

# Diffusion of free/open source software as innovation: A case study of METU

Altay Ş. Özaygen  
Department of Science and Technology Policy Studies,  
Middle East Technical University  
ozaygen@metu.edu.tr

October 25, 2005

## Abstract

In this research, the diffusion of free and open source software (FOSS) on desktop PCs at Middle East Technical University (METU) in Ankara is investigated within the framework of the diffusion of innovation theory. This work aims to propose some policies for the migration to FOSS system on desktop PCs at METU. The research is conducted through a web-based survey which was open to all students and academic and non-academic staff with a METU network account. There were 1224 participants in the survey. As expected, Microsoft OS rules the desktop PCs within the METU campus. According to the surveys, there is a rather large PC user base which could potentially migrate to FOSS operating system. In addition to a large amount of data, it has been found out that a migration to FOSS is welcomed greatly by the users if the process is explained on the basis of public economic gains. However, personal migration is still difficult if the user is left alone to install any new OS. Furthermore, different innovation-decision models are discussed based on the research findings.

## 1 Introduction

Prior research on free and open source software (FOSS) has focused on the motivation of FOSS developers (Hertel et al., 2003; Ghosh et al., 2002), organisation and community of software projects (Zeitlyn, 2003; von Krogh et al., 2003; O'Mahony, 2003), FOSS adoption by MIS organisations (Dedrick and West, 2004) or economy of FOSS (Lerner and Tirole, 2002; Bonaccorsi and Rossi, 2003) . While there has been very little attention given to the FOSS adoption decision of end user, there is a very large number of research which has been carried out on technology adoption and diffusion.

Many innovations require a lengthy period of time to be adopted. According to Rogers (1995), diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. Diffusion is a special type of communication in which the messages are about a new idea. Due to this “newness”, diffusion has some degree of uncertainty. When new ideas are invented, diffused, and are adopted or rejected, they lead to certain consequences, such as social change. Many technologists believe that if an innovation has certain advantages it will sell itself.

In this study, it has been targeted to find out appropriate policies for the diffusion of GNU/Linux system within METU. One of the most important aims of this study was to understand the diffusion of the usage of FOSS OS<sup>1</sup> and the reasons of adoption or rejection of the FOSS OS at METU. Furthermore, the survey also aimed to understand the desktop

---

<sup>1</sup>In this study FOSS OS comprises GNU/Linux and BSD systems.

computer usage habits of all participants. For this purpose, a web-based survey which is based on Rogers' (1995) diffusion of innovation model has been carried out.

## 2 Background

According to Rogers (1995) the four elements of his diffusion of innovation model are innovation, communication channels, time, and the social system. In this research, the innovation is FOSS and the social system is the university campus of METU in Ankara. Rogers (1995) lists five technology characteristics that influence the adoption process; relative advantages, compatibility, complexity, trialability and observability. But on the other side, Tornatzky and Klein (1982) concluded that three of the characteristics above are linked to the adoption process; relative advantages, compatibility and complexity.

A highly significant criticism of the theory has been carried out by Flynn and Preston (1999). Authors criticise Rogers's model for its "universalistic assumptions that innovations diffuse within a context marked by an autonomous or free market and that diffusion is driven by the demands of individual consumers freely exercising their market power". Flynn and Preston (1999) argue that through empirical studies, a robust theory could be developed by taking into account the role of social and institutional factors that shape the trajectory of diffusion.

## 3 Methodology of the Survey

Most of the diffusion research surveys have been conducted on potential adopters, and survey methods in diffusion research tend to "destructure human behaviour" (Rogers, 1995). Web surveys became highly popular as the free and reliable development platforms became available. According to Burkey and Kuechler (2003) web-based surveys do not have the same potential for bias that occurs in personal interviews.

In the survey which has been conducted for this study, participants had considerable freedom in their answers; i.e., no one was forced to participate and complete the survey. When a question was left unanswered, a notice popped up, reminding the participant to answer for the sake of the survey without forcing them to cover all questions.

