OPEN SOURCE FOR E-GOVERNMENT IN NIGERIA: A CATALYST FOR ECONOMIC DEVELOPMENT.

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Abstract

The case for a developing country like Nigeria to adopt an open source software (OSS) driven Information technology strategy is a compelling one. The huge investment of the government in Information and Communication Technology and software has not been reflected in the system of government as it is being ranked low in e-government provision to its citizens. E-government (e-gov) projects have an increasing influence on how government business processes evolve and change. It is a means of making government more efficient while altering it to be more responsive to the citizenry .The migration to holistic e-government system is extremely costly. The open source software (OSS) has been adopted by developed countries to provide e-governance to its citizens. Rather than hiding their source code away from the world, practitioners of open source allow everyone to see it. It has a great potential of saving cost for developing economies in Africa and reducing the cost of doing business and automation operations. Developing countries like Brazil, Argentina and Holland are already shifting towards OSS for E-governance. This paper explores the applications and benefits of open source software/free software (OSS/FS) as an alternative to developing and deploying cost effective and sustainable e-governance solutions towards rapid development of the Nation's economy.

Keywords: Open Source, e-government, Catalyst, Economic Development

INTRODUCTION

Nigeria is a developing country and as a result, the day-to-day business of Nigerian government or any other government is built on information. Information is a critical resource that helps to ensure the accountability of government, enables government to manage its operations, and allows the public to participate in the governance of their country. This has caused the huge investment of the government in Information and Communication Technology and softwares that would provide e-government services. Sadly this has not been reflected in the system of government as it is being ranked low in e-government provision to its citizens.

With the revolutionary changes that ICT is bringing to our global society, governments worldwide continue to develop more sophisticated ways to digitize their routines and practices so that they can offer the public access to government services in more effective and efficient ways.. All around the world, several countries use the Internet to deliver government services. These activities that incorporate the use of the internet and World Wide Web are broadly referred to as e-government, which is an "umbrella term that comprises all uses of information and telecommunication technologies in the public sector" (Garson, 2006).

Government has made moves towards the migration to holistic e-government but the available proprietary or closed software packaged to offer a variety of e-government services have been found to be quite expensive. This has made government to specifically select some of these services for use instead of making use of the whole package as a means of cutting down administrative costs since the government still has to spend large amount of money in fulfilling the basic needs of people. This has reflected badly on the system of governance as it limits the interaction of the government with the citizenry, hinders the immediate execution of administrative tasks amongst other government functions and processes thereby resulting in an overall reduction in efficiency and effectiveness of the government. Hence, this has necessitated the need for the use of free open source software that will allow the creation, editing and manipulation of source codes to achieve the stated objectives of the government. This would consequently lead to growth of in economy of a nation.

From research carried out in the past and from several indications due to happening in the future, it has been brought to the fore that the cost of software is the major hurdle in introducing e-Governance that has several benefits that could serve as a catalyst for economic development.

DEFINITION OF E-GOVERNMENT

The term e-Government (e-Gov) emerged in the late 1990s, but the history of computing in government organizations can be traced back to the beginnings of computer history. A literature on "IT in government" goes back at least to the 1970s (Danziger and Andersen, 2002). This literature concerns IT use within government, while the recent e-Gov literature more often concerns external use, such as services to the citizens (Ho, 2002). Just like the term e-Commerce, the term e-Government was born out of the Internet boom.

However, it is not limited to Internet use or publicly accessible systems for direct use by customers or citizens. E-Gov started as a practitioner field, basically convening practitioners struggling to meet the new challenges of the Internet medium by implementing new systems creatively. All definitions of e-Gov go beyond services to the citizen to include organizational change and the role of government. E-government is a generic term that refers to any government functions that are carried out in digital form over the internet to overcome the physical bounds of traditional paper and physical based systems. E-Government is "The use of ICTs, and particularly the Internet, as a tool to achieve better government" (OECD, 2003). It harnesses information and communications technology to transform relationships with citizens and businesses, and between arms of government to bring about good governance (Backus, 2001). Confusion still reigns concerning the difference between the two terms 'e-governance' and 'e-government'. In short, e-Government refers to what is happening within government organizations (in information system research the term is often restricted to those government organizations that provide services to citizens or companies).e-Governance, on the other hand, refers to the whole system involved in managing a society.

The system includes activities not only by government organizations but also companies and voluntary organizations, and often forgotten citizens. Moreover, it features the processes and flows of governance, dimensions that are critical to understanding the context of information systems deployment and use (Atkinson, 2003). E-governance is the public sector's use of information and entails the digitized coding, processing, storage and distribution of data relating to three key aspects of governing societies: the representation and regulation of social actors; the delivery of public services; and the generation and circulation of official information (Coleman, 2008).

