Usability of E-Government Services in Developing Countries

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***Abstract*— Usability is requirement for which not much research has been done in relation to designing usable e-Government services especially in developing countries. The high failure of most of e-government projects in these contest has been linked to poor usability. Most research on e-government services has been focused on general e-government implementations. This paper dicusses why usability of e-government services in developing countries is poor and presents a proposal for a possible solution.**

***Keywords:*-- E-Government services, Usability, Developing Countries, Usable e-government services**

I. INTRODUCTION

United Arab Emirates [UAE] Federal Government [2005] defines e-government services as those services that are offered to the end users through an electronic provisioning channel. According to Kelleher and Peppard [2009], e-government services are deeds, efforts or performances whose deliveries are mediated by information technology. Usability is a measure of the effectiveness, efficiency and satisfaction with which users can achieve specified goals in a particular environment [ISO, 9421]. The goal of usability is a better experience for the user in terms of efficiency, effectiveness and satisfaction [Lamminen et al., 2009; Alexander, 2006] in [Baguma, 2010]. Therefore usability of e-government services is concerned with the extent to which government services whose delivery is mediated by information technology can be used by specific users to achieve specific goals with effectiveness and efficiency in a specified context [Physical and Social] of use.

This area has become a critical research area due to continued failure of e-government services as a result of unmet user requirements and other usability issues especially in developing countries [Ray 2011]. A developing country is a country which has a relatively low standard of living, an undeveloped industrial base and a moderate-to-low Human Development Index [HDI] score and per capita income [Cleveland 2008; Gaillard 2010].

According to Hochstrasse & Griffiths [1991] in Ray, [2011] noted that the failure rates of information systems in developing countries is as high as 70%. Heeks [2006] observed that developing countries constitute 80% of the world population but only 20% of these are e-government users. Heeks add that only 0.7% of citizens in Africa use e-government services.

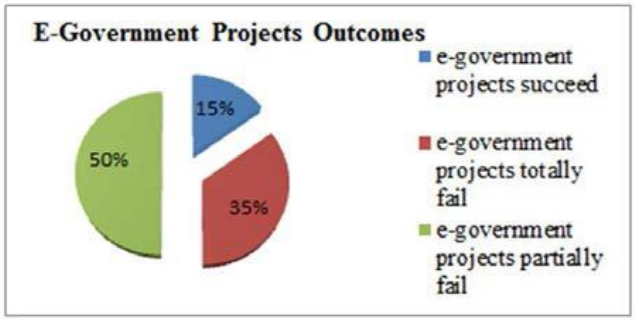

Figure 1: The failure rates of e-government services in developing countries [Peppa et al., 2012]

According to Heeks [2003], e-government services in developing countries fail mainly due to the big difference between system designs and the realities of the environment where they are supposed to be used. Heek's view is that development of information systems in developing countries lacks enough attention to the environment and characteristics of the people supposed to use the systems. This is because of the reality gaps brought about by changes from Information, Technology, Processes, Objectives, Staff, Management and the Dimensions [ITPOSMO] that do not match the realities in developing countries [Ray 2011]. Hochstrasser and Griffiths [1991] in [Ray 2011] noted that there is a 70% failure rate of information systems in developing countries. This is due to lack of proactive user engagement in system development and deployment processes [Ashurst et al. 2011]. According to Burke [2010], the high rates of failure are a result of lack of information literacy and skills that obstruct the use of electronic resources. The gaps created by culture and technology widen the gaps between expectations and realities in developing countries [Eynon 2007]. According to Al-adawi et al. [2005]; Thomas and Schmidt [2006]; office of e-government [2010], most research on e-government services has been focused on general e-government implementations, despite the fact that 34% the failure of most e-government services is due to poor usability. Not much research has been done on strategies for addressing this situation hence there is continued failure of e-government service in developing countries [Kitsing 2011].

