A review of citizen-centric modelsfor evaluating e-government services: A Kenyan perspective

Lincoln Kithandi[1], Wilson Ambale[2]

[1](School of Computing & Informatics, University of Nairobi, Kenya)
[2](School of Computing & Informatics, University of Nairobi, Kenya)

Abstract: Citizen-centricity is about shifting the focus of government around and designing portals from the view point of the citizen and businesses. The portals should take care of the needs of the citizen and business rather than operational or other imperatives inside the government machine. But some government agencies have successfully implemented a customer centric approach to service design and delivery. This paper identifies five citizen-centric models that could be adopted in the context of Kenya. A comparison of the five models is also made and the most suitable citizen centric model to the Kenyan context is proposed.
Keywords: Citizen-centric, e-government, e-service, system, model

I. INTRODUCTION

Delivering services to citizens is at the heart of what most government agencies do. Tasks like paying taxes, renewing driving licenses, and applying for passports are often the most tangible interactions citizens have with their government. Citizens today expect more transparent, accessible, and responsive services from the public sector. And those expectations are rising. In Kenya, the government has made efforts to improve service delivery through online portals or "one-stop centres" like Hudumacentres, but it's still unable to meet the public's expectations. Citizens continue to feel frustrated by cumbersome or confusing websites and find it's often still necessary to speak with multiple parties before their question is answered or their request is completed. Part of the problem is that despite their best intentions, the government continues to design and deliver services based on their own requirements and processes instead of the needs of the people they serve. Citizen centricity is about shifting the focus of government around and designing portals from the view point of the citizen and businesses. The portals should take care of the needs of the citizen and business rather than operational or other imperatives inside the government machine. But some government agencies have successfully implemented a customer centric approach to service design and delivery.There exist various citizen-centric models for evaluating e-government services. The focus of this paper will be on five models; COBRAS framework, EGOVSAT model, I-MEET framework, E-SERQUAL model and WEBQUAL model.

II. CITIZEN-CENTRIC MODELS

2.1. COBRAS framework.

The COBRAS model is a comprehensive model that evaluates users' satisfaction with e-government services. The model development methodology follows a grounded theory approach in which an extensive literature review on existing e-service assessment models is conducted to identify the various fragmented success factors (or key performance indicators, KPIs). The identified KPIs are then classified into four main groups: cost; benefit; risk; and opportunity hence the name COBRAS.

The cost and benefit variables are mostly tangible and are often easy to measure, whereas the risk and opportunity are mostly intangible. The expected directions of the hypothesized causal-effect relationships among the five constructs of the new framework called COBRAS: Costs, Opportunities, Benefits, Risks Analysis for Satisfaction are presented in Figure 3.

COBRAS is developed by analogy to a strategic management tool known as SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis. SWOT analysis is recently used in combination with data envelopment analysis to reduce the subjectivity of weight assignments in evaluation models like VMM. Moreover, SWOT analysis is often used in academia for development of business projects and improvement of operations. In our analogy, strengths correspond to benefits, weaknesses to costs, threats to risks and opportunities are the same. Normally, the costs and benefits are internal factors to an e-service whereas the opportunities and risks are external factors to the eservice.

