Adoption of Open source on Darbar Group of Institution - Impact and Challenges

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ABSTRACT: The term "Open Source" is a trending topic at present among Schools, Colleges and professionals in India. Open Source applications in education very Important Topic it is a matter of serious discussion among the Education, The study area investigates Darbar Group of Institution - Vijayapura Karnataka State- India, A sample size of 20 students, 20 teaching staff and 20 Technical staff were selected in different colleges that comes under Darbar Group of Institution using stratified sampling techniques with well-structured questionnaires. Google forms and googlesheets were used to capture the data frequency and percentage distributions were used to analyze it. In all 420 copies of questionnaire were administered to 07 affiliated colleges comes under Darbar Group of Institution while 400 copies were returned which represent respondent rate of 95.2%. This Paper attempts to find out the Implementation, adoption and challenges of Open Source software's that are made curriculum. At the same time it is relive that open source adoption to Darbar Group of Institution reduce cost of software improve independence to the technological goods, and increasing computing power to students who will be competitive in the international market challenges.

KEYWORDS: Open source in education, Open source software, Open Resources, Darbar Group of Institution.

I. INTRODUCTION

The Open source software is software with source code that anyone can inspect, modify, and enhance. "Source code" is the part of software that most computer users don't ever see; it's the code computer programmers can manipulate to change how a piece of software—a "program" or "application"—works. Programmers who have access to a computer program's source code can improve that program by adding features to it or fixing parts that don't always work correctly [10]. Open source culture and concepts help students, teachers, schools, and communities have a better learning experience being free to share their ideas and build on the work of others. Learning and teaching "the open source way" will better prepare students for their careers, while helping schools differentiate themselves and growing the next generation of open source contributors.

The problem for most schools is finding the mentors and exemplars of this paradigm. Teachers have the experience to teach students open source but they have the mentors and need for documentation and models to use these open source software's a clear path could be helpful. Exploring parts of undocumented software might be a minefield of troubleshooting for a teacher that lead to unstructured environment.

In this paper, Open Source in education Impact and challenges on adoption to Darbar Group of Institution have been study and investigated. The impact assessment investigates the gains derived from the adoption of open source in education on Darbar Group of Institution while the challenges assessment investigates the problems and constraining factors mitigating with the successful adoption and use of open source in Seven Affiliated colleges of Darbar Group of Institution. It concludes by recommending strategies to manage the identified challenges in the study area

II.   LITERATURE REVIEW AND CONCEPTUAL UNDERPININGS

Use of free and open source software could help India save more than Rs 8,300 Crore in government expenses on education and police only, says a new study, vindicating the Centre's move to promote such software as part of its Digital India initiative. Schools and other institutions could save an estimated Rs 8,254 crore by adopting free and open source software while police departments could save about Rs 51.20 crore, said a study led by Rahul De, Hewlett-Packard Chair Professor at the Indian Institute of Management Bangalore [1].

Rahul De conducted a survey on Open Source software and the authors argued that Open Source software leads to huge cost savings and promotes a do-it-yourself attitude towards technology amongst officials. "Both in the education and police departments, where vendors have a strong presence, the decision makers have low familiarity with free and open source software and confidence in expressing their preference, as one respondent stated he was worried about recommending free and open source software, but had no fears about recommending proprietary software[1].

Among the education departments, Kerala was found to be using free and open source software most effectively for schools and benefited in the form of massive cost savings, inculcation of a do-it yourself culture amongst teachers and students and active participation in the education process. All other states were found to be dependent on proprietary software such as Microsoft Windows.

Experts also believe that educational institutes should be the first places that use open source extensively. "The problem of working with closed software, especially in educational institutes, is that the talent that comes out of these places are too dependent on commercial software. It's very important that we create an environment where open-source talent can come out of these institutes. Open source can allow things to be done in a much faster manner and it's also cheaper. Using such software in government departments is good but using these in educational institutes is even better," says Akhilesh Tuteja, partner and head of IT advisory, KPMG.[1].

Rahul De[1] argued that Even though many institutes of higher education have adopted open source in a big way, a lot more can be done. "Big institutes like IITs and IIMs have started using open source but a lot more can still be done. Many institutes, especially schools across many states in the country, have not been able to adopt these software because there is no serious policy backing them. As a result they are left with no option but to go with commercial vendors for closed software.

