The Role of Open Source Software for the Development of Bangladesh Economy

Mohammad Saifullah[1] and Shaikh Mostak Ahammad[2]

ABSTRACT

Software is the main ingredient, which helps us to work with computers. Private people or users, and companies possess the majority of the software's that is licensed. This sort of software is called proprietary or closed source software as the user purchases a license for using the software and the actual product (source code). They don't have any legal right for the alteration of the source code for any purposes. For the last few decades a novel approach for software development has emerged which is called OSS model. Open Source Software (OSS) movement is built on the principle that improved software is produced when every person is permitted to alter and change the software. Thus, as an alternative of selling user licenses, the product (source code) is distributed. Open source software (OSS) is an excellent approach to convey information and communication technologies to developing countries. Developing countries have to employ OSS as a means to gain knowledge regarding the technology itself and as a way of creating technology products that fit their precise requirements. Bangladesh has been long experiencing the glance of Open Source Software in a very partial and limited exposure. Following the enactment of ICT Act 2006, which officially restricts the use of pirated proprietorship software, the computer users in Bangladesh would in fact have to depend on the utilization of Open Source Software widely, as contrasting to the luxurious proprietorship software. This piece of writing discusses the merits and demerits of OSS and how Bangladesh can use OSS to achieve its development goals.

Keywords: open source software (OSS), VSAT, ISP

INTRODUCTION

Information and communication know-how plays an essential function in promoting openness, convenience, answerability, connectivity, democracy and decentralization-all the "soft" traits so necessary for successful collective, economic, and political development. Bangladesh required the ability to network with people, ideas and initiatives. This is as critical and primary to state construction as water, agriculture, well being and accommodation, and without it, Bangladesh's democracy may possibly collapse.

In Bangladesh computer utilization has started back in 1964 by Atomic Energy Center, and earliest mainframe computer came to Bangladesh during 1964.

The Internet came behind schedule in Bangladesh, by means of UUCP e-mail, launching in 1993 as well as IP connectivity in 1996. AS a result in July 1997 there were probable 5,500 IP as well as UUCP accounts.

In June 1996 the government determined to permit private companies to operate as Internet Services Providers (ISPs) by means of VSATs.

In June 1997, the Government of Bangladesh has chosen a working group to gaze into the problems and prospects of export of software from Bangladesh. The Committee submitted its details in September 1997.

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[1]Senior Lecturer, Department of Economics, Asian University of Bangladesh, [1]Assistant Professor, Department of Accounting, Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh

Bangladesh government has taken a decision on June 1998 to remove every part of import duties and VAT from all computer hardware as well as software. This has brought the prices of computers reduced to a height reasonable for middle-income households. (Bangladesh ICT Policy Monitor Network, 2007).

Over view of Bangladesh economy:
Population: 150.4 million (July, 2007)
Area Total: 144,000 sq km
Purchasing Power Parity: $2,300 (2006 est.)
Average annual income: US $480 (World Bank, 2006)
GDP -real growth rate: 6.4% (2006 est.)
Population below poverty line: 45%
Unemployment rate: 35% (2001 est.)
Literacy Rate Total: 41% (2001)
Exports:$11.16 billion (2006)
Imports: $14.75 billion (2006)
Internet domain: .bd
International dialing code: +880

The hardware that makes present computing and communications feasible has developed at an astonishing pace in the last a few decades and it is probable to go on. Moore's law states that the potential of microprocessors doubles at the same time as the cost falls at a very rapid speed (by nearly one-half) in 18 months. This has shaped an information-processing environment where the physical equipment are a great deal more complicated, competent, and dependable, than are the commands (programs) that human beings know how to create for them.

Software, the set of directions that inform a general-purpose computer what to perform with a piece of information, has become bottleneck for the information economy. There is no Moore's law for software. Though computing power decrease quickly in cost, powerful software that is capable to utilize of that computing power becomes more intricate, most of the time more costly, often a lesser amount of dependable, and nearly all the time more complicated to organize and preserve. Nearly all the time original Proprietorship software overheads more than twofold then the price of one high performing private computer, which in actual sense, a country like Bangladesh can not be able to afford or depend on. Nevertheless it is software that constitutes the primary rules for information processing and therefore for a country as well as e-society.

Similar to any 'product' software is just the result of a manufacture procedure that combines individual endeavor, inputs, and capital of some type in a unique manner. The 'typical' method of organizing the construction of software has been a great deal similar to the usual way of developing a composite engineering good: a proper separation of employment that uses proprietary understanding, protected by restrictive intellectual property rights, enclosed inside a corporate ladder, to direct and oversee the course. But this is not the single method to arrange the construction of software. In the previous few years an additional means of building software, the open source procedure, has gained popularity just as the products of this course have gained market share across key segments of the information economy. Actually open source is not a new method. But it is unique, and the triumph of open source software projects reveal empirically that a huge and composite system of code can be built, maintained, developed, and extended in a nonproprietary surroundings where numerous developers labor in

a vastly parallel, somewhat formless method and with no straight financial reward. (Câmara, G. and F. T. Fonseca , 2007: 255-272)

Computer software can be largely split into two development models

• Proprietary, or 'closed' software, owned by a business or person. Copies of the 'binary' are made open; the 'source-code' is not typically made public.

• Open source software (OSS), where the source-code is unrestricted with the binary. Users and developers can be licensed to utilize and adapt the code, and to share out any improvements they make.

