

Open Source Software Expectations in Retail Businesses of Igualada: An Exploratory Study.

Albert Pastrana
Universitat Oberta de Catalunya
Barcelona, Spain
apastranaf@uoc.edu

Enric Serradell
Department of Economics and Business
Universitat Oberta de Catalunya
Barcelona, Spain
eserradell@uoc.edu

Abstract—The emergence of open source software¹ in the last years has become a common topic of study in different fields, from the most technical characteristics to the economical aspects. This paper examines the current status about the literature dealing with economics of open source and explores the uses, infrastructure and expectations of retail businesses and institutions of the town of Igualada about it. This qualitative case study finds out that the current equipment and level of uses of ICTs are low and that the current situation of the town stores is receptive to a potential introduction of open source software.

Keywords—open source; free software; computer economics; SME; retail businesses; microenterprise.

I. INTRODUCTION

The so-called open source software is almost as old as computers themselves, in fact one could say that in the beginning there was only open source software. The operating systems and applications of the first computers sold on a large scale in the sixties came with the source code, so that programs could be modified, improved and shared freely, but this situation changed during the next decade when companies began to value the software and closed sources [1-3].

It can be considered that the phenomenon we know nowadays began in the mid-eighties, in response to the needs of several developers and software users who understood that software is an asset that must be shared freely [4], this movement would become the GNU Project and the Free Software Foundation (FSF).

During the nineties open source software experienced a period of growth thanks to two significant events. On the one hand the birth of the Linux kernel in 1991 and, on the other hand, Netscape became the first major software

¹ There are several terms (free software, open source software, Free Free/Libre Open Source Software (FLOSS), Free Open Source Software (FOSS)...) used to designate software that gives the freedoms of use, study, modify and redistribute, as opposed to proprietary software that does not. To refer to them in this writing open source software will be used.

company to release its source code in 1998 [5]. This and the birth of the Open Source Initiative (OSI) made the open source software to acquire a new dimension, away to some extent from the early idealism headed by the FSF.

Beyond the ethical or philosophical movement, in recent years open source software has become a matter of great importance and a real alternative to proprietary software, so that in some areas it has become the most used option [6] –in the market of web servers Apache is a clear example, with a penetration of 47.12% as of June 2009 [7]–. As for the desktop applications, today the open source software offers solutions –operating systems, graphical user interfaces, Internet browsers, office packages, among others– that meet the needs of the vast majority of users [8], nevertheless, there are certain requirements in some business processes that are not completely satisfied by existing open source solutions [9].

Regarding the development model, it must be remembered that open source software was developed at the beginning almost entirely by volunteers or educational entities. Today situation has changed, many companies –including some which base their business model in non open source software– and governments are beginning to use, develop and fund projects of open source software [10],[11].

So it can be said that open source software has become a phenomenon that goes beyond the purely technical dimension, because it is assumed that any technology is in a process of social building, affected by the social, economic, political and/or moral, exceeding the merely technical.

II. ECONOMIC ASPECT OF OPEN SOURCE SOFTWARE

If one focuses on the economics derived from development and implementation of open source software, several advantages are shown in adopting these types of solutions [6],[12-14]:

- Increases choice in software and prevents near-monopolistic situations.
- Provides freedom and ability to customize, improve and localize the software stimulates innovation and creativity.
- Increases demand on local software industry.
- Reduces investment in software.
- The purchase of software and related services may be done from local economy.

Of these factors, the discussion often is only focused on the investment required to purchase the software. On this issue there have been several attempts to compare the total cost of ownership (TCO) of Windows® and GNU/Linux in several environments [15-17]. In most of these studies the difference in TCO is between 10 and 15 percent, which is not significant and can change depending on the application environment or local conditions, for example.

Thus, in a first approximation it seems reasonable to assume that none of these platforms has a considerable advantage over the other in terms of TCO [18-20] and therefore this can not be the only argument. In this regard, other factors such as open source software impact in the local economy are also noteworthy, as Jordi Mas [12] points:

«[...] open source software contributes to the development of a software industry regionally, and replaces the abroad transfer of royalties in licensing payments for local service contracts based on new business models provided by open source. It encourages the establishment of new businesses and skilled jobs creation, taking advantage of local knowledge available.»