Across the world, 173 of 190 countries use the Internet to deliver government services. A comparative study of the E-Readiness Index of the first five West African countries performance in the 2004, 2005 and 2008 UN global e-government survey was carried out. Table 1 presents the Global ranking and Index of the first five West African countries out of a total of 192 UN member countries surveyed and it can be seen that Nigeria is steadily rising though slowly in its e-readiness but this snail pace is due to a variety of reasons amongst which are credited to the use of proprietary software as would be later discussed. Hence, the need for open source and the benefits it can bring to the nation's economy cannot be over-emphasized.

Table 1: West African countries e-government readiness index 2004/2005/2008 (Source: Adeyemo, 2011)

		Index 2004	Index 2005	Index 2008	Global ranking in		
					2004	2005	2008
1	Cape Verde	0.3442	0.3346	0.4158	107	116	104
2	Nigeria	0.2485	0.2758	0.3063	141	139	136
3	Ghana	0.2369	0.2758	0.2997	143	133	138
4	Senegal	0.2328	0.2238	0.2531	145	153	153
5	Gambia	0.171	0.1736	0.2253	162	163	159

Table 2: Nigeria e-readiness/e-participation index 2004/2005/2008. (Source: Adeyemo, 2011)

Year	Web measure index	Infrastructure index	Human capital index	E-gov. readiness index	E-gov. readiness rank	E-participation index	E-participation rank
2008	0.2241	0.0492	0.648	0.3063	136	0.0682	116
2005	0.2231	0.0143	0.59	0.2758	139	0.0794	39
2004	0.143	0.013	0.59	0.248	141	0.0656	33

Types of Service Delivery in e-government

The quest to improve service delivery through the use of ICTs in governments typically focuses on four main dimensions. These are:

1. **G2C (Government-to-Citizens):** This focuses primarily on developing user-friendly one-stop centers of service for easy access to high quality government services and information.
2. **G2B (Government-to-Business):** This aims to facilitate and enhance the capability of business transactions between the government and the private sector by improving communications and connectivity between the two parties.
3. **G2G (Government-to-Government):** This is an inter-governmental effort that aims to

Improve communication and effectiveness of services between federal, state and local governments in the running of day-to-day administration. It generally aimed at improving the efficiency and effectiveness of overall government operations.

4. Intra-government: This aims to leverage ICT to reduce costs and improve the quality of administration and management within government organization (Islam and Ahmed, 2007).

OPEN SOURCE AND PROPRIETARY SOFTWARE

The history of open source software began with the early stages of computer and software development. It dates back to the 1960s when computers were first used as research tools in universities. At that time, software was freely passed around between programmers in different labs. Programmers were paid for the act of programming, not for the programs they created.

Later, however, when computers reached the business world and profit making was uppermost on most minds, programmers began to support themselves by restricting the rights to their software and charging fees for each copy. Open source software is very popular because its source code is open to all but the question that has always plagued the mind of several individuals is what makes a software open source or free software?

Bruggink (2003), described open source/free software (OSS/FS) as the software which may be copied and used freely. Open source/free software (OSS/FS) is the software where users have the freedom to run, copy, distribute, study, modify and improve the software, and the source code is freely available. Open source/free software is often available free of charge on the Internet so it can be acquired only at the cost of downloading it or obtained on CDs at packaging cost. The most popular open source software is the GNU/Linux operating system.

Proprietary or 'closed' software on the other hand is owned by a company or individual. Copies of the 'binary' are made public but the 'source-code' is not usually made public hence modifications cannot be made to it.

Open source software is thus considered to have a potential impact for knowledge acquisition by developing nations. Combining free software tools with the technical work force available in developing countries can enable technology transfer. The essence of open source is not the software; it is the process by which software is created.

Milestones in the history of open source Software is:

1983 - Richard Stallman formed GNU project.

1985 – Creation of Free Software Foundation.

1991 – Development of Linux kernel by Linus Torvalds.

1998 – Open Source Initiative (OSI) formed by Eric Raymond.

The two terms, “free” and “open source” has been used synonymously for free distribution of software’s. Popular licenses used for this purpose are the GNU General Public License (GPL), BSD license, GNU Lesser General Public License, MIT License, Mozilla Public License and Apache License. All these licenses have some differences in their terms and conditions; they ensure users freedom to use, copy, distribute and improvement of software.