Charlie Reisinger, IT Director at Penn Manor High School in Lancaster Pennsylvania delivers a talk on how we can empower students at all public schools with the elements of the open source way. Charlie defined that tablets are all the rage in public schools, but they are locked down. Students are prevented from tinkering with them and installing programs. This sends them the message that we don't trust them to use computers. But through the moral of the old folktale "stone soup," we can empower students by focusing on community, collaboration, and trust.

Penn Manor has successfully implemented one of the largest one-to-one deployments of Linux laptops. A student help desk was spun up at the same time. Laptops are prepared by a group of students for the whole school; one senior even created an imaging program that is now up on GitHub.[2]

Red Hat Academy is an open source education program that provides turnkey curriculum materials for educational programs in institutions of higher education worldwide. Red Hat Academy outfits institutions that have the required technology and support environments with hands-on curriculum, labs, performance-based testing, and educator training and support — all the elements necessary to start and sustain a Linux curriculum program.[3] Red Hat Academy's 100% web-deployed and web-managed curriculum helps create proven competencies through hands-on, performance-based learning and testing. Red Hat Academy course textbooks are web-based, mobile-friendly, and accessible any place there is an internet connection.

Bharat Operating System Solutions is a free and open source, Linux distribution developed by the National Resource Centre for Free/Open Source Software of India.The latest version is 6.0, This software package has been described as "India's own PC operating system" and "the most meaningful product to come out of the Indian software industry in decades — and let's recognize it, this is work that a government department had to do[4].

EduBOSS comes with a set of features which are relevant to primary and secondary school environment, to provide a complete usable Operating System consisting of GUIs and console applications for routine tasks and additional utilities which are useful for teaching/learning in schools. EduBOSS is designed to bring the power and flexibility of free software and an open operating system to kids and the education community.[5].

A major technology transfer is required in India to increase the IT Literacy rate by implementing Information and communication technology in education at various teaching-learning levels. In the present scenario of technology transfer, Free and Open Source Software is gaining importance with its numerous features viz. knowledge sharing, professional recognition, group problem solving, challenge proprietary software, project developments, development of new skills and many more. The Free and Open Source Software movement is one such development that is playing out before us today.[6] IT Education has become a key factor in the socio-economic progress of India. In fact, it has played a crucial role in exploring the potential for technology to redefine the terms of teaching and learning. Imbibing Information and communication technology in education is very important to increase the IT literacy rate in India but the conventional educational system as well as the cost of proprietary software puts a big constraint in the implementation. Adoption of Free and Open Source Software by various Government departments and educational institutions may provide an impeccable solution to address this unprecedented issue because free and open source software provides higher degree of independence [6].

Darbar Group of Institution relay on closed software's, Implementation and awareness needed but there is a open source communities like Mozilla, LibreOffice organized and coordinated events under Mozilla Club as per article published in Local newspapers[12] .

III. MATERIALS AND METHODS

The Methods and approach adopted using Research Questions are highlighted, the study area sampled population and research techniques

A. *Research Techniques*:

To realize the purpose of this research study, three (3) research questions are formulated as follows: what is the level of adoption of open source to undergraduate colleges that comes Universities in the study area?

What are the benefits associated with the adoption of open source software's by colleges in the study area?

What are the Implementation and the constraining features to the successful adoption and use of open source by Darbar Group of Institution in the study area?

B. *Data Presentation*:

This study is an empirical research which investigates the level of adoption, benefits and challenges of open source tools in colleges that comes under Group of Institution. The instrument for data collection using questionnaire titled, "Adoption of Open source on Darbar Group of Institution - Impact and Challenges" firstly we collect personal information about each respondent second part provides information on the assessment of the adoption of open source in colleges. The third part shows impacts of open source tools. The fourth part investigates the challenges of using open sources tools.

In all 420 copies of questionnaire were administered to 07 affiliated colleges comes under Darbar Group of Institution while 400 copies were returned which represent respondent rate of 95.2%. A sample size of 20 students, 20 teaching staff and 20 Technical staff were selected in different colleges that comes under Darbar Group of Institution using stratified sampling techniques with well-structured questionaries.Googleforms and googlesheets was used to capture the data frequency and percentage distributions were used to analyze it.

IV. RESULTS AND INTERPRETATION

The results of adoption of open source technology and their impacts of implementation with challenges for using Darbar Group of Institution are discussed in this section.