Other authors add to this argument that open source adoption helps the progress of local software development industry and stimulates innovation and creativity [6],[20],[21]. This is also very important because the social returns (total economic return to the society) on R&D spending on average is 66% [22], that is, encouraging innovation does not only affect those who perform investment but the whole society where it is located.

Another advantage of adopting solutions based on open source software is to avoid situations where a client is depending from only one vendor. Due to network effects and the use of closed standards the software market tends to create monopolies [6]. Instead, open source software is characterized by the use of open standards and the availability of source code -which enables to continue the software development under some license conditions-, and that makes the apparition of monopolistic situations difficult.

However, many companies often mistrust in adopting solutions based on open source software because the decision is conditioned by a number of myths. Several authors [3],[8],[12] have outlined the most common beliefs that are collected below²:

- There is no company behind it to give support.
- Nobody writes software for free.
- If something does not cost money, it does not work.
- Only works under GNU/Linux.
- It is only for servers and computer geeks.
- It is not compatible with other systems.
- It is less secure because the source code is available.

From a business point of view, the most important inference derived from these myths is the belief that open source software is not financially feasible and therefore is not a model on which a company can put one or more business processes. In this sense, there are several authors who refute these myths and

² Jordi Mas i Hernández exposes arguments challenging these beliefs in his book “Programari Lliure: tècnicament viable, econòmicament sostenible i socialment just” [12]

expose reasons that explain the success of open source software in economic terms and its business sustainability [23-26].

Therefore, given the open source business model viability and its idiosyncrasy –due to special features, such as participation, collaboration, exchange and freedom of use, modification and adaptation–, it is interesting to explore whether it would be feasible its implementation in the retail trade –the business sector with the lowest technology penetration ratio– as well as anticipate what effects may have its use. Specifically, this research inquires about whether there are barriers to entry for this technology implementation and if its deployment could mean an incentive for local software industry.

III. RETAIL TRAIL AND OPEN SOURCE SOFTWARE

Microenterprises, those with less than ten employees according to the European Union definition, are the base of the business network of a country and one of its economical engines. Observatorio Red.es [27],[28] reported that these kind of companies represent the 90% of companies in Spain, particularly, retail business are the biggest group with a 18% and also contributes with more than 20% to the Spanish gross domestic product (GDP) [29].

However, if one regards to the Information Technologies penetration ratios the numbers are reversed. Microenterprises have less computer and Internet connection ratios and the retail business is the lowest among them, with 20 points below the average [27],[29].

According to a study conducted in 2005 by the e-Business Center of the IESE business school, the criteria most often taken into account by companies when adopting ICT are: cost rationality, standardization of the solution, and the irreversibility of the solution adopted [30]. These subjects largely coincide with those that limit the adoption of new technologies by the microenterprises, which are basically of two types: on the one hand financial and economic factors and on the other a lack of perception of ICT tools usefulness [27],[29].

Regarding this last factor, it is true that the relationship between ICT and business success is complex and has been widely questioned [31-33], it is also true that decisions on new technologies bring both risks and potential benefits in the long term [34], but there is plenty of literature examples showing that the strategic use of ICT within a company improves its performance [35]. In addition, it can be said that a company that does not incorporate the ICT in the same way competitors do, is taking serious risks of losing its competitive positions [36].

If one focuses in the use of open source software in particular, it can be seen that there are multiple facts. Europe is one of the regions in the world with a highest penetration ratio, specially in the public sector [6]. Regarding to this, the Spanish public sector has been one of the pioneers in introducing open source software, with initiatives such as the initiated by the Junta de

Extremadura in 1998, that developed a strategic plan for the Information Society development in the region through open source software. Other regions such as Galicia, show a significant growth of the open source software adoption, moving from 10% in 2006 to 32% in 2008, coinciding with the launch of the Mancomún project, framed within the Plano Estratégico Galego da Sociedade da Información which promotes the implementation of open source software in Galicia [6],[11],[37-39].

