

EXPERIENCES OF OPEN SOURCE SOFTWARE IN INSTITUTIONS: CASES FROM TANZANIA AND NORWAY

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Abstract: Despite the wide spread adoption of Open Source Software (OSS), there are continuing debates over the competition between OSS and proprietary software. Proponents of open source software contend that developing countries find ICT to be too expensive to afford but with Open Source Software they will manage to leap frog and address the digital divide. We found it useful to establish more evidence of the usefulness of open source software. In this study, the consequences of adoption and use of OSS was investigated in a cross sectional interpretive case study in selected Institutions in Tanzania and Norway. The empirical material suggests that OSS products are enterprise dependent software. They lower ICT expenditure, support open standards implementation, and promote creative knowledge on the use of local languages.

Keywords: open source software, ICT in public sector, zalongwa, kilinux, Tanzania, Zanzibar

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1. INTRODUCTION

The public become familiar with Open Source Software (OSS) concepts with the success of Linux Operating System. As a result, OSS has generated much interest among researchers and practitioners. OSS development approach claims to improve the timeliness and effectiveness of software development and support for demanding applications run by large organisations (Isene, 2005; Simon, 2005; Weber, 2004). Proponents of open source software contend that developing countries find ICT to be too expensive but with open source software they will manage to leap frog and address the digital divide (Lungo, 2005a; Schmidt, 2005; Weerawarana & Weeratunga, 2004). However, there is much hype about open source software and existing studies on the use of OSS in public organisations (Schmitz, 2001; Wichmann, 2002) are a bit old when compared to the pace of ICT advancements. We found it important to establish more evidence of the usefulness of OSS. Our study aimed to give both: evidence of use and reasons for use of OSS in public sector establishments. This study is an interpretive case study organised around four research questions:

- *How are the performances of Open Source products perceived after installation and use?*
- *Is there any consequence on ICT expenditure after adopting Open Source Products?*
- *Is the organisation depending on external supplier or internal staff to support ICT functions?*
- *What are the most common Open Source Products used in the organisation?*

The public sector is the main source of funds particularly in developing countries. In addition, the public sector hosts large information systems which demands serious IT solutions. Our main assumption is that if the public sector found OSS as useful as proprietary software products, it is an indication that OSS is mature enough to be trusted.

The remainder of the paper is organised as follows: In section 2 we present theoretical perspectives. In this section we describe the cathedral and the bazaar theory, total cost of ownership and open standards concepts. Section 3 presents research settings and methodology. Section 4 is the findings and discussion. In the last part, section 5, we formulate the concluding remarks.

2. FREE AND OPEN SOURCE SOFTWARE

2.1 Definitions and Concept of Free and Open Source Software

The restriction of rights to software and charging fees for each copy of software are the main characteristics of 'proprietary software'. Proprietary software means software that is owned by someone or an organization, who exercises control over the software by putting restrictions on use and copying of the software. The prevention of use, copying, or modification can be achieved by legal or technical means. Technical means include releasing machine-readable binaries only, and withholding the human-readable source code. Legal means can involve software licensing, copyright and patent law. Proprietary software put the owner as of prime importance, in contrast to 'free software' in which the freedom of computer users is of prime importance.

Free Software as a political idea has been popularized by Richard Stallman since 1984, when he formed the Free Software Foundation (FSF, 2006a) and its GNU Project (FSF, 2006c). The

freedom envisioned by FSF which was formalised in the General Public License (GPL) concerns four freedoms to (FSF, 2006b):

- (0) run the program, for any purpose;
- (1) study how the program works, and adapt it to your needs;
- (2) redistribute copies so you can help your neighbour; and
- (3) improve the program, and release your improvements to the public, so that the whole community benefits.

Klang describes the term "free software" as including a philosophy, an understanding that software is an important building block in the information society and that the control of this infrastructure needs to remain accessible to all (Klang, 2005). However, opponents of FOSS see the FSF's GPL license being constraining the user since it requires any derivative to be licensed under the same terms (Rosen, 2004).