There are many theoretical approaches that try to explain the phenomenon of open source but still no generally agreed well defined standard development model for open source software exists. Several open source development model exists but Ming-Wei Wu and Ying-Dar Lin proposed a development model for open source by incorporating the open source licensing and version control as shown in figure 1 below

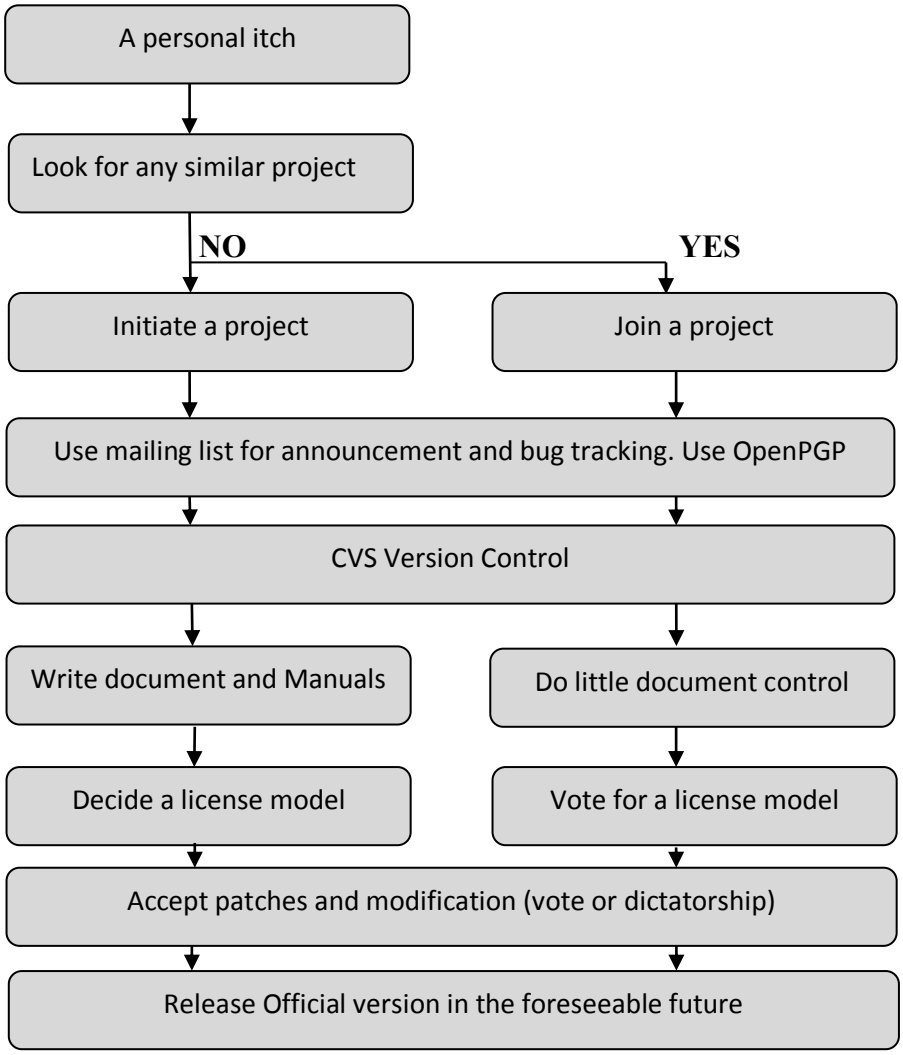

Figure 1: Open source system development cycle (Source: Wu and Lin, 2001)

COMPARISON BETWEEN OPEN SOURCE AND PROPRIETARY SOFTWARE

The table below shows the comparison between open source software and proprietary software under different factors.

Table 3: Comparison of OSS and Proprietary software (Source: Alam, 2012)

	Open Source Software	**Proprietary Software**
COST	Open source software is free	Have to pay to the company or software owner.
Service and support	Relies on online Community users and developers to deliver support via forums and blogs	Service and support provided by vendor.
Ownership of the Software	No ownership, Because it is developed by the community around the world	Organization or vendor who created it.
Modification the source code	Modification is possible; any user can modify the source code.	Modification cannot be done by the user or client except creator or Vendor.
Security/Bug liability	No specific individual	For any kind of program bugs, vendors take the liability.
Redistribution	Possible	Not allowed

SOME AVAILABLE OPEN SOURCE SOFTWARE AND APPLICATION

The table below shows examples of OSS/FS and their purpose.

Table 4: Examples of OSS/FS tools and their purpose (Source: Baguma, 2010)

Software Category	OSS/ SF	Purpose
Operating system	Linux	Desktop & server operating system
Web development	PHP, Apache web server, page tool	Web development , hosting and content management
Internet access	Mozilla	Web browsing
Database management systems	Mysql	Database development and management
Anti -virus	Clam, ClamWin	Virus, worms and trojans detection and cleaning
Office productivity	Open off ice	Word processing, spreadsheets and presentations
Geographic information system	Chameleon, FTools	For finding/getting locations

HOW SECURE IS OPEN SOURCE?