Similarly, COBRAS can be very subjective like SWOT analysis. Elaboration on these factors will be followed next.
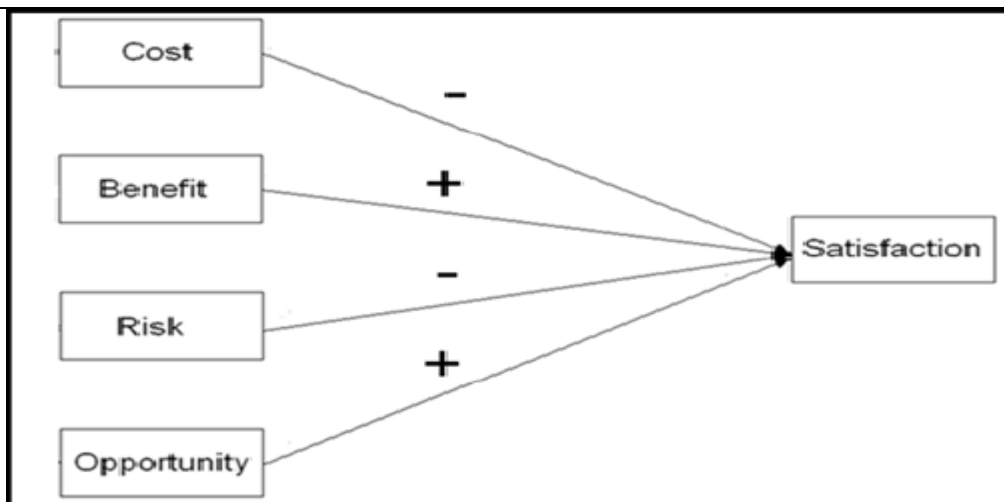
Fig 1: The COBRAS model for user satisfaction

Accordingly, users' satisfaction is measured in terms of the cost–benefit and risk–opportunity analysis for engaging with an e-service. This analysis has its roots in social science theories, and is in line with the recent e-service evaluation literature [1-3].

2.2. EGOVSAT model.
EGOVSAT, a structured equation model that measures service quality, has been developed with an aim to provide a scale according to which government-to-citizen web-based initiatives can be evaluated in terms of satisfaction derived by citizens [4]. This quantitative model includes various performance and emotional measures. This model includes constructs such as utility, efficiency, and customization; as affecting emotional dimensions including confidence, pleasantness, frustration, satisfaction [4].
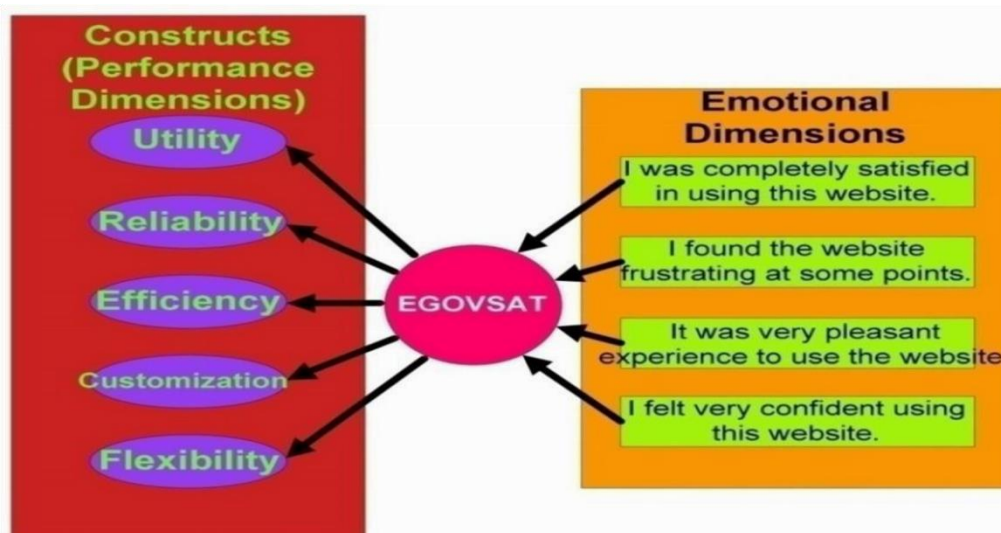

Fig 2: EGOVSAT model with five performance and four emotional dimensions for people Satisfaction

Fig. 2 shows the satisfaction model of EGOVSAT as a causal construct comprised of features that promote confidence, trust, openness and citizen-centric delivery in applying e-Government initiatives. This model has been devised for testing in the domain of ATIS. Furthermore, the emotional response of the users is being considered as a dependent factor on performance features of e- government service delivery [4].
Abhichandani [4] further summarized the EGOVSAT model as shown in Table 1 below:

