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Software piracy: A study of causes, effects and preventive measures

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<p>Software piracy is a serious issue that has been affecting software companies for decades. According to Business Software Alliance (BSA), the global software piracy rate in 2013 was 43 percent and the commercial value of unlicensed software installations was \$62.7 billion, which resulted in millions of revenues and jobs lost in software companies. The goal of this study was to better understand the software piracy behaviours, how it happens, how it affects to individuals and software companies, security issues associated with using pirated software and possible preventive measures that can be considered to reduce piracy.</p> <p>The study utilized quantitative research method to collect data from students. For this purpose, an online survey was conducted among 46 undergraduate students studying at Helsinki Metropolia University of Applied Sciences and Laurea University of Applied Sciences using Google Form and asked several questions concerning software piracy. Students were provided a link to the form via Facebook messages and emails to participate in the survey. Importantly, most of the respondents responded that high software prices, pirated software being available on the Internet and economically weak people not being able to afford software were the major reasons behind the increasing software piracy.</p> <p>The study provides an overview of software piracy and creates awareness against unauthorized use and distribution of software. Moreover, it is a huge and interesting topic for further studies.</p>	
Keywords	software piracy, types, causes, consequences of piracy, possible measures to prevent piracy

Abbreviations

B2B	Business-to-business
BSA	Business Software Alliance
CAAST	Canadian Alliance Against Software Theft
CD	Compact Disk
CD-ROM	Compact Disc-Read Only Memory
CIO	Chief Information Officer
DMCA	Digital Millennium Copyright Act
FAAST	Federation Against Software Theft
FTP	File Transfer Protocol
GPL	General Public License
IDC	International Data Corporation
ISP	Internet Service Provider
IT	Information Technology
OSS	Open Source Software
P2P	Peer-to-peer
SIIA	Software & Information Industry Association
TRIPS	Trade Related Aspects of Intellectual Property Rights
WIPO	World Intellectual Property Organization

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1 Introduction

1.1 Overview

Over the past few decades, the world has seen rapid growth and great achievements in the field of information technology. This has resulted in the expansion and rapid progression of the software companies. As the software companies have expanded in huge numbers, so has the criminal activity of software piracy. Software companies have been plagued by piracy for years. Technological advances have made it easy for anyone to reproduce and distribute copyrighted works anywhere, anytime and to anyone. These same technologies have made large-scale commercial copyright infringement a major form of thefts and fraud. Software piracy has been identified as the worst problem facing the software companies today. It has not only affected the software companies but also has caused much panic for the content owners. The development of technological tools such as computers, software and the Internet has made our lives easier, but abuse of such tools has created a serious issue like software piracy which is now a growing concern for several countries.

Software piracy is a crime commonly defined as illegal copying, downloading, sharing, selling or installing of copyrighted software. The majority of software today is purchased as a single-user license, meaning that it can be used by exactly a single authorized user in one or more machines as long as the same licensee is the only user. Making multiple copies of it and sharing it with friends or relatives is considered to be violation of the license terms and conditions. Although most computer users today are aware of unauthorised use and duplication of software being illegal, software piracy still exists as a serious issue. The Global Software Survey conducted by Business Software Alliance (BSA) in partnership with International Data Corporation (IDC) shows that 43 percent of the software installed on personal computers around the world in 2013 were not properly licensed. The total loss due to installations of unlicensed software was \$62.7 billion. The survey was conducted among 22,000 consumers and enterprise PC users. [1]

1.2 Purpose of the study

The purpose of this study was to better understand and identify software piracy behaviours. The study begins with a discussion on software piracy followed by an overview of a survey conducted among students. The study mainly aims to answer the following questions.

1. What are the types of software piracy?
2. What are the key factors encouraging software piracy?
3. How are anti-piracy organizations working to control increasing software piracy?
4. What measures can be taken to reduce software piracy?

