

Benefits and Drawbacks of Open Source Software: An Exploratory Study of Secondary Software Firms

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Abstract. Much of the assessment of OSS benefits and drawbacks has been based on anecdotal evidence appearing in practitioner publications, white papers, web articles etc. To a greater extent this research has tended to concentrate more on the technical benefits and drawbacks of OSS rather than their business counterparts. Furthermore, public administrations and companies operating within the primary software sector have traditionally been the focus for research on OSS benefits and drawbacks. Taking the viewpoint of IS/IT managers in 13 companies operating in the secondary software sector in Europe, this paper examines their experiences of the benefits/drawbacks of OSS.

Keywords: Open Source Software, Secondary Software Sector, Benefits, Drawbacks

1 Introduction and Research Motivation

The OSS movement has pragmatically shifted towards a more business-friendly and hybrid concept, and is now rapidly changing into a feasible alternative to proprietary software. Several innovative business models and new business opportunities have emerged as a result of the OSS phenomenon and many organisations have begun to capitalise on these [1]. Indeed, OSS plays a critical role in the business models for firms in high technology and other industries [2]. However, despite the considerable interest in OSS, there is a lack of published empirical research that rigorously examines the benefits and drawbacks of OSS. This is surprising considering there is an underlying assumption that the perceived benefits and drawbacks of OSS appear to be an underlying factor in its adoption. Our review identified the following benefits of OSS: reliability [3, 4]; security [3, 5]; quality [3, 6], performance [3], flexibility of use [4, 6]; large developer and tester base [6, 7]; low cost [8]; flexibility allowed by licenses [9]; user support from a community [6], escaping vendor lock-in [10]; increasing collaboration [1] and encouraging innovation [11, 12]. Our review also identified the following drawbacks: compatibility [13, 14]; security risks [15, 16]; installation problems [13]; lack of expertise [6]; version proliferation [6], user-friendliness [7]; lack of user support [17]; lack of ownership [7, 14]; insufficient marketing [6]; giving away the source code [18] and higher training investment in OSS [16].

Nevertheless, given the dearth of extant research in this area, the benefits and drawbacks, particularly the business ones, relevant to OSS adoption are not well understood, as much of the research has been based on anecdotal evidence appearing in white papers [3, 4, 5, 16], practitioner papers [7] and web articles [10, 13, 14, 17, 18]. Furthermore, a great deal of this research has tended to focus mainly on public administrations and software companies operating within the primary software sector. This is rather surprising as Europe is the world leader in secondary development, a market that is rapidly taking the place of primary development [19].

Another important incentive for carrying out this research is the fact that this issue has not been addressed exclusively in the previous two Open Source Systems conferences held in 2005 and 2006. For instance, while the benefits of OSS were somewhat covered by Davini et al. [20]), this paper was more concerned with the use of OSS in the e-government area and did not address the drawbacks of OSS. Ven and Verelst [21] also presented a paper on organisational adoption of OS server software by five public administrations. Again, this study reported on five case studies in Belgian organisations currently using OS server software and focused more on the factors deemed important in the adoption decision. It is therefore argued that some rigorous analysis of the benefits and drawbacks of OSS experienced by managers operating in companies in the European secondary software sector would be timely.

2 Research Design

The objective of this study is to examine the benefits/drawbacks of OSS experienced by managers in firms in the European secondary software sector. The study was categorised as exploratory due to the scarcity of empirical work in this area. Thus, Marshall and Rossman [22] suggest that either a case study or field study research methodology can be used. The researchers decided that a field study would be appropriate as it would facilitate the collection of data from a larger number of organisations and would form the basis for more focused research at a later stage. Data collection was carried out using semi-structured interviewing in 13 companies (see Table 1).