In 1998, the Open Source Initiatives (OSI) movement was launched with the term 'Open Source Software'. The Open Source definition includes many of Stallman's ideas. Explaining open source and the way open source works, Weber argues that, the philosophy of open source is not the software. It is the 'process' by which software is created (Weber, 2004). For example, today there is ongoing Open Source Car (OSCar) project (Tucci, 2000). Klang (2005) describes the essence of open source as a software development model acceptable to corporate developers, who had been reluctant to adopt a methodology connected to the 'free software'. The Open Source definition coined by Perens (2005) defines nine terms of rights that a software license should conform in order to be certified as Open Source Software (OSS). The terms of OSS definition are summarized in Table 1.

Terms of Open Source Software	Description
Free Redistribution	Any one can make any number of copies of the software, and sell or give them away, without paying anyone for that privilege
Source Code	The intent here is for source code to be distributed with the initial work, and all derived works.
Derived Works	The intent here is for modification of any sort to be allowed. It must be allowed for a modified work to be distributed under the same license terms as the original work.
Integrity of The Author's Source Code	This gives a way to enforce a separation between modifications and original author's work without prohibiting modifications.
No Discrimination Against Persons or Groups	Open Source Software license must not discriminate against any person or group of persons.
No Discrimination Against Fields of Endeavour.	The license must not restrict anyone from making use of the program in a specific field of endeavour.
Distribution of License	The license must be automatic, no signature required
License Must Not Be Specific to a Product	The rights attached to the program must not depend on the program's being part of a particular software distribution
License Must Not Contaminate Other Software	The license must not place restrictions on other software that is distributed along with the licensed software
Example Licenses	The GNU GPL, BSD, X Consortium, and Artistic licenses are examples of licenses that are considered conformant to the Open Source Definition.

Table 1: Terms of Open Source Software Definition (Perens, 2005)

OSS rights address the rights of users as well as the rights of programmers. This provides users with the option of providing their own support, or the economy of a number of competing support providers. The fact that any programmer can tailor an Open Source program to specific markets in order to reach new customers adds strength to the open source movement. This is because people who do these things are not compelled to pay royalties or license fees to the original author of the software.

Although there are some ideological differences between Free Software Foundation (FSF) and Open Source Initiative (OSI), in this paper we treat the two schools of thought as the same. We only focus on the differences between proprietary software and free open source software.

2.2 The Cathedral and the Bazaar Theory

The cathedral and the bazaar theory (Raymond, 2001) state that proprietary software production is a carefully planned building of a cathedral while OSS production is a chaotic interactions of participants of an oriental bazaar. This gives hints to a major difference between the two types of software development: strong powerful management on one side (i.e. proprietary) and loosely related developers and users organised in several thousand seemingly interdependent projects on the other side (i.e. open source). The Cathedral and the Bazaar theory is a means of communicating the core aspects that philosophers would call the research programme hardcore theory (Lakatos, 1970) of the OSS. Three concepts of cathedral and bazaar are important in distinguishing OSS characteristics and performance. Raymond (2001) describes those concepts as follows:

- (1) *The simplification of resolving software bugs, 'given enough eyeballs, all bugs are shallow'*
- (2) *Referencing to Linux as one of the bazaar development model and mentioned that "Linus Torvalds' style of development [is:] release early and often, delegate everything you can, be open to the point of promiscuity"*
- (3) *The claim that open source software development creates high quality software products where "quality was maintained not by rigid standards or autocracy but by the naively simple strategy of releasing every week and getting feedback from hundreds of users within days"*

Our stands on the cathedral and bazaar assertions are that, they were aimed at distinguishing OSS development from that of proprietary software development approaches. However, this does not imply that all OSS development take the same path. Thus, we refer to the cathedral and bazaar as a theoretical presentation of OSS development. For example, the cathedral and the bazaar simplification of software debugging process by claiming 'given enough eyeballs, all bugs are shallow' (Raymond, 2001) is a critical assertion in free and OSS. In the cathedral and the bazaar, the assumption is that several talented developers can successfully work on the same piece of code in parallel without much coordination and will eventually fix a bug quickly, but this is not always the case.

The Cathedral and Bazaar theory was one of the main promoters of FOSS ideas and influenced individuals as well as companies to rethink open source software, including government owned institutions. Perhaps this theory aimed at appealing and enticing its readers and hence it required attractive writing style.

2.3 Total Cost of Ownership in Open Source Software

The decision to introduce new software in an organisation begins with cost calculation. Total cost of ownership of a software may cover not only the selling price of the software, but also any cost that is caused by the decision to install the software in the organisation (Evers, 2000; Samuelson, 2006). Thus, the economic of free OSS should consider among other things the costs incurred for activities presented in Table 2.