A. *Adoption of open source tools in colleges:*

The analysis of the finding for research queries is in figure1 and figure2. The response obtained from research study indicate that out of 07 colleges, only 01 colleges are already adopted the open source technology and tools which means only 14.2% adopted rate in Darbar Group of Institution as shown in Figure-1.
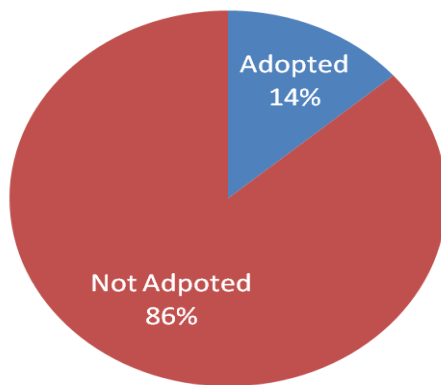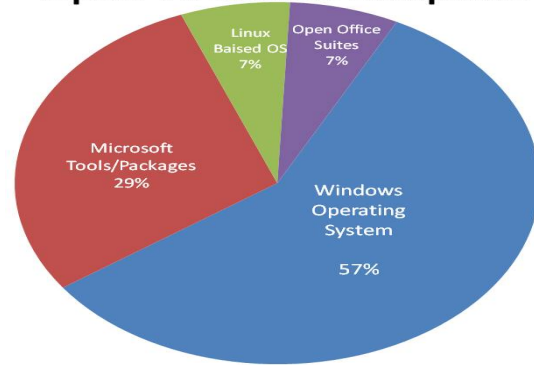

Fig-1

Fig-2

However lack of awareness and may think of open source software have no customer support. As figure 2 responses obtained indicated that 86% colleges uses closed source software (the Microsoft tools in their colleges) But only 14% colleges reports that offer deployed open source tools and technology service to their colleges. Based on Seven colleges only One College is adopted Open source Tools IDE like Eclipse, NetBeans, Linux based Operating System and E-learning Through Open source Community Like Mozilla.

Table-1 Shows adopted of Closed and Open Source Tools both in Theory and Practical's by Darbar Group of Institution.

Table-1

BCA Course in Semester	Software Tool-1	Software Tool-2	BCom Course in Semester	Software Tools	BBA Course in Semester	Software Tools
First	LibreOffice/Openoffice	Eclipse IDE	First	-	First	Tally
Second	*IBM SPSS*	Eclipse IDE	Second	*MS-Office*	Second	*MS-Office*
Third	Fedora OS	Eclipse IDE	Third	MS-Office	Third	CodeBlocks IDE
Fourth	NetBeans IDE	*MS- Visual Studio 08*	Fourth	CodeBlocks IDE	Fourth	-
Fifth	*Ms- visual Studio 08*	*MSSQL/MYSQL*	Fifth	HTML/E-com	Fifth	-
Sixth	NetBeans IDE	*Selenium IDE*	Sixth	Tally/Multimedia	Sixth	-

Table -2: Challenges and Benefits of open source technology in Darbar Group of Institution in study area.

Challenges of open source technology in study area	% Of Respondents	Benefits of open source technology in study area	% Of Respondents
Interoperability and migration problems	87.2	Security	85.5
Lack of support	74.5	Quality	78.75
Poor quality software	65.5	Customizability	81.25
Not what users want	55.7	Freedom	86.75
Lack of staff expertise, training needs	51.7	Flexibility	77.75
There is no open source solution for our needs	41.5	Interoperability	76.75
Legal issues including licensing	34.2	Audit ability	79.75
Time costs of identifying relevant software	31.2	Reduced Cost	90.5
Migration costs	23.5	Reliability	67.5
Existing contractual obligations	17.2	Support Options	16.5
Poor documentation	14.5	Localization	11.5
Solution does not scale	12.5	Transparency	84.7
		Affordability	89
		perpetuity	82.25