Table 1. Companies Studied

| Name | Informant |
|--|------------------------------------|
| BSS Group PLC, UK | IT Contracts Manager |
| Combitech Systems, | Lead Engineer |
| Conecta, Italy | Head of R&D |
| Eircom Group PLC, Ireland | Technical Architecture Mgr |
| Eurocontrol Experimental Centre, France | Senior Researcher |
| Consult. Comp. (pseudonym), Switzerland | Consultant |
| Nokia Research Centre, Finland | Head of Software Technology |
| Phillips Medical Systems, The Netherlands | International Project Leader |
| Siemens AG, Germany | Program Manager |
| Sony Computer Entertainment Europe, UK | Linux for Playstation 2 Specialist |
| St. Galler Tagblatt AG, Switzerland | Chief Information Officer |
| Supertramp, UK | Technical Director |
| Vodafone, Spain | R&D Engineer, Head of R&D |

Each interview lasted between forty-five minutes and two hours. Content analysis was undertaken using coding techniques proposed by Strauss and Corbin [23]. This approach seeks to develop theory systematically in an intimate relationship with the data, and can be utilised in the absence of, or in conjunction with, existing theory [23].

3 Findings

The ability to access the source code, modify it etc., has resulted in many of the technical benefits found in Table 2. However, it was found that many of the technical benefits, e.g. quality and the presence of a large developer and tester base only apply in some cases to more mature products like Linux, Apache etc. A new finding in the form of improved harmonization was also identified as another technical benefit. The business benefits outlined in Table 3 were seen as very significant for the interviewees, particularly escaping vendor lock-in, increased collaboration, and innovation. Although many of the benefits are similar to those found in the literature, some new findings also surfaced such as the extra business functionality experienced with OSS and establishment of de facto standards. In relation to the technical drawbacks of OSS, the findings from the study only support two of the technical drawbacks found in the literature (see Table 4), namely compatibility issues and lack of expertise. However, it was found that the lack of expertise issue tends to be more related to a lack of awareness about OSS. New findings in the form of poor documentation, proliferation of interfaces, less functionality and lack of roadmaps were considered chiefly to be the real drawbacks.

Table 2. Technical Benefits of OSS

| | |
|-------------------------|--|
| Reliability | Reliability cited by majority as one of the main technical benefits in terms of high availability and dependability of applications |
| Security | Majority believed that OSS provides high security due to the availability of source code, the reduced threat of viruses and extra awareness of security in design phase of products. Two companies felt OSS would not be beneficial in terms of security |
| Quality | Majority of interviewees found quality beneficial in terms of enhanced quality from peer reviews and the quality of developers and testers. Two companies felt this could only be applied to top-tier, mature OSS products (e.g. Linux) |
| Performance | 8 interviewees cited high performance in terms of capacity and speed. 3 have yet to see more evidence of how well OSS performs while 2 were uncertain if OSS performed any better than proprietary |
| Flexibility of Use | Beneficial for majority of interviewees because it facilitates changes, customisation, experimentations and allows freedom of choice |
| Developer & Tester Base | Very beneficial for majority as it ensures that OSS is quality software and is up-to-date. |
| Compatibility | Several mentioned that OSS is conducive to ensuring compatibility as it has a great interest in conserving formats for better interoperability. Remaining had not seen any evidence of this or it was not worth considering |
| Harmonisation | Improved harmonisation in interoperability and practices/operations |

Table 3. Business Benefits of OSS

| | |
|------------------------------|--|
| Low Cost | Half of the interviewees found this beneficial in terms of reduced licensing fees, upgrades, virus protection and the cost of the whole package, i.e. service and software. The other half considered low cost of no benefit |
| Flexibility by licenses | Seen by most as having a significant impact on reducing capital expenditure in company |
| Escapes vendor lock-in | Highly beneficial for most as it facilitates freedom of choice, gives sense of control and provides independence from private vendors. 2 companies felt vendor lock-in may also be experienced with OSS |
| Increases collaboration | Greater collaboration beneficial for majority as OSS facilitates product development, cooperation and exchange of knowledge, provides new ways of collaboration and permits sharing of expenses with other companies |
| Encourages innovation | Majority found that access to the source code facilitates more innovation; it produces ideas and encourages technical innovation while also creating more opportunities for innovation. |
| Extra business functionality | Beneficial because it results in ability to keep teams small which in turn improves productivity and communication |
| De facto standards | Not the only company doing something. Developing a standard that allows the company to focus on core competences would be beneficial |