As for Catalonia, open source software was first on the political agenda in early 2002, when various associations and organizations promoted a manifesto for the use of open source software in the public sector [40]. Due to this manifesto, the agreements signed in 2003 by the government under the name of Tinell Pact considered measures to promote open source software in Catalan language, use of open standards and free linguistic resources. At the same time, several Catalan town councils approved motions and similar initiatives at local level. All this activity around the open source software in the public sector has given a boost to several companies working on these technologies, so they can participate in these projects [13].

A good example is the growth of number of companies engaged in providing open source related service in Catalonia, that reached 115 in early 2007 [11]. Also, in 2003 the Catalan Association of Business for Free Software was created by independent companies working in the field of open source software [41].

From the context of this study, which is in the town of Igualada, it must be noticed that a nonprofit organization was founded in 2004 in order to distribute and promote open source software in the city and region, from then it is performing several actions in this direction [42]. Also, in 2008 it was created an ICT commission focused in creating a space for reflection and proposals around the incorporation and use of new technologies in the region, however, the promotion of open source software is not explicitly in its objectives [43]. Apart from these initiatives there are also some companies that base their business on open source software, such as Crearic and Identitat Digital.

Another important factor that must be considered in this area is outsourcing or not the ICT related tasks. According to the report “Tecnologías de la Información y las Comunicaciones en la microempresa española” [27] there is only ICT specialized staff in an 8.5% of microenterprises. All this leads to the deduction that the rest of the companies that are using these technologies need to subcontract the required services. Therefore, if the solutions used were open source, the possibilities of provider selection would diversify and expand.

In this sense, there are a several studies that investigated the economic effects of open source software, most of them focus on the consequences of open source on software industry [2],[6],[11],[12],[24],[25],[44], but these studies usually do not focus on client businesses, that is, the effects on the companies that are using software as a working tool. It is therefore interesting to analyze the current status of the topic in the city of Igualada, and to understand how the

traders beliefs and attitudes affect the introduction of open source software in their business.

IV. PURPOSE OF THE STUDY

To sum up, it is considered useful to conduct an investigation that focuses on two main objectives. On the one hand, to analyze the current situation of open source software in the city of Igualada regarding to:

- the technological resources in small businesses, as well as their uses;
- the shopkeepers attitudes and expectations regarding ICT and open source software in particular;
- the institutional initiatives towards ICT;
- the institutional attitudes and expectations regarding ICT and open source software in particular;

On the other hand, to predict the feasibility of the introduction of open source software in the retail trade in relation to:

- their daily activities and business processes;
- and promotion of economic activities due to open source software introduction.

V. MATERIALS AND METHODS

A. Participants

To carry out this research there were identified two different groups of participants: the retail businesses themselves and representatives of the local institutions related to them.

Regarding the first group, it was considered important to exclude from the study those stores belonging to a chain or franchise. That is because in those cases the decision of introducing ICT usually is taken by the company (probably a big one) and not by the shopkeepers themselves, so there were considered only the “traditional” retail stores usually driven by a family.

To understand which are the reasons and expectations of retailers towards new technologies and open source in particular, it was necessary to include shop owners with a range of technology introduction levels.

The first sample consisted of eight retail businesses in the city of Igualada, they all located in downtown and belonging to *Unió de Botiguers i Comerciants d'Igualada (UBIC)*, the biggest commercial association in the city. Participation was voluntary; two stores declined participation, so the final sample consisted of six.

The main characteristics of these businesses can be seen in Table 1 and include three stores that were working with Point of Sale (PoS) software (Store

1, Store 4 and Store 5) whereas the rest of them were working with a cash register. Curiously, the PoS application Store 1 was working with was open source³ although the owner didn't know because it was installed by a friend. The other applications were proprietary and none of the retailers had any knowledge about open source software⁴.

