



COMPARATIVE EVALUATION OF BOSS (BHARAT OPERATING SYSTEM SOLUTIONS, A FREE/OPEN SOURCE SOFTWARE, DEVELOPED BY INDIA) VERSUS M.S. WINDOWS, A PROPRIETARY SOFTWARE TO ASSIST INDIAN ORGANISATIONS TO SELECT THE BETTER OPTION

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Abstract: According to [1] Framework for Adoption of Open Source Software in e-Governance Systems Version 1.0 April 2015, prescribed by Department of Electronics and I. T., Ministry of Communications and I. T., Government of India, Annexure-II Illustrative list of OSS includes Icedtea, PHP, HTML, libre office, open office, Koha, evergreen, Gimp, evince, clamav, Bresero, CloudStack, Meghdoot, Ubuntu and BOSS. As per the recommendations of Govt of India the organizations should prefer the softwares of FOSS category but according to [2] Red Hat – Georgia Tech study ranked the top countries in FOSS adoption. India is at twenty third rank out of 75 countries studied. It means that the appeal of our former scholar president APJ Abdul Kalam, to Embrace open source philosophy [3] has not been followed properly... It is being said that Government's OS BOSS is dying a slow death due to lack of patronage [4]. In the above scenario BOSS (Bharat Operating System Solution), a free and open source software has been picked up for analysis and its comparison with corresponding proprietary software i.e. MS Windows. In this paper these two operating systems have been studied, analysed, compared on the basis of experiments, surveys using questionnaires, study of previous research outputs in form of research papers and phd thesis'. MS windows may be better in many aspects than B.O.S.S but at many points B.O.S.S. may be better and it may be improved if used and feedback supplied regularly. The practical implementation has been performed on these two operating systems for exploring the features like file system, language support, disk partitioning and CPU usage. Also users feedback has also been collected using questionnaire and analysed.

Keywords: Microsoft, Windows, BOSS, FOSS, adoption etc.

I. INTRODUCTION

Operating system acts as interface between user and machine and is responsible for all the operations which a computer system performs. Therefore it is deliberated in such a way that there is proficient use of the system resources and execute all the desired operations. With the initiation of new technologies and enhancements in the previous ones, it has turned out to be equally significant for the operating system to maintain and support them, so that they perform well with what it has. The operating systems should be devised with forethought that it is well with the existing technologies and may adapt the future technologies as well. Before the actual comparisons, let's briefly introduce these two operating systems. [5]

II. WINDOWS OPERATING SYSTEM

Windows is a proprietary operating system, which means that it is possessed by a company i.e. Microsoft with copyrights. It is important to note that windows source code is not accessible to the users; only the developers of windows can access and modify/update its code. The GUI of

windows operating system is so nice and user friendly that no command is .. required to remember ease of use

III. BOSS OPERATING SYSTEM

(a) Basically B.O.S.S. is a short form of BOSS GNU/Linux. [6] BOSS (Bharat Operating System Solutions) GNU/Linux distribution developed by C-D.A.C (Centre for Development of Advanced Computing) derived from Debian for enhancing the use of Free/ Open Source Software throughout India. BOSS GNU/Linux Version 4.0 is coupled with GNOME Desktop Environment. [4] BOSS has six versions: BOSS GNU/Linux Evaluation Sethu, BOSS GNU/Linux v1.0 Tarang released on 10/01/2007, BOSS GNU/Linux v2.0 Anant released on 17/09/2007, BOSS GNU/Linux Server released on 01/01/2008, BOSS GNU/Linux v3.0 Tejas released on 04/09/2008, BOSS GNU/Linux v4.0 Savir released on 02/08/2012, BOSS GNU/Linux v5.0 Anokha released on 23/12/2013, BOSS GNU/Linux v6.0 Anoop released on 04/03/2015. [7] EduBOSS: EduBOSS provides teaching and learning aids in schools. Its components include Fotowall, GCompris, TuxPaint, Kalzium, Geogebra, and Gbrainy etc.