Activity	Description
Purchase	this is the selling price of the software (in case the software is delivered for free – without pay)
System Setup	additional hardware and software required to facilitate smooth running of the software
User Training	extra money should be spent for training users and therefore provide them with additional skills in order for them to use the system smoothly
User Support	in the case where the training was not able to deliver all required skills to users, additional support costs is required
Updates	after a system is put into use, software update might be required to fix bugs and introduce new features. These updates have cost implications

Table 2: Items to be considered in calculating Software Total Cost of Ownership (TCO)

On the other side, individuals and companies who develop open source software could easily give away their software products and concentrate on making profit with related services and support. That is, their business is based on the knowledge gained in developing the software and their popularity as the original authors. With this model of not focusing on the selling price of the software but on its related products, many make money with activities described in Table 3.

Activity	Description
Software Distribution	distributors make life easy for users who are willing to pay a small amount for comfortable access to the software.
User Support	support range from disaster recovery, backups, training to bug fix
Hardware drivers	developing hardware drivers
Information	publishing books, magazines, news tutorials and software manuals

Table 3: Sources of Profit in Open Source Software

2.4 Open Source Software Supports Open Standards

A standard, as defined in the concise Oxford English Dictionary, is ‘a level of quality or attainment’ (Soanes & Stevenson, 2004). From the financial point of view, a standard may be defined as an agreement between a number of players within a certain area of technology (NITA, 2004). In the IT industry the players are software developers and hardware vendors. Standards are of two kinds: market created standards (*de facto*) and standards introduced by a recognised standardization body (*de jure*). NITA¹ (2004) define a *de facto* standard as the one which is introduced by a market player and establishes itself as the – or one of the – dominant standards without the backing of official standardisation bodies. A *de jure* standard is drawn up by a recognised official standardisation body. Standards have two characteristics: proprietary and open standard. Open source supports the implementation of open standards in IT technologies through addressing inter operability among the technologies. Open standards is the choice of many government owned establishments. For example, the UK government insist on interoperability through mandatory compliance with electronic-Government Interoperability Framework (e-GIF) (OGC, 2004).

¹ The Danish National IT and Telecom Agency

In summary, four main concepts from the literature form the base of our paper: (1) the definition of free and open source software, (2) OSS use Bazaar development approach; (3) OSS has a low initial total cost of ownership and (4) OSS supports open standards. These are the driving forces underlying OSS development and philosophical features.

3.0 RESEARCH METHODOLOGY

The research presented in this article is based on an interpretive approach to case study. We have chosen this case study approach because we wanted to investigate Open Source Software phenomenon within its real life context in organisations. Throughout the study, we were flexible in questioning similar themes to overcome subjective observations (Lincoln & Guba, 1981). The large amounts of verbal information became easy to analyse using empirical material summaries and concepts from grounded theory (Glaser & Strauss, 1967; Orlikowski, 1993; Pettigrew, 1989) where data codes and categories were largely developed from the data. In addition, direct quotes (interviewee excerpts) were used to bring out actual voices from the informants.

Research Settings

Six months in Norway (September 2005 – February 2006) and five months in Tanzania (March 2006 – July 2006) were used to collect empirical material from a total of eight organizations, four in Tanzania and four in Norway. The organizations and the number of informants involved from each country are presented in Table 4.

Country	Setting	Informants
Tanzania	Tanzania Commission for Universities (TCU) ²	4
	University of Dar es Salaam (UDSM) ³	6
	National Council of Technical Education (NACTE) ⁴	4
	National Examination Council of Tanzania (NECTA) ⁵	6
	Sub-total	20
Norway	Hurum Municipal (HUKO) ⁶	5
	Sarpsborg Municipal (SAKO) ⁷	2
	University of Oslo (UiO) ⁸	6
	Agder University College(AUCO) ⁹	5
	Sub-total	18
Grand-total		38

Table 4: The Research Settings

² Website: <http://www.heac.go.tz/> [Accessed 11th September 2006]

³ Website: <http://www.udsm.ac.tz/> [Accessed 11th September 2006]

⁴ Website: <http://www.nacte.go.tz/> [Accessed 11th September 2006]

⁵ Website: <http://www.necta.go.tz/> [Accessed 11th September 2006]

