RESEARCH ARTICLE OPEN ACCESS

Critical Role of Usability in the Adoption and Implementation of E-Government Systems: User-Centred Approach

Julius Bwire Magero, Prof. Franklin Wabwoba, PhD, Dr. Yonah Etene , PhD
Department of Information Technology, Kibabii University, Kenya
Department of Information Technology, Kibabii University, Kenya
Department Computer Science, Kibabii University , Kenya

ABSTRACT
The implementation of e-government systems promised to revolutionize public administration, offering streamlined services, improved transparency, and enhanced citizen engagement, ultimately fostering efficiency and accountability within governmental operations and service delivery. Despite the rollout in all 47 counties in Kenya, e-government systems faced high failure rates, resulting in significant losses, diminished user trust, and low citizen uptake. The purpose of the study was to evaluate the role of system usability in the adoption and implementation of e-government systems, with the user at the center. The study adopted a survey research design. A sample size of 228 county employees was selected from a target population of 530 employees through stratified sampling and simple random sampling techniques. Questionnaires and focus group discussions were used as data collection instruments. The validity of the tool was tested using IT experts, while reliability was realized through the use of Cronbach's alpha internal consistency coefficient. Findings from the research suggest that the success of e-government systems heavily depends on their usability and focus on user needs and experiences. This shows that for enhanced adoption of e-government systems, the usability aspects should be carefully looked into with a user-centered approach.

Keywords — E-government systems, Usability, User-centred approach

I. INTRODUCTION

In the digital age, implementing e-government systems has become crucial for enhancing public service delivery, improving transparency, and increasing citizen engagement (Kettl, 2016). As governments worldwide transition to digital platforms, ensuring these systems are user-friendly and accessible is paramount. Usability, defined as the ease with which users can interact with a system to achieve their goals (Nielsen, 2012), plays a critical role in determining the success of e-government initiatives. A user-centered approach, which prioritizes the needs and preferences of end-users during the design and implementation phases, can significantly enhance the usability of e-government systems.

Research has shown that systems designed with a focus on usability not only lead to higher user satisfaction but also promote greater adoption rates among citizens (Davis, 1989; Venkatesh & Bala, 2008). This paper explores the critical role of usability in the adoption and implementation of e-government systems, emphasizing the necessity of a user-centred approach to ensure these systems meet the needs of diverse populations

II. METHODOLOGY

The study employed a survey research design. The population for this study was employees of all 47 counties found in the Republic of Kenya. The study employed stratified sampling, purposive sampling, and simple random sampling methods. In the random sampling approach, every member of the population had an equal probability of being selected, which helped to eliminate biases and ensure the sample was representative (Rahim, 2008). Purposive sampling was utilized to choose departments that frequently interact with the systems, whereas stratified sampling was applied to categorise counties into various ecological zones. After grouping the respondents into strata, simple random sampling was used to select a county from each strata randomly.

A. *Sample Size:*

Sample Size was determined by calculation using Yamane's formula (Yamane, 1973).

$$n=N/ (1+Ne^2)$$

Which gave a sample size of 228 Employees out of the target population of 530. This study assumed a 95% confidence level.

B. *Response Rate*

Out of the 228 questionnaires distributed, 200 were returned fully completed, resulting in an 88% response rate. According to Fox (2020), a response rate of 60% is considered strong and acceptable. Therefore, the achieved response rate indicates that the sample is adequate for analysis.

C. ***Demographic Information***

Response Rate and Category The findings are as shown in Table 1 Respondent category below

TABLE 1
RESPONSE RATE

Count Government (Strata)	Sample Size	Participants	Return Rate%
Baringo	30	20	67%
Makueni	43	40	93%
Kakamega	52	50	96%
Nairobi	103	90	87%
Total	**228**	**200**	**88%**

III. STUDY FINDINGS

This chapter provides an analysis and findings from the data gathered via a questionnaire administered to a randomly selected group of 228 respondents. This group includes county staff from the ICT, Health, and Finance departments.

D. Suitability of Data for Factor Analysis

To assess the suitability of the sampled data for factor analysis, the researcher employed Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. The results are presented in Table 2 below.