BOSS and Microsoft Windows are different from each other in various aspects like philosophy, adaptability and many more. Some aspects of comparisons between the two are such as file system, memory usage, language and disk partitioning.

A. FILE SYSTEM:

[8]A file system is an approach to systematize, accumulate and name information at data storage devices. But in a simple way: it is a method of saving information at various storage devices and at the computer hard disk. Microsoft Windows uses the most commonly utilized system that is NTFS file system.

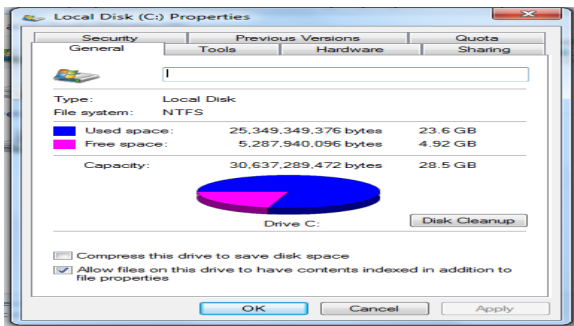


Figure 1
Screen shot for MSWindows File System

[9]In the file system of BOSS/linux the files are always identified by a number which is known as inode. Each and every inode is correlated by the attributes such as name, permission, type etc. in this system, if a file is deleted the inode of that file is unlinked. But at the same time if another application is using that file, the link of that file is still open in the operating system and works properly. This is the reason that if accidentally a file is deleted the data is still there but not indexed:

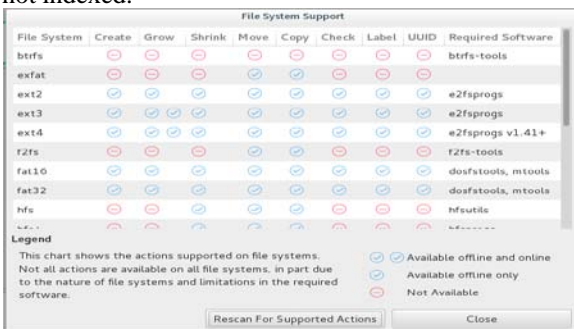


Figure 2
Screen shot for BOSS file system

B. LANGUAGE SUPPORT:

A Microsoft window uses the languages from all over the world but not any local language of India.

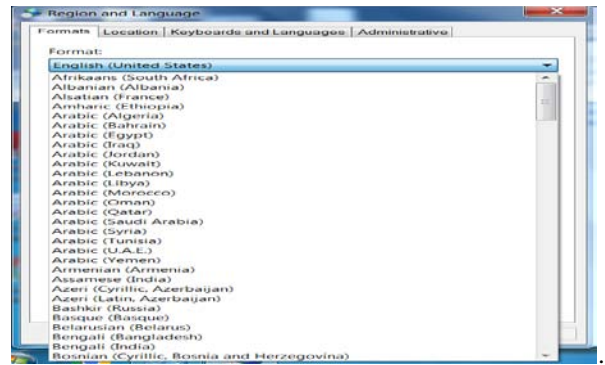


Figure 3
Screen shot for Language support by MSWindows

[6]Currently BOSS GNU/Linux Desktop is available in all the Official Indian Languages like Assamese, Bengali, Gujarati, Hindi, Ka nnada, Malayalam, Marathi, Oriya, Punjabi, Sanskrit, Tamil, Telugu, Bodo, Urdu, Kashmiri, Maithili, Konkani, Manipuri. This enables non-English literate users in the country to use computer efficiently with ease.



Figure 4
Screen shot for Local Language support by BOSS

C. DISK PARTITIONING SYSTEM:

[10]In Microsoft windows the disk partitioning of the system should have matching level of firmware of that particular system. It is mainly based on Basic Input/Output System (BIOS), Extensible Firmware Interface (EFI) Class 1, Unified Extensible Firmware Interface (UEFI) Class 2 and Unified Extensible Firmware Interface (UEFI) Class 3Equations



Figure 5
Screenshot for Disk Partitioning System for Windows

In BOSS operating system, the physical storage can be separated into multiple logical storage units known as partitions. Each partition will demonstrate under /dev as a device node. A number after the device letter signifies the number of the partitions, for example the device node files

/dev/sda1 and /dev/sda2 refer to the first and second partition of the first SATA device.