⁶ Website: <http://www.hurum.kommune.no/> [Accessed 11th September 2006]

⁷ Website: <http://www.sarpsborg.com/> [Accessed 11th September 2006]

⁸ Website: <http://www.uio.no> [Accessed 11th September 2006]

⁹ Website: <http://www.hia.no/> [Accessed 11th September 2006]

In line with the technique of theoretical sampling presented by Glaser and Strauss (1967), the eight institutions were selected for their similarities as well as their differences. All settings have common characteristics: they store large amount of data and are using or intend to use OSS products in their critical systems. Theoretical sampling requires paying attention to theoretical relevance and purpose. With respect to relevance, the selection process of settings ensured that the substantive area addressed and the adoption and use of FOSS are kept similar. In addition, the FOSS themselves, while not identical, were compatible across all organizations in that they are of two categories: infrastructure software and application software. Infrastructure software includes software platforms like database management systems; operating systems; web server; and email server systems. Application product includes applications like email client systems; web browsers; office application suites; and bespoke application software that support user interactions with computers.

Data Collection Methods

Selection of organisations to be included in the study was done through snow ball sampling. In Norway, first we started to approach a course lecturer who teaches an Open Source course at the department of Informatics, University of Oslo. That lecturer helped us to identify municipalities which have a substantial installation of OSS products. Similar approach was followed in the Tanzanian case study. In all research settings, data were collected through different methods: unstructured and semi-structured interviews, documentation analysis, participant and passive observation. These sources of data are presented in order to illuminate how data were collected, with which criteria and in what quantity.

Interviews: Walsham (1993) submits that probably the most important source of information for interpretive study is constituted by interviews. We have conducted 38 interviews where each interview session lasted for 45 minutes in average but interviews with system administrators (IT professionals) took longer than non IT professionals. In each organisation we visited, the informants were from lower to upper carders. Again informants were selected strategically in order to interview those who are involved in OSS implementation and use. An interview guideline questionnaire we used in this study is attached as appendix.

Observation: In some organisations we visited, we were able to observe users using OSS products including email client programs. We were also shown servers where OSS server side software are installed. Observation was an important part of the study since it confirmed what we have been told by the informants.

Documentation Analysis: While visiting the organisations, we have collected documents: Organisational ICT policies, ICT Project documentation and ICT project proposals. Also we have collected meeting resolutions which approved installation and use of OSS products.

This triangulation of data collection provides multiple perspectives on issues, more information on emerging concepts, allows for cross-checking, and yields stronger substantiation of constructs (Glaser & Strauss, 1967; Orlikowski, 1993). Data collection focused on the topics of ICT policy, FOSS products, performance of FOSS Products, ICT Expenditure, key players, and change process, and sought information on, among other things: type of software application domain, number of users/stakeholders, and impacts associated with use of the FOSS. Data collection, coding, and analysis proceeded iteratively (Glaser & Strauss, 1967) with the early stages of the research being more open-ended, and later stages being directed by the emerging concepts, and hence involving more strategic selection of informants and more structured interview protocols. In this study the primary unit of analysis was the organization or organizational department where the software is installed. To complement users' views towards open source products, the interviewees of the study are from different occupations in their respective organisations. Table 5 presents occupation and number of interviewees involved in the study.

POSITION/OCCUPATION	Informants
University Vice Chancellor	1
University Chief Academic officer	1
Dean of Faculty	5
Director/Head of Units	6
Project Manager	2
Systems Administrator	13
Office Secretary	4
University Students	6
Total	38

Table 5: Type of Interviewee Involved in this Study

Other sources of data are from our own experiences as IT professionals working at higher learning institutions: University of Oslo and University of Dar es Salaam. Our past experience provided insight in evaluating informants' conversation and analysing the documents from the fields. The first author is a young faculty member at the University of Dar es Salaam also involved in several OSS project such as the University of Dar es Salaam Student Information System known as ZALONGWA¹⁰. His experience was valuable in this research while conducting interviews with project managers and systems administrator on the potential and limitations of OSS products. The second author is a long experienced professor of Informatics at the University of Oslo. Being in the IT profession for years, he was able to link OSS development from the time when OSS was a just a hype to when OSS products delivers real achievements. As academicians, the authors were able to bring theories and practical experiences to the study.