Table 4. Technical Drawbacks of OSS

| | |
|-----------------------------|---|
| Compatibility Issues | Not significantly disadvantageous but some companies experience compatibility problems with current technology, skills and tasks |
| Lack of Expertise | Some agreed that the average lay employee lacks expertise but this may be related to a lack of awareness of OSS |
| Poor documentation | Documentation outdated or may have died in development |
| Proliferation of Interfaces | Different builds often results in confusion in deciding which one to choose |
| Less Functionality | Level of integration not as good as Microsoft |
| Lack of Roadmaps | Makes it difficult for companies to see any strategic direction for vast majority of products. Most products don't have any strategic intent. |

It was found that the business drawbacks outlined in Table 5 pose a bigger challenge for managers than their technical counterparts. For example, lack of support was considered a real drawback for the majority of the companies. Some of the companies have teams of technicians that can provide support internally. However, this is not always an option for many smaller organizations.

Table 5. Business Drawbacks of OSS

| | |
|--------------------------------------|--|
| Lack of support | Majority felt that there was no safety net as there is no support and no company to back it up |
| Lack of ownership | 11 found this a drawback as there is an inability to hold someone responsible or accountable for problems |
| Access to the source code | Several mentioned that others in the company may be uncomfortable with releasing source code. Lack of knowledge in relation to this issue |
| Insufficient marketing | Majority found this a drawback as no one organisation owns it all (OSS); there is no one to market it; OSS has no marketing budget which results in it being driven primarily by word of mouth |
| Investments for training | 4 companies mentioned that training investments were higher for Linux than Windows. However, it was found that one receives better quality in terms of training on OSS. |
| Finding the right staff/competencies | Can be difficult to find staff and develop competencies to work with OSS applications |

4 Conclusion

This paper has built on extant practitioner-oriented examinations of OSS benefits and drawbacks by examining the technical and business benefits/drawbacks experienced by managers in companies in the European Secondary Software Sector. The ability to access the source code, modify it etc. has resulted in many of the technical benefits, e.g. reliability, security, flexibility of use and performance. It was also found that these benefits compared extremely well with proprietary software. The business benefits found in the study were just as significant for the interviewees and of equal value to them as the technical benefits, particular escape from vendor lock-in, increased collaboration and innovation. However, there was little support for findings from Krishnamurthy [6] that the *user support from a community* is quite beneficial to OSS because anyone using the software has an engaged community willing to answer questions. Only one of the companies found user support from the community to be a possible business benefit of OSS adoption. The remaining companies found user support from third parties, e.g. consultants, professional software houses more appealing.

The technical drawbacks identified by existing research e.g. version proliferation, security risks, installation problems, security risks, OSS being less user-friendly and troubleshooting and upgrading of OSS were not considered major drawbacks by the interviewees. In addition, there was no support for Kenwood's [7] assertion that OSS is less user-friendly, and few companies experienced installation problems. Finally, the business drawbacks found in the study depict a similar picture to those outlined in the existing literature. However, these drawbacks appeared to pose a bigger challenge for OSS than their technical counterparts.

