

Using Free and Open Source Software in the Selected Organizations in India: No budget, No Worries

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Abstract

The budget impact of any technology introduction is studied by considering the impact that the technology has on the adoptive population. FOSS is a competitive technology to proprietary software. It differs in the manner in which it is produced and distributed. For many cases, it is a substitute for proprietary software; the most important and substantive budget impact of FOSS is as a substitute for proprietary software. It is widely believed that Free and Open Source software (FOSS) has an Important and lasting role to play in a developing country such as India. FOSS has already made a strong impact as it has been adopted by many businesses, educational institutions, government departments, and individual users. The various software packages and applications available in FOSS have assumed a serious and non-hobbyist position vis-a-vis proprietary software. Many Indian government departments and businesses have now made it policy to use and deploy FOSS wherever possible. In this context it is important to ask whether the adoption of FOSS has a specific budget impact and whether the adoption decisions are justified by sound economic rationale. In this paper an attempt is made to study of this nature is difficult. Managers and IT officers who responded to us about FOSS also warned us that teasing out the exact impact is difficult – does the cost reduction come from using FOSS or from a number of other factors that could have been an influence? We were sensitive to this subtle and difficult issue and analysed the data accordingly.

Key Words: FOSS, Proprietary Software, open Source.

Introduction

It is widely believed that Free and Open Source software (FOSS) has an important and lasting role to play in a developing country such as India. FOSS has already made a strong impact as it has been adopted by many businesses, educational institutions, government departments, and individual users. The various software packages and applications available in FOSS have assumed a serious and non-hobbyist position vis-a-vis proprietary software. Many Indian Government departments and businesses have now made it policy to use and deploy FOSS wherever possible. In this context it is important to ask whether the adoption of FOSS has a specific economic impact and whether the adoption decisions are justified by sound economic rationale.

The economic impact of any technology introduction is studied by considering the impact that the technology has on the adoptive population. FOSS is a competitive technology to proprietary software. It differs in the manner in which it is produced and distributed. For many cases, it is a substitute for proprietary software; the most important and substantive economic impact of FOSS is as a substitute for proprietary software. It should be pointed out here that there is some difference in the meanings and values associated with terms such as “open source” and “free software.” While adherents of the “free software” term emphasize the ethical and philosophical aspects of community use and development of software, the “open source” adherents emphasize the pragmatic and business-friendly aspects of this technology. There is much in common between the adherents of both the phrases, in their outlook on issues such as open standards and patents. In this report the term FOSS is used to reflect these common values, as well as to reflect a term that has currency in the community in India.

Objective of the Study

1. To explain the most important reason for adopting FOSS was to save costs on the acquisition of IT.
2. To analyse FOSS as a substitute for more expensive desktop operating systems , office productivity applications , expensive server software.
3. FOSS enabled cost savings from complementary products such as anti-virus software required on Windows desktops.

Methodology

This study examines the economic impact of FOSS technology for organizations in India. Organisations are selected from government, education and commercial segments. In the commercial segment firms are selected from small and medium enterprises (SMEs) and from

large firms, including large multi-national firms. Government organisations include government departments and public sector undertakings (PSUs).

The method is that of directly studying organisations that have adopted FOSS and measuring, in multiple ways, the impact the technology has had. Some organizations that have not adopted FOSS are also studied to understand the reasons why FOSS was excluded by them.

The case study methodology is adopted for studying the organisations. This methodology entails a detailed and context-specific analysis of the organization that unravels the conditions under which FOSS was adopted and the manner in which the decisions were made. The methodology relies on primary data obtained from interviews of personnel in the organisations as well as secondary data and reports available in the public domain.

Data Analysis and Results

Case studies of the following organizations were conducted.

Organisation/Department	Type	FOSS User
Life Insurance Corporation	Large Commercial Firm	Yes
IT@School	Government Department	Yes
St.Martin's Engineering College	Higher Education Institute	Yes
Fusion Technologies Pvt. Ltd	Small/Medium Enterprise	Yes
St Joseph's College of Business	Higher Education Institute	No

Table 1: Organisations Studied (name changed at the request of respondent)*

Analysis Impact of FOSS In Select Organisations

IT @ School, Telangana

The IT @ School project is run by a department of the same name in the state of Telangana. The project replaced the Windows operating system on 50,000 desktop computers in 2800 schools across the state with a FOSS operating system. This move from a particular operating system that the teachers were familiar with to a new one required extensive training of the teachers and the support staff. The switch over was initiated in 2014 and by 2016 the systems had been changed in all 2800 schools. The costs incurred and the costs saved are indicated in the table below.