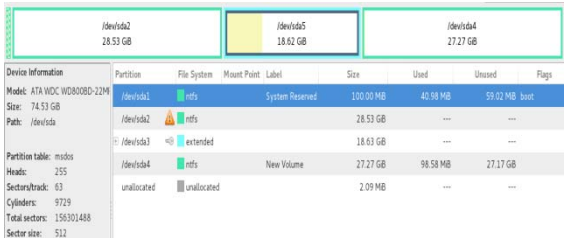


Figure 6
Screenshot for Disk Partition System for BOSS

D. CPU USAGE:

To check the CPU usage: while running some online application on Microsoft windows we get the following scenario:

Before running any application :

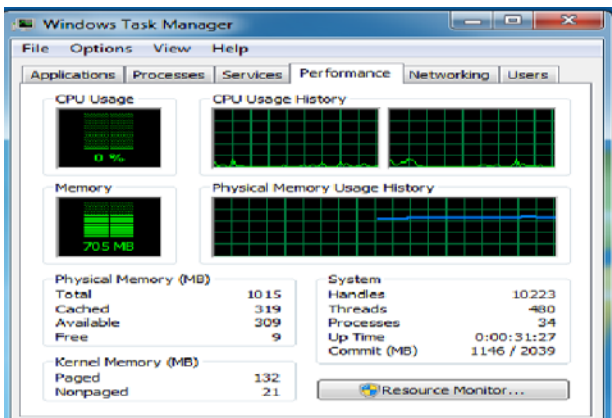


Figure 7
Screen shot for CPU usage in Windows

After running online application:

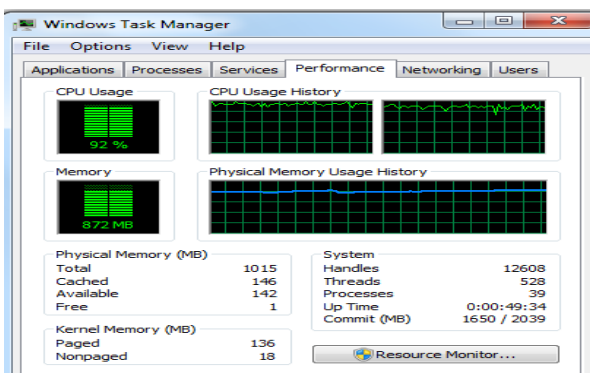


Figure 8
Screen shot for CPU usage in Windows

When the same online application is run on the BOSS operating system, the result is as shown below:

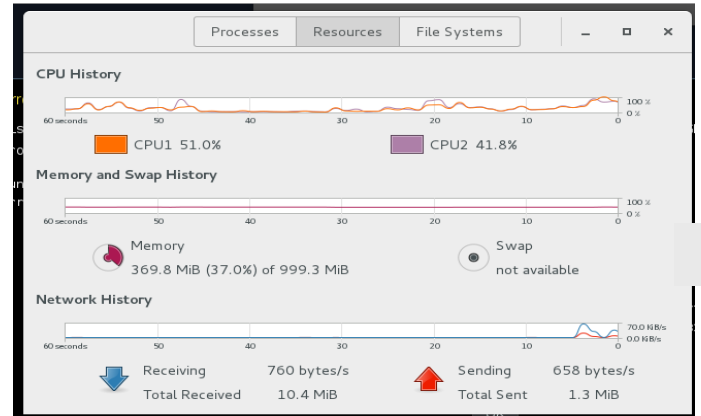


Figure 9
Screen shot for CPU usage in BOSS

From the above results it is clear that, the CPU utilization is much less in BOSS i.e. only 51 % as compared to 92% in Microsoft Windows. This signifies that in case of BOSS the CPU power can be utilized to perform other additional operations as compared to those with Microsoft Windows.