4.0 FINDINGS AND DISCUSSION

Generally this study revealed an increasing interest of the public sector towards OSS. At the beginning of the fieldwork, we were motivated that since many workers in public sector depend on the central government to pay for ICT infrastructure and software in particular; individual workers can never feel the pressure to lower ICT expenditure. Also, we assumed that since OSS becomes an alternative method of the long lived concern for realising software projects, the public sector would perceive OSS products immature with un-acceptable performance in large and critical systems of the public sector. The research findings inform our two earlier premises as untrue: OSS products perform better and now large systems are migrated to Open Source based products; and yes, individuals in public sector feel the pressure to lower ICT expenditure and they make use of any opportunity available including adopting and using FOSS products.

4.1 Open Source Software Development Produce High Quality Software

In this study, we sought to find out availability of established ICT Policy and where ICT policy/strategy exist we evaluated its content to determine whether it addresses the ICT

¹⁰ Website: <http://www.zalongwa.com>

infrastructure. The evaluated ICT policies/strategies were found to address ICT infrastructure to some extent. We identified that the most Open Source based Infrastructure Software products in use are Linux, MySQL, PostgreSQL, PHP, Java, IMAP Server (Sain) and Apache. The main Application Software Products include OpenOffice.org, Mozilla/Firefox, Squirrelmail and Mozilla Thunderbird mail client (Norwegian version). This implies that OSS products are of high quality. This study confirms the maturity of OSS products when it reveals that there are large and critical systems being powered by Open Source Products.

In Tanzania, the Tanzania Commission for Universities (TCU) currently uses Microsoft Spreadsheets and Tally Software to manage student records and to detect duplicates of records respectively. However, TCU has contracted a private company to develop its first student record database using Open Source technologies. At the University of Dar es Salaam (UDSM), KiLiNuX is an exclusive open source software project which translates OSS products like Linux into local Kiswahili language. Also, UDSM in collaboration with international partners runs other FOSS related projects, for example the Health Information Systems Project (HISP). As an academic institution student records are vital and critical data. UDSM uses FOSS based software to manage its student records known as ZALONGWA. The National Council for Technical Education (NACTE) was known for having large database in Oracle database management system, but its recent switching to an open Source database management system, MySQL, is a clear indication that OSS are dependable products. NACTE confess that the administration of oracle servers is complex when compared to MySQL which delivers satisfactory performance.

Since 1985, the National Examination Council of Tanzania (NECTA) has been running its database on a main-frame computer, WANG. In 2006, NECTA saw its WANG as an obsolete technology and a threat to loss of data. Alternatively, NECTA is investing in Linux Servers and has already trained its systems administrator on working with LAMP (Linux, Apache, MySQL, and PHP) systems. When asked why LAMP now, the director said the following:

“...the way we are locked to WANG we do not like it to happen again. We need a flexible system that will allow us to have large pool of expertise. The current technology is locking us to depend on one developer” (Director, NECTA, 14.07.2006).

In Norway, we found large cases of OSS deployment. The e-learning system called ClassFronter¹¹ was migrated from Oracle Database to MySQL database. While the motivation of migrating ClassFronter System from Oracle to MySQL was because of lack of support of Oracle database, one informant narrated:

“The system administrators observed that the performance of the system in the MySQL outweigh that of Oracle database, now it have fewer downtime points than before” (Director, UiO, 3.2.2006)

The student information systems (StudentWeb), also hosted by the University of Oslo but being used by all higher learning institutions in Norway is powered by MySQL database. StudentWeb stores students' examination results, among other things, and is the only system which informs all students about their examination results. That is to say each student has to have an account in the StudentWeb. While MySQL database management system can be installed cross platforms, this study found that all systems using MySQL (both in Tanzania and Norway) are stored in Linux servers. Explaining the performance of Linux servers, a database administrator at the University of Oslo narrated:

“All our mail servers and many database servers run Linux operating system. Linux Servers are stable and do not re-boot frequently” (Database Admin, USIT, 2.2.2006).

This feature of Linux servers was also noted in Tanzania:

¹¹ Website: <http://fronter.info/com/> (NB: classfronter is not open source but it uses MySQL database)

“Linux servers are hard to configure, but once they are, they work better for they do not crash frequently even in case of viruses” (System Admin, UDSM, 16.06.2006).

In Norway, there is a project making use of Open Source Products in schools. This project is called ‘SkoleLinux’ has over two hundred schools using their products.