Existing research on usability of e-government services has mainly focused on business goals of the system, leaving out interaction issues [Göransson et al. 2004; Office of e-

government 2010]. On a good note, some governments are making positive contributions that need to be built upon to get a comprehensive solution. For example the government of Uganda developed website standards in 2007 that provide recommended practices to government ministries and departments in the planning, design and evaluation of websites [Government of Uganda Web standards 2007]. However these guidelines are silent on how usability can be integrated in the design process which reflects the little attention the IT and e-services fraternity in the country and other developing countries give to usability despite its importance in the success of e-service initiatives. Asiimwe and Lim [2010] suggested that if revised to include guidance on usability, the standards can be used to improve on web usability in the country and beyond.

High failure rates are still being registered in developing countries & poor usability is one of the major causes.

A summary of the major causes of failure of e-government services in developing countries

Category	Factors	Description	Key References
User Factors	Requirements	Unmet user requirements	AlFawaz 2012;Ray 2011
	Involvement	Insufficient level of end-user involvement	AlFawz 2012; Harms & Adams, 2008
	Usability Awareness	Lack of usability awareness (costs, time and effort, with a detrimental impact on productivity)	AlFawz 2012; Harms & Adams, 2008
	Usability	little attention to usability	AlFawz 2012; Huang & Brook 2011
	User Trust	Users do not trust the systems	Gunawong & GAO, 2010; Huang & Brook 2012; Harms & Adams, 2008
System factors	IT Skill	Shortage of IT skills and knowledge by users and usability professionals in the implementation of eGovernment	Mundy & Musa, 2010
	Concept-reality gaps	Gap between the design of the systems and context of use	Akther et al, 2007; Ray, 2011
	Utility	Failure of the developed system to achieve intended objective	AlFawz 2012; Al-Azri et al. 2010
Organisational Factors	Culture	Unconducive organisational culture	Ray 2011; Al-Azri et al. 2010
	Large design-reality gaps	Off-the-shelf solution from industrialized countries not matching the actual needs for a developing country. Differences between organisations	Almarabeh & AbuAli, 2010; Akther et al, 2007; Ray, 2011

Table 1: Causes of failure of e-government services.

Given the important roles usability play in design and the implementation of most electronic systems and in particular the integration of usability in e-government services design and implementation processes the research investigated why usability of e-government services in developing countries is poor and the strengths and weaknesses of the proposed solutions. Consequently, a research question and the problem statement were drawn to direct the study. The research question includes:

1. *Why is usability of e-government services in developing countries poor and what are the strengths and weaknesses of the proposed solutions*?

The Problem Statement includes: To date not much research has been done on usability of e-Government services especially in developing countries, yet failure of most of e-government projects has been linked to poor usability [AlFawwaz, 2012]. Little research has been done on strategies for addressing usability related issues from users' perspective in developing countries [kitsing, 2011]. AlSobhi et al. [2009] noted that little attention has been paid to issues pertaining to usability, accessibility and the availability of e-government services from a user's perspective. Yimbo [2011] observed that most developing nations adopt plans of advanced nations to develop e-government services that pays little attention ordinary citizens rather than developing strategies and plans that are unique to their context. This has resulted in poor usability and adoption of e-Government and a significantly low usability index is a major indicator of failure of e-Government project [AlFawaz, 2012]. Poor usability has contributed up to 34% failure rates of most e-government services [Thomas and Schmidt, 2006; AlFawwaz [2012].

Reasons for poor usability of e-government services in developing countries

1. Unmet user requirements
    1. Due to non-involvement of users in design and development processes
    2. Pay more attention to design teams
    3. Technology driven designs
    4. Little research has so far been done on strategies for addressing usability
2. Little attention paid to usability from user's perspective
    1. Due to supply side design and deployment

A summary of the major cause of poor usability of e-government services in developing countries