IV. RESULT AND DISCUSSION

Feedback collected from users on factors mentioned in [1]Framework for OSS adoption by NEILT, Govt of India The data on various factors has been collected from users through the questionnaire and results are represented in form of pie charts in following sections.

1. Economic Level Factors :

(a) Cost Effectiveness :

Cost Effectiveness: The windows software and license have cost charges in thousands. But [1]BOSS is being provided free by NRCFOSS (National Resource Centre For Free and Open Source Software), promoted by the Department of Electronics & Information Technology (DeitY) Govt. of India. TCO i.e. Total Cost of Ownership, ROI i.e. return on investment and IRR i.e. Internal rate of return are based upon the cost incurred on software therefore all of these three factors are in favor of BOSS instead of Windows.

(b) Preservation of Foreign Exchange (+)

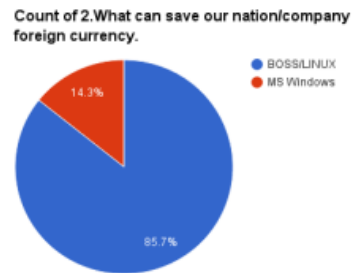


Figure 1.1

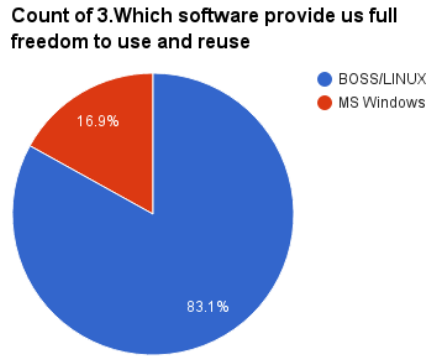


Figure 1.2

(c) Freedom to Use & Reuse (+)

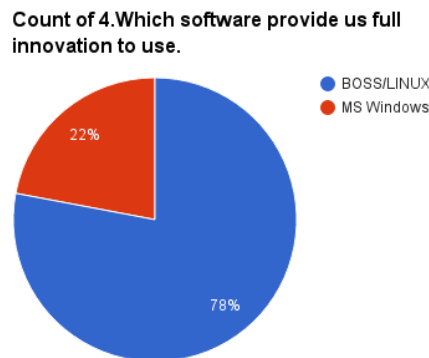


Figure 1.3

(d) Help Innovation (+)
(e) Better Local Capacity Building (+)

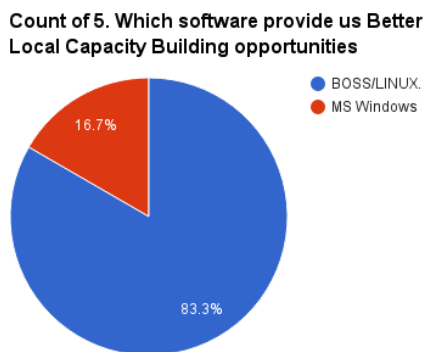


Figure 1.4

(f) Minimised Piracy (+) : the governments in the Philippines, Thailand and India are initiating an effort of using OSS in government agencies, small businesses and schools. Although the software piracy rate is relatively high in many countries, this kind of effort can help in bringing down their piracy rate. [11]. It signifies that proprietary software have piracy chances where as oss are of free and open source category. Therefore no need of piracy.