In order to prevent inaccurate feedback through multiple responses, access to the surveys was carried out by LDAP authentication as the survey targeted the whole campus. The surveys were done with the PHP programming language, and answers were stored within a Postgresql database. Furthermore, a web link was provided through the popular web-mail login page in order to encourage and increase the participation. The survey was designed in multiple pages with forking depending on the answers given. The forking of the survey was designed based on Roger's (1995) innovation-decision process stages (knowledge, persuasion, decision, implementation, confirmation) to reveal the individual innovation-decision process;

1. Those who have heard of the concepts of free and open source software,
2. Those Who Have Tried FOSS OS,
3. Those Who Have Not Tried FOSS OS,
4. Those Who Will Switch to FOSS OS,
5. Those Who Will Not Switch to FOSS OS,
6. FOSS OS Users.

Depending on the adopters' behaviour, the survey consisted of 3 to 6 sequential web pages. The design of this web survey mostly follows the outlines described by Burkey and Kuechler (2003).

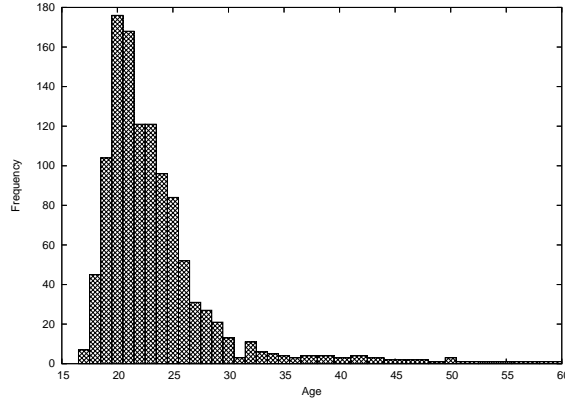


Figure 1: Age Distribution of Participants

**Test Subjects:** The survey was done during 23 March and 24 May 2004 within the whole of the METU campus. All students, staff, academics and others having a METU account had the chance to participate.

**The Social System:** Middle East Technical University is the first university to connect to the Internet in Turkey since 1993. According to Temizlisoy’s (2003) research carried out for ULAKBİM<sup>2</sup>, there are more than 5000 active IP at METU, but the real number is estimated to be higher. METU, which is an English-medium university, is a model university to other Turkish universities in many aspects. There is a computer center at METU which handles all the IT infrastructure within the campus with its staff over 100. This center has a considerable amount of knowledge accumulation on a large scale involving campus wide networking, system administration, in-house-software development, etc. In addition to these capabilities, the “.tr” domain name service is also provided by METU. Moreover, there are over 21.000 students and around 2400 academic personal and 2300 staff working at METU.

## 4 Results and Discussion of the Survey

In this section firstly, general profile of participants, secondly of PC usage habits and finally participants’ innovation-decision results will be discussed.

### 4.1 General Profile of Participants

There were 1224 participants who logged in to the survey. The initial questions were on demography. This survey type also follows the conventional way of starting by asking the age of the participant. The age average of the survey was 23.2 and the distribution is shown in Figure 1.

Sex distribution was 74.7% male and 25.3% female participants. There were no other choices provided for the question on gender.

The titles of all participants are shown on Table 1. As expected, undergraduate students was the most populated group. While the total number of academicians (Prof.Dr., Assist.Prof., Assoc.Prof., Research Assistant and Teaching Staff) represents 16.5% of the 1131 participants who answered the question related to the titles, 14.4% of the 1131 participants

<sup>2</sup>Turkish Academic Network and Information Center, ULAKBİM aims at providing technological facilities such as computer networks, information technology support, and information and document delivery services, to meet the information requirements of Turkish universities and research institutions, and to increase the efficiency and productivity of their end users. <http://www.ulakbim.gov.tr/>

Table 1: Title Distribution of Participants

	Frequency	Percentage
Undergraduate	757	66.9
Research Assistant	163	14.4
Master Student	123	10.9
Administrative Staff	39	3.4
Ph.D. Student	25	2.2
Teaching Staff	14	1.2
Prof. Dr.	4	0.4
Assist. Prof.	3	0.3
Assoc. Prof.	2	0.2
Specialist	1	0.1
Total	1131	100.0