An on-going, iterative process develops OSS where people split the ideas expressed inside the source-code. The intention is that a big population of developers and users be able to add to the advancement of the code, ensure it for errors and bugs, and construct the enhanced edition obtainable to others. Scheme supervision software is used to permit developers to maintain track of the different versions.

Equally OSS and proprietary approaches permit companies to generate revenue. Organizations developing proprietary software create cash through constructing software and afterward selling licenses to utilize the software, for example Microsoft receives a fee for each copy of Windows sold with a personal computer. OSS companies create their riches through giving services, such as advising customers on the edition that perfectly suits their requirements, installing and customizing software plus development and improvement. The software itself might be made obtainable at no price. (J. Lerner and J. Tirole, 2001: 819–826)

At present there are two main types of OSS licenses:

"• Berkeley Software Distribution (BSD) License: this permits a licensee to 'close' an edition (by withholding the most up to date modifications to the source-code) and sell it as a proprietary product.

• General Public (GNU) Licence: under this license, licensees might not 'close' versions. The licensee may modify, duplicate and redistribute any derivative version, under the same GPL license. The licensee can either charge a cost for this service or work free of charge." (G. Moody, 2001: 48-79)

The open source procedure is a feasible form of software construction that presents a genuine option for governments taking ICT decisions. The technological development has the sharp impact on configuration of communal arrangement, social associations and sociological discourse. Despite the fact that this postmodern technology, that is Information and Communication Technology (ICT), has been changing the world into a knowledge-based society since its induction, still it has side effects too. Due to difference in utilization of ICT, the humankind is at the present clearly digitally divided. Even though the UN has accepted that right to information as one of the basic rights, the greater part of the populace in the Third World countries are underprivileged of this right still in this information age. (N. Rosenberg, 1982: 85-96). The causes of this are various. Nevertheless, two chief causes that have been recognized, up to now, are: the high price of ICT technology and the linguistic obstruction. About the cost of the ICT technology, it might be mentioned here that the prices of hardware since the beginning of microprocessors have been going down but on the other hand the prices of software are escalation rapidly. This, in turn, has exposed that the consequential cost of the ICT technology are presentation an increasing trend. Though, if we study the Third World countries similar to Bangladesh, then it might disclose amazingly that although the price-hike of software in the international bazaar, the amount of computer users has been growing at an exponential pace since the last decade. This is, in fact, possible due to the accessibility of pirated software in the local market.

Everything has some limitation. In preparing this paper, we have faced some problems, such as during the finding period it was very difficult to collect data, shortage of the time of Internet

Services Provider and some miscommunication. We also couldn't able to get sufficient reliable data regarding Open Source Software from different statistical recourses because of its inadequacy.

Justification of the research:

Even though sufficient study has been made in the developed countries, parallel research on open source software in Bangladesh has been so far very inadequate and insignificant. Particularly, research work on practical usability and impact has been far less. Insufficiency of information in respect of the framework for open source software in Bangladesh has encouraged us to conduct this research. Moreover, as the student of the Department of Development Studies, this research will be of tremendously beneficial for us in the near future.

Open source is particularly attractive to developing countries such as Bangladesh, which see it as a means to assist closing the technological segregation that separates rich and poor nations.

As an example Microsoft Windows and Office price tag at least $140 in Bangladesh --way out of reach for the majority people, where the per capita annual income is approximately $380.

The economic reason for using software that's free of charge is hard to refuse, and more and more countries appear eager to take a chance on it. China, Japan and South Korea lately declared that they would labor jointly to build up an open-source substitute to Microsoft

There are also following reasons for which we were really motivated to conduct this research:

Assume a Municipal Corporation decides to produce a software, if the software is unrestricted, subsequently a Municipal Corporation in a different city or town could use again most or the entire of that code. They can also develop upon it and send it back to the original developers. By this means code can be reused, there by, reducing the price of additional development. Lot of government projects labor on the substitute projects and every one is re-inventing the wheel. If the code of the complete project is accessible, they can work together and keep away from repetition of work. (Bangladesh Open Source Network, 2007)

Showing the code also convey clearness in the way the administration functions as society can scrutiny the code and authenticate the excellence of work completed as well adjudicate weather the money was rightly spent.

Most of the time it happens that a government funded project dies over time due to a mixture of reasons. What happens to the code that they developed? The code also dies with the project. Every now and then the project may be active but code may be misplaced or incapable after a few years. If the source code of each and every government-funded project is unconfined as Open Source, the code will by no means die even if the project is discontinued. Any one who desires to carry on can just download the code and go on where someone else left off.

Open Source and Linux helps in minimizing the Total Cost of Possession of the entire system drastically. Bangladesh being a emerging country, ought to use such technologies so as to diminish the over all price. The cash saved can be used to supply computers where there aren't any currently or can be used for new projects.

More than 95 percent of software that Bangladesh purchases are not created by Bangladesh companies, precious overseas exchange is used to obtain them. Through using Open Source software, there is no depletion of foreign currency as the fundamental software is free of charge. You possibly will have to pay for services, but the services revenues goes to Bangladeshi companies or Bangladeshi subsides of foreign companies which make use of Bangladeshi to provide local support. (Khairil Yusof, 2007)

When proprietary/close source software is used, there is awfully modest profits prospect for local vendors. With Open Source, given that the source code is accessible, local vendors can accomplish value add-ons and customization as requisite by the client and thus make additional profits.