Table 1: General characteristics of the stores belonging to the sample

Store	Number of Workers ⁵	Number of Locations	Store Age (in years)	Store Owner Generation	Sector
Store 1	4	1	>60	2 nd	Clothes
Store 2	3	1	103	3 rd	Footwear
Store 3	2	1	100	3 rd	Clothes
Store 4	6	2	>150	5 th	Haberdashery & Leather goods
Store 5	2	1	145	4 th	Perfumes
Store 6	1	1	14	1 st	Interior decoration

The second sample was constituted by a representative of UBIC association and two representatives of the town council, one belonging to the Development, Employment and Trade department and the other one of the Information Technology (IT) department.

B. Instruments and proceedings

The categories and items covered by the interviews have been established from the study of scientist literature in this field [11-13],[21],[35],[45],[46]. With respect to shop owners, a pilot interview was conducted in order to help generate questions for the interview protocol.

The resulting interview was semi-structured; that is, the interview protocol was used only as a general guide so that issues that had not been previously raised in the pilot study could be addressed. The interviews were conducted in their own workplace by the first author and lasted around 20–40 minutes each. Each interview was logged through field-notes that were later transcribed.

3 OpenBravo POS v2.20

4 This information was very important in order to design retailers interviews.

5 Includes the shop owner but not includes temporary workers.

The interviews with the institutions were also semi-structured and conducted by the first author in their workplace, but lasted around 1h–1,5h each. Each interview was logged through field-notes that were later transcribed.

C. Data analysis

The analysis of the interview data was carried out in two major phases: thematic analysis and generation of affinities.

The first phase was used in order to “find and mark the underlying ideas in the data, group similar information together, and relate different ideas and themes to one another” [47].

During this phase the transcripts of the interviews were read and then the data was organized into small units of basic ideas. Each basic idea unit along with the original quotations of the interviewees was organized into a spreadsheet created for this purpose. During this process and through comparisons of the basic ideas, similar themes were grouped together.

During the second phase the previous results were organized into thematically defined clusters referred to as affinities. This process facilitated the further analysis and identification of the relationships among affinities, that is to understand how affinities were linked.

VI. RESULTS

A. Retailers point of view

1) Technological equipment and its uses

Regarding the technological equipment, all the retailers interviewed mentioned that they have at least one computer with broadband connection (ADSL). It should be understood that these shops are very small-sized (most of them with less than three employees, including the owner) and that all of them have familiar character. Due to this nature, personal life and belongings are often mixed with the professional ones, so the personal computer and Internet connection is often used at home for professional matters.

The interviewees reported that they use the computer mainly to connect to the Internet for several issues.

This first affinity identified was the increasing communication with the suppliers that it is done through the e-mail and, sometimes, the suppliers' website. This is highly valued by retailers because they can easily and quickly receive information, such as catalogs or product offerings.

Before, we received the offers by regular mail and sometimes we had placed an order without taking advantage of them. Now, as we receive the offers right away, we don't have this problem.

The e-mail (from the supplier) is much better than the phone. Now, I can see the pictures (of the product) of what I'm buying.

Online banking was reported to be another usual activity carried out by shop owners, in some cases on a daily basis. They pointed out the utility of being updated without the need of going to the bank, so they can control the expenses and incomes from the shop itself, and anticipate any needed transfers to cover the accounts. Despite, most of the retailers didn't feel comfortable with online transactions and they only use online banking to check the accounts, they still go to the branch to do the transactions.

Once we card swipe, I can see the transaction in my account almost instantly. It's fantastic!

I don't trust online transfers, besides, my bank is right here, so I still go there to make them.

Some of the participants also reported the use of text processing software – Ms Word– to create some simple documents, such as holiday notices, simple sales signs or return delivery notes. Thus, it was perceived a very elementary use of office applications, which they mainly learned by themselves through the practice. Besides, one of the interviewees, who is the only one with computer science formation and experience, explained that he does the books with the help of spreadsheets –Ms Excel– and a specific proprietary program – Contaplus–.

2) Point of Sale software

As shown, comments from the interviewees reveal a regular use of both the computer and the Internet. In spite of that, only half of them have a Point of Sale system implemented in their businesses.

There were two main reasons argued by these shop owners to introduce an IT solution replacing the classic cash register. On the one hand, to reduce the effort in daily tasks –like stock management– and, on the other hand, to be more efficient and improve the shop administration. These retailers also mentioned other reasons such as handling the stocks among different locations or the general need for innovation, modernization and/or updating.