Table 2
CRITICAL ROLE OF USABILITY IN THE ADOPTION AND IMPLEMENTATION OF E-GOVERNMENT SYSTEMS KMO AND BARTLETT'S TEST

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.753
Bartlett's Test of Sphericity	Approx. Chi-Square	47.947
	Df	45
	Sig.	.035

As shown in Table 2 above, the Kaiser-Meyer-Olkin measure of sampling adequacy is 0.753, which is higher than 0.6, Role of Usability in the Adoption and Implementation of E-Government Systems KMO and Bartlett's Test. Therefore, it can be concluded that the underlying factors explain 75% of the variability. Additionally, Bartlett's test of sphericity shows a significant p-value of 0.035, which is less than 0.05.The results suggest that the dataset is appropriate for factor analysis due to adequate sampling and significant correlations among the variables.

E. Factor extraction

The indicators associated with e-government system usability that influence the adoption of e-government systems were the focus of this section's analysis. Based on findings where the initial value of the ten (10) indicators that had been provided to respondents to rate on a Likert scale ranging from Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), to Strongly Agree (5). Utilizing exploratory factor analysis, the responses were computed and analysed to identify the principal components and their associated indicators as presented the constructs are discussed below.

1) System Usability Construct :

In this study, three indicators were provided to respondents to rate on a Likert scale from Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), to Strongly Agree (5). These ratings were then converted into a System Usability Construct, as detailed in Table 3 system usability construct. Respondents indicated their level of agreement with respect to the three different indicators.

TABLE 3
SYSTEM USABILITY CONSTRUCT

	N	Mean	Std. Dev
The system is easy to use	200	2.88	1.443
It is easier to use the system a second time	200	2.91	1.413
The system can easily be used by people with disability	200	3.05	1.436
Valid N (listwise)	200		

Research findings with respect to Table 3 System Usability Construct reveal varied perceptions among users regarding different aspects of the system's ease of use.

Firstly, the component "The system is easy to use" has a mean score of 2.88 and a standard deviation of 1.443. This mean score indicates a slightly negative perception, suggesting that users generally find the system somewhat challenging to use. The high standard deviation of 1.443 indicates considerable variability in user experiences, with some users finding the system easier to use than others.

Secondly, the component "It is easier to use the system a second time" has a slightly higher mean score of 2.91, indicating a marginally more positive perception compared to the initial ease of use. The standard deviation for this component is 1.413, which, although still high, is slightly lower than that of the first component. This suggests that while users may find the system slightly easier to use upon subsequent interactions, there remains significant variability in their experiences.

Thirdly, the component "The system can easily be used by people with disabilities" has the highest mean score of 3.05, indicating a neutral to slightly positive perception regarding the system's accessibility for users with disabilities. The standard deviation for this component is 1.436, again showing considerable variability in user experiences.

In summary, while the system's overall ease of use and subsequent ease of use received slightly negative to neutral perceptions, with high variability in user experiences, the perception of the system's accessibility for people with disabilities was slightly more positive. However, the high standard deviations across all components suggest that user experiences are diverse, indicating areas where the system's usability could be improved to provide a more consistent and positive user experience for all users

2) ***System Hint Construct:***

In this study, One indicator was provided to respondents to rate on a Likert scale from Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), to Strongly Agree (5). These ratings were then converted into a System Hint Construct, as detailed in Table 4 The system hint construct asked respondents to indicate their level of agreement concerning the indicator.

TABLE 4:
SYSTEM HINT CONSTRUCT

	N	Mean	Std. Dev
The system gives important hints	200	2.86	1.393
Valid N (listwise)	200		

Research findings in Table 4 above show that "The system gives important hints" shows a mean score of 2.86, indicating a slightly negative perception among users regarding the usefulness of hints provided by the system. The standard deviation for this component is 1.393, suggesting a considerable variability in user experiences. This high standard deviation indicates that while some users may find the hints provided by the system helpful, others have a significantly different experience, finding them less useful

3) ***General Ease of Use Construct:***

In this study, one indicator was provided to respondents to rate on a Likert scale from Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), to Strongly Agree (5). This ratings was converted into a General ease of use Construct, as detailed in Table 5 The General ease of use construct asked respondents to indicate their level of agreement concerning the indicator.

TABLE 5
GENERAL EASE OF USE CONSTRUCT

	N	Mean	Std. Dev
It is easy to accomplish intended tasks on the system	200	2.98	1.442
Valid N (listwise)	200		

Research findings in Table 5 above shows that the usability component "It is easy to accomplish intended tasks on the system" show a mean score of 2.98, which is just below the neutral midpoint, indicating that users have a slightly negative perception of this aspect of the system. The standard deviation for this component is 1.442, which is relatively high, suggesting considerable variability in user experiences. This high standard deviation indicates that while some users may find it easy to accomplish their intended tasks, others have a significantly different experience, finding it more challenging

4) ***System Responsiveness Construct:***

In this study, two indicators were provided to respondents to rate on a Likert scale from Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), to Strongly Agree (5). These ratings were then converted into a System responsiveness Construct, as detailed in Table 6 The system responsiveness construct asked respondents to indicate their level of agreement concerning the indicator.