In view of the fact that Open Source follows Open Standards, government ought to persuade the employment of Open Standards document formats. For example if the government tender credentials are in Microsoft Word documents, which is a proprietary format, in that case general public, are required to buy Microsoft Word to read/write those documents. On the other hand if the government standardizes on the employment of open standard document format, then the citizen be capable of using any software to produce them.

To build up software there is an investment necessary in the PC + Operating System + Development tools. The price of proprietary development tools only would come to a million of taka. The price of Open Source development tools is nil and there are enormous families of development tools obtainable as well as a vast group of development libraries are accessible for at no cost. In addition as the source code is obtainable, the developer be able to learn the source code of a number of best applications.

If the government appreciates the Open Source model of development, the software business can turn into a cottage industry. The Open Source development model is also decentralized, which means a student, sitting in a little rural community can simply add code to a huge Open Source project. Where as if he had to add code to a close source task, he would be required to be present in the flesh at the location of the software company and be engaged by them.

In addition Open Source makes it simple for any person to donate code, even if the individual is new out of academy, he could still write some function and put it out as Open Source. Linux started by Linus Torvalds as leisure pursuit while he was a student at University of Helsinki in Finland. We would like the next Linus Torvalds to be from Bangladesh.

By means of Open Source we are not reliant on a sole merchant, so if one merchant fails to support us, we will be able to get some one beside to support us in view of the fact that code is on hand. This creates a strong competition and companies cannot seize the government at ransom.

In reality all this reasons inspired me to write up this article.

Broad and specific objectives of the research:

The objective of this study was to consider using OSS/FS effectively and efficiently for the development of Bangladesh economy. This paper doesn't portray how to assess particular OSS/FS programs. The purpose was not to show that all OSS/FS is superior than all proprietary software. It's true that OSS/FS users have primary control and flexibility advantages, in view of the fact that they can adapt and preserve their own software to their liking. And a number of countries see reward to not being reliant on a sole-source company based in a different country. Yet, no statistics could establish the extensive claim that OSS/FS is all the time "better" (certainly you cannot logically use the term "better" until you decide what you mean by it). As an alternative, we have just compared frequently used OSS/FS software with commonly-used proprietary software, to demonstrate that at least in certain situations and by certain measures, some OSS/FS software is at least as high-quality or improved than its proprietary competition. Of course, some OSS/FS software is technically poor, just as a number of proprietary software is technically poor. And we must recognize that even very high-quality software may perhaps not fit our exact requirements. But though most people recognize the need to evaluate proprietary products before using them, a lot of people fail to even think about OSS/FS products, or they produce policies that needlessly hold back their use; those are errors this paper tries to correct.

Theoretical/Conceptual Framework:

Software is the name given to the programs that run on a computer, e.g. Microsoft Word.

Programs are written as text documents, known as 'source-code', that contain the readable instructions controlling the program's operation (written in computer code, such as C++). Software must be transformed, or 'compiled', before it can be used by a computer. This is known as the 'binary'. Once compiled into a binary, a computer application may be used, but cannot be modified and improved unless developers have access to the underlying source-code. An operating system is the basic software required for a computer to work. Usually all other applications require an operating system in order to work. The most widely used proprietary and open source operating systems are Microsoft Windows and GNU/Linux respectively. Software is also required for the desktop and for infrastructure that is to handle the basic data processing and connections in a computer network.

In this paper we have taken this assumption that open source software is really useable in a third world country like Bangladesh. For that we have gone through the case study of a few developing countries and tried to figure out a common pattern among them.

METHODOLOGY

For the purpose of this study we have used systematic and objective process for gathering, recording and analyzing data. We have tried to avoid distorting effect of personal bias as much as possible. For the purpose of research first of all we have tried to identify the issues. Then we find out those problems. In the end we selected and evaluate the course of action. Mainly we have depended on secondary data.

For the study most of the information was collected from the following sources:

- Text Book
- Web Pages
- Internet Service Providers
- Ministry of Commerce
- Ministry of Science and technology
- BTTB

Interpretation of the results:

From the study following interpretation has emerged:

In nutshell open source software is the ultimate IT solution for an underdeveloped country like Bangladesh. Though we have a lot of problem regarding its implication. Still its prospect cannot be denied and over looked. We have to adopt this phenomenon as early as possible for the rapid development of our country.

Dynamics of Open Source Software and Present Scenario:

Open source software is not a new happening. It might even be an old incident that may be traced back to the beginning days of computing and programming. Knowing awfully little of this era that starts in the 1940ies, we pass over to the beginning of 1970ies when AT&T developed the Unix operating system. AT&A were not permitted to generate revenue from this new and revolutionizing operating system. Because of accusations of misuse of their telecommunications monopoly AT&T were merely permitted to create money from telecommunications. They were, though permitted, to do research on other area not associated with telecommunications. In 1978 AT&A were divided into little companies - the Baby Bells, and limitations on the business were withdrawn. In the era from 1970 to 1978 AT&T gave away the source code for the rising Unix operating system for free of charge, and Unix lived and evolved in educational communities. The Unix operating system was living in academic

communities normally as a research object. After AT&T was divided, Unix was no longer complimentary and as a response Free BSD (a Unix variant) were produced at the Berkeley University. In addition the Free Software Foundation was created. In the 1990ies the Linux operating system were developed and lived a silent existence until around 1998, where all of a sudden open source software were reaching headlines. This was largely because of Netscape loosing the browser war to Microsoft and making a last try to carry on as open source software.