References

1. Agerfalk, P.J., Deverell, A. Fitzgerald, B. and Morgan, L. (2005) Assessing the Role of Open Source Software in the European Secondary Software Sector: A Voice from Industry, *First International Conference on Open Source Systems*, Genova, 11-15 July 2005, 82-87.
2. Overby, E.M., Bharadwaj, A.S., Bharadwaj, S.G. (2006) An Investigation of Firm-Level Open Source Adoption: Theoretical and Practical Implications. In R.K. Jain (ed.), *Open Source Software in Business - Issues and Perspectives*, Hyderabad, India: ICFAI University Press, 2006.
3. Forge, S. (2006) *The rain forest and the rock garden: the economic impacts of open source software*, www.emeraldinsight.com/10.1108/14636690610664633
4. Varian, H.R. and Shapiro, C. (2003) Linux Adoption in the Public Sector: An Economic Analysis. *Working Paper*, University of California, Berkley.
5. Coppola, C. and Neelley, E. (2004) *Open source – open learns: Why open source makes sense for education*, http://www.findarticles.com/p/articles/mi_qa4011/is_200401/ai_n9466456/pg_5

6. Krishnamurthy, S. (2003) A Managerial Overview of Open Source Software, *Business Horizons*, 46(5), September-October, 47-56.
7. Kenwood, C.A. (2001) *A Business Case Study of Open Source Software*, (http://www.mitre.org/support/papers/tech_papers_01/kenwood_software/kenwood_software.pdf)
8. Open Source Initiative (OSI) (2006) *The Open Source Definition*, <http://www.opensource.org/docs/definition.php>
9. IDC Research (2005) Western European End-User Survey: 2005 Spending Priorities, Outsourcing, Open Source, and Impact of Compliance, <http://www.itworldcanada.com/Pages/Docbase/ViewArticle.aspx?id=idgml-8f87ddb3-bfe-0-4b69&s=90323>
10. Stafford, J. 2006: Time to plan your company's escape from Microsoft. http://searchopensource.techtarget.com/columnItem/0,294698,sid39_gci1163576,00.html
11. Wheeler, D. (2005) *Why Open Source Software/Free Software (OSS/FL, FLOSS, or FOSS)? Look at the Numbers!* http://www.dwheeler.com/oss_fs_why.html.
12. Forrester Report (2000) *Open Source Cracks the Code*, www.forrester.com/ER/Research/Report/0,1338,9851,00.html
13. Webb, M. (2001) *Going with Open Source Software: Is it the Right Choice for your Organisation?* <http://www.techsoup.org/howto/articles/software/page1124.cfm>.
14. Guth, S. (2006) Limiting factors for the adoption of open source software, http://claweb.cla.unipd.it/home/sguth/pdfs/OSS_gov_cons.pdf
15. Herbsleb, J. (2002) *Research Priorities in Open Source Software Development*, www.infonomics.nl/FLOSS/workshop/papers/herbsleb.htm
16. Forrester (2004) *The Costs and Risks of Open Source*, www.forrester.com/Research/Document/0,7211,34146,00.html
17. Stevenson, J. (2005) Open Source Software: The Drawbacks, www.academon.com/lib/essay/open-source-software.html
18. Parsons, A. *Case Against Open Source*, http://www.builderau.com.au/program/windows/soa/Case_against_open_source/0,339024644,320265682,00.htm
19. Information Society Technologies Results (2005) *FLOSSing can make EU tech leader* <http://istresults.cordis.europa.eu/index.cfm/section/news/tpl/article/BrowsingType/Features/ID/80607>
20. Davini, E., Faggioni, E. and Tartari, D. Open Source Software in Public Administration. A real example OSS for e-government Observatories, *First International Conference on Open Source Systems*, Genova, 11-15 July 2005, 119-124.
21. Ven, K. and Verelst, J. (2006) The Organisational Adoption of Open Source Server Software by Belgian Organisations, *Proceedings of IFIP 8.2 Foundation on Open Source Software Conference*, 08-10 June 2006, Como, Italy, 111-122, Springer.
22. Marshall, C. and Rossman, G. (1989) *Designing Qualitative Research*, Sage Publications, California.
23. Strauss, A. and Corbin, J. (1990) *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*. Sage Publications, Newbury Park, CA.

Acknowledgement

This work is supported by LERO, the Irish Software Engineering Research Centre, University of Limerick.