Table 1: EGOVAST Model

Utility	Reliability	Efficiency	Customization	Flexibility
Ease Of use	Uptime	Ease Of Access	Customized Access	Flexible Planning
Completeness	Accuracy	Presentation	Customized Content	Dynamic content
Usefulness				
Coverage				

2.3. I-MEET framework.

The I-MEET framework was developed by Ibrahim H. Osman in 2014. I-MEET is an Integrated Model for Evaluating E-government services Transformation from stakeholders' perspectives. It is based on an integration of concepts from value chain management and business process transformation to optimize the system-wide value chain of providers and users simultaneously. It aims to align stakeholders on a common global value against traditional disintegrated approaches where each stakeholder optimizes its e-service local value at the expense of others.

The IMEET framework is developed from the perspective of all stakeholders. Stakeholders' groups include users/citizens; businesses; public administrators (employees and politicians); Government agencies; E-government project managers; design and IT developers; suppliers and IT developers; research and evaluators. Rowley [5].

I-MEET is a mission-driven interconnected framework based on the five main components that are shown in Fig. 3.
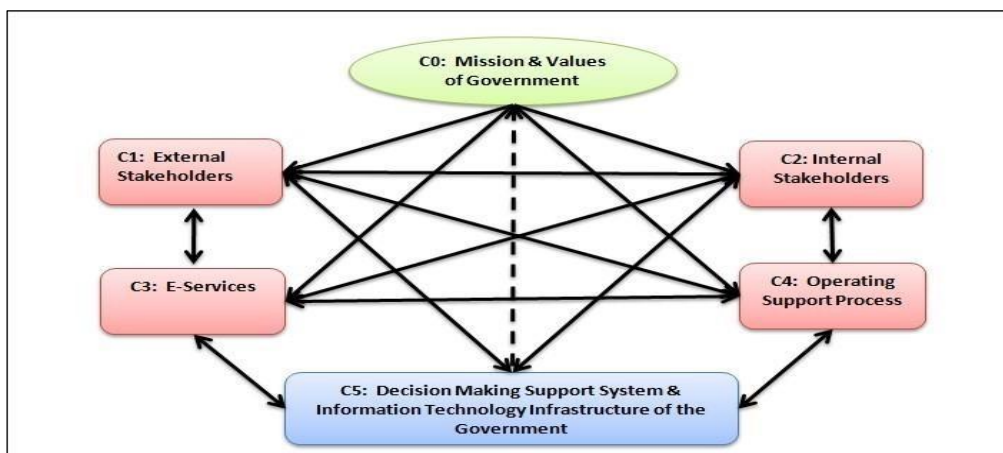

Fig 3: The main interconnected components of I-MEET framework

The I-MEET evaluation process starts by the identification of the e-service to access, and the engaged stakeholders group which provides the real-experience data on the e-service to evaluate. An e-service is delivered using an e-system which is considered a black-box process to users (external stakeholders). The blackbox process is the concern of governments and agency providers (internal stakeholders). It is normally designed according to providers' strategic initiatives, objectives and desired public values. The providers inject various input resources to provide outputs and outcomes to the all stakeholders including users. However, the users provide inputs to an e-system during online interactions to receive e-system's outputs and outcomes. This interaction process during the actual engagement with an e-service is a white-box process to users. The inputs and outputs of the white-box process are the main concern of users that influence the users' satisfaction.

The framework is a mission driven approach with goals that are translated into strategies with objectives and initiatives with desired values. These initiatives would affect the input-resource efficiencies, quality of generated output/outcome effectiveness and business impact of the eservice provisions. The users are one of the key stakeholder and their opinions are often neglected but very important to increase take-up and

providers objectives. Moreover, while using an eservice, the e-service may require users' inputs to generate outputs and outcomes that impact users' satisfaction in contrary to the desire of the providers [6].