The awareness of a free, open source substitute operating system has spawned a lot of new projects to generate software for all sorts of purposes. From the quiet backwaters of academic circles, open source software is currently contending head to head with the world's major software merchants.

Rival companies are not anything new to the world but competing philosophies, - this is very different. Commercial software vendors sell their software for cash, while open source software is exposed for free of charge.

Open Source Software (OSS) is computer software, which comes with a license that is exceptionally diverse from the licenses that are used in commercial software like Microsoft's Office suite or the Windows(tm) operating system. Commercial companies have normally relied on very firm license schemes, which permitted the user a bare minimum right, as the license does not transfer possession but merely the right to utilize the software. Typically no warranties for the implementation or possible harm caused by the software were provided. Users were not permitted to duplicate or adapt the software in any way, in other words: The software came as is. Any problems arising from utilization of the software were for the user to take care of. Even if a user were capable to fix some of the problems in his new software, the user was not permitted to do so and the source code to the software would not be provided.

Top 10 software companies, ranked by revenue and market capitalization.

		Annual revenue	Market capitalization
		(millions of $)	(millions of $)
1	Microsoft	31,375	260,000
2	Oracle	9,487	63,400
3	SAP	7,700	32,300
4	Computer Associates	3,083	12,400
5	VERITAS	1,531	10,100
6	Electronic Arts	2,489	9,300
7	Intuit	1,373	9,000
8	Adobe Systems	1,194	8,000
9	Symantec	1,328	6,600
10	PeopleSoft	1,949	4,700
11	Competition to Top 10	8,445	28,582
	Total	**69,954**	**444,400**

Source: UNCTAD estimates based on data from Yahoo Finance (h finance.yahoo.com) and Financial Times Market Data and Tools (http:/ www.ft.com).

The source code of software is the human-readable commands that construct the program. When the source code is compiled, a particular program (a compiler) translates the human-readable source code into a machine-readable code, which a computer can recognize. It is fundamental to modifying a program is access to the source code. As noted the license to open source software is very different from that of commercial software. The name open source software hints one of the special properties of the license: The source code for the software is freely available - open source. In this paper the words 'software' and 'program' is used in a similar way. The usual understanding of a program is that it is contained in one file, whereas software is a more generic term that covers programs and/or applications, which run on computers as well as the many programs or sub-programs that constitutes, for instance, an office application. Software usually consists of several or many programs performing different functions for the software. This is done to make the software easier to maintain and design. Apart from access to the source code, open source software licenses have other properties, which are very different from that of the usual commercial software license. An open source software license grants the user:

- The right to access and review the source code
- Access to the source code may not cost more than shipping and handling.
- The right to modify the source code
- The right to use the source code or parts of in his or her own product
- The right to freely distribute the software or source code

In general the organization of open source software development is structured as many different projects some of which are dependent on each other. Some projects are overlapping in their goal and others try to archive the same goal. Open source software development is dependent on the Internet to provide infrastructure for communications and transport of all things that may be digitized. Websites relating to the different projects provide means of communication from the developers. Newsgroups and email provide two-way communications between developers and users. Real time communications are provided by chat-forums. Organizationally most open source development projects have a central person or group of people called maintainers. People who wish to contribute to a program or the software may then communicate their comments or their changes to the maintainer. Often this communication is done using one or more dedicated newsgroups/mailing lists, where discussions are open to all interested parties. Contributions are sent to the newsgroup for discussion and possible acceptance by the maintainer. If accepted, the maintainer includes the contribution in the software, and makes the new version available to the public. Often the maintainer is the person who has written the first version of the software in the project. The maintainers have a certain degree control the development of the program, but contributors are at any time free to use the source code in a new project of their own and create a competing project. However, competing projects cannot use the name from the original project, and may thus have problems creating a user base. However, the maintainer has an obvious interest in attracting as many co-developers as possible, since this will speed up development of the program. (V. Valloppillil, 1998)

At present in some areas like web servers open source software products is claming in excess of 60% of the market. The Linux operating system is another prominent example of open source software. Linux is fast becoming the dominating UNIX operating system with growing backup from commercial vendors. IBM is backing their Linux serves with 24 hour 7days support and other vendors are following this example. In stark contrast to the problems of understanding the incentive to develop open source software, adoption or use can easily be understood within the framework of standard economics. The incentive to use a product is extremely high, if the product has the required quality, and if the price is low. In the case of the Apache web server

the price is negligible – it can be downloaded at no charge from many websites, and it is included in most Linux distributions. The volume of software which is developed and offered to anyone, who wishes to use it, is overwhelming. A quick look at SourceForge shows that they host 14,198 projects, and currently have 108,060 registered users. A project is a commonly used reference to a particular development effort i.e. the development of a certain piece of software. Other websites like SourceForge exist; Freshmeat and the Linux portal Linux Online7 are examples of web sites, which host many projects. The projects range from applications to projects wants to use Linux on other hardware than originally intended (called a port). All these projects and many more apply open source software license, and could thus be used and further developed whatever the particular need might be.

Theories behind open source software:

The sustained development of open source software is fascinating, and it is vital to recognize the mechanisms, which lie behind open source software development. For the understanding of open source software development, this paper proposes two distinct different bodies of theory and a number of mechanisms about how open source software development process works.