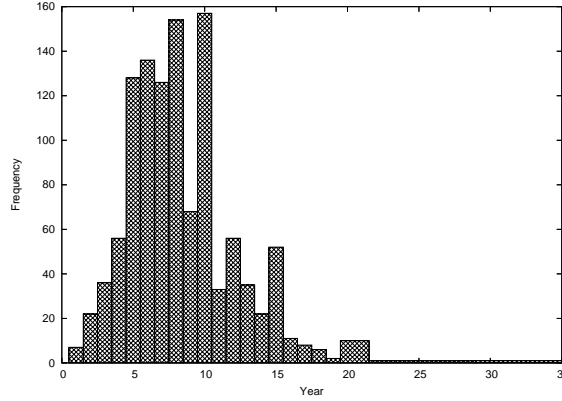


Figure 2: Distribution of PC Experience (year) of Participants

were research assistants. But as expected, 66.9% of the participants were undergraduate students and the total number of all students (of both undergraduate and postgraduate levels) was 79.0%.

## 4.2 PC Usage Habits

The experience of computer usage and the diffusion rate among participants were rather high compared to the old but large scale survey carried out by TUENA<sup>3</sup> for the Ministry of Transportation in Turkey: The Turkish National Information Infrastructure Masterplan report (1999). The PC experience distribution of participants is shown in Figure 2 and the average PC usage was more than 8.4 years. These results show that most of the students who participated in this survey started to use computers before their entry to the university.

Apart from the computer laboratory in the departments, there are approximately 500 dual boot (Microsoft XP and Mandrake Linux) in the computer laboratory which are controlled by METU CC. The participants were asked whether they had a computer which they could install and configure softwares to their own taste. 90.7% (of 1023/1128 people) answers were positive, while 9.3% (105/1128 people) were negative.

To find out the METU's social system of the participants within the context of the theory of diffusion, it has been asked to state two sources where the participant gets any

<sup>3</sup>Turkish National Information Infrastructure Project Office. <http://tuena.tubitak.gov.tr/>

Table 2: Sources of Help Regarding PC

	Frequency	Percentage
Friends	805	36.9
Web	536	24.6
Professional support	115	5.3
Books	39	1.8
Documentation on the installation CDs	187	8.7
Students	83	3.8
Department's PC coordinator/CC Staff	164	7.5
Does not need any help	183	8.4
Other	70	3.2
Total	2182	100.0

Table 3: The Operating System Used by Participants

	Frequency	Percentage
XP	677	63.7
Win98	199	18.7
Win2000	107	10.1
Linux	63	5.9
Other	8	0.8
Win95	4	0.4
BSD (Free/Net/Open)	2	0.2
Win3.1	2	0.2
Macintosh	1	0.1
Total	1063	100.0

aid whenever s/he encounters any problems with his/her PC. The most important answer were friends, with 36.9 %. The Web, with 24.6%, was the second most important source to solve problems regarding PCs. The whole distribution could be found in Table 2. The most important source of help mentioned in the “Other” choice was “a relative” (with 15 of 70 answers). However, in the survey, among the same 70 answers, 17 answers reveal that participants solve their own problems and 11 answers display that participants look for “technical support” provided by the PC vendor.

As predicted, the OS distribution shown in Table 3, was in the favour of Microsoft products. On the other hand, GNU/Linux system has its share with 5.9% and BSDs consist of 0.2%, making FOSS OS users constitute the 6.1% of valid answers. Windows XP was the leader with 63.7% usage among the survey's participants. On the other hand, Windows 98 was still important among the participants, being the second most used OS with 18.7%. Answers regarding Windows 98 are quite interesting since it was not supported anymore at the time of the survey, and users are often forced to upgrade their operating system as well as their hardware due to the increase in required resources by newer Microsoft products. This user group could be persuaded to migrate to GNU/Linux products which do not require much resource if well configured. Moreover, the process to migration from Windows 98 to XP might be as difficult as the migration process from Windows to GNU/Linux.

The usability of a computer has become one of the most important areas of research.