Cost item	FOSS Use	Microsoft Platform Use
50000 PCs, hardware for 2800 schools	Same	Same
50000 Operating Systems (licensing costs)	0	Rs 10,000/- per Unit, Rs 500 million (Rs 10000 includes the price of the Operating System as well as desktop Software)
Training of 200 Master trainers	Rs 6000/- per trainer, total Rs.1.2 million	
Training of 5600 IT School coordinators	Travel expenses	

As the highlighted row in the table indicates, the biggest cost saving, according to the project manager was in the purchase price of the Operating System. Had IT @ School purchased the Windows operating system they would have incurred a cost of Rs 10,000 per unit, whereas for the FOSS option the price is zero.

The cost of switching over to the FOSS system was significant. It involved training 200 Master Trainers (who trained teachers in their districts) and 5600 IT school coordinators (who were responsible for the IT functions at their schools). The cost of training the Master Trainers was borne by IT @ School, whereas the cost of training the school coordinators was borne by the schools themselves. The costs for the latter were mostly travel costs, for attending workshops.

Other costs of ongoing maintenance and support are also being incurred by the state. IT @ School has outsourced a part of these activities, however it is being found that the schools themselves have found local means by which to attend to their maintenance and support needs. These costs, we learned from our field interviews, are no different from those that they would have incurred had they stayed with the Windows platform.

FOSS has intangible benefits over proprietary software like Windows. The availability of source code allows development of application software for school subjects such as science, mathematics, history, etc. This is possible with proprietary software too; however the large availability of pre-existing tools that can be easily accessed helps this project. Supporting vendors and partners can build tools based on the requirements of the schools and department. A FOSS platform ensures that all supporting tools are freely and easily available. This work has already begun in Telangana with the development and use of tools for teaching science. To support this effort textbooks are also being developed.

Local language access improved with FOSS as fonts were developed by the community and included with all applications. This requires access to source code that is not possible with proprietary software.

The overall economic benefit of the IT @ School project may be summarized as follows:

Tangible Benefits	Intangible Benefits
Cost savings from Free Operating System deployment plus Scalability – use for FOSS in other classes in the schools minus Training Costs minus Support Costs = Rs 490 million for 2800 schools (approximately) (\$ 10.2 million)	Development of support software applications Local language customisation Teacher confidence

Tangible benefits are derived from the direct costs savings by using FOSS (operating system and applications), less the support and training costs for switching. Intangible benefits arise from the ability and freedom to develop supporting applications, language customisation and improvement in teacher confidence.

Thus, the IT @ School project has benefited the state of Telangana by about Rs 490 million. This figure is a minimum value as the exact value of the intangible benefits is hard to quantify.

Fusion Technologies Pvt. Ltd

Fusion Technologies Pvt. Ltd (GM, name changed) is the e-commerce arm of a retail conglomerate in India. The company, which was incorporated in 2006, deals in different consumer goods categories like apparels, designer goods, jewellery and watches, electronic goods, and entertainment products etc. Located in Hyderabad, the company has about 150 employees.

Fusion Technologies' FOSS strategy was top-down, where they focused on central, and important, servers that were converted to Open Source operating systems (RedHat Linux). They use linux on 50 servers, out of a total of 90 in the organisation. The remaining servers run Window, HP and Solaris operating systems. As a next step GM moved the internal software development (such as MIS and other utility software) to the FOSS platform. In both cases the transitions were successful. Recently, they have started using an open source document management tool (Solr) based on the search tool Lucene (also open source). Said Mr. K, the Chief Technology Officer.

The main reason for moving to FOSS software was stability and security, and not costs. Another important reason to switch was access to the latest and state-of the-art technology that could be updated quickly and at very low cost.