1.3 Limitations

This study has some limitations. The study presents the current situation of software piracy and utilized ideas from previous studies related to the topic. Students who use computers and the Internet on a daily basis were invited to participate in the study via email and Facebook messages. A relatively small number of participants took part in the survey and the sample data obtained cannot be generalized to the whole population in the world. The study discusses the causes, consequences and preventive measures of software piracy. The study emphasizes the Open Source Software (OSS), public education and awareness, and understanding the proper use of software as preventive measures to reduce piracy. The OSS model discussed in the paper could be of great assistance to reduce piracy. The other two measures depend on individuals, how they consider it and implement in their real lives.

2 Theoretical framework

2.1 Software piracy in different forms

Software piracy is unauthorized reproduction of copyrighted software. The unauthorized copying can be done for different purposes such as personal use, business use and even selling copies of the pirated software. Even though pirating copyrighted software is illegal, there are still millions of computer users pirating copyrighted software in the world. The rates of software piracy have been increased rapidly with the growing use of computers and this activity not only affects the economy of software companies but also affects the loyal customers who actually purchase their products as intended. [1, 7]

Software piracy occurs in different forms. The most common form as defined by Microsoft is considered to be 'End User Piracy'. It happens when individuals and businesses make copies of software without a license to do so. People may copy a program and give it to others without realizing that this is software piracy. Similarly, an organization may install software on more computers than its licenses allow. SIIA (Software and Information Industry Association) and BSA are non-profit trade associations established to advance the goals of the software industry and its hardware partners. They have listed some common types of software piracy on their websites. The most common types of software piracy as listed by BSA and SIIA are explained below, [2]

2.1.1 Softlifting

Softlifting is the act of illegal copying of software and distributing it to friends, organisations or duplication and resale in violation of the terms of the license agreement. Many personal users and enterprises are doing it knowingly or unknowingly and only few of them care about it. Such activities lead software industry to lose billions of dollars each year and shatter the profitability of large software companies as well as small ones. It often happens when organizations expand computer capabilities and install unauthorised copies, rather than going through the purchasing procedure. Softlifting is sometimes referred to End User Piracy as in both cases one copy of software is pur-

chased for a particular machine and later installed on several machines in violation of its copyright law. [2]

2.1.2 Internet piracy

Nowadays, Internet piracy is one of the fastest and easiest ways to receive pirated software. There are several websites that make software available for free download in a number of ways. Many computer users download software from the Internet, which makes their lives easy as they do not even need to visit stores or sending out copies of software on a CD-ROM or floppy disk. These techniques have made our lives easier but at the same time they have also increased internet piracy, which occurs in different forms such as downloading or uploading of illegal copies of software over the Internet. [2]

2.1.3 Hard-disk loading

Hard-disk loading occurs when an individual or company sells computers preloaded with illegal copies of software into the hard disks to encourage the consumer to buy their products. Since this kind of activity is common, SIIA recommends computer buyers to confirm with the vendors that software preloaded on the machines are legal and licensed copies. If the vendor is unwilling to supply with the proper documentation, SIIA highly recommends not dealing with that vendor. [2]

2.1.4 Software counterfeiting

Software counterfeiting is illegal duplication and sale of copyrighted software in such a way that it appears to be authentic. Counterfeit software includes accompanying manuals that the original legitimate software was sold and is usually sold at prices well below that of the retail price of the legitimate software. [2] This is the most typical type of software piracy and different organizations are actively participating in stopping this kind of activity. Though counterfeit software is cheap and easily available but it is also risky to use, since it can bring malware along with it. According to a study, "The dangerous world of counterfeit and pirated software" conducted by IDC in 2013, the

chances of infection of malware from counterfeit software are 1 in 8 for consumers and 1 in 9 for businesses. [13, 8]

2.1.5 Unauthorized use of academic software

Many software companies sell academic versions of their software to public schools, universities and other educational institutions. When the software is labelled to use for academic or educational purposes only, it cannot be used for commercial or other for-profit purposes. Using academic software for private use in violation of the software license is a form of software piracy and it not only hurts the software publisher, but also the institution that was the intended recipient of the software. [2]