2.4. E-SERVQUAL model.

Being a conceptual model of service quality, e-SERVQUAL model is used for e-tailing environments. The model consists of seven service quality characteristics: efficiency, fulfillment, reliability, privacy, responsiveness, compensation and contact. Compared with other models, eSERVQUAL has the advantage of being based on the SERVQUAL approach. This approach, which is a well-known approach, has been extensively tested in measuring service quality under a wide variety of conditions. Despite a wide array of critiques, SERVQUAL is believed to be one of the most widely used tools in collecting appraisals by the users in relation to the services they receive. This is mainly because it has been applied to a wide variety sectors in order to evaluate the quality of service provided [6-7].

2.5. WEBQUAL model.

WebQual uses Theory of Reasoned Action as the general theoretical frames and the Technology Acceptance Model as starting points in order to develop a measure of web site quality [8-10]. The website has the potential to predict consumer reuse of the site. The following is a systematic review of the development and validation process of a web site quality measure:

(1)   Informational fit-to-task;
(2)   Tailored communications;
(3)   Trust;
(4)   Response time;
(5)   ease of understanding;
(6)   Intuitive operations;
(7)   Visual appeal;
(8)   Innovativeness;
(9)   Emotional appeal;
(10)   Consistent image;
(11)   On-line completeness; and
(12)   Relative advantage.

According to Loiacono [9], through web site quality evaluation developers have the potential to evaluate web site quality from both owner and user viewpoints. In the website quality control, there are some elements that, when suitably combined, allow developers thorough site assessment and guide development. These dimensions are identity, content, services, location, management, usability and feasibility.

Table 2: Summary of the different citizen-centric models and their related dimensions.

Study	Source	Measurement type	Performed methodology	Models and associated variables
Alanezi, Kamil, and Basri (2010)	[12]	Service quality	Conceptual model	Modified version of SERVQUAL that includes seven dimensions and 26 items. The seven dimensions in this scale are: website design, reliability, responsiveness, security/privacy, personalisation, information and ease of use.
Batini, Viscusi, and Cherubini (2009)	[13]			GovQual considers a wide set of quality dimensions: efficiency; effectiveness; accessibility; and accountability
Henriksson, Yi, Frost, and Middleton (2007)	[14]		Conceptual model	The instrument questions in the e-government website (eGwet) are grouped into six categories to evaluate the quality of government websites: security/privacy; usability; content; services; citizen participation; and features (the presence of commercial advertising, external links and advanced search capabilities)

Horan and Abhichandani (2006)	[4]		Structured equation model	EGOVSAT model consists of: utility; efficiency, customisation, reliability (whether the website functions appropriately in terms of technology as well as accuracy of the content) and flexibility.
Kaisara and Pather (2011)	[15]		Descriptive statistics	The e-service quality (eSQ) model includes factors (Information quality, security/trust, communication, site aesthetics, design, access)
Lee, Kim, and Ahn (2011)	[16]		Logistic regression	The model includes: tangible factors (i.e. equipment); reliability; responsiveness; assurance; empathy; promptness of service and overall satisfaction with the filing process to measure the offline service quality. They include 6 control variables.
Lin, Fofanah, and Liang (2011)	[17]		Structured equation model	TAM
Magoutas and Mentzas (2010)	[18]		Two-sample Z-test	SALT model includes the following factors: Portal's usability, Forms interaction, Support mechanisms and Security
Magoutas, Schmidt, Mentzas, and Stojanovic (2010)	[19]		Two-Sample one-tailed Z-test	Model for Adaptive Quality Measurement (MAQM): The model includes 6 quality factors and 33 quality dimensions.
Papadomichelaki and Mentzas (2012)	[20]		Structured equation model	e-GovQual: Includes 21 quality attributes classified under four quality dimensions: efficiency; trust; reliability; and citizen support.
Rotchanakitumnuai (2008)	[21]		Content analysis	E-GOVSQUAL-RISK model includes service quality (service design; website design; technology support; and user support) perceived risk (performance risk; privacy risk; social risk; time risk and financial risk)
Papadomichelak and Mentzas (2012)	[22]		Structured equation model	e-GovQual model includes 25 quality variables (55 questions) classified under 4 quality factors: reliability, efficiency, citizen support and trust.
Kim, Im, and Park (2005)	[23]		Statistical reporting and tools	g-CSI model is based on customer satisfaction index of e-government model. It is an integrated model of customer satisfaction index in Korea and American customer satisfaction index. It is based on perceived quality (information, process, customer service, budget execution, and management innovation) and user expectation to contribute to user satisfaction as a moderator for subsequent user complaints and trust and re-use.