Table 4: Cross-tab of OS Downgrade vs. the OS Used

used OS		downgraded or not?		Total
		No	Yes	
FOSS OS	Frequency	48	17	65
	% within the used OS	73.8	26.2	100.0
	% within the downgrade	6.3	5.8	6.2
Microsoft OSs	Frequency	710	278	988
	% within the used OS	71.9	28.1	100.0
	% within the downgrade	93.7	94.2	93.8
Total	Frequency	758	295	1053
	% within the used OS	72.0	28.0	100.0

When the participants were asked if they were satisfied with their operating systems, results were as follows; 71.7% were satisfied, 10.4% were not satisfied and 17.9% had no opinion.

The analysis of the cross-tab distribution concerning the level of satisfaction of OS vs. the OS used shows that 95.2% of GNU/Linux users were satisfied, while 73.2% of XP users, 61.3% of Windows 98 and 67.3% of Windows 2000 were satisfied with their OS. By adding the percentage of the group who expressed uncertainty concerning their satisfaction with the group who were not satisfied, a user base (of 26.8% of XP, 38.8% of Windows 98 and 32.7% of Windows 2000 users) which could be a good target with a great potential for conversion to GNU/Linux is obtained. Two participants who use BSD stated that they were satisfied with their system.

The upgrading of an OS to a later version could lead to certain undesirable and unpredictable consequences, such as problems related to hardware drivers or some backward compatibility. Backward compatibility is one of the main assets for the open source softwares and a major target of criticism concerning Microsoft products. But the main challenge is to do with the change of users' habits, which they gain from the earlier versions. Such problems sometimes result in the immediate downgrading of the newly installed software. It was obvious from the start that Microsoft products dominate the METU campus. Hence, in order to find out whether such Microsoft upgrades are problematic or not, the survey also asked whether the participant downgraded his/her operating system after an upgrade. The cross-tab of downgrade vs. OS is displayed on Table 4. Those who downgraded to the previous version consisted of 28.0% answers (out of 1063 answers). Furthermore, the downgrade rate among Microsoft OS users was 28.1%. These results show that FOSS OS users tend not to downgrade as much as Microsoft users. If these individuals downgrade their OS due to backward compatibility or hardware problems, this creates another potential target for the free, open source software migration.

In order to describe the social and communicative systems of computer usage at METU more precisely, questions regarding software providers were asked. Some of these providers could be considered as a pirated software sources. These illegal ways consist of friends, ambulant street vendors (who are in fact just sellers of often pirated software copies) and peer to peer programs which aid to share files and software on the Internet. The total percentage of these three sources was 56.1% of participants. As Table 5 displays, friends constitute the most important routes in obtaining software. This question was answered by ticking the listed sources, and the participants were allowed to make any number of choices.

The objective to find out how FOSS is generally perceived and how the participants might respond to different innovation-decision process led to three Lieckert type propositions, whose results are given on Table 6. For an evaluation, inclinations were calculated for each proposition. All answers had a value starting from 1-5, where the answer "Absolutely no" had a value of 1 and "Absolutely yes", of 5. Number of answers were multiplied by their

Table 5: Software Providers

	Frequency	Percentage
Friends	545	30.1
Preinstalled on the PC	381	21.1
Ambulant street vendors	271	15.0
P2P programs	199	11.0
Authorised sellers	61	3.4
School/work, university	244	13.5
GPLed software	103	5.9
Total	1808	100.0

Table 6: Three Lieckert Type Propositions

	Number of answers	Inclination, over 5
Public sector should consider solutions other than software which have a licensing fee.	1060	3.99
As a personal user I should consider other solutions than software which have licensing fees (i.e. Microsoft products) in order to decrease my own expenditure.	1057	3.99
I am afraid of losing data while installing new software on my computer.	1057	3.04

corresponding value and the sum was divided into the total number of answers that showed an inclination for the Lieckert type proposition.

The inclination with 3.99/5 for the first proposition is encouraging for the process of migration within public places such as libraries, possible public kiosks (which are still not that popular in Turkey) and computer laboratories, if the economical ramifications are explained to users with clarity and precision. Based on the results of the first and second propositions, it might be concluded that a personal and public migration policy designed on economic grounds would be effective.

The inclination for the third proposition was 3.04/5. Thus, participants did not appear to have a strong inclination to either “way”, revealing that personal migration would likely be difficult if the user is left alone with no help during any installation process. However, if the users are informed that there are various Live CD options, the trialability of the innovation could be carried out without hesitation or fear.