The first theory is classical economic theory of pure public goods. But interestingly open source software's are a pure public good that are privately produced. It is believed that the theories of privately produced, pure public goods are the only part of mainstream economics that might clarify open source software development. A pure public good is both nonrival and nonexcludable. Nonrival means that one person's consumption doesn't diminish the amount available to other people, while nonexcludable means that one person cannot exclude another person from consuming the good in question. Classic examples of pure public goods are goods like national defense, lighthouses, TV broadcasts, and so on.

An important feature of commercial software is that there are large costs to the consumer of using it. First, you have to buy the software. It's a fixed cost. Then one must learn how to use a particular software package. Even if one only wants to use the package occasionally, one has to read the documentation, practice a bit, and invest time and energy in learning the basics of how to use the package. This cost of learning the software is also a fixed cost to the user: it is more-or-less independent of the amount of use that the software gets. This should be contrasted with These are costs that are incurred every time one uses the software. The most obvious of these costs are time costs, such as a delay in loading or saving a file. If it takes 10 seconds to start the package every time you use it, this is 10 seconds of lost time each time the package is used. If one has to move around through an elaborate menu structure to perform a simple task, then this is a cost that must be born every time the task is undertaken. People who use a particular software package every day incur a large amount of these variable costs, while people who use this software rarely incur little variable costs. However, everyone incurs roughly the same fixed cost of operating a software package. cost of learning the program and buying it. (J. Lerner and Incase of open source software, we are exempted from first fixed cost (Which is buying the

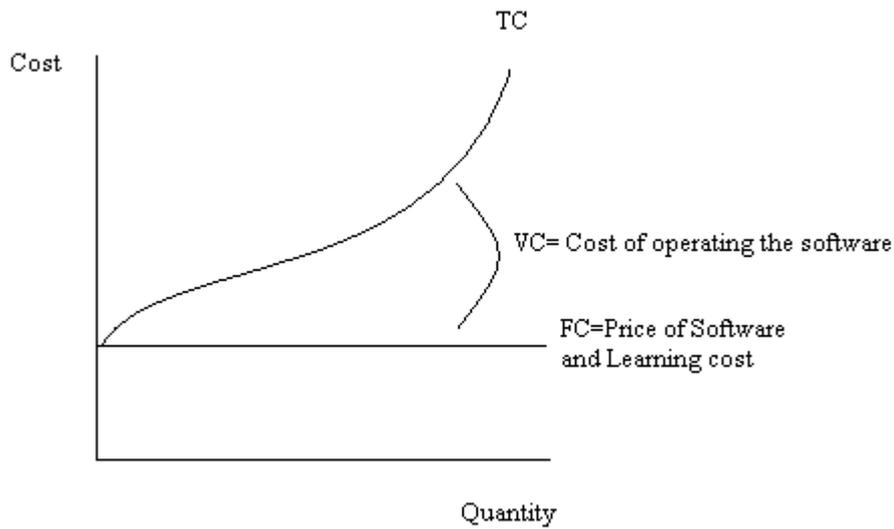software). But we have to incur other costs.   J. Tirole, 2002: 197–234) the variable
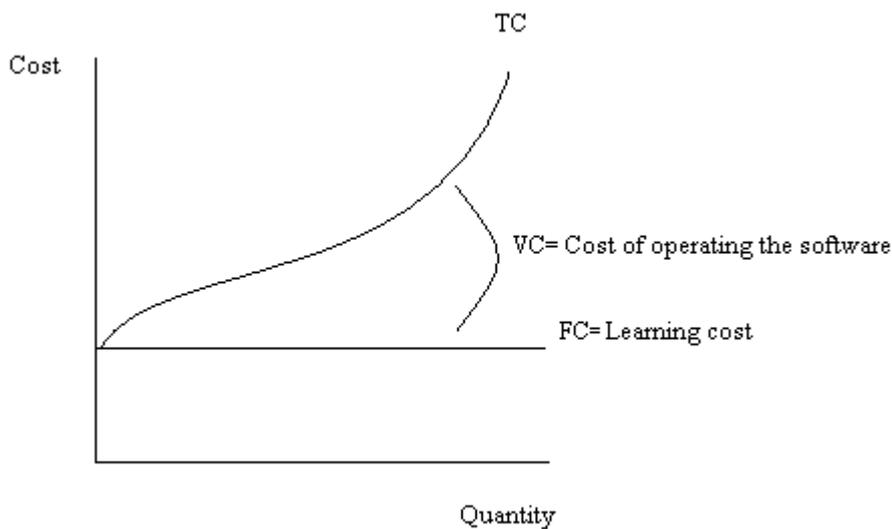

Figure 1.1: Commercial Software

Figure1.2: Open Soource Software

The second theory treats open source software phenomenon as epistemic communities, and couples this with situated learning. According to Haas "Epistemic communities came about in a long search for theory that could explain the special group phenomenon, which seems to exist in open source software development. This theory will provide a perspective very different from the economical, and will shed light on the dynamics of the development process. The epistemic communities approach is intended to be linked to economic understanding by treating epistemic communities and situated learning as mechanisms, which drastically reduce the cost of co-ordination. Much like the invisible hand of Adam Smith, which in essence reduces co-

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ordination, costs by collapsing all information about a product into one unite – its price." (Haas, P. M., 1992: 46)