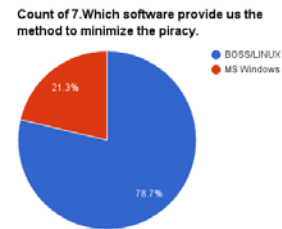


Figure 1.5

(g) Economic Opportunities for Local Industry (+)

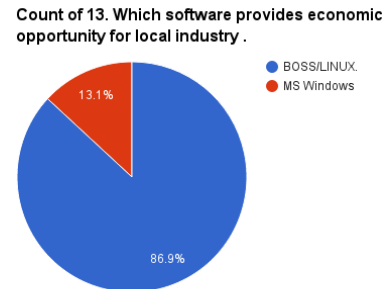


Figure 1.6

(j) Better Suitability (+)

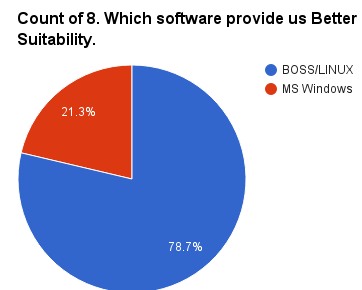


Figure 1.7

(k) Wider choices on OSS (+)

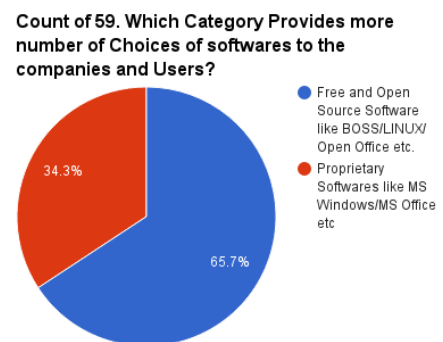


Figure 1.8

II. Security Level Factors :

(a) Enhancing Security (+)

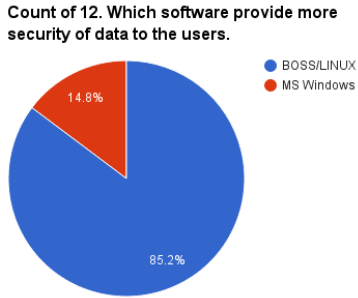


Figure 2.1

(b) Enhancing source code level security without mistrust code (+)

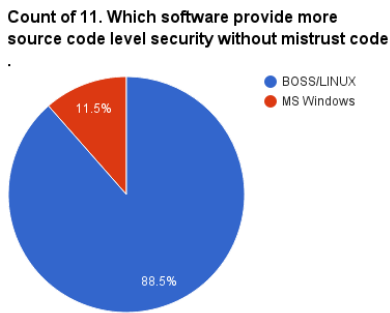


Figure 2.2

Security : [12]There are about 60,000 viruses known for Windows, and perhaps 40 for Linux. Most of the Windows viruses are not important, but many hundreds have caused widespread damage. None of the Unix or Linux viruses became widespread – most were confined to the laboratory. And BOSS is based upon Linux. Therefore names BOSS GNU/Linux. Hence more secure.

III. Technological Level Factors

[13]One thing that linux can do that Windows cannot, is run from a CD [14]BOSS is a GNU/Linux distribution that boots and runs completely from DVD

(a) Technological Compatibility based on Standards (+)

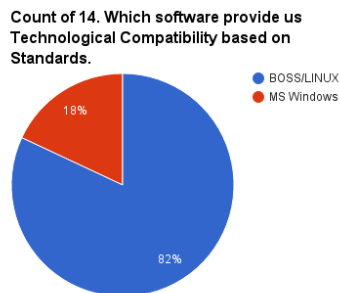


Figure 3.1

(b) Availability of Device Drivers for OSS Operating Systems (+)

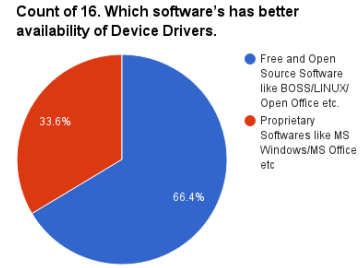


Figure 3.2

(d) Trial ability of OSS (+)

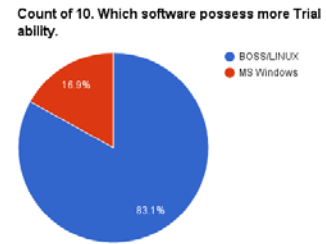


Figure 3.3

(e) Availability of OSS stack (+)