Now (since the use of PoS software) we don't have to label (the prize of) the products one by one.

Because it's (the technology) the future, you must innovate.

However, there were also some negative aspects pointed out by the participants. One of them was the amount of information available and the difficulty to handle it. Related to this, all of them affirmed that it is needed to spend time and put extra efforts in the maintenance of the new system.

I thought it (PoS software) would save me more work. I have more information, but I have as much work or even more.

You need to feed it (PoS software), time commitment.

This last aspect was also noticed by all of the traders that don't have PoS software in their shops as the top reason not to install it. Surprisingly, none of the shopkeepers showed fear of introducing new technologies and the laziness and lack of time and resources emerged to be their most argued reason.

There is too much work in translate everything (referring to add the products into the system).

Also, these interviewees had the strong belief that the cost of a PoS solution and its implementation is very high and some of them didn't feel the need of spending this time and money at this moment of economical crisis.

We (the shop) are fine, we don't need to change anything.

With respect to the factors that traders would consider when acquiring this kind of technical solution, all of them expressed the importance of the low cost, quick and trustworthy service, ease of use of the program and, in less measure, the possibility to customize the software for their needs and language (Catalan). However, all of them admitted that they would have difficulties in choosing among different options due to their lack of knowledge.

3) Expectations and satisfaction

Both the shop owners with PoS and the ones without it expressed the conviction that they will increase the use of the computer and the Internet in the near future in their professional lives. The first group stated that they will probably acquire more computers and use the Internet to increase the communication with the suppliers as well as start to do it with the customers. In addition to that, the second group figured out that their shops will change the cash register by a computer-based solution in few years in order to control the stocks, among other features.

I would like a computer in my office because it will help me in my daily tasks.

I guess it (the PoS) would be useful to know if you have a specific product.

Finally, regardless the level of use of the new technologies, all of the shopkeepers assured that they are plenty satisfied with the utility and benefits they are obtaining from their experience.

Introduce the computer was a good idea, we are happy with it.

Now it will be an inconvenience to go back to the paper catalogs.

B. Institutional point of view

The representatives from the Igualada town council explained that currently there is no official initiative regarding the open source, and they remarked that all the software used internally in the town council is Microsoft based except

specific cases, like some FTP servers or some people using Mozilla Firefox as web browser.

Some (employee) uses the Mozilla (Mozilla Firefox navigator).

As well, the interviewees reported that none of the town's departments has the explicit aim of developing the ICT. Although this situation, they considered that there is a good ICT network in the town and they pointed that the town council organizes some events like the “innovation week” or trainings in order to reduce the digital divide. They also expressed the concern to improve their relationship with the technologies and the open source in particular.

This preoccupation (ICT) is not in our top priorities.

Maybe it would be a good idea to study the promotion of open source in town. It may help to develop the local businesses.

The town representatives also expressed their lack of current information about the level of ICT introduction in the stores of the town. They added that the two most recent studies –less than two years ago– that investigated this topic didn't consider the new technologies implementation as an important variable. One of the reasons argued was that the town council delegates matters related to retail businesses to the UBIC association.

The Council doesn't carry out any retail dinamization, it's the UBIC (association) responsibility.

The UBIC responsible described that the more important aim of the association is to become a pressure lobby in front of the administrations. He also mentioned they organize training courses –most of them about specific office applications– and promotional activities; come to agreements with suppliers; inform the retailers about regulations and new trends, among others. Finally, he informed that the most important ICT related activities the association is doing are the intranet and web page administration –with useful services for the retailers– and the promotion of a prepayment loyalty card.

Though we organize trainings, maybe there is a lack of deeper courses for management staff, with topics like new trends of new technologies.

As well as the town council representatives, he explained that neither the association has recent data about the ICT situation in the town shops. The last report –dated last 90s– stated that almost half of the retailers never had come into contact with computers, although the interviewee assured that the situation has changed.