The first step in the innovation-decision process is knowledge. In order to assess this, the participants were asked whether they have ever heard of free softwares or open source software concepts. The distribution for the surveys is given on Table 7. The awareness of innovation (i.e. the awareness of the free and/or open source softwares) is 77.1%. Following

Table 7: Distribution of Participants Who Have Heard of the Concepts of FOSS

	Frequency	Percentage
No, never heard	245	22.9
Yes, heard of the concepts	823	77.1
Total	1068	100.0

Table 8: Communication Channels of the FOSS Concepts

	Frequency	Percentage
Internet	355	44.2
Friends	259	32.3
Printed press	121	15.1
Television	7	0.9
Courses	32	4.0
Radio	3	0.4
Students	10	1.2
Other	16	2.0
Total	803	100.0

this question, the first forking within the survey occurs. For those who have not heard of FOSS concepts, the survey ends.

### 4.3 Innovation-decisions of participants

This section is divided upon the forking in the survey which is based on innovation-decision process of participants.

#### 4.3.1 Those Who Have Heard of the Concepts of Free and Open Source Software

To find out about the communication channels, the questions of how the participant first heard of the sources and how they learned about free software and open source software concepts were asked. The communication channels of free software and open source software concepts are on Table 8. The communication channels of the concepts were primarily the through the Internet with 44.2% and secondly, friends with 32.3%. This is natural since these concepts are born within and spread through the Internet.

One of the most crucial software, the killer application for desktop usage, is the office suite in which a word processor, a spreadsheet, a slide show and some other minor programs are incorporated. On the open source software front, among certain choices, one of the most important software, is the OpenOffice. One of the most significant aspects of such softwares is it has the capability to run on a multitude of platform which eases the migration from any OS to another. Those who know about the open source, free software concepts were asked whether they have ever used OpenOffice. 43.3% out of 755 participants of the survey who gave answer to this question have used OpenOffice at least once. While the OpenOffice

Table 9: People Considering to Migrate to a FOSS OS

	Frequency	Percentage
No, do not consider to switch	101	26.6
No idea	167	43.9
Yes, consider to switch	112	29.5
<b>Total</b>	<b>380</b>	<b>100.0</b>

product is vital for METU, the IS100 course which aims to introduce all METU students the basic IT concepts and application is based on Microsoft products. Moreover, METU has the Microsoft campus wide licence, making the trialability and usage of OpenOffice software useless for many.

In order to estimate the number of people who are converted, which is the second step of the innovation-decision process, the trialability of the innovation was assessed by asking the participant if s/he ever tried using FOSS OS. This question leads to the second forking in the survey with those who have tried FOSS OS and those who have not. Among those who have heard of these concepts, 50.3% (out of 757 answers) have tried FOSS OS at least once.

#### 4.3.2 Those Who Have Tried FOSS OS

The question asked to the participants, who have tried FOSS OS once but still used OS other than FOSS OS, was whether they considered migrating to a FOSS OS today; results are shown on Table 9. The rate of the participants who have tried FOSS OS once and consider migrating is 29.5%. The percentage of those who did not have any opinion was rather high, however; with 43.9%, presenting an important user base for those who could be convinced to migrate. Those who do not consider switching was 33.3%, showing that there is a user base which could not be underestimated as they are attached to their OS habits.

#### 4.3.3 Those Who Have Not Tried FOSS OS

The reason why a participant has not even tried a FOSS operating system is crucial while constructing a policy that attempts to persuade people to adopt the innovation. This question was asked with four choices (very important, important, less important and not important). An inclination variance was calculated by a value number starting from 0 to 3, where the answer of “Not important” had a value of 0 and “Absolutely important” was equal to 3. Later, these numbers were multiplied by their corresponding value and their sum were divided into the total number of answers. The most important reason-category for the non-trialability was not among the provided ones, but the one given under the choice “Other” which was selected by 54 participants. The second most important reason for not having tried at least once was a lack of friend who is also interested in the subject, and who is willing to help. The inclination for this choice was  $1.62/3$ , which is between the values of “Less important” and “Not important at all”.