In short, the tangible gains from using FOSS are Rs 3 million for FT, however they have significant intangible gains resulting from increased security, scalability, stability and access to state-of-the-art technology.

Tangible Benefits	Intangible Benefits
More than 50% of servers migrated to FOSS with cost savings. Replacement of MS Office with Open Office on desktops alone saved Rs 3 million.	Increased security, scalability, stability and access to state-of-the-art technology.

Life Insurance Corporation of India

Life Insurance Corporation of India (LIC) is one of the largest insurers in India and was created to spread life insurance widely and, in particular, to the rural areas with a view to reach all insurable persons in the country, in order to provide them adequate financial cover at a reasonable cost. Today LIC functions with 2048 fully computerized Branch Offices, 100 Divisional offices, 7 Zonal offices and the corporate office. LIC's Wide Area Network covers 100 divisional offices and connects all the branches through a Metro Area Network.

LIC was a pioneer organization in India to introduce and leverage information technology in their business. Data pertaining to almost 100 million policies is being held on computers in LIC. In 1995, it initiated a massive computerisation drive with a view to enhancing customer responsiveness and services. This service enabled policyholders to receive immediate policy status reports, prompt acceptance of their premium payments, and to get a revival quotation or a loan quotation on demand. All the 2048 branches across the country were covered under front-end operations, thus making all the divisional offices achieve the distinction of 100% branch computerization. All the branches are connected to the zonal and divisional offices through Wide Area Network (WAN) while the offices in the same city are connected via a Metropolitan Area Network (MAN). Each branch has one dedicated server while the divisional and zonal office have about 10 servers each and the central corporate office has about 50 servers. Thus, in total, the server count is close to 3500. Each branch has about 20 to 30 workstations. The total desktop count is close to 30,000.

LIC is one of the pioneers in FOSS deployments in India, having started in 2001. It began by moving servers to Linux, and then moved desktops to Linux too. In a pilot in 2003, LIC deployed Linux on some of its servers and saved Rs 120 million. Subsequently, in 2003-04 it migrated all its servers to Linux. Later, LIC migrated almost 60% of its desktops to Linux and open source based applications.

LIC's tangible cost savings are summarised in the table below. These computations are based on extrapolations of the data provided by LIC.

Item	Cost Saving
Servers – Initial saving for fraction of servers is assumed to be double for the entire migration.	Rs 240 million (\$ 5 million)
Desktop migration to FOSS operating system and FOSS applications. Computed for 60% of 30,000 desktops, @ Rs 10,000/- saving per desktop.	Rs 180 million (\$ 3.75 million)
Total	Rs 420 million (\$ 8.75 million)

Analysis of Case Data

This section presents a detailed analysis of the case data. 5 case studies, of organisations that had adopted FOSS, are used for this analysis. The intention of the case studies was to inquire about FOSS usage using an unstructured set of questions, rather than pose structured questions for a quantitative analysis. The analysis below examines certain issues arising from the data available in the cases. Basic summary statistics are provided.

A summary of the organisations studied is as follows:

Organisation	Number of cases	No. of Employees(range)	IT Budget(range)
Government Department	1	800-4000	
Large Commercial Firm (including multi-nationals)	1	150-1,20,000	Rs 400 million – Rs 100 billion (2 billion USD)
Small-Medium Enterprises	1	20-120	Rs 1.0 million – Rs 5.5 million
Higher Education Institute	2		Rs 10 million

Table 2: Overview of Organisations Studied

The most important reason for adopting FOSS is to reduce costs. 3 out of 5 respondents mentioned this as a factor for choosing FOSS. Although, some clearly mentioned that this was not the most important factor, it clearly is an issue that influenced the adoption decision. Other reasons mentioned for adopting FOSS include improved performance, security, stability etc. Cost remains the most important reason, however other factors are important for various types of organisation. The factors mentioned are:

- Improved performance – this includes aspects of stability, interoperability, operational ease and maintenance. Some organisations running FOSS on core servers mentioned the mission-critical

nature of applications for which the choice of FOSS was made.