Why Bangladesh need Open Source Software for its development:
Bangladesh must adopt open source software for the following reasons:
Reduces expenses:
A number of governments have saved millions of dollars in software licensing by adopting open source. The South African government has apparently saved millions of US dollars by using open source not only by saving software licensing fees but also by keeping old computer hardware since Linux (Which is a open source operating software) is able to run on less processing power and memory (old computers) than the newer versions of Windows. In recent times in Bangladesh, talk of e-government has been increasing in many ministries. Some have already taken primary initiatives towards the use of ICTs to make possible different governmental activities. But the disadvantage is that the government has to use a considerable amount of resources on software licensing requirements and on updating hardware resources to meet the requirements for latest proprietary technologies such as Windows XP. In order to avoid "unnecessary" expenses in software procurement, use of pirated software is becoming more and more common, which in the long run will be very much harmful for our local software industry. Use of OS technologies can drastically reduce costs for e-government for Bangladesh.

Reduces safety risks:
There have been cases where the governments of a number of countries have refused to utilize certain software in panic of safety vulnerabilities. A number of them have warned that proprietary software whose source code is not made obtainable may have hidden "logic bombs" through which unwarranted leakage of sensitive information may be probable. The Chinese government has plainly stated, "China thinks Microsoft software contains secretly embedded code that the United States government can manipulate at will. So, in case of dissension between the two countries, a Pentagon official can hit a switch and--presto! -- Cripple China's computing infrastructure."

Open source technologies are entirely seen-through for the subsequent reasons:
1. Their source code is made openly available.
2. Programmers from all over the world who are not essentially surrounded by a sole corporation as it happens with proprietary software develop them.
3. They usually go from beginning to end by the scrutinizing eyes of thousands of programmers and users from all over the world. As Bangladesh builds additional databases and supplementary information repositories with sensitive data, it will become more and more vital to defend against reckless use of "closed software".

So if Bangladesh adopts this software as their official software in future we don't have to be concerned about our national safety.

Gives liberty to adapt and tailor according to needs:
One of the chief attractive features of open source software is that because its source code is obtainable it is likely to modify a particular software application according to local needs. With proprietary software, for case, one cannot even make as a basic alteration as changing the menu items to a local language. For a lot of e-government projects in Bangladesh, local language support is of completely necessity. Though there is every sign of far-sight in steering governmental activities towards the adoption of English, it cannot be completed immediately, given the preference of the country's top political leaders making the use of Bangla compulsory for governmental credentials. To allow for the change, use of open source technologies to make

a Bangla-enabled e-government platform will encourage acceptance and increase usability of various ICT-based solutions for governmental actions. (Frederick Noronha, 2007)

Gives autonomy to redistribute and copy:

Due to the without charge accessibility of open source technologies, a solution based on these technologies is to a large extent more effortlessly replicable than one based on proprietary technologies. Assume one ministry has effectively implemented a particular e-government scheme and the government wants the model replicated in other ministries. However, if the solution is built upon licensed proprietary technologies, then the expenditure of replicating it will immediately become a main restriction. If the solution is built upon open source technologies, the software expenses can be kept back to a least amount.

Prevents confinement to a sole retailer:

One shortcoming that has deterred many government agencies around the world to depend on proprietary software is that it often necessitates lock-in to a single vendor. For instance, a system built on the Windows platform need to be upgraded at the willingness of the software company, Microsoft. When the company decides to develop a new version of Windows, some old software turn out to be backdated, some older hardware become too inadequate to hold up the requirements of the new version. This puts the government and other users at the compassion of the seller, which can dictate needless upgrades and from time to time place excessive charges for these upgrades. This leaves the user with little alternative other than unhappy obedience since moving to a new system can be yet more high-priced after investment has already been made into a particular system.

Utilization of open source technologies prevents any such hazardous lock-in to any sole seller or technology. The government will have the autonomy to employ third party vendors to familiarize itself with the technologies and solutions as preferred, which is only likely because the source code of open source technologies is freely obtainable. For Bangladesh, the price of lock-in to a particular vendor can be more expensive than nearly all other countries, because the country does not have local presence of most multinational software vendors thus most of the time rising service and maintenance charges.

Promotes open standards thus easing interoperability:

One major drawback of developing solutions based on proprietary software is that they often do not stick to open standards, meaning that they do not run on certain platforms and often diverge with systems based on solutions from a different seller. For example, an application built on Visual Basic will not run on a Linux-based platform and will also be difficult to incorporate with additional applications. In typical e-government projects, extension leads to the requirement of different applications in different government agencies so that they are able to inter-connect and inter-operate smoothly. Because of this chief drawback, many governments make it compulsory for governmental ICT applications to preserve open standards. Open source technologies naturally recommend the reward of ensuring open standards to allow for flawless interoperability. It prevents the government from being trapped with legacy systems, which cannot be upgraded nor be interfaced with new technological improvements.

Prevents possible international harassment for software piracy:

Due to the exorbitant price of software, piracy has become prevalent in Bangladesh to the extent that there are many who think that the cost of a Windows XP of Office XP is really just Tk. 100 at a reduced rate for Bangladesh. While it is less dangerous for households to use pirated software, its use in corporate offices and specially in government agencies can potentially lead to international harassment. Business Software Alliance, an international software policing agency, and its numerous collaborators are expanding at a fast rate to reach countries with high levels of software piracy. Even in India, with official collaboration from

NASSCOM, BSA has filed several piracy law suits. There is every indication that it will not be long before BSA comes into Bangladesh as well, and when that happens different IT-related associations and the government will be left with no choice but to collaborate. With international defamation for ranking high in corruption indexes looming over our national image, Bangladesh can ill afford to risk more cases of humiliation. Also, compliance with WTO intellectual property regulations will also likely put international pressure on the country. One of the major driving forces for China opting for open source is its requirement to comply with strict WTO regulations in order to become its member.