As shown in Table-2, Percentage is more in" Interoperability and migration problems" in adopted area due to change in syllabus by university which effect computer hardware and license software's and lack of support and training to faculty's staff. Similarly the Benefits are Reduced Cost and freedom with Security as most of open source uses linux operating system.
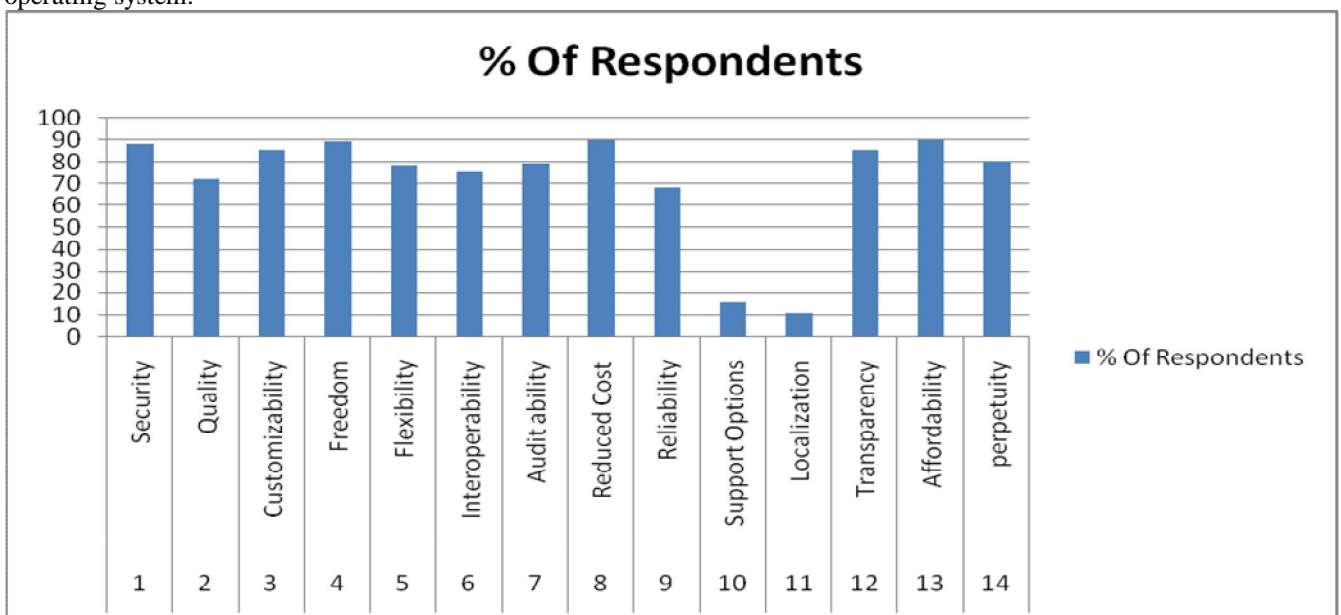

Figure 3

Fig-3 shows the percentage of respondents from different colleges both faculty, admin staff make open source with reduced cost and Fig-4 shows interoperability and migration problems as many of them using a close software tools with pirated version. The challenges that include is giving awareness and training on the University level and encourage to use Open source tools as maximum number of students and faculty already using android operating system on their smart phones apart from that to train to interact with open source support team.
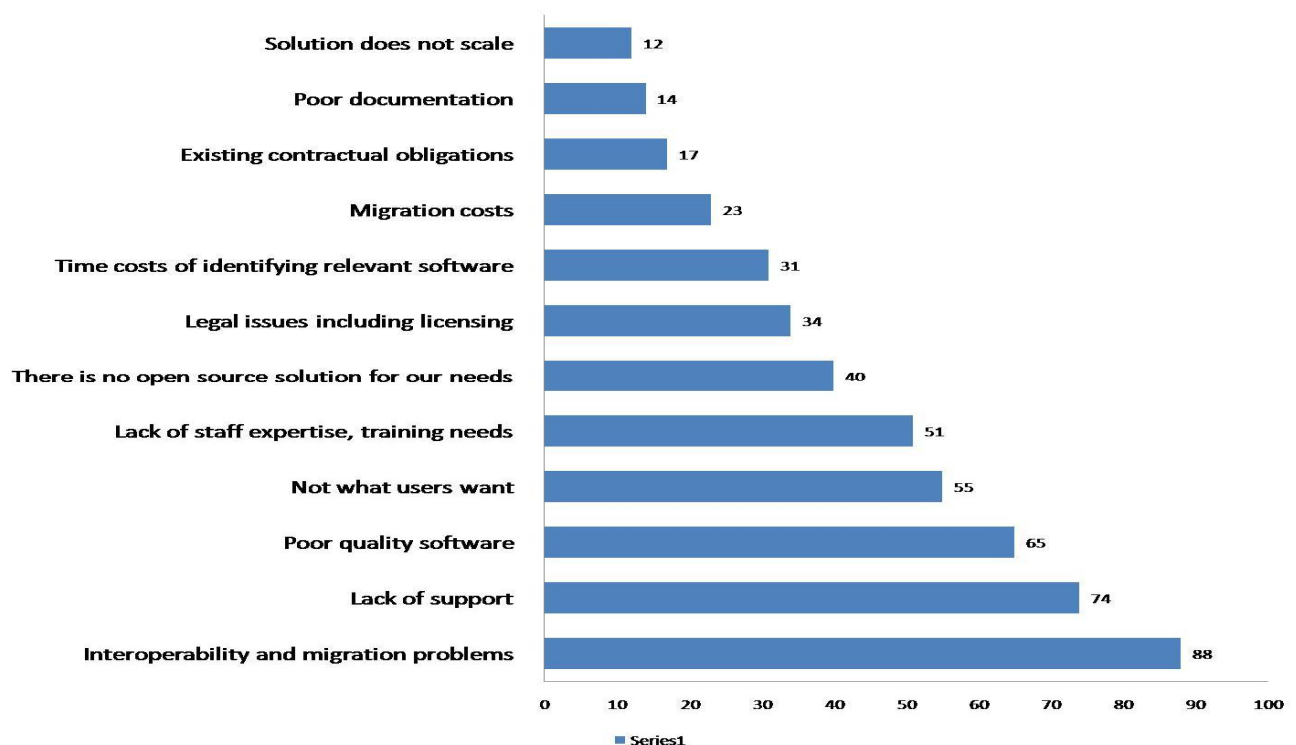