2.1.6 Renting

Renting involves someone renting out a copy of licensed software for temporary purposes. In such type of piracy, software is rented to individual computers and returned the original software to the renter. This method of piracy is not as common as other forms of piracy due to its distribution nature but it still does exist. It has always been illegal to rent unauthorized copies of software. The "Computer Software Rental Amendments Act" formed in the US in 1990 strictly prohibits the rental, lease or lending of a computer program for direct or indirect commercial gain unless authorized by the owner of the copyright in the program. [4]

2.2 Major factors behind software piracy

Software piracy continues for several reasons, however, and is a serious problem. The magnitude of software piracy varies in different countries. In some countries, the legal protection for software does not exist while in some other countries laws are rarely enforced. In addition, many buyers believe they have the right to copy the software for which they pay a huge amount of money. In recent years, many studies and surveys have been focused more on finding the causes of software piracy. Christensen and Eining (1991) utilized the Theory of Reasoned Action (TRA) to build a model of piracy behaviour which pointed out that an individual's intention towards software piracy was

a major factor [5, 71]. Some key reasons behind software piracy based on different studies are analyzed below.

2.2.3 Public awareness

Lack of awareness in proper use of software is considered to be the key point influencing software piracy. Although software industries provide information regarding copyright of software to computer users by employing licensing agreements as a means of information during the installation process, most of the users do not even bother to read license agreements before moving to the next step in the installation period. Many people misuse software products. They install software in their computers and make a copy of it and give it to others and they do not even realize that what they are doing is illegal and against the copyright law. [3, 61]

2.2.2 High price of software

The high price of software is another factor causing software piracy. Countries with low economies are likely to have higher piracy rates when software products are priced higher in comparison with the developed countries. Software products developed in economically rich countries are generally not affordable in poorer countries. The economy of any country has a strong correlation with the piracy rates. According to a global study conducted by BSA in 33 countries as a part of the ninth annual BSA global software piracy study, piracy rate was higher in developing countries than in the developed countries [6]. The study found that computer users in developing and poorer countries are unable to afford the higher priced software products and they look for an alternate way to get them. [3, 62]

2.2.3 Legal enforcement

Several studies regarding software piracy have shown that the piracy rate is mostly higher in the Asian and African countries in comparison with the countries in the North America and Western Europe. This is because computer users in North American and Western European countries are aware of copyright rules and laws. Copyright laws are strictly followed in these countries. For example in the US, if any business organization

or individual is found guilty in copyright infringement, they will be sentenced to jail terms of up to 5 years along with \$250,000 as fines. [7, 3] Moreover, European Union Council Directive 91/250/EEC, TRIPS (Trade-Related Aspects of Intellectual Property Rights) international agreement and WIPO (World Intellectual Property Organisation) also protect computer programs under the copyright law as 'literary works'. Thus, unauthorised reproduction and distribution of such computer programs without the permission of owner leads to criminal proceeding and penalties. [28, 1-3; 36] However, a study by Tan (2002) suggests that where there is low probability of being caught and penalised, an individual or business will continue using pirated software. [5]

2.2.4 Social and cultural factors

It has been found that there is a strong correlation between social or cultural factors and software piracy. These factors refer to the prevailing social structure of a country and the attitudes shared by the members of that society. Several previous studies have shown that collectivist-individualist aspects of the society affect the piracy rate in any country. [3, 65-66] For example, according to a study by Kallol, Peeter and Robert (2006), software piracy is most popular in collectivistic societies where software is purchased by an individual and is shared among other members of the society. [8, 72]

2.2.5 Pirated software on the Internet

There are millions of people around the world who use computer and the Internet on a daily basis. Using computers in our daily lives has made our lives easier and has benefited us in many aspects but it has also brought some problems, and software piracy is one of them. Availability of pirated software on the Internet is one of the major factors increasing the software piracy rate globally. Pirating the software from the Internet is termed as the Internet piracy where the Internet is used to download unauthorized software. Access to high-speed Internet connections makes it easier to download software programs. Beside this, many illegally attached computer games are sent through the Internet as emails, which is also a form of piracy. [2]

2.3 Statistical analysis of software piracy and comparisons

2.3.1 Comparison of software piracy in different regions

Software industries have been seen to acquire significant profits. To give an example, Adobe Corporation achieved a total revenue of \$4.4 billion in the fiscal year 2012 as stated in the corporation's annual revenue report (2012). [9] This figure could have been higher if there was control over illegal copying of their products.