In such a global economic and political scenario, adoption of open source technologies can vastly reduce Bangladesh's current vulnerabilities in terms of potential harassment for widespread software piracy and allegations of violation of WTO rules leading to possible trade restrictions.

Stimulates the local software industry:

Implementation of open source technologies by the government can actually improve opportunities for the local software industry to offer high-end solutions to the government therefore developing much-needed ability for bidding for international projects. The local software industry would gain from the huge body of information that would need to be acquired to construct upon existing open source technologies and create tailored solutions for the government. Reliance upon foreign vendors can be drastically reduced while providing a competitive atmosphere for local companies to build know-how essential to become global players and push the country towards a software export-oriented one. The Chinese government is a major example of a state that has provided considerable impetus to the local software industry by making a major shift towards the implementation of open source technologies. In view of the fact that the declaration of the Chinese government that it would adopt Linux as the de facto operating platform, a rising number of government contracts have gone to the local software vendors with skill in open source technologies therefore reducing reliance on foreign vendors and saving enormous amounts of foreign currency. The Ministry of Economic Affairs of Taiwan has also determined to give contracts to a host of local software companies to build Linux-based applications for the government. The Ministry wants over half of government agencies to move to Linux within the next five years.

Awareness of the IT Industry:

However, as much as the government may understand the significance of moving to open source technologies, if the IT industry is not prepared to offer the essential technological, maintenance and supports services, then all the good intentions of the government and other related institutions will be thwarted. The IT industry should take definitive steps in creating solid expertise in open source technologies, not just to supply to potential local demand but also to advantage from amplified advancement and transfer of technologies. The intrinsic knowledge base provided by the freely available source code developed and debugged by some of the brightest minds around the world would empower local software companies to move towards higher-end solutions building upon existing technologies. This would also make available opportunities for improved positioning for attracting software outsourcing as some of the world's biggest IT manufacturers and solution providers are greatly investing into open source technologies.

To give some examples, Motorola Semiconductor and a different company named TurboLinux are developing a Chinese-Language version of Linux OS. Intel is vigorously developing Linux Standard Base to develop Linux standards for the development of test suites for base libraries. An IA-64 Linux project is under way between HP, IBM, Red Hat and some other companies to

port the Linux kernel to IA-64. Sun Microsystems have put out one its major products, Star Office - an alternative to Microsoft Office - as open source software. IBM is, however, by far the biggest sponsor in the progress and endorsement of open source technologies, having dedicated US 2 billion dollars for the development of Linux-based solutions and outsourcing many its development work to Asia. (Md. Anwarul Kabir, 2007)

Support from the Academia:
With preparedness of the IT industry should come support from the academic world in Bangladesh to construct human resources with skills in open source technologies and understanding in working with Linux environment. The computer science departments of the majority universities in the Western world have Linux-based computer labs - the approach is catching on in many countries of Asia as well. Recently, the President of the University of the Philippines declared the decision to "shift all academic systems to open source software". Importance on practice and alteration of open source technologies in the academic circles also propagates a research-based approach as students consider themselves to be an element of a global community involved in a repetitive progression of study and improvement. In Bangladesh, this would be particularly significant since students feel cut off from the rest of the academic world and often engage themselves in reinventing wheels. Another advantage of using Linux platform in the academia is that old computers with hardware specifications that are obsolete for Microsoft's standards can be put to good use in a Linux-based networked environment.

From the above discussion it is very clear to us that open source software could be very beneficial for the over all development of a country like Bangladesh. This phenomenon can not only help us in developing a cheap, efficient and local software sector but also can ultimately help us in increasing the total GDP (Gross domestic product) of the country. To develop an underdeveloped country rapidly, there is no alternative of ICT sector. In fact investment in ICT has greater multiplying impact on GDP then any conventional sectors. Best argument for this comment is the current activities of Grameen Phone in Bangladesh and their contribution to our economy.

Current Open Source Scenario in Bangladesh from survey:
We have surveyed 10 software-developing houses, 10 private universities and 10 governmental organizations regarding the information related with open source software.

Our survey question was straightforward. That is, do these organizations use any open source software? If yes then what is its name and what kind off application package it is? Are those beneficial for them? etc. The results found are following:

In Bangladesh all most 50 Software Developing Houses uses OSS like MySQL database server, PHP, Perl , Apache web server Perl

More than 25% of Total 21 Public and 53 Private Universities, which are producing 6000 ICT related, graduate every year in Bangladesh uses OSS. Bangladesh University of Engineering and Technology's Institute of Information and Communication Technology (IICT) taking leading role to Promote OSS among academic and business world. Different Universities taking programs for wide spreading use of OSS.

More than 50% Government Ministry offices uses OSS like Linux Operating System and MySQL databases.

Total ISP in Bangladesh now operating 62. Initially few ISPs started to move to Linux. Currently 90% ISPs in Bangladesh are dependent on OSS like Linux, Apache, PHP, MySQL, SendMailetc.

