. The dashboard helped institutions assess revenue sources that contribute less than others and, therefore, plan for strategies to ensure those sources contribute as per set targets. Providing users the ability to track the revenue collection process saves time in removing the need to follow up to the client's offices (Gilbert *et al.*, 2004). On the other hand, enabling users to follow the payment process results in confidence in using the e-government system (Chan *et al.*, 2020).

Despite these contributions, some limitations were noted. First, this study was based on a single e-government system, namely the GePG system, in a particular context. This choice may limit the generalizability of the findings to other e-government systems implemented in Tanzania and beyond. This is because different e-government systems have different attributes and can vary between contexts and expected public values. Second, e-government develops in parallel with government development and the digitalization of society in general (Mukamurenzi *et al.*, 2019). These results represent a snapshot in time, whereas many dimensions of public value may not be static. Future studies are needed to examine the causality and interrelationships between public value variables as e-government systems success.

Despite these limitations, this study contributes to reducing research gaps regarding e-government success from government employees' perspectives in developing countries. Additionally, an investigation of the factors that best measure the success of e-government systems by taking dimensions from public value was needed.

Conclusion

In many developing countries, governments are spending a significant amount of resources

implementing various e-government systems to provide better services to citizens. Although there is no specific figure, with investment in ICT infrastructure, human resource development, information system acquisitions, and other resources that support the implementation of e-government initiatives, it is clear that thousands of dollars are being spent.

This study evaluated the success of the GePG system by drawing success measures based on public value: efficiency, effectiveness, and social value. The study adopted a concurrent mixed research design where the questionnaire was integrated within interviews in a single investigation involving 442 respondents from 271 public institutions in 11 regions. The study found that the use of the system increased revenue collection by 44.28% while reducing the cost associated with revenue collection by 27.10% between 2015/2016 and 2019/2020 in surveyed institutions.

Moreover, the use of the system enhanced the trust between citizens and government, increased transparency and traceability in the process of revenue collection. Nonetheless, the lack of integration of the GePG system with institutional billing systems in some institutions hindered them from preparing institutional reports. Moreover, the lack of self-service facility in some institutions was a challenge. The findings from this study contribute to understanding the effectiveness of e-government systems based on the public value.

Acknowledgment

This work would not have been possible without support of the Ministry of Finance and Planning. We would also like to show our gratitude to Mr. Doto James, former Permanent Secretary and Paymaster General, for his guidance during the course of this research and the overall implementation of the GePG system in Tanzania.

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