- Scalability – many organisations selected FOSS for scaling up their operations when needed. This is facilitated by the licensing and distribution aspects of FOSS.
- Security – FOSS products attracted some organisations owing to their security features. Many mentioned this as helping with administration also. This is particularly attractive to those adopting FOSS for desktop use.
- No vendor lock-in – this aspect of FOSS implies that the open source nature of the product enabled the client organisation avoid lock-in with a single vendor.

When cost calculations were conducted for FOSS adoption, the calculations involved a number of factors, these are mentioned in the table below.

Costs	Mentioned by
License costs	11
Service costs	9
Distribution costs, maintenance costs, integration costs	7
Migration, upgrade costs	6
Exit costs	2

Table 3: Cost Criteria Considered for FOSS Adoption

- License costs are the costs of buying licenses, or buying software. Commercial software licenses are sold on a per seat, per server, per desktop, per concurrent user or per use basis. These costs may be one time costs, on purchase of license, or incurred on an annual basis, as a renewable license. Upgrade costs are related to licenses, as these are incurred when software is upgraded to new versions and license charges have to be met.
- Service costs are charges for acquiring external or internal support for maintaining the software. This is important for FOSS as organisations are acquiring these for the first time and need technical support for running and using the software.
- Distribution costs refer to the savings/expenses incurred while distributing the software within the organisation. Some licenses prevent distribution, and hence the advantages of FOSS are in reducing distribution costs as FOSS can be easily shared.
- Integration costs are those incurred while introducing new technology, such as FOSS, and then having it work with existing technology in the organisation. Integration will include modifying data and programs to suitable forms and also training of personnel.
- Migration costs are incurred when data that was created with old software has to be converted to that which can be used with the new software. Migration may be required for programs also, particularly when they have to be used on new operating systems.
- Exit costs are incurred when data or programs have to be abandoned and work is required to modify the data/program to new or non-digital forms.

This cost is incurred very rarely by the respondents.

18 of the 20 FOSS-using organisations studied for this project used a total of 157731 desktops and 6689 servers. These totals exclude the numbers for the two large commercial firms that are in the IT industry and use a lot of hardware for production purposes. The totals reflect the values for organisations that use IT for assisting their internal functioning and operations, where IT is not their main line of business. It is important to note that these totals cover a very large range of businesses and functions that range from education to e-commerce and defence accounts.

Of the desktops being used, 48% are using FOSS. Of the servers being used, 86% are using FOSS. FOSS has commanded a much better competitive position in the server market than in the desktop market, and it is where most of the FOSS vendors have also concentrated their sales. The server market is also more conscious of the advantages that FOSS provides and competitively evaluates it in light of the other offerings. The desktop market, on the other hand, operates largely in the commodity space, in that the requirements of desktop operating systems and application software are not very stringent, and rarely mission critical, and it is here that FOSS penetration can be the highest.

Respondents were asked to provide competitive pricing of various software available in both FOSS and in proprietary forms. The responses are from the perspective of the organisation and unique requirements for which prices were sought. There is thus a wide variability in the prices mentioned, and these are shown in the tables below.

Desktop Software	FOSS Price	Proprietary Price
Desktop Operating System	Rs. 0 – 1000	Rs 3000 – Rs 13750
Desktop Publishing software	0	Rs 10000 – Rs 50000
Office software	0	Rs 2000 – Rs 15000
PDF Creation	0	Rs 5000 – Rs 17500
Media Creation/Player	0	Few thousands – Rs 42000
Photo Editing	0	Few thousands – Rs 50000

Table 4: Price Comparison of Desktop Software as mentioned by respondents

Server/Enterprise Software	FOSS Price	Proprietary Price
Web Server	0	Rs 10000 – Rs 0.7 million
Database Server	0	Rs 10000 – Rs 0.3 million
Content Management System	0	Rs 10000 – Rs 0.4 million

CRM	0	Rs 25000 – Rs 0.5 million
ERP	0 – Rs 0.2 million	Rs 25000 – many millions

Table 5: Price Comparison of Server/Enterprise Software as mentioned by respondents

Note: Table 5 indicates that prices for most types of FOSS-based servers, as seen by respondents, are zero. Some commercial FOSS vendors, Red Hat for instance, have specialised servers available at a price. FOSS vendors price their products based on the services and additional features they package. However, many users perceive these prices to be much lower than proprietary servers, as the licensing and upgrade costs are very low. Also, users sometimes download FOSS servers at no cost, provided they are able to do the installation and management themselves.