4.2 Open Source Software Products Lowers ICT Expenditure

In Tanzania, the main justification of launching and running the KiLiNux project is that, with OSS, Tanzania will leap frog the digital divide for it will afford cheap yet effective IT solutions (Suárez-Potts, 2004). The argument is that customised software and translated in Kiswahili language in order to be used in Tanzania could have been very expensive if they were proprietary software. In an action research study on implementation of OSS in education and health sector, it was established that the education sector made large serving of money (Lungo, 2005b; Lungo & Sahay, 2005). It is reported that, a total amount of USD \$ 414,000 was served when a prominent university switched to OSS (Lungo, 2006).

In this study we found that OSS lowers ICT expenditure in three main aspects: hardware, software and support. Linux Operating systems delivers desirable performance like other specialised server side operating systems like UNIX and HP, yet it runs on less demanding hardware. While specialised Server Operating Systems require specialised hardware which are produced at high cost and thus become expensive, Linux operating systems run on low level servers and hence on cheap hardware. This results into lowering of hardware expenditure, as one interviewee commented:

“The best thing with Linux is the fact that it runs on any Intel inside servers which are produced in large quantity and thus become cheap” (System Admin, USIT, 2.2.2006).

Thunderbird and Squirrelmail (the free OSS mail clients), has been a substitute of Eudora mail client at the universities studied. OpenOffice.org, though in limited use, but it serves some significant money which make a difference compared to using Microsoft Office 2003 in all PCs at the organisations studied. While MySQL is now replacing Oracles in powering critical systems, MySQL is free of charge (sometime comes already pre-installed in Linux servers), while Oracle license stands in the order of thousands US Dollars, see Table 6. Most of the organisations studied have thin-client computers. The client PCs can boot with windows or Linux operating systems. However, with Linux the client PCs can use free bios system to connect to the server and boot, thus lowering the hardware purchasing costs. When asked to estimate the percentage of which OSS lowers ICT expenditure in his municipal, the Manager of IT operations at Sarpsborg municipal simply put it, ‘50%’. This confirms that OSS do lowers Software expenditure.

Supporting OSS requires validating and testing the authenticity of software updates and releases due to frequent updates and quick bug fix model of software development. It may be seen that this could make software support services to become more expensive than proprietary software. Surprisingly, all visited sites appreciate the low costs offered in supporting software products. At the University of Oslo, they have signed supporting contracts with Redhat to support Linux operating system and MySQL AB to support MySQL databases. These contracts ensure that the University gets authentic versions and updates of the respective products. The University of Oslo also has comparative support contracts with Microsoft and Oracle on Windows Operating System and Oracle Database respectively. An interviewee in this study revealed that, although academic institutions have best deal with Microsoft and Oracle corporations, the amount being paid to MySQL AB and Redhat is negligible when compared to that being paid to Microsoft and Oracle even when divided into the same number of servers. At Hurum municipal, they also have a support contract with a small company called FreeCode. Again the interviewees there claimed that, FreeCode is an Open Source company which offers good service at low costs than any other company. We

therefore conclude that, ICT expenditure related to Software support could be lowered at large if an organisation switch to FOSS products.

Category	Proprietary Product		Free Open Source Software	
	Software	Price (USD)	Software	Price (USD)
Operating System	Windows 2003 Server	3,919 ¹²	Redhat Enterprise Linux AS 2.1 Server	1,545 ¹³
Office Application	Microsoft Office 2003	499 ¹³	OpenOffice.org	0 ¹⁴
Database Management Systems	Oracle Enterprise	40,000 ¹⁵	MySQL	4,995 ¹⁶
	Microsoft® SQL Server Enterprise Edition 2005 Win32 English CD/DVD 1 Processor License	24,999 ¹³		
Web server	Microsoft Internet Information Server		Apache	0 ¹⁷
Email Client	Microsoft Outlook		Mozilla Thunderbird	0
	Qualacomm Eudora	19 ¹⁸	SquirreMail	
Programming Languages	Microsoft Visual Studio2005	799 ¹³	Java	0
			PHP	0
			Perl	0

Table 6: Price list of open source software products and proprietary software products