In the current situation, he thought that there are two important variables that determine the use of ICT in the stores. On the one hand, the nature of the company, almost all the shops belonging to a chain or franchise work with computer-based solutions meanwhile the situation is quite different in stores of familiar character. On the other hand, the sector of the store was considered also a significant variable.

There is a sector that will never want it (ICT) because they have no necessity. This sector (the stores that work with perishable goods) has a high turnover of goods so they will never see it useful.

Regarding the relationship of the association with open source software, he explained that is limited to a presentation done back in 2008 by a private foundation⁶ that promotes the ICT in the SMEs. In this event the UBIC was able to know what the open source software is and its possibilities, but he recalled that it was an isolate action.

We were talking about a very useful thing (the open source), but I would say that something failed.

Finally, according to his point of view, although the market is not sensitive to open source software, it could be a feasible choice for those stores that still have no PoS solution implemented, but he argued that it is very difficult for to introduce it in those currently working with a proprietary application.

VII. DISCUSSION

The results obtained in this study about the technological equipment of the stores and its uses is higher than expected, specially if we compare it to the statistical data of studies reviewed [27-29], or even to the perception of institutions interviewed during this research.

This fact is probably due to the different nature of investigations. The present study is qualitative and this feature and the instrument used –semi-structured interview– allowed the authors to understand the shade of meaning of the answers and the contextual situation. Meanwhile, the reports reviewed were quantitative and based on instruments –like surveys– with which it is almost impossible to detect these nuances.

The authors focused the interviews looking for the uses and purposes the retailers find in the computer and the Internet, regardless of whether the computer is located in the store or at shopkeepers' home.

The shop owners tend to use ICT almost every day for their business purposes, performing simple tasks that require only a text processor or a web browser. As said, they don't use the advanced features of the programs and, in addition, due to their recent computer deployment they don't have a lot of files and data saved in proprietary formats.

Thus, some of the most common problems that appear in an open source implementation, such as the captivity of users to certain programs or file formats, the compatibility with other systems or the fact that the users are used to work with a particular application, would be not present in this context.

⁶ CATIC: <http://www.catic.cat>

Furthermore, the existing open source solutions cover all the current retailers' needs.

Probably, the fact that retailers are beginners with new technologies is the main reason why they do not mention nor give importance to the most common myths [3],[8],[12] that exist around the open source.

In fact, what shop owners appreciate more is total cost of ownership, time of implementation, ease of use, service offered and product customization. It can be said that the open source and, more specifically, a company who offers products and services around it can be as much as competitive as any other, or even more.

Since the shopkeepers interviewed are satisfied with their use of computers because they have already noticed that ICTs are useful for their jobs, they also foresee an increase of their technological equipment and its use. This seems to be positive because there are examples in literature showing that strategic use of ICT within a company improves its performance [35]. On the other hand, this situation also manifests that this market seems to have a growth potential.

Curiously, retailers mentioned that their technological skills are mainly self-learned, so it seems that the few initiatives promoted by the institutions –town council and UBIC association– were not the trigger to the retailers' approach to ICTs.

This could be explained by two main reasons. The first one is the low involvement and interest of the town council about the deployment of technologies in the stores. The second one is that there are few training courses and most of them have instrumental nature so, instead of teaching the different tools available and its possibilities, they teach how particular applications work.

Despite this situation, both town council and UBIC association were receptive about the possibilities of open source. They expressed interest in promote new initiatives towards its introduction in the retail businesses because they think it may help the town ICT network.

Thus, it is considered that a major involvement of the institutions in the promotion of ICTs through the organization of speeches, training courses and funding (subventions, investments, project promotions) would be well received by the retailers and would probably generate mid and long-term benefits. Related to that there are initiatives –like the one driven by the Extremadura regional government– that could be a good example to follow [48].

In summary, through this exploratory research some important facts and trends have been observed. Retailers from Igualada are satisfied with their current uses of new technologies; they are not in a situation of captivity related to proprietary software, they don't have prejudices about the open source software and they estimate an increase of their ICT uses. Also, the local institutions are in a good predisposition towards the ICTs promotion and open source software in particular. Thus, it has not been observed any important

obstacles in the development and introduction of open source software in the retail businesses of Igualada.