Projected Economic Impact of FOSS

We anticipate that FOSS will make a significant impact as a replacement for desktop operating systems, particularly Microsoft Windows. This implies a significant cost saving as is evident from the case data.

The volume sales of personal computers in India for the last ten years, from 1998 to 2008 is shown in the graph below. This data corresponds to the retail sales of PCs at different distribution channels across the country – this represents sales to small office/home office (SOHO), small businesses (SMEs) and home use. This data thus excludes large enterprise desktop sales (covered later). The data was obtained from EuroMonitor reports (2008).

The graph (Illustration 1) shows that PC sales have grown exponentially from about 430,000 units in 1998 to about 3.6 million units in 2008.

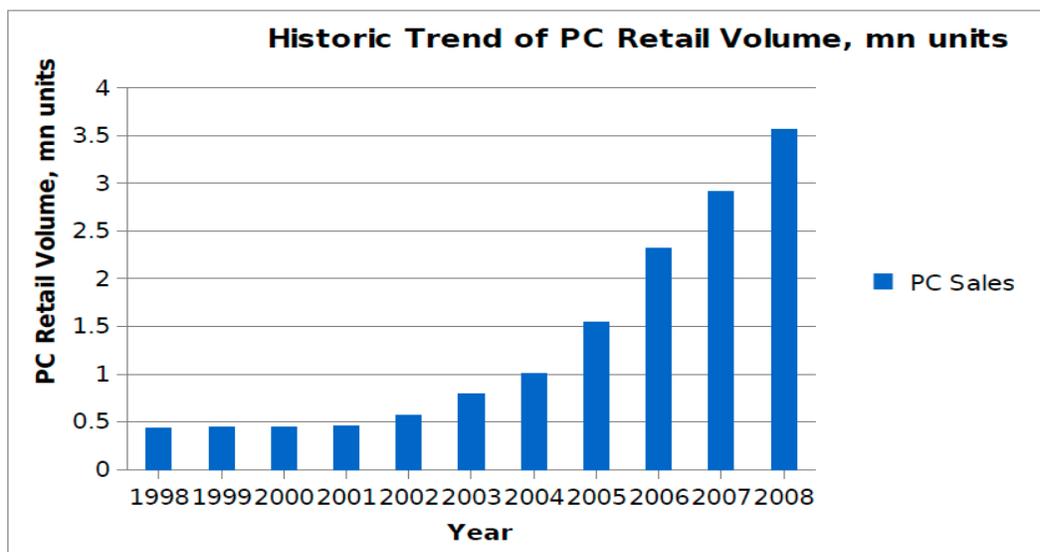


Illustration 1: PC Sales in the Past (Source: EuroMonitor reports (2008))

The forecast for PC sales in the next few years is depicted in the graph (Illustration 2) below.