Category	Factors	Description	Key References
Effectiness	Task completion	percentage of the task completed	Abran 2003; ISO 9241-11 1998; Andrews 2011
	Rate of failure of handling	Users ability to use the service	Abran 2003; ISO 9241-11 1998
	Speed	How fast is the task achieved	Abran 2003; Al-Aama, 2008; Andrews 2011
Efficiency	Time	information retrieval time	ISO 9241-11 1998
	Time to activate a task	Understandability of the service	Abran 2003; ISO 9241-11 1998
	Time spend on errors	Efforts on error correction	Abran 2003
	Percentage of errors	Number of errors encountered	Abran 2003; ISO 9241-11 1998; Andrews 2011;
	Frequency of help's	How often does the user needs help	Abran 2003
	Number of failed commands	The response of the executed command	Abran 2003
	Unnecessary commands		Abran 2003
	Usage	actual application of the artifact	Abran 2003; Yonazi 2010; Andrews 2011

Table 2: Causes of poor usability

However, high failure rates are still being registered in developing countries and poor usability is one of the major causes. Existing usability frameworks do not clearly show how to identify, analyst and design usable e-government services.

II. RELATED WORK

Several Design Strategies for involving users to address usability issues and user requirements are explored. The analysis shows that usability of e-government services in developing countries has become a critical research area due to continued high failure rates [Heeks 2003; Göransson et al 2004; Harms and Adams 2008; AlFawwaz 2011; AP [2004] in Salem and Jarrar 2011; Gunawong and GAO 2010; Kitsing

2011]. Developing countries have experienced high failure rates of e-government projects partly due to poor usability which according to [Heeks 2003; Al-Azri et al 2010] is contributing between 40% and 85% to the failure rates. For example in 2005, 40% of most e-government projects failed within a year to achieve business objectives in developing countries IT Cortex in Nauman. et al. [2005]. According to Salem and Jarrar [2011], more than 60% of e-government services are still failing, causing great concern among users and other stakeholders in developing countries. Despite some efforts to improve this situation e.g. development of country wide web site standards by some governments Asiimwe and Lim [2010], usability has remained a challenge which Tariq [2008] attributes to technologically driven and off-the-shelf implementations. Wahid [2011] observed that designs and implementations of e-government systems in developing countries do not pay vital attention to users and their requirements in the design process.

Developing countries always acquire off-the-shelf implementations that are technologically foreign to their context. Hence implementations are affected by design-reality-gaps such as e-readiness problems, management and trust challenges, resistance to change, etc [Heek 2003; Rahul De' and Sarkar 2010; Almarabeh and AbuAli 2010]. Furthermore another big challenge faced is how to include real users in such large user based task-oriented environment in the design process [Poppinga 2010]. These and more challenges is what this research will study and investigate possible solutions.

Usability standards/guidelines that have been developed to address usability issues such as ISO 13407 [1999], ANSI 354 [2001] and Web Accessibility Initiative's [WAI] guidelines Quesenbery [2005] are not specific to any application domain in terms of developed or developing countries yet these two environments have unique aspects such as level of infrastructure development, general literacy of the population, ICT literacy, etc. It has also been noted that that members that develop these guidelines have software engineering background but yet assumed duties as project members with user backgrounds. According to Quesenbery [2005], ISO 13407 [1999] mainly aims at encouraging better usability practices in companies and integration of usability in software development processes to take care of users who require usability certification on procuring. Boivie et al. [2006] noted that international standards provide only general advice and guidance, but not much practical support to identify, analyse and address usability issues and user requirements in order to develop usable systems.

Therefore employing usability guidelines in projects or system designs does not guarantee achieving product usability. ANSI 354 [2001] which was initially a Common Industry Format [CIF] was generally used to report formative usability testing and the standard was only focusing on guidance for reporting on a finished product's usability rather than guiding the entire development process [Quesenbery 2005]. Quesenbery [2005] observed that the WAI guidelines support designs based on the developed countries' environment living out developing cxountries. Therefore there is a need for research on how usability challenges in a developing country context can be addressed.

Agile software development methods though usually user focused based on iterative and incremental development procedures gives more priorities to design teams compared to other stakeholders [Apostu 2011; Leau et al. 2012; Johnson 2012]. This is because agile development processes iterate over application codes only [Fox 2010]. In addition Blomkvist [2005] in Rannikko [2011] observed that agile developments cannot be considered to be user centered because its values do not have the necessary focus on the user, user requirements and usability issues and some of the prioritized areas of interest can prevent user centered attitude. Rannikko observed that agile processes focus on programming and programmers, automated test, very short iterations, fast increments, and executable software as a measure of success of projects. Other problem areas with agile methods are the confusion between users and customers, unsatisfactory techniques for modeling users and tasks [user stories and use cases], the fear of early design as well as insufficient activities for iterative design Blomkvist [2005] in [Rannikko 2011]. In fact, in agile approaches, handling of non-functional requirements [which includes usability requirement also] is ill defined [Durrani and Qureshi 2012].