Shyu and Huang (2011)	[24]	E-government Success	Case study	Perceived enjoyment; Perceived e-government learning value; Perceived usefulness; Perceived ease of use; Attitude; Behavioural intention; and Actual usage
Verdegem and Verleye (2009)	[25]		Structured equation model	E-government acceptance model; Communication about services; currency of information; security; help or guidance; personal contact and centralisation/ integration. The indicators are clustered into three groups: 1) access to service; 2) use of service; and 3) impact of service.

III. CONCLUSION AND RECOMMENDATION

We propose the COBRAS model as the most suitable citizen-centric model. The following reasons justify our decision.

Firstly, from the previous reviewed models, dimensions with associated indicators and performed analytical tests are presented in tables. It is clear that the evaluation of e-government success is approached from different directions with a recent interest in user-centered satisfaction. The existing models are insufficient for comprehensively assessing the multidimensional and multi-stakeholder influences that e-government services encapsulate.

However, user's satisfaction evaluation depends exclusively on the user's experience and interaction with an e-service and the generated values. This rationality encourages the development of e-government services from users' perspectives based users' costs, benefits and risks used separately for evaluation but not simultaneously in previous performance evaluation models. These evaluation models ignored the value of opportunities and impact that can be obtained from using e-services. The SERVQUAL based models accounted for the service quality of system that includes some of benefit and risk aspects, but it ignores the cost and opportunity aspects.

The updated models account for users' benefit and overlooked the cost; risk and opportunity. Consequently, the COBRAS model builds on previous models and extended them to develop a holistic assessment model for e-government services. The various fragmented performance factors are now integrated and new updates based on the following observations on user's satisfaction namely: the users' experience during the execution and interaction with an e-service, the efficiency of the e-system, the effectiveness of the delivered e-service and the post-impact of the delivered e-service. The COBRAS framework is based on theoretical causal-effect relationships between the cost-benefit analysis and the risk-opportunity analysis on the one hand, and users' satisfaction on the other hand.

Whilst the I-MEET framework evaluates E-government services transformation from stakeholders' perspectives and seem ideal for use, it was developed in 2014 and has not been thoroughly tested and validated. It may therefore be too soon to adopt the model. These aspects makes the COBRAS model most suitable citizen centric model for adoption in Kenya.

REFERENCES

[1]   J Millard, eGovernment measurement for policy makers.*European Journal of ePractice*. 2008.
[2]   I Osman, A Anouze, Z Irani, B Al-Ayoubi, H Lee, A Balcı, and V Weerakkody, COBRA framework to evaluate e-government services: A citizen-centric perspective. *Government information quarterly*, *31*(2), 2014, 243-256.
[3]   Z Irani, V Weerakkody, M Kamal,N Mohammed Hindi, I Osman, A LatefAnouze, and B Al-Ayoubi, An analysis of methodologies utilised in e-government research: A user satisfaction perspective. *Journal of Enterprise Information Management*, *25*(3), 2012, 298-313.
[4]   T Abhichandani, T Horan, and R Rayalu, EGOVSAT: Toward a robust measure of e-government service satisfaction in transportation. In *International Conference on Electronic Government. Ottawa, Canada*. 2005.