Finally, it could be interesting to perform further studies –of quantitative nature and using a wider sample– regarding this topic and including the technical service providers of the town.

ACKNOWLEDGMENTS

This research was carried out thanks to the support of Universitat Oberta de Catalunya (UOC), the town council of Igualada, the Unió de Botiguers i Comerciants d'Igualada (UBIC) association and all the participant shop owners.

REFERENCES

- [1] J.A. Martínez, “La empresa ante el software libre,” Abril. 1999.
- [2] S. Weber, *The Success of the Open Source*, Cambridge (Massachusetts, EE.UU.): Harvard University Press, 2004.
- [3] Working Group on Libre Software, “Free Software / Open Source: Information Society Opportunities for Europe?,” Apr. 2000.
- [4] R. Stallman, “The GNU Manifesto,” 1985.
- [5] P.E. Schmitz and U. Belgium, “Study into the use of Open Source Software in the Public Sector,” *An IDA Study (Interchange of Data between Administrations)*, 2001.
- [6] R. Ghosh, *Study on the: Economic impact of open source software on innovation and the competitiveness of the Information and Communication Technologies (ICT) sector in the EU*, Maastricht: International Institute of Infonomics. University of Maastricht., 2006.
- [7] Netcraft, *June 2009 Web Server Survey - Netcraft*, 2009.
- [8] J. Minguillón and J. Prieto, “Hi ha alternatives al programari comercial? El programari de codi obert, situació actual,” Jun. 2002.
- [9] Á. Jiménez, J. Velásquez, and A. Fuentes, “Mejoramiento de la Gestión y Uso de Tics en las Mipymes a Través de Software Libre,” *Revista Ingeniería de Sistemas*, vol. 22, 2008, pp. 31-55.
- [10] A. Abella and M.A. Segovia, *Libro Blanco del Software Libre en España (III)*, [en línia]: 2007.
- [11] R. Ghosh, *Free/Libre and Open Source Software: Survey and Study*, Bruseles: European Comission, 2002.
- [12] J. Mas, *Programari Lliure: Tècnicament Viable, Econòmicament Sostenible i Socialment Just*, Barcelona: Generalitat de Catalunya, Escola d'Administració Pública de Catalunya, 2006.

- [13] J. Mas, *Programari Lliure i Empresa a Catalunya. Experiències empresarials i casos d'èxit.*, Barcelona: Infonomia, 2006.
- [14] T.M.A. Shariffadeen, "The Economics of FOSS. Developing Countries' Perspective," Sep. 2004.
- [15] Cybersource, *Linux vs. Windows. Total Cost of Ownership Comparison*, 2002.
- [16] Microsoft, "IDC Puts Windows Ahead of Linux in TCO Study," 2002.
- [17] Robert Frances Group, *Total Cost of Ownership for Linux in the Enterprise* *Total Cost of Ownership for Linux in the Enterprise*, 2002.
- [18] F. Miralles and G. Armelini, "'Linux' y 'software' de código abierto: ¿listos para su empresa?," *Harvard Deusto Business Review*, Mar. 2004, pp. 60-70.
- [19] K. Moyle, *Total Cost of Ownership and Open Source Software*, South Australia: Department of Education and Children's Services, 2004.
- [20] H.R. Varian and C. Shapiro, *Linux Adoption in the Public Sector: An Economic Analysis*, University of California at Berkeley, 2003.
- [21] J.W. Paulson, G. Succi, and A. Eberlein, "An Empirical Study of Open-Source and Closed-Source Software Products.," *IEEE Transactions on Software Engineering*, vol. 30, Apr. 2004, pp. 246-256.
- [22] L.C. Thurow, *Building Wealth: The New Rules For Individuals, Companies and Nations In A Knowledge-Based Economy*, HarperCollins Publishers, 1999.
- [23] A. Bonaccorsi and C. Rossi, "Why Open Source software can succeed," *Research Policy*, vol. 32, Jul. 2003, pp. 1243-1258.
- [24] B. Perens, "The Emerging Economic Paradigm of Open Source," 2005.
- [25] E. Raymond, "The Magic Cauldron," 2000.
- [26] S. Lee, N. Moisa, and M. Weiss, "Open Source as a Signalling Device - An Economic Analysis," Mar. 2003.
- [27] Observatorio Red.es, *Tecnologías de la Información y las Comunicaciones en la microempresa española. Análisis por sector de actividad y Comunidad Autónoma*, Madrid: Ministerio de Industria, Turismo y Comercio, 2007.
- [28] Observatorio Red.es, *El Trabajador Autónomo y la Sociedad de la Información*, Ministerio de Industria, Turismo y Comercio, 2008.
- [29] Fundetec, *Informe e-Pyme 2008*, 2008.
- [30] J. Valor, S. Sieber, and F. Miralles, *Spanish Managers, Followers and Conservatives in the Adoption of IT*, e-Business Center PwC & IESE, 2005.
- [31] D.E. Avison, W.A. Eardley, and P. Powell, "Suggestions for capturing corporate vision in strategic information systems," *Omega*, vol. 26, Aug. 1998, pp. 443-459.
- [32] E.D. Moyi, "Networks, information and small enterprises: New technologies and the ambiguity of empowerment.," *Information Technology for Development*, vol. 10, Dec. 2003, pp. 221-232.