Figure 1 illustrates the average rate of unlicensed software use in different regions. The rate was much higher in Asia-pacific of 62 percent in comparison with the Western Europe and North America which had 29 percent and 19 percent respectively. The rate in Asia-pacific was 60 percent in 2011 and rose by 2 percent in 2013. The rate was higher in Asia-pacific as the demand for software was being fulfilled by piracy in economically emerging countries, specifically China and India. China and India, considered being the biggest markets in the region had the piracy rate of 74 percent and 60 percent respectively. According to BSA, China's piracy rate was 82 percent in 2007, which showed a gradual decrease in a later survey. The reduction in the piracy rate in China was the result of legalization programs by vendors, enforcement efforts and legal requirement for PC manufacturers to ship legal operating systems with new PCs. Australia and Japan had the lowest piracy rate of 21 percent and 19 percent respectively. Figure 2 shows lists of countries that were ranked in terms of the commercial value of pirated software in 2013 by BSA. [1, 8-9]

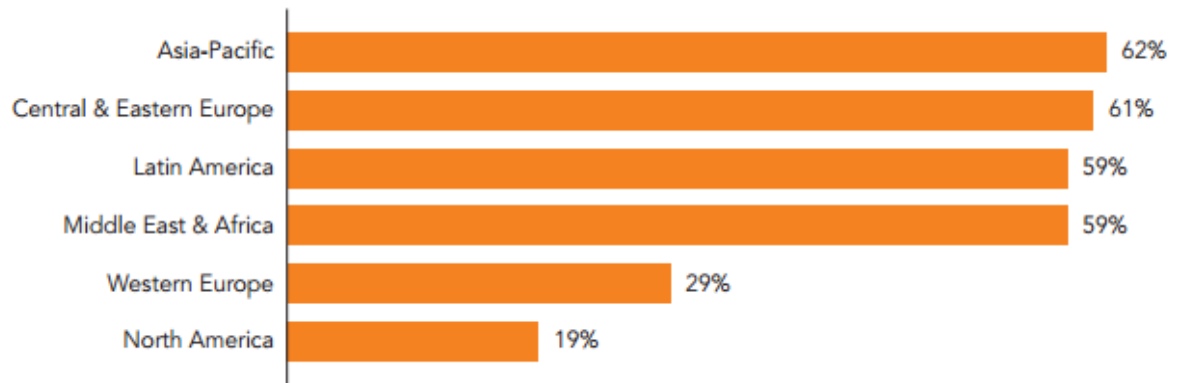


Figure 1. Average Rate of Unlicensed Software Use. Reprinted from BSA (2013). [1, 7]

Country	Unlicensed Value (\$M)	Licensed Market (\$M)	Unlicensed Rate
United States	\$9,737	\$44,357	18%
China	\$8,767	\$3,080	74%
India	\$2,911	\$1,941	60%
Brazil	\$2,851	\$2,851	50%
France	\$2,685	\$4,773	36%
Russia	\$2,658	\$1,629	62%
Germany	\$2,158	\$6,834	24%
United Kingdom	\$2,019	\$6,394	24%
Italy	\$1,747	\$1,970	47%
Indonesia	\$1,463	\$279	84%
Japan	\$1,349	\$5,751	19%
Mexico	\$1,211	\$1,032	54%
Canada	\$1,089	\$3,267	25%
Spain	\$1,044	\$1,276	45%
Venezuela	\$1,030	\$140	88%
Argentina	\$950	\$427	69%
Thailand	\$869	\$355	71%
Australia	\$743	\$2,795	21%
South Korea	\$712	\$1,162	38%
Vietnam	\$620	\$145	81%