Savings (Rs 3600 per unit) in OS Spending, Rs Millions

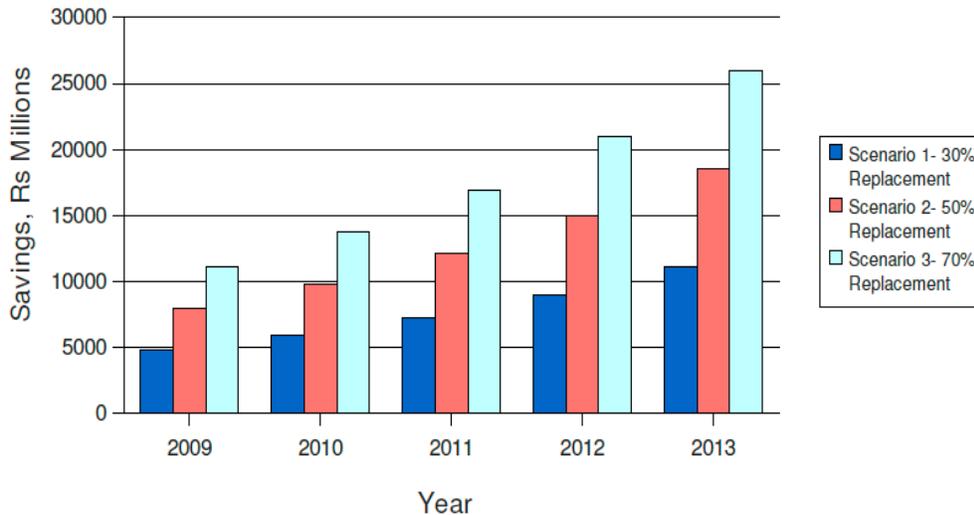


Illustration 4: Savings from replacing Home edition Microsoft Office, priced at Rs 3025 per package, with FOSS 3 scenarios

Illustration 4 above shows that if the Home edition of Microsoft Office, which is priced at Rs 3025 per unit, is replaced by the free Open Office there will be considerable savings for users. The replacement is considered at three levels – where 30% of the users replace with Open Office, where 50% replace, and where 70% replace. Using the forecast of PC sales from Illustration 2, we can compute the cost savings for all the three replacement scenarios. The graph above shows that in 2010, for instance, the savings will be Rs 4967 million at the 30% replacement level, Rs 8278 million at the 50% replacement level and Rs 11589 million at the 70% replacement level.

We consider similar replacement scenarios for the next, more expensive, version of Microsoft Office, the Professional Edition, which is priced at Rs 16,500. Illustration 5, below, shows that in the year 2010, if users replace MS Office Professional Edition with Open Office, the savings will be – Rs 27,091 million at the 30% replacement level, Rs 45,152 million at the 50% replacement level, and Rs 63,213 million at the 70% replacement level.

Savings in Office Tools (Professional ed), Rs millions

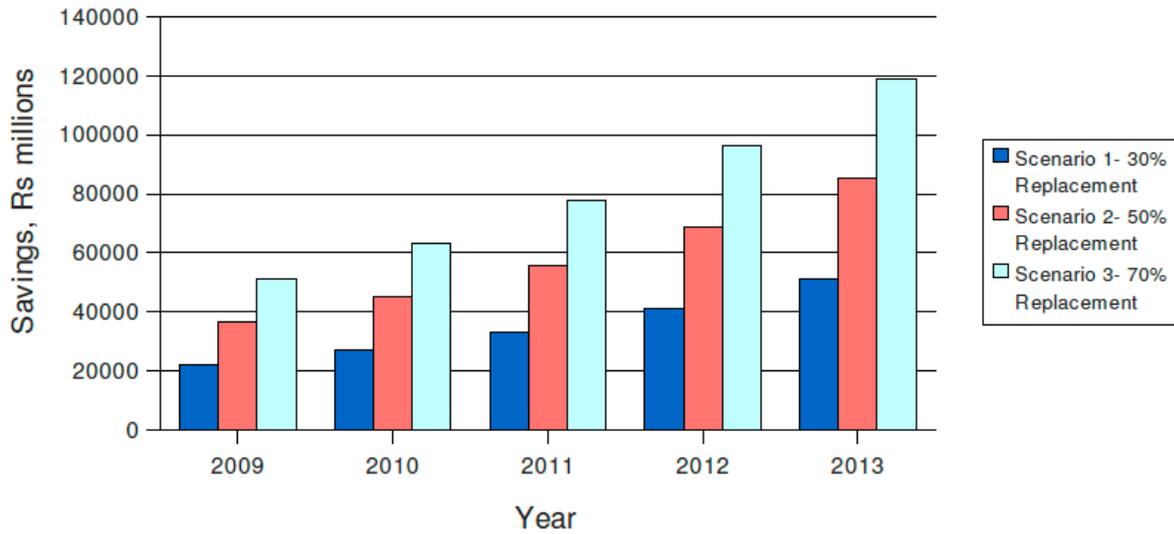


Illustration 5: Savings in replacing the Professional Edition of MS Office, priced at Rs 16,500 per package, with FOSS 3 scenarios

For the most expensive version of Microsoft Office, the Ultimate Edition, we consider only a 30% replacement scenario as this is a premium product and organisations would replace this rarely, only when they are certain that their work requirements could be met by Open Office. (Organisations would also buy this product only when there is a clear and direct need for the special features.)