When 54 “Other” answers are analysed, 9 of them are concerned with the incompatibility of software, 5 are related to lack of time, 10 of them show satisfaction with the Microsoft products and 16 of them point at the needlessness of trying a FOSS OS. While these results indicate the potential of lock users, the incompatibility among OS could be surpassed by the use of or at least the presentation of a cross-platform office suite such as the OpenOffice.

#### 4.3.4 Those Who Will Switch to FOSS OS

Reasons for switching to FOSS OS in the near future are mostly to do with FOSS's technical merits. The number one reason was its stability. The second reason was the curiosity of the participants who want to know its usage, and the third reason was the security that FOSS provides. These three reasons got an inclination of over 2.5/3, which is between "absolutely important" and "important". Other reasons with an inclination over 2 point in the order of importance are, decreasing software expenditure, independence over firms, getting the ability to control and configure the PC and not to finance transnational corporates. The lowest inclination was for the ease of use, the satisfaction of known users and the easiness to find professional grade software. It could be concluded that GUI, desktop usage, user-friendliness was not appreciated by the future FOSS OS users while stability and security was the ultimate reasons for migration.

The most important reason for not having switched yet was the need to upgrade the PC and the second reason was the lack of needed professional or educational software. There were 104 persons considering to switch. Through various information campaigns, this problem could also be easily surpassed. Most of the software needed by an undergraduate student are in their stable phases and could be downloaded; further, FOSS OS can run even on old hardwares.

#### 4.3.5 Those Who Will Not Switch to FOSS OS

Participants who do not consider switching to a FOSS OS were given reasons of four choices ("Very important", "Important", "Less important" and "Not important"). It has been found that the most important reason for not switching was the lack of educational and/or professional purpose software with an inclination of 2.26/3. The second most important reason was that old files cannot be used having an inclination of 1.68/3. Other following reasons were fear of losing data, difficulties of usage and lack of help centers. Less important reasons include security, PC capacity to run FOSS OS and possible financial cost of migration. These findings indicate that given some information on FOSS, many users could switch to FOSS OS.

#### 4.3.6 FOSS OS Users

82.2% of those using FOSS OS (62 persons) migrated around two years ago or more, which shows that these people are early adopters. The rest adopted FOSS OS within the year in which the survey was conducted. This answer is also one of the main points of evidence in accordance with the "S" shape of the diffusion of innovation model, that the process is still in its infancy.

The reasons for using FOSS OS and the inclination of the participants are shown on Table 10. The top reasons for using FOSS OS were security (2.78/3) and stability (2.70/3). Other two important reasons for using FOSS OS include the ability to configure the PC and not being a lock user of a corporate product. These results reveal that FOSS OS users tend to be early adopters with high technical capabilities, giving not so much importance to GUIs or PC usability and so on, but rather, emphasising the importance of not being manipulated by becoming a lock user of a corporate product.

Among those who did migrate, 52 of 63 people installed FOSS OS by themselves, once again showing their relative technical competence and ability. Eighth of them received help from their friends, which was the second most selected answer.

The source of FOSS OS was mainly a writable CD (25 out of 65 answers) and CDs given by PC magazines (17 out of 65 answers). Thus, the role of PC magazines is significant in this area. The third source was installation over a network (consisting of 11 answers), which has the advantage of being connected to the Internet within the METU campus because important distributions are mirrored on METU's FTP site, or if not found, they can be installed over the ULAKBİM network (National Academic Computer Network).

Table 10: Reasons for Using FOSS OS

	Absolutely important	Important	Less important	Not important	Total	Inclination (over 3)
Security	50	12	1	0	63	2.78
Stability	48	12	2	1	63	2.70
Flexibility to configure and control a PC	44	10	2	6	62	2.48
Did not want to be a lock user of a corporate product	33	12	9	8	62	2.13
Not to support financially transnational corporates	24	16	12	10	62	1.87
Tried and liked	18	21	13	9	61	1.79
To decrease the cost of software expenditure	22	16	9	15	62	1.73
Easier to find educational/professional software	19	14	15	14	62	1.61
Ease of use	6	26	22	7	61	1.51
Should use in office/school	20	9	17	17	63	1.51
Other	5	0	0	0	5	3

There were four propositions for those using GNU/Linux in a 5-option Lieckert-type answers. The answers are given with their inclination values on Table 11. The inclination values on this Table show that all FOSS users were eager to be of help to their social environment.