Figure 4

These study area Questionnaire as **Part -I** to collect personal details of respondent **Part-2** Awareness and Adoption- for faculty and Staff **Part -3** Benefits and Challenges - by using rating.

V. CONCLUSION

The Study find out that by taking the colleges that comes under Darbar Group of Institution, the mindset fixed that open source software's are free but difficult to install and there is no customer supports the study is observed that there is no syllabus related to Open Source Tools and no community at earlier stage of education primary and high school section, Even University mention to use of Open Source tools in Higher level of education.

Which can be leveraged through the adoption and giving awareness, training, involving in community based events workshop and active participate in different activities that exist in open source community, Open Source technologies can actually help institutions reduce high expenditure on software licenses , Professional interactions, Outside opportunities, Better understanding of computing, Unbounded learning and have a better learning experience being free to share their ideas and build on the work of others.

Based on the results obtained from this research work from seven colleges and only one college is adopted open source, the following implementation should be made. The open source technologies can help Darbar Group of Institution.

a)   Giving training to faculty and students through online communities for doing installation and configuration of Open Source tools and operating System.

b)   Encouraging being a part of open source communities like Mozilla, opening source initiative to promote Open source.

c)   Need to adopt subject at earlier stage on "Philosophy and practice of Free and Open Source Software.

Future research work can investigate on how these above factors can be managed easily with additional overheads, how to interact with open source community members around the world and how to make Cultural Considerations in localization of Open Source Tools. To popularize Open Source Software's among the masses especially among the students. The founding of NRCFOSS(National Resource Centre for Free/Open Source Software) is the first initiative by the Government of India in the direction of making efforts for increasing the acceptance of FOSS at a national level. Some state governments, for example Kerala, already have programmes; AU-KBC Research Centre of Anna University[8] is good example for implementing Open source technologies. The research made here is based on Darbar Group of Institution only and extend to University and university affiliated colleges.