The word open in "open source" has brought about certain misconceptions about the security of open source software amongst several individuals. The question on the minds of many is usually, how secure is open source software? It would come as a surprise to many that open source software are actually more secure than proprietary software's. Open source software also has its flaws but the advantages far outweigh the disadvantages. As earlier discussed, the word open means free but the fact that the software is free/cheap doesn't make it less secure and there are several reasons behind this. Open source software enables anyone to examine the software for

security flaws since the source code is open to registered users of the community that has decided to dedicate their time and expertise towards making the software good and reliable. The continuous and broad peer-review enabled by publicly available source code improves security through the identification and elimination of defects (bugs) that might otherwise be missed. If an update or a better version of the software is available, users can choose to study the code and see if the update is bug free, necessary and beneficial to them at no cost. Proprietary software on the other hand does not make the source code available and it is often difficult to tell if it is bug free since it is not open to continuous peer review by developers. Also, any update done on any proprietary software attracts a certain cost.

HOW OPEN SOURCE CAN BENEFIT THE NIGERIAN ECONOMY

In Nigeria currently, e-government is beginning to see the light of the day as several steps are being taken to digitize government functions .So far only a few of these government functions have been digitized but plans are underway for full digitization and improvements are being made with each passing day. An example is the last election conducted in Nigeria. The use of card reader for authentication is a giant step in the digitization process and this brought about several advantages such as reduction in data redundancy which discouraged double voting since information concerning individuals was stored in a database and such databases were normalized using appropriate foreign keys.

Also, the Government of Nigeria is getting considerable foreign co-operation in terms of financial assistance and technical collaboration for realization of e-Governance on a national scale. For implementing the various initiatives and projects concerning e-government government is using different types of proprietary software and spending large amount of money to buy proprietary software for these projects. For this purpose the government can use open source software for implementing these projects and the government as well as the citizens can benefit in many ways which are discussed below thereby leading to rapid economic growth and development.

Finance

Large amount of money can be saved by the government if the government uses open source software in different IT sectors of government offices and other sectors. This makes OSS/FS a

far more cost-saving option as opposed to proprietary solutions and thus makes it possible for the government to finance and invest in other areas like agriculture which could lead to an increase in gross domestic product resulting in overall economic growth of the country.

Skilled Manpower

Government is trying to involve the people of Nigeria with the project of e-Governance. It can be easy for the government if they use the open source software in all aspect of their projects so that people get the opportunity to see and modify the source code of the software and get the option of performing practical's instead of spending too much time reading theories and trying to grasp the concept behind such theories. As a result government can get some skilled IT individuals who would become valuable asset for the country.

Increased job opportunities/Employment

Unemployment problem is a major issue for any developing country. Nigeria is facing this problem on a large scale. If the government runs all the projects using open source software then government can recruit many people to develop and manage the projects. As a result a large number of educated people will get the opportunity for doing the job with modern technology like IT. For this reason unemployment ratio can be decreased day by day which will bring about increased job opportunities

Revenue generation from other sectors

Government has to expend huge amount of money in different development sectors of the country. For this reason, government has to depend on many developed countries, World Bank, IMF or European Union for running any project.. So if the government implements the full project using open source software then government need not necessarily depend on World Bank or others for their investments and the government can easily divert capital and invest in other sectors or development project.

Reduced level of corruption

The use of open source software for electoral processes will reduce the rate of corruption because it will discourage the usual rigging and stealing of ballot paper that has become the order of the day in almost all elections that has ever been conducted in this country. Also, facts and figures that has been altered will easily be detected by skilled and experienced individuals who will be able to ascertain if any form of foul play has been committed or not.

Other benefits include easier administration, increased transparency, diffusion of technology/technology transfer, Security amongst others

WAY FORWARD OF OSS USE FOR E-GOVERMENT

There is need to provide strategic and technical information geared to the needs of IT decision-makers about OSS/FS in relation to the following:

• Supporting decision-makers with decision models, toolkits and case studies relating to choice of technology and system migration in different contexts.

• Getting the message across that Linux and open source software in general are increasingly user-friendly and easy to install.

• IT training institutions should also incorporate in the curriculum OSS/FS training to increase the support skill base for OSS/FS.

RECOMMENDATION

Government should encourage the use of open source software with powerful functionalities especially for electoral processes and even other sectors by enlightening individuals and corporate bodies through workshops, seminars, training and other related activity that would expose individuals to the advantages of using OSS which in itself is an alternative to developing and deploying cost effective and sustainable e-governance solutions towards rapid development of the Nation's economy.

CONCLUSION

OSS/FS has great potential for low-cost, flexible and reliable e-governance implementation but to exploit its potential fully, there is need for stakeholder collaboration and augmentation of one another: namely governments should work with the OSS community, educational institutions and other goodwill promoters to groom local expertise and set up local focal points for distribution of the software, user awareness and sensitization for a wider adoption and appreciation of OSS/FS in order to promote rapid economic development.

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