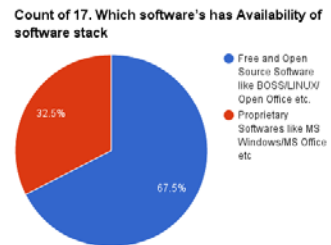


Figure 3.3

(f) Technological Complexity in OSS usage (-)

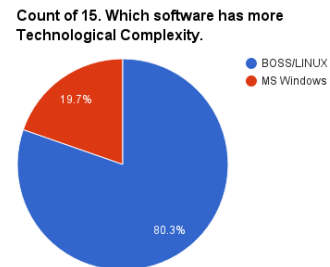


Figure 3.4

(h) Freedom to modify and improve (+)

Count of 16. Which category of software provide freedom to modify and improve.

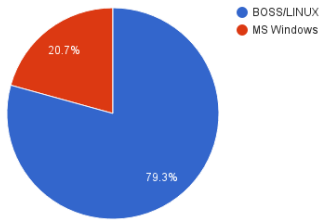


Figure 3.5

IV Organizational Level Factors

(a) Management's Positive Attitudes towards OSS (+)

Count of 20. What is the attitude of management towards Free and open source softwares adoption

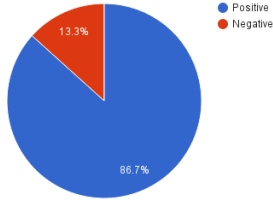


Figure 4.1

(c) Size of Organization (+)

Count of 21. Which size of companies prefer BOSS/LINUX over MS Windows

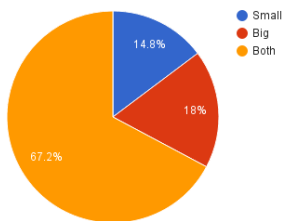


Figure 4.2

d) Diverse Expertise at Management Level (+)

Count of 24. The educational background of members in your organization's management is:

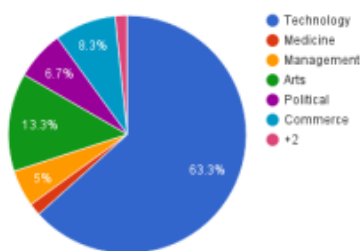


Figure 4.3

(e) Inter-connectedness of Organisation (+)

Count of 25. What is the level of Inter-connectedness in your Organization?

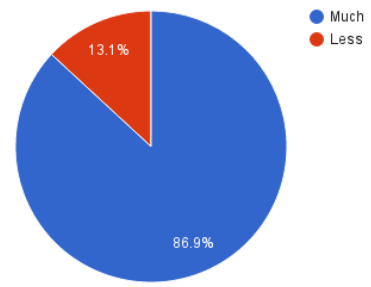


Figure 4.4

(g) Inclination towards Business Processes Re-engineering (+)

Count of 22. Is your company/organisation/ institute positive towards business process reengineering?

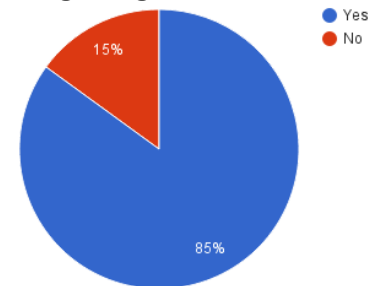


Figure 4.5

(j) Centralization on Decision Making (-)

Count of 31. Do your organization have Centralizations on Decision Making?

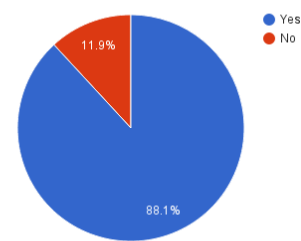


Figure 4.6

(k) Availability of Financial Resources (-) : The financial resources required for FOSS are not so high therefore organizations do not face problem in this aspect.