Savings in Office Tools (Ultimate ed), Rs millions

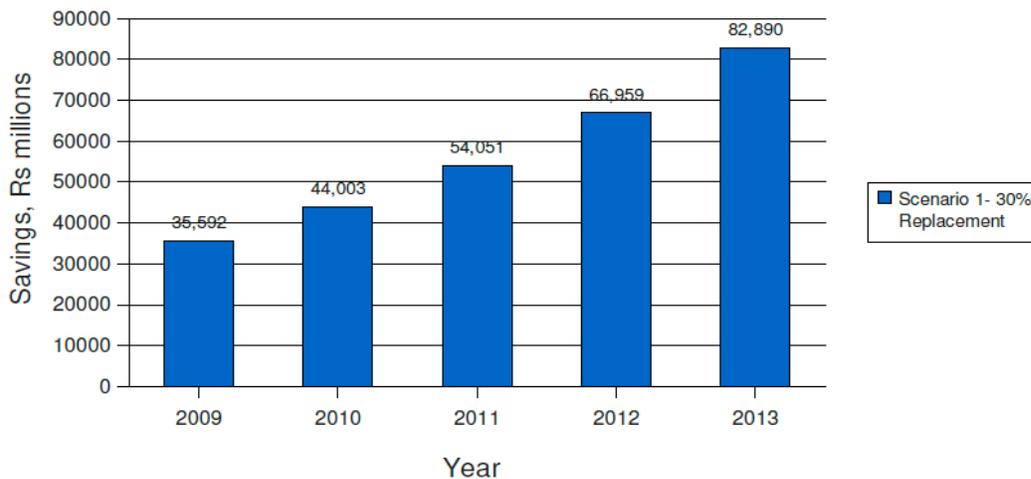


Illustration 6: Savings in replacing the Ultimate edition MS Office, priced at Rs 26,800 per package, with FOSS 30% replacement

Illustration 6 shows that in the year 2010, for instance, the savings achieved by replacing the Ultimate Edition of MS Office with Open Office, at a 30% replacement level, will be Rs 44,003 million.

Conclusions

The economic impact of FOSS is measured by computing the cost savings that will be possible if proprietary software is replaced by free software. The computations are done for software on PCs and servers.

Computations of cost savings resulting from replacing proprietary and commercial software with FOSS is done by first forecasting PC sales in the retail market, and then estimating the savings by considering three scenarios. The first is one in which it is assumed that 30% of the PCs will be replaced with FOSS software. The other two scenarios consider 50% and 70% replacement respectively.

We first consider replacing the operating systems on the PCs with a FOSS alternative. We assume that the proprietary operating system costs Rs 3600 per PC licence. When considered for the 50% scenario in the year 2010, in which it is assumed that 50% of the PCs sold will use FOSS, the savings amount to Rs 9847 million.

Cost savings resulting from replacing desktop productivity software with FOSS alternatives is also computed on the basis of forecasts. Microsoft Office is available in three price bands – at Rs 3025, at Rs 16,500, and at Rs 26,800 per unit. If these are replaced with Open Office, for example, the prices indicate the savings possible. We consider, again, three replacement scenarios. For the scenario where 50% of the middle price band product is replaced, in the year 2010, the cost savings are Rs 45,152 million.

We consider next PC sales in the enterprise market, which is different from retail sales, and constitutes bulk orders placed directly by institutions. We assume that the savings achieved will be Rs 20,000 per unit for both operating system and office productivity tools. In the year 2010, for a scenario where 50% of the enterprise PCs are replaced with FOSS, the total savings will be Rs 43,388 million.

Cost savings can be also achieved from not having to buy complementary software on PCs. Anti-virus software sales in India are likely to be about Rs 20 billion in the year 2010. This is mainly procured to protect proprietary operating systems used on PCs, like Windows. With FOSS desktop operating systems, this money can be saved entirely.

FOSS is used mainly on servers currently. In future, as servers sales grows, with a likely growth in FOSS products replacing proprietary products, it is likely that large savings can be achieved. With a conservative estimate of Rs 10,000 per server, the savings for the year 2010 are likely to be Rs 1,380 million.

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