[5]   J Rowley, e-Government stakeholders—Who are they and what do they want?,*International journal of Information management(31)1,* 2011, 53-62.
[6]   I Osman,AAnouze, N Hindi, ZIrani, H Lee, and VWeerakkody. I-meet framework for the evaluation e-Government services from engaging stakeholders' perspectives.2014.
[7]   V Zeithaml, A Parasuraman, and A Malhotra, Conceptual Framework for understanding e-service quality: Implications for future research and managerial practice. 2000.
[8]   V Zeithaml, A Parasuraman, and A Malhotra, Service quality delivery through web sites: a critical review of extant knowledge. *Journal of the academy of marketing science*, *30(4),* 2002, 362-375.
[9]   E Loiacono,WebQual (TM): A web site quality instrument. 2001.
[10]   F Davis, Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 1989, 319-340.
[11]   E Dudley, D Lin, M Mancini,and J Ng. Implementing a citizen-centric approach to delivering government services. 2015.
[12]   M Alanezi, AKamil, and S Basri, A proposed instrument dimensions for measuring e-government service quality. *International Journal of u-and e-Service, Science and Technology*, *3(4),*2010, 1-18.
[13]   C Batini, G Viscusi, and D Cherubini,GovQual: A quality driven methodology for E-Government project planning. *Government information quarterly*, *26(1),*2009, 106-117.
[14]   A Henriksson, Y Yi,B Frost, and M Middleton,Evaluation instrument for e-government websites. *Electronic Government, an International Journal*, *4(2),*2007, 204-226.
[15]   G Kaisara, and S Pather, The e-Government evaluation challenge: A South African Batho Pele-aligned service quality approach. *Government information quarterly*, *28(2),*2011, 211-221.
[16]   J Lee, H Kim, and M Ahn, The willingness of e-Government service adoption by business users: The role of offline service quality and trust in technology. *Government Information Quarterly*, *28(2),*2011,222-230.
[17]   F Lin, S Fofanah, and D Liang, Assessing citizen adoption of e-Government initiatives in Gambia: A validation of the technology acceptance model in information systems success. *Government Information Quarterly*, *28(2),* 2011, 271-279.
[18]   B Magoutas, and G Mentzas, SALT: A semantic adaptive framework for monitoring citizen satisfaction from e-government services. *Expert Systems with Applications*, *37(6),*2010, 4292-4300.
[19]   B Magoutas, K Schmidt, G Mentzas, and L Stojanovic, An adaptive e-questionnaire for measuring user perceived portal quality. *International Journal of Human-Computer Studies*, *68(10)*, 2010, 729-745.
[20]   X Papadomichelaki, and G Mentzas, e-GovQual: A multiple-item scale for assessing e-government service quality. *Government information quarterly*, *29(1)*, 2012, 98-109.
[21]   S Rotchanakitumnuai, Measuring e-government service value with the E-GOVSQUAL-RISK model. *Business Process Management Journal*, *14(5)*, 2008, 724-737.
[22]   X Papadomichelaki, and G Mentzas, E-GovQUal: A multiple-item scale for assessing E-government service quality. *Government Inf. Q.,29,* 2012, 98-109
[23]   Kim, T. H., Im, K. H., & Park, S. C. Intelligent measuring and improving model for customer satisfaction level in e-government. In *EGOV*, 3591, 2005, pp. 38-48).
[24]   S Shyu, and J Huang, Elucidating usage of e-government learning: A perspective of the extended technology acceptance model. *Government Information Quarterly*, *28(4)*, 2011, 491-502.
[25]   P Verdegem, & G Verleye, User-centered E-Government in practice: A comprehensive model for measuring user satisfaction. *Government information quarterly*, *26(3)*, 2009, 487-497.