Traditional methods such as participatory design are technology driven processes that only address user needs and usability requirements from a technological point of view. According to Sousa [2012], participatory designs mainly focus on internal architecture of the system. Oostveen et al. [2005] noted that user involvement in processes using participatory design techniques do not apply in development of large-scale user based systems. Oostveen and others observed that participatory designs are skewed to developing small scale projects that involve groups of users who are more specific to their different cultural backgrounds, opinions, moral standards and values. But e-government projects are large scale normally country wide projects hence participatory-methods are inadequate. According to Veljković et al [2012], developing countries are slower in employing participatory methods with users because they have low economic based, political challenges and little time, and resources devoted to the designs. Veljković and others noted that these countries faced challenges related to investing in ICT infrastructure and laws/policies as well as human education. Slegers et al [2012] noted that participatory designs processes are based on issues such as problems involving thought processes and communication in understanding abstractions, sequencing thoughts and actions, understanding symbols, and interpreting social cues whish results in developing systems that are not usable unless they are adjusted to suit people with impairments.

III. METHODOLOGY

This was an investigative study using Literature review technique which is an evaluative report of studies found in the literature [Boote and Beile 2005]. This involved the process of

searching, reading, describing, summarizing and evaluating reports of the research as well as reports on observation and discussions that were relevant to the research. Literature review involves identifying and analyzing of documents containing information that were related to the research problem. The research utilized literature review to study existing research on why usability of e-government services in developing countries is poor and the strength and weaknesses of proposed solutions.

Objective one	Method	Outcome
To study why usability of e-government services in developing countries is poor and the strengths and weaknesses of the proposed solutions	Literature review	-To determined the extent and reasons for failure of e-government services. -To determined strength and weaknesses of the existing methods

Table 3: Research approach used for this paper

IV. RESULTS

Research question: *Why is usability of e-government services* in developing countries poor and what are the strengths and weaknesses of the proposed solutions? To answer this question a comprehensive literature review was carried out. The results indicated that suggested methods for improving usability of e-services including e-government services are inadequate.

Existing usability methods/ frameworks do not adequately show how to develop usable e-government services for developing country environments

The existing usability methods/frameworks do not also show how user needs can be understood by involving real user in practice in large user based environment in developing countries

Figure 2: involving real user in practice in large user based environment

However there is lack of a coherent usability framework for designing and deploying usable e-government services in developing countries. Not much research has been done on strategies for addressing this situation hence there is continued failure of e-government service in developing countries [Kitsing 2011]..

V. CONCLUSION AND RECOMMENDATION

Given the acclaimed importance of usability to improving usability of e-government services, there was a need for efforts to investigate better strategies for improving usability of e-government services in developing countries.
According to Queensberry (2005) Usability standards and or guidelines such as ISO 13407 (1999), ANSI 354 (2001) and Web Accessibility Initiative's (WAI) guidelines such as the Web Content Accessibility Guidelines (WCAG) have been developed to address usability issues worldwide and they are only focused on guidance during early stages of the design rather than guiding the entire development process. Quesenbery (2005) observed that ANSI 354 aimed to report on the results of a summative usability testing. According to Quesenbery (2005), Web Accessibility Initiative (WAI) guidelines support designs specific to people with disabilities and those using assistive devices. Therefore poor usability of e-government services in developing countries contexts remains a challenge and that needs to be addressed in the entire development process of the design. In agile approaches, the processes for handling non-functional requirements, which includes usability, is ill defined (Durrani & Qureshi, 2012).

This is because to date, these suggested methods for improving usability of e-services including e-government services are therefore inadequate.

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