In order to understand the lacking aspects of GNU/Linux from the standpoint of adopters, some issues were proposed and questioned. The most important lacking point was the ease of use, which having the highest inclination with 2.25. The other closest answer was support in Turkish with 1.78. Even though FOSS OS users appear to be early adopters, they were also critical of FOSS OS's non-user-friendliness.

The last question for FOSS OS users was concerned with their first source of information that they consult when they encounter problems regarding their preferred OS. The first source for these early adopters was the Web with 35 answers, and forums, e-mail lists and so on, as the second source with 12 answers.

## 5 Migration Policy Recommendations

In line with the results obtained from the survey, some recommendations could be made for the migration to GNU/Linux system on desktop PCs within METU. The author believes that an informative campaign should be designed openly through Internet together with the collaboration of METU's FOSS users. For such a collaboration to take place, some simple initiative could be encouraged or provided especially by the METU Computer Center. This could involve the creation of a site such as <http://linux.metu.edu.tr/> which should give some basic and simple tips, hints and links much needed by a potential METU GNU/Linux community.

Furthermore, a Live CD customised for METU might be created and distributed with the help of the METU FOSS users and the METU Computer Center. Hence, the relation-

Table 11: Four Propositions Given to FOSS OS Adopters

	Absolutely no	No	No idea	Yes	Absolutely yes	Total	Inclination (over 5)
I would aid people around me to adopt FOSS OS.	0	2	3	25	31	61	4.39
I would be glad to help people around me regarding FOSS.	0	1	2	25	33	60	4.55
I would help my relatives/family to adopt FOSS OS	1	2	6	27	25	60	4.27
I would be glad to help on my relatives/family regarding FOSS.	0	1	1	22	37	60	4.63

ship between the METU FOSS users and the METU Computer Center is crucial; if such a relationship is exposed to the METU Computer Center's bureaucratic hierarchies, the possible volunteer group would be much less willing to collaborate than hoped. If one is to consider a kind of hierarchy, it should be based on technical excellence and meritocracy, as it is the accepted rule within the FOSS community.

Moreover, presentations, seminars and conferences in FOSS which target decision makers could be held in addition to other presentations focusing more on the technical merits of these softwares. Installation festivals or what is known within the FOSS community as "installfests", where newbies bring their PCs and are helped by experienced users in the installation of a GNU/Linux system, can be highly effective and successful within the campus. Installfest is a very important means for the possible migration of users who feel uncertain or even intimidated by the task and idea of the installation of a new operating system.

Another important issue is that the Institute of Informatics, which provide the IS100 courses, should consider stopping the use of the Microsoft material alone. Course curriculum should also comprise FOSS and focus more on computer literacy and not merely on one product array.

Additionally, a catalog of required softwares for METU's undergraduate courses should be created and the possible FOSS equivalent should be used or at least proposed to students and academicians. This catalog should be designed with the help of METU's FOSS community.

The breaking of monoculture in a network environment is another crucial aspect. Today, viruses and other threats still target one architecture only and no virus-like threats exist which could target different architectures simultaneously. On the other hand, such courses as IS100 should not just use and teach Microsoft materials, because a university is a place where different approaches should be discussed and tried out, and not contribute to a worldly reigning monoculture.

A massive migration would be extremely difficult in the case of a university; a collective innovation-decision especially would be almost impossible and an authority innovation-decision cannot be taken easily. Yet, such initiative could be taken for the university staff who use PCs for their administrative work, electronic correspondence, and so on. However, academicians should not be targeted for the purpose of the authority innovation-decision in the same degree or manner. Instead, a slow pace but massive information campaign with an optional innovation-decision might be initiated. As some academicians have other special usage of PC like data acquisition systems or some software working solely on platforms other than GNU/Linux system, they are often difficult to be persuaded to use other systems or

solutions than what they have already been using. Thus, after a well-defined, and large user base of FOSS is established, academicians might also be persuaded to switch to use FOSS; or, if the “decision makers” are convinced of FOSS, an authority innovation-decision can be implemented with confidence. However, it is crucial that a strong unifying vision amongst these decision makers is preserved, maintained and developed.