V Environmental Level Factors:

(a) Rules for the adoption of OSS

Count of 37. What have been your greatest concerns about BOSS licensing policies [k] Are you in favour of Rules for the adoption of OSS]

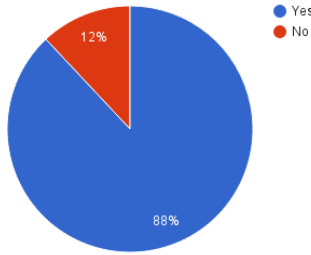


Figure 5.1

Also number of downloads and deployments of BOSS are 2.5 millions as shown in following screenshot.

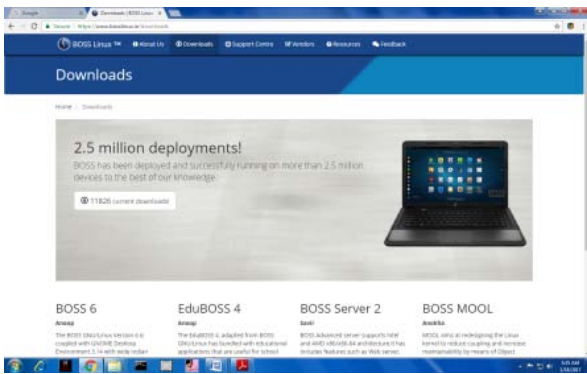


Figure 5.2

According to [1]framework on oss by govt of india a number of State Governments have started to adopt Open Source Software as their platforms for e-Governance applications deployment like Kerala, Tamil Nadu ,Uttaranchal, Assam, West Bengal, Pondicherry, Haryana.

(b) Provision for Capacity Building (+)

Count of 5. Which software provide us Better Local Capacity Building opportunities

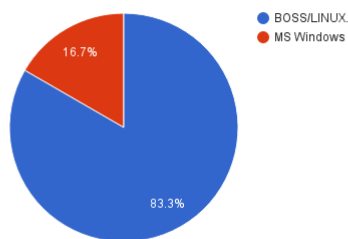


Figure 5.3

(b) Availability of Support Services on OSS (+)

To promote BOSS/Linux across the government bodies, [15]support centres have been set up at various C-DAC centres, along with a national help desk facility setup at C-DAC Chennai.

Count of 31. BOSS/LINUX have problems in : [b] Support]

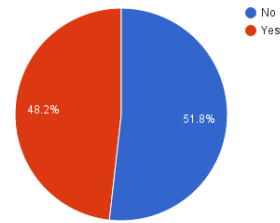


Figure 5.4

(f) Past Experience on OSS (+)

Count of 38. Experience [a] What is your Past Experience on BOSS]

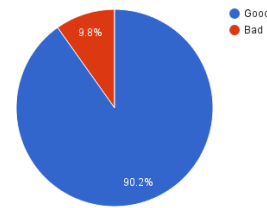


Figure 5.5

(g) Availability of Internal Collaboration Mechanism (+)

Count of 39. Further on Experience [a] IS there satisfactory Availability of Internal Collaboration Mechanism for BOSS]