4.3 Importance of Software Dealers Due to the Bazaar Model of Software Development

In this study, we investigated how the public institutions acquire OSS. The study informs that all OSS serving a serious mission in the institutions were obtained from trusted software dealers and companies. To mention some, Linux operating system is distributed by Redhat, MySQL comes from MySQL AB, SkoleLinux and FreeCode are another sources of open source products. The impression we got here is that, OSS has to pass through dealers/agents, who test, validate the performance and authenticity of those products. The tendency of using agents to get open source products empower public establishments to approach OSS with confidence, as they believe that somebody is responsible for ensuring the quality of the software. At Agder University College, one interviewee explained:

“when a windows application crashes, it sends a lot of information to Microsoft, and I doubt if they make use of all that information to track application bug, if it was open source we could know what all those information is all about. This is because with open source, we can check the codes, even if I don't check the codes, but someone out there is checking the codes” (Systems Admin, Agder College, 3.02.2006).

¹² Price list as at <http://www.microsoft.com/products/> [accessed 24th October 2006]

¹³ Price list as at <http://shopping.msn.com> [accessed 24th October 2006]

¹⁴ Price list as at <http://www.openoffice.org> [accessed 20th October 2006]

¹⁵ Price list as at http://www.cintra.com/us_licensing_price.html [accessed 20th October 2006]

¹⁶ Price list as at <http://shop.mysql.com/enterprise> [accessed 20th October 2006]

¹⁷ Free download from <http://apache.org> [accessed 24th October 2006]

¹⁸ Price list as at <http://www.eudora.com/> [accessed 25th October 2006]

This narration emphasises the importance of OSS agents to check the codes of the application. Users need to be assured that the software has been tested and is working fine by someone they trust.

4.4 Open Standards Add Value to Open Source Software Applications

The organisations manage large number of PCs and Servers which come from different vendors. It is impossible to force all departments and units of the organisations to implement the same Application Software, say Office Application and Operating Systems. Due to diversity of the ICT infrastructures in these establishments, inter-operability is a key issue. On the one hand, systems administrators interviewed agreed that organisational units can buy hardware from any vendors, but in all cases administrators encourage interoperability among the hardware. On the other hand, in publishing information, 'pdf' and 'html' documents are used instead of '.doc' and '.ppt' format in order to support access to all users with different computer platforms. Thus, since OSS supports open standards, this adds values as they are seen as a means of overcoming interoperability dilemma in organisations. For example, OpenOffice.org ships with a PDF converter capability.

4.5 Open source software Promotes use of Local Languages in ICT Products

In Tanzania, two projects studied at the University of Dar es Salaam are engaging in translating software to local languages. KiLiNux project translates several OSS including OpenOffice.org Office suit, Mozilla Fire Fox web browser and Linux operating system. The project is a success story which won a prize in the Stockholm Challenge 2006 in Education Projects (SCA, 2006). The University of Dar es Salaam also runs a Health Information System Project (HISP) in collaboration with other partners. In the HISP project, the software used as a health data storage and analysis tool is developed and translated into Swahili. At the time of writing, the HISP software is installed in all district medical offices and some hospitals in Zanzibar as well as few district medical offices in Tanzania Mainland. The study also found Thunderbird main client in Norsk language in Norway. The skolelinux project in Norway has its school application software bundle in local languages. This concludes that, OSS facilitates the use of local languages because those who translate the software are not necessarily the ones who developed the software. As long as the software source codes are available, translation to local language can take place when need arises.

5.0 CONCLUSION

The study reveals evidence that organisations using open source software find the performance of their products satisfactory to do the intended job. OSS products are cheaper software which avoids proprietary software standards lock-in. The results further indicate that, open source makes its way into public organisations through software dealers. These software dealers offer their services in cheaper price compared to proprietary software and organisations have the possibilities of changing to other dealers. In addition, we found that infrastructure products especially MySQL and Linux are the most used products and OpenOffice.org, Firefox browser, Thunderbird mail clients are most used application software. Thus, organisations have a credible alternative to proprietary software infrastructure and application software products. The Cathedral and Bazaar theory offers a valuable insight on our understanding of open source software. We further highlight that, although the organisations studied are from two different contexts: high income country and low income country, they are on the same level with regard to ICT issues like total cost of ownership and avoiding vender lock-in. The implication of this study is to confirm that OSS products are not always hyped. There are vivid evidence of the success of OSS performance which encourages continue use of OSS products in the public sector as well as the private sector.

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