Bangladeshi ISP's are the pioneer in adopting OSS

Linux, PHP, MySQLare the most used OSS in Bangladesh.
Most of them are really satisfied with their open source software.

Conclusions and Recommendations:

Over the past years Open Source Software and Free Source Software have matured into a serious alternative when considering new software. The methods and the tools supporting software development processes in distributed environments like Open Source communities on the Internet have been refined over the past years. As a result software products from the Open Source community have reached levels of reliability and security that allows them to compete with commercially developed software. In turn this gives an important impulse to the growth of the community.

Organizations in the developed world Open Source Software starts to replace an increasingly more wide range of Closed Source Software applications. For a variety of reasons organizations let the advantages of Open Source Software outweigh the advantages of Closed Source Software. Although most of the implementations of OSS are still on the server side, user side adoption of OSS grows now that friendly environments, high functionality and reliable alternatives for office applications become available. Governments, like Germany, the Netherlands and the United Kingdom, start to promote the use of OSS Financial and moral support for development and use of OSS alternatives.

Open Source Software initiatives in Bangladesh are still very limited. We can label Bangladesh as resent adopters. The government of Bangladesh does not take an explicit position promoting the use of OSS. This is may be partly due to fact that they are not well informed about the possibilities of OSS, but it may also be caused by the fact that we have a low level of expertise in the ICT field. At present the skills levels needed for implementing and maintaining OSS are perceived as higher. The fact that Bangladesh have limited access to Internet, and when we have access the bandwidth is too low to enable reliable file transfer, does account for a slower pace in the adoption of OSS. Internet has become indeed the premium medium for the OSS community. The software development community in Bangladesh is still in its infancy. University programs in software engineering are of relatively recent date, and the quality of the program is low due to lack of facilities, lecturing materials and knowledgeable lecturers Training programs in the development of OSS are not in place, which makes that Bangladeshi developers have to rely heavily on the expertise in other parts of the world. High bandwidth Internet access is a precondition for success. In spite of the low adoption, the Open Source Software paradigm provides advantages that are relevant within the Bangladeshi context. The most obvious advantage is the costing aspect. With increased licensing costs combined with high penalties for illegal use of proprietary software, OSS and FSS provides a low cost alternative. Once the software is acquired, it can be used to automate a whole organization, small or large. Especially in large organization this can lead to a significant cost reduction. A different angle on the costing aspect is the fact that OSS can easily be designed to run on 'obsolete' hardware. The financial situation of the population of Bangladesh does not allow large investments in new and modern hardware. Streamlined software can extend the lifespan of computer hardware without compromising on functionality. From a capacity development point of view, the openness of the program source code provides the software development community in Bangladesh with an insight on near-commercial software development. Bangladeshi software developers can participate in the worldwide OSS development community and improve their skills from this participation. From a macro perspective a widespread adoption of OSS may provide governments in Bangladesh in the position to negotiate better conditions and improved functionality for the software they acquire. At present governments are the largest buyers of software products in Bangladesh, but they have virtually

no influence on the functionality of the products they purchase. Finally, the flexibility of the OSS makes it the perfect candidate for developing customized applications, which can keep into account peculiarities and specificity of the different local cultures. By adopting the OSS paradigm organizations do not only reduce their costs, but also support a different perspective on intellectual property. If software is 'owned' by everyone, the people of Bangladesh also own it. This 'ownership' also provides the possibility to influence the direction of its development, and new, "Bangladeshi" features like the development of user interfaces in local languages, may be adopted.

There is still a long way to go, but the potential benefits are there at the end of the journey. Adoption of the OSS paradigm needs to be encouraged in Bangladesh, as it will represent a significant change in the technological relationship between the North and the South, developed and less developed countries, as we will no longer have to solely rely on the technical expertise of those in the First World. And this represents the first true step towards true sustainability.

In light of the above discussion, we will now briefly discuss a few steps that should be taken by the three major stakeholders who are very much interrelated with each other:

Recommendations:

(1) Government:

• The government should give serious thought to creating a high-powered public-private body to scrutinize opportunities for employment of open source -based IT solutions in the government.

• It must persuade the local industry, the academia, and the training centers to build suitable talent to provide support for such infrastructure.

• In all government IT projects, safeguarding of open standards in preference of technologies have to be made mandatory.

• The government is supposed to give the same fondness to open source technologies and proprietary software when giving out tenders for projects.

(2) IT Industry:

• Individual companies in the IT industry ought to have unambiguous goals to quickly build know-how in open source technologies.

• Knowledge and understanding in open source technologies should be marketed greatly as part of the strategy for attracting outsourcing allies.

(3) Academia:

• The universities should take urgent steps to build "Linux labs" and make their students use to with working in open source technology-based atmosphere.

• Schools should think installing Linux and Open Office in to their computer as alternatives to Windows and Microsoft Office.

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Appendix 1: Questionnaire:

Research Title: *"Role of open source software for the development of Bangladesh economy"*

[The following information will be used only for research purpose. Please fill it up as per given instruction.]

1. Do you use any open source software?

Yes   No

2. What is/are the name of the software's?

3. Are you satisfied with its quality?

Yes   No

4. (Only for Universities)

    a.   How many computer graduates you are producing every year?

    b.   Do you have any Linux lab?

Yes   No
    c.   Please name the open source software you use most.

5. (For other organization)
    a.   In what purpose you are using open source software?

    b.   Please name the open source software you use most.

Thank you for your cooperation