TABLE 6
SYSTEM RESPONSIVENESS CONSTRUCT

	N	Mean	Std. Dev
Can navigate through the system without confusion	200	3.02	1.376
The system gives prompt responses	200	3.08	1.413
Valid N (listwise)	200		

Research findings in Table 6 above show that participants felt slightly more positive about "The system gives prompt responses," which has a mean score of 3.08, compared to "Can navigate through the system without confusion," which has a mean score of 3.02. This indicates that users perceive the system's responsiveness more favorably than its navigational ease.

Regarding the standard deviations, "The system gives prompt responses" has a standard deviation of 1.413, while "Can navigate through the system without confusion" has a slightly lower standard deviation of 1.376. Although both standard deviations are relatively high, indicating a considerable variability in user experiences, the higher standard deviation for prompt responses suggests that opinions on the system's responsiveness vary more among users than their opinions on navigation. Overall, while both components received neutral to slightly positive ratings, users were marginally more satisfied with the system's promptness than with its navigability, with greater variability in perceptions of responsiveness.

5. System Clarity:

In this study, three indicators were provided to respondents to rate on a Likert scale from Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), to Strongly Agree (5). These ratings were then converted into a System clarity Construct, as detailed in Table 7 . The system clarity construct asked respondents to indicate their level of agreement with respect to the three different indicators.

TABLE 7
SYSTEM CLARITY CONSTRUCT

	N	Mean	Std. Dev
It is easy to recover from a mistake	200	3.06	1.420
The error messages are clear and helpful	200	3.04	1.396
I like the appearance and colors used in the system	200	3.04	1.341
Valid N (listwise)	200		

Research findings in Table 7 above show that participants felt it was easiest to recover from mistakes, with a mean score of 3.06, indicating a slightly more positive perception than the other two items. In contrast, both "The error messages are clear and helpful" and "I like the appearance and colors used in the system" received slightly lower mean scores of 3.04, suggesting a neutral stance. The standard deviations for each item indicate variability in responses; the highest standard deviation of 1.420 for ease of recovery from mistakes suggests a wider range of opinions on this aspect compared to the other two statements, which have slightly lower standard deviations (1.396 for error messages and 1.341 for system appearance). This variability indicates that while users generally felt more positively about recovering from mistakes, opinions on the clarity of error messages and system appearance were more varied among participants.

Critical Role of Usability in the Adoption and Implementation of E-Government Systems

IV. CONCLUSIONS

This study aimed to evaluate the Role of system Usability in the Adoption and Implementation of E-Government Systems with the user at the Centre. Respondents were given various indicators to rate their level of agreement on a Likert scale ranging from Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), to Strongly Agree (5)

The study concludes that while some usability factors such as system responsiveness and recovery from mistakes are viewed slightly positively, many factors, including ease of task accomplishment, overall ease of use, and the helpfulness of hints, receive neutral to slightly negative ratings. The high variability in user responses across all factors suggests inconsistent user experiences, highlighting the need for improvements in design and functionality to create a more intuitive, accessible, and user-friendly system. Enhancing these usability factors is crucial for the successful adoption and implementation of e-government systems

ACKNOWLEDGMENT

I wishes to acknowledge Dr. Yonah Etene and Prof. Franklin Wabwoba for their support.

REFERENCES

I. Butt, S. M., Butt, S. M., Butt, M. M., & Tariq, M. U. (2015). *Improving the usability of network security tools*. Information Technology & Electrical Engineering, 4(5), 28-32.

II. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319-340.

III. Gupta , A. (2021),Study on the Effect of ICT on E-governance and its Distribution of Facility for Rural Development in Satna District of Madhya Pradesh. *International Journal of Information Technology*, 36-40.

IV. Holtom, B., Baruch, Y., Aguinis, H., & A Ballinger, G. (2022). Survey response rates: Trends and a validity assessment framework. *Human relations, 75*(8), 1560-1584.

V. Salem, F., & Yasar , J. (2012). Learning from Failure: Braving the Multifaceted Challenges to E-Government Development." Organisational Learning and Knowledge: Concepts, Methodologies, Tools and Applications. IGI Global.

VI. Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision Sciences, 39*(2), 273-315.