## 6 Conclusion

This study has been carried out with a web-based survey and 1224 person has logged in to it. 77.1% of participants were aware of the free and/or open source software concepts and 6.1% were using one of the FOSS OS for their daily routines. The research reveals that there is a large user base which could be persuaded to use a GNU/Linux system. This user base consists of those who are dissatisfied with their installed Windows OS, those who have downgraded back to an earlier version of Windows OS and those who are using an old version of any Windows OS. On the other hand, results show that there is also a group of Microsoft OS lock users who could be persuaded at least to use a cross-platform software like OpenOffice office suite and Firefox web browser and Thunderbird e-mail software as a first step to approach FOSS.

Some Lieckert type propositions were given to all participants; according to these propositions, the process of migration within the public places is welcome greatly with an inclination of 3.69/5 as long as the process is explained on the basis of public economical advantages and gains. Hence, it is suggested that such solutions as Live CDs might help the user to overcome his/her fear or reluctance for such installations. This study has also shown that trialability and observability are linked to the adoption process and the process to adopt a new software could be achieved with proper policies.

According to the survey used in this study, use of FOSS OS is still in its early stage, but with appropriate policies their percentage of employment and accessibility would rise, at least decreasing the cost of software usage at METU in the long run. On the other hand, with its large number of different PC users, METU would be an important laboratory for the design of migration policies from which other institutions in Turkey could also benefit.

Nevertheless, follow-up research on the diffusion of FOSS is vital for the theory of the diffusion of innovation and for the design of policies for the diffusion of FOSS. The diffusion of OS and other softwares for desktop PCs with connection to their license schemes would be extremely interesting to further pursue and investigate, particularly within the framework of the diffusion of innovation theory.

## References

- Bonaccorsi, A. and Rossi, C. (2003). Why Open Source Can Succeed. *Research Policy*, 32(7):1243–1258.
- Burkey, J. and Kuechler, W. (2003). Web-based surveys for corporate information gathering: a bias-reducing design framework. *IEEE Transactions on professional communication*, 46(2):81–93.
- Dedrick, J. and West, J. (2004). An exploratory study into open source platform adoption. In *Proceedings of th 37th Hawaii International Conference on System Sciences*.
- Flynn, R. and Preston, P. (1999). The long-run diffusion and techno-economic performance of national telephone networks: a case study of Ireland, 1922-1998. *Telecommunication policy*, 23(5):437–457.

- Ghosh, R., Glott, R., Krieger, B., and Robles, G. (2002). Free/Libre and Open Source Software: Survey and Study. Technical report, International Institute of Infonomics, University of Maastricht, The Netherlands.
- Hertel, G., Niedner, S., and Herrmann, S. (2003). Motivation of software developers in Open Source projects: an Internet-based survey of contributors to the Linux kernel. *Research Policy*, 32(7):1159–1177.
- Lerner, J. and Tirole, J. (2002). Some Simple Economics of Open Source. *Journal of Industrial Economics*, 50(2):197–234.
- O’Mahony, S. (2003). Guarding the commons: how community managed software. *Research Policy*, 32(7):1179–1198.
- Rogers, E. (1995). *Diffusion of Innovation*. The Free Press, New York.
- Temizlisoy, O. (2003). Ulaknet Operasyonel Problemler. *Akademik Bilisim 2003, Adana*, <http://www.ulakbim.gov.tr/belgeler/ab2003/opprob/>.
- Tornatzky, G. and Klein, K. (1982). Innovation Characteristics and Innovation Adoption Implementation. *IEEE Transactions on Engineering Management*, 29(1):28–45.
- TUENA, T. U. E. A. P. O. (1999). Turkish National Information Infrastructure Masterplan. Technical report, TÜBİTAK Bilten.
- von Krogh, G., Spaeth, S., and Lakhani, K. (2003). Community, joining, and specialization in open source software innovation: a case study. *Research Policy*, 32(7):1217–1241.
- Zeitlyn, D. (2003). Gift economies in the development of open source software: anthropological reflections. *Research Policy*, 32(7):1287–1291.