- [33] J. Vilaseca and J. Torrent, *L'empresa Xarxa a Catalunya. TIC, productivitat, competitivitat, salaris i rendiment a les empreses de Catalunya.*, Barcelona: Universitat Oberta de Catalunya. Internet Interdisciplinary Institute (IN3), 2007.
- [34] S. BliliL and L. Raymond, "Information technology: Threats and opportunities for small and medium-sized enterprises," *International Journal of Information Management*, vol. 13, Dec. 1993, pp. 439-448.
- [35] A. Cataldo, "Una reflexión respecto a las barreras de entrada del Open Source en pequeñas y medianas empresas," *Theke*, vol. 1, 2008.
- [36] E. Grandon and J. Pearson, "Strategic Value and Adoption of Electronic Commerce: An Empirical Study of Chilean Small and Medium Business.," *Journal of Global Information Technology Management*, vol. 6, 2003, pp. 22-43.
- [37] Junta de Extremadura, "gnuLinEx.org," 2009.
- [38] Observatorio Galego da Sociedade da Información (OSGI), *O Software Libre nas Pequenas e Medianas Empresas de Galiza*, Santiago de Compostela: Xunta de Galicia, 2008.
- [39] Xunta de Galicia, "Mancomun," 2009.
- [40] Softcatala, "Manifest sobre l'ús del programari lliure a l'administració pública," abril. 2002.
- [41] CatPL, "CATPL - Associació Catalana d'Empreses per al Programari Lliure," 2009.
- [42] IGLU, "IGLU - Igualada GNU/Linux Users - Associació Tecnològica d'Igualada," 2009.
- [43] TICAnoia, "Qui som? - TIC Anoia," 2009.
- [44] G. Garzarelli, Y.R. Limam, and B. Thomassen, "Open source software and economic growth: A classical division of labor perspective.," *Information Technology for Development*, vol. 14, Jun. 2008, pp. 116-135.
- [45] J. Dedrick and J. West, "An exploratory study into open source platform adoption," *Proceedings of the 37th Hawaii International Conference on System Sciences*, 2004.
- [46] L. Morgan and P. Finnegan, "How perceptions of open source software influence adoption: An exploratory study," *Proceedings of the 15th European Conference on Information Systems, St. Gallen, Switzerland*, 2007, pp. 973-984.
- [47] H.J. Rubin and I. Rubin, *Qualitative interviewing: The art of hearing data*, Sage Publications, Inc, 1995.
- [48] A. Pastrana and E. Serradell-López, "Possibilities of Open Source Software in Developing Local Small Business.," *The International Conference on Intelligent Networking and Collaborative Systems, INCOS*, Barcelona: Institute of Electrical and Electronics Engineers (IEEE), 2009, pp. 413-416.