Figure 2. Countries ranked in terms of commercial value of pirated software in 2013. Reprinted from BSA (2013). [1, 4]

The worldwide PC market grew much faster in the past decade and at the same time due to unauthorized use and distribution of software, global piracy rate also increased. The BSA and IDC global software piracy revealed that, in 2007 to 2013, the global piracy rate increased from 38 percent to 43 percent. Table 1 compares the unlicensed software installation rates in six different regions from 2007 to 2013. The data shows that the piracy rate is gradually decreasing in Central and Eastern Europe, Latin Amer-

ica and North America whereas in other regions, the rate fluctuates by one to three percent and seems to remain steady. [1]

Table 1. Unlicensed software installation rates [1, 8-9]

Regions	2013	2011	2009	2007
Middle East and Africa	59%	58%	59%	60%
North America	19%	19%	21%	21%
Western Europe	29%	32%	34%	33%
Asia Pacific	62%	60%	59%	59%
Central and Eastern Europe	61%	62%	64%	68%
Latin America	59%	61%	63%	65%

According to the study, Asia Pacific had the highest rate of unlicensed software installations in 2013 followed by Central and Eastern Europe. Individual countries such as Russia and Ukraine which are considered the biggest markets of PC showed only one percentage-point decrease from 2011. Russia, where 62 percent of PC software was installed without proper licensing in 2013, was only one point down from 63 percent in 2011. In Ukraine, the rate was 83 percent in 2013, which was 1 percent lower than in 2011. Most of the countries in Central and Eastern Europe were found to have the highest piracy rate. [1, 8]

Latin America had a piracy rate of 59 percent in 2013, which was 6 percent lower than in 2007. Brazil, an individual country to have the biggest market for PCs, had the lowest rate of 50 percent according to the BSA study. The study showed that the use of unlicensed software in Argentina, Mexico and Uruguay was 69 percent, 54 percent and 68 percent respectively. According to the study, 66 percent of the total population in Argentina use the Internet. The reason behind Argentina having a high piracy rate was due to availability of highly pirated contents in online sources and lack of enforcement as well as effective laws to restrain Internet piracy [13]. Colombia had the second-lowest piracy rate of 52 percent in the region. [1, 8]

Middle East and Africa had a piracy rate of 59 percent in 2013 and it remained nearly constant over the past five years. South Africa had the lowest piracy rate of 34 percent and it was comparatively lower than in any other countries in the region. It had a 50

percent piracy rate on an average whereas Zimbabwe had the highest piracy rate of 91 percent. Most of the African countries such as Nigeria, Algeria, Cameroon and Libya had a piracy rate above 80 percent individually. While comparing the piracy rate it was found that the piracy rate was relatively higher in the countries with poor economy, unlike South Africa, Qatar and Saudi Arabia. Turkey had a piracy rate of 60 percent and showing gradual decrease in rate which had 65 percent of piracy rate in 2007. [1, 9]

North America had the lowest piracy rate of 19 percent in 2013. The United States and Canada, being the highly developed countries, had 19 percent and 25 percent of piracy rate respectively. Most Internet users are cautious of software piracy. Besides, strong laws and legal enforcement also contribute to a low piracy rate in the region. Similarly, Western Europe had a piracy rate of 29 percent in 2013. It was 33 percent in 2007 and it is gradually decreasing. Most of the individual countries in Western Europe had a piracy rate less than 25 percent on an average. Greece had the highest piracy rate of 62 percent and some other countries including Sweden, United Kingdom, Finland, Denmark, Switzerland, Belgium and Germany had the lowest piracy rate of 23 to 24 percent. However, countries such as Spain, Italy, Portugal, Cyprus, Malta and France had varying piracy rates from 26 percent to 47 percent according to the BSA study. [1, 9]

2.3.2 Commercial values of unlicensed software installations

This section discusses revenue losses by software industries due to unlicensed software installations in different regions. A recent study by BSA shows that worldwide commercial losses due to software piracy were \$62.7 billion in 2013. The survey claimed that Asia-Pacific had high commercial losses worth more than 21 billion dollars alone followed by Western Europe which had \$12.7 billion losses due to unlicensed software installations. Similarly, other regions included Central and Eastern Europe (\$5.3 billion), Latin America (\$8.4 billion), Middle East and Africa (\$4.3 billion) and North America (\$10.8 billion). Table 2 shows the comparative losses due to software piracy from 2007 to 2013 in different regions.