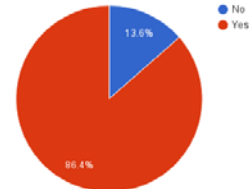


Figure 5.5

VI. Individual Level Factors :
(a) Level of Organizational Objectives Consensus(+)

Count of 46. Level of Organizational Objectives Consensus

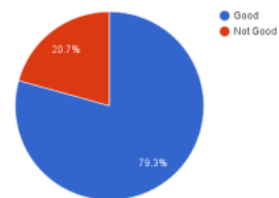


Figure 6.1

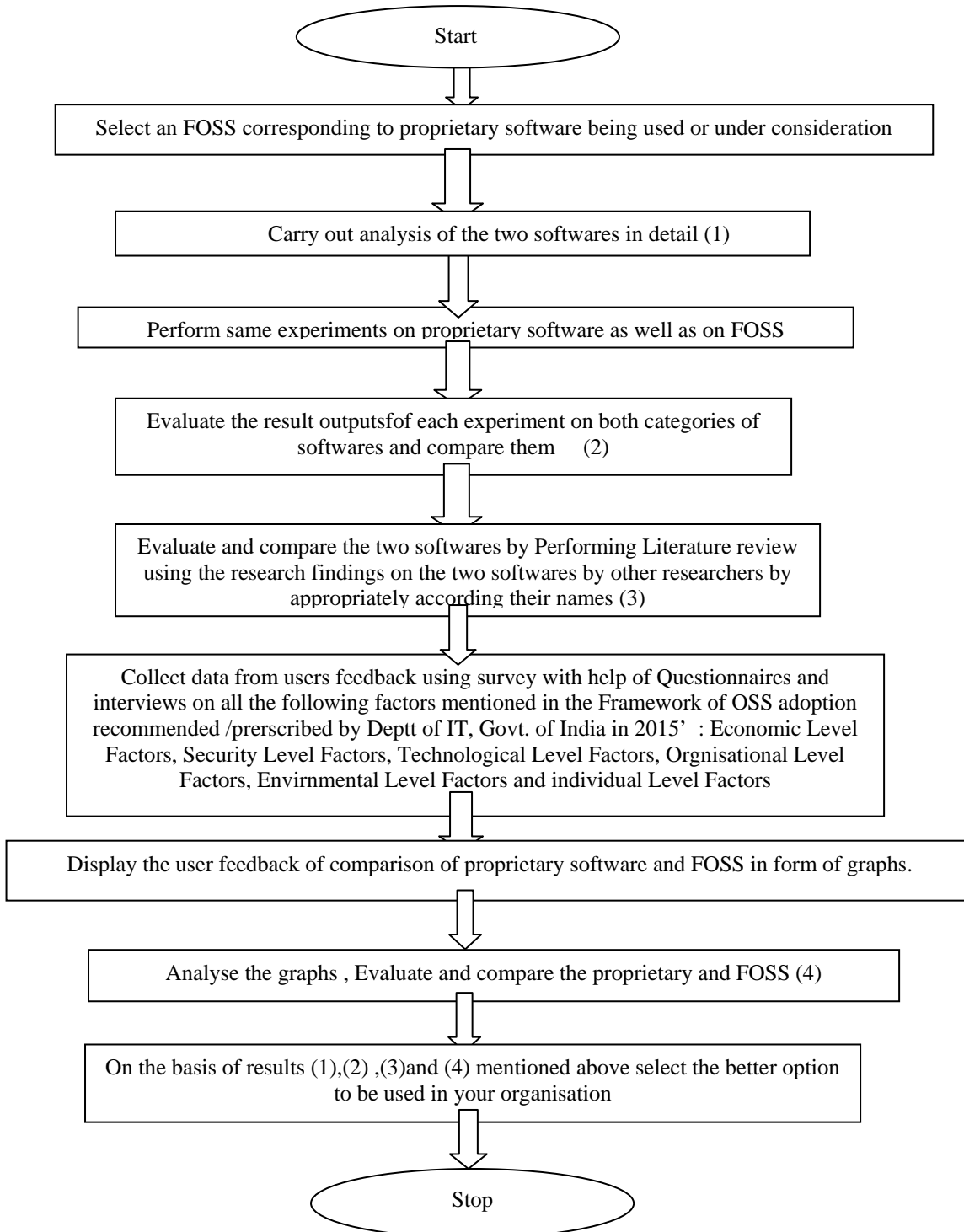
(b) User's Fear on De-skilling of Legacy Expertise (-)



Figure6.2

If above system of evaluations is summarized in a algorithm or flowchart or model form then it may be expressed as follows :

A new evaluation approach developed for comparing the two categories of softwares i.e. proprietary Softwares and FOSS (Free/Open Source Softwares) to assist Indian organizations to select the better option



V. CONCLUSION

From the above experiments it is evident that BOSS can be used as an alternative to windows especially in India. There may be many shortcomings in B.O.S.S.in comparison to MS Windows but if we use it and provide the feedback to right people then it may be improved.

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