VI. ACKNOWLEDGMENTS

REFERENCES

1.   Neha Alawadhi,Open source software could help India save Rs 8,254 crore in education alone: Study, ET Bureau,http://economictimes.indiatimes.com,Software-Sep 24, 2015, 05.23 AM IST.
2.   Charlie Reisinger, IT Director at Penn Manor High School ,Open source schools: More soup, less nuts,education,05 Jan 2015 Opensource.com (Red Hat).
3.   linuxlearningcentre.com,redhat training, Bangalore India.
4.   Bharat Operating System Solutions,From Wikipedia, the free encyclopedia, 2 June 2017,Wikimedia Foundation, Inc., under the Creative Commons Attribution-ShareAlike License.
5.   EduBOSS GNU/Linux, the free operating system for schools,bosslinux.in/eduboss,2015 .BOSS Linux ™C-DAC, Chennai INDIA.
6.   Amit Kumar, Tanvir Singh,The Emergence of Free and Open Source Software (FOSS) for Implementation of ICT in Education in India,ISSN: 2348-0033 (Online) ISSN : 2249-4944 (Print),IJEAR Vol. 4, Issue 2 Spl-1, July - Dec 2014.
7.   Heidi Ellis,5 reasons professors should encourage students to get involved in open source projects,opensource.com/education,Education Back to School 2016, 22 Aug 2016.
8.   C-DAC Chennai and Anna University Chennai , NRCFOSS-AU project,NRCFOSS-AU, the Anna University Chennai unit,nrcfoss.au-kbc.org-Homepage, India.
9.   (NRCFOSS) is an initiative of the Department of Information Technology, Ministry of Communications & Information Technology, Government of India,nrcfoss.org.in,April 2005.
10.   Opensource.com,"What is open source?",opensource.com/resources,Red Hat, Inc.100 East Davie Street, Raleigh, NC 27601 USA.
11.   Scott Wilson,Tackling the challenges of open source adoption in education,opensource.com/education,08 May 2014.
12.   Samyuktha Karnataka , Vijaya Karnataka, Kannada Prabha dated Aug 10 2015, 17th July 2016 Bijapur Kannada NewsPapers.

APPENDIX

Questionnaire for the Evaluation of Adoption of Open source on Darbar Group of Institution - Impact and Challenges.
 Part I: Respondent Details:
Name: Age: College:
Status: Teaching Staff ☐ Non-Teaching Staff ☐ Student ☐
Part II: Awareness and Adoption of Open Source technologies by Darbar Group of Institution.
1. Are you aware of Open Source technologies in Education?
Part III: Assessment of the benefits of Using Open source technologies College Affiliated colleges. Rate as applicable to your College on the likert scale of strongly Agree, Agree, Not Sure, Disagree and Strongly Disagree (N = 400).

YE☐   NO ☐

2. If yes, what Open Source services are being adopted and used in your College? Tick as appropriate:
Services like hosting of the E-library resources, storage of educational multimedia resources, Learning Management Systems like Moodle or university portal on open source cloud or any open source or open source cloud infrastructure components adopted.

Any Services adopted or contribution or promoting to open source communities like libreoffice,Drupal, Firefox, OpenOffice, Gimp, WordPress, Eclipse, any open networks such that teachers are able to share lessons, lectures, and other course materials within a community or developer communities or any open source community affiliated membership adopted by your college.

Any services of open source Academic Projects endorse by your college or any student contribution to LIVE open source project as tester, developer etc.

Any services adopted or implemented in college Computer Laboratory like open source Integrated Development Environments tools for teaching and during practical lab assignments.

Nos	Benefits	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1	Security	221	121	45	13	0
2	Quality	205	110	55	30	0
3	Customizability	220	105	36	39	0
4	Freedom	226	121	31	22	0
5	Flexibility	204	107	48	41	0
6	Interoperability	203	104	44	49	0
7	Audit ability	204	115	45	36	0
8	Reduced Cost	237	125	22	16	0
9	Reliability	169	101	72	58	0
10	Support Options	32	34	117	217	0
11	Localization	22	24	115	239	0
12	Transparency	224	115	34	27	0
13	Affordability	234	122	22	22	0
14	perpetuity	209	120	36	35	0

Part IV: Assessment of the challenges of using Open Source Technologies: Rate as applicable to your College on the likert Scale of Strongly Agree, Agree, Not Sure, Disagree and Strongly Disagree (N = 400).

Nos.	Challenges	StronglyAgree	Agree	NotSure	Disagree	Strongly Disagree
1.	Interoperability and migration problems	221	128	42	9	0
2.	Lack of support	196	102	58	44	0
3.	Poor quality software	164	98	66	72	0
4.	Not what users want	122	101	87	90	0
5.	Lack of staff expertise, training needs	102	105	96	97	0
6.	There is no open source solution for our needs	82	84	100	134	0
7.	Legal issues including licensing	72	65	96	167	0
8.	Time costs of identifying relevant software	64	61	97	178	0
9.	Migration costs	48	46	150	156	0
10.	Existing contractual obligations	33	36	117	214	0
11.	Poor documentation	27	31	113	229	0
12.	Solution does not scale	26	24	151	199	0