Table 2. Commercial value of unlicensed software (\$M) [1, 8-9]

Regions	2013	2011	2009	2007
Middle East and Africa	\$4,309	\$4,159	\$2,887	\$2,446
North America	\$10,853	\$10,958	\$9,379	\$9,144
Western Europe	\$12,766	\$13,749	\$11,750	\$11,655
Asia pacific	\$21,041	\$20,998	\$16,544	\$14,090
Central and Eastern Europe	\$5,318	\$6,133	\$4,673	\$6,351
Latin America	\$8,422	\$7,459	\$6,210	\$4,123

Between 2007 and 2013, the United States alone had approximately \$8 billion to \$9 billion losses annually followed by China which had \$6 billion to \$8 billion losses annually. This figure was much higher than in any other countries in the world. Other economically developed and highly populated countries including Canada, Spain, Germany, United Kingdom, France, Japan and Italy, showed \$1 billion to \$3 billion losses annually despite their relatively low piracy rates. Some other countries such as Bangladesh, Pakistan, Sri Lanka, Philippines, Greece, Turkey and Peru which are considered good markets for software sales showed commercial losses of \$100 million to \$400 million.

Argentina, Brazil, Mexico and Venezuela in the Latin America region emerged to have high losses with approximately \$1.1 billion individually where Brazil alone had \$2.8 billion losses due to software piracy. Colombia which showed their lowest piracy rate of 52 percent in the region had losses of \$396 million. Whereas Russia and China considered being the big market place for software and computers sale showed their losses of \$2.6 billion and \$8.7 billion respectively. The report stated that as the living standard of people in these countries is rising, consumers seem more likely to buy legitimate software which will help to drop the current piracy rate and value of commercial losses in the future. US Trade Representative (USTR) cited 12 countries in its priority watch list in terms of software piracy in 2007 where China and Russia were at the top.[10] National Copyright Administration (NCA) of China signed an agreement in 2006 with trade association in the UK and US stating that China has the world's second largest number of Internet users and therefore it is important to keep an eye on illegal installation of software and also stated that the government will work more to crack down on software piracy [11].

2.3.3 Software piracy behaviours in mature and emerging economies

Software piracy comes in different forms. However, the principle of pirating software remains the same. Some computer users do not consider unauthorized copying of licensed software or downloading pirated software from the Internet to be wrong whereas some want to test the software and see if it can fulfil their wishes before they go and spend money on it. Recently, advancement in the Internet world is also increasing software piracy as an endless number of software can be downloaded from the Internet. There are some defenders of piracy who might say that pirating software in a way is good for software companies as it gives their products free publicity. The general thought might be good but the majority of these people would just download it rather than go and buy it. Different people have different objectives for pirating software. Some pirate because they do not want to wait until the latest software is released in their country as it can be easily downloaded from the Internet, while some do piracy as their hobby.

According to a survey by BSA in 2011, 31 percent of computer users said that they pirate software always, mostly or occasionally and 26 percent said that they rarely do it. The survey was conducted with approximately 15,000 computer users in 33 countries. The rate was found different in different countries on the basis of their economies. People who always and mostly pirate software were found to be more than 6 percent and 10 percent respectively in countries with emerging economies while this rate was lower in countries with matured economies. The study stated that frequent software pirates were young and male. Remarkably, the survey reported that business decision makers in enterprises pirated software more frequently than other ordinary computer users, which adds up the total loss of commercial values of software quickly as large companies often make hundreds or even thousands of illegal copies. [12] Figure 3 shows how often the software is pirated in different countries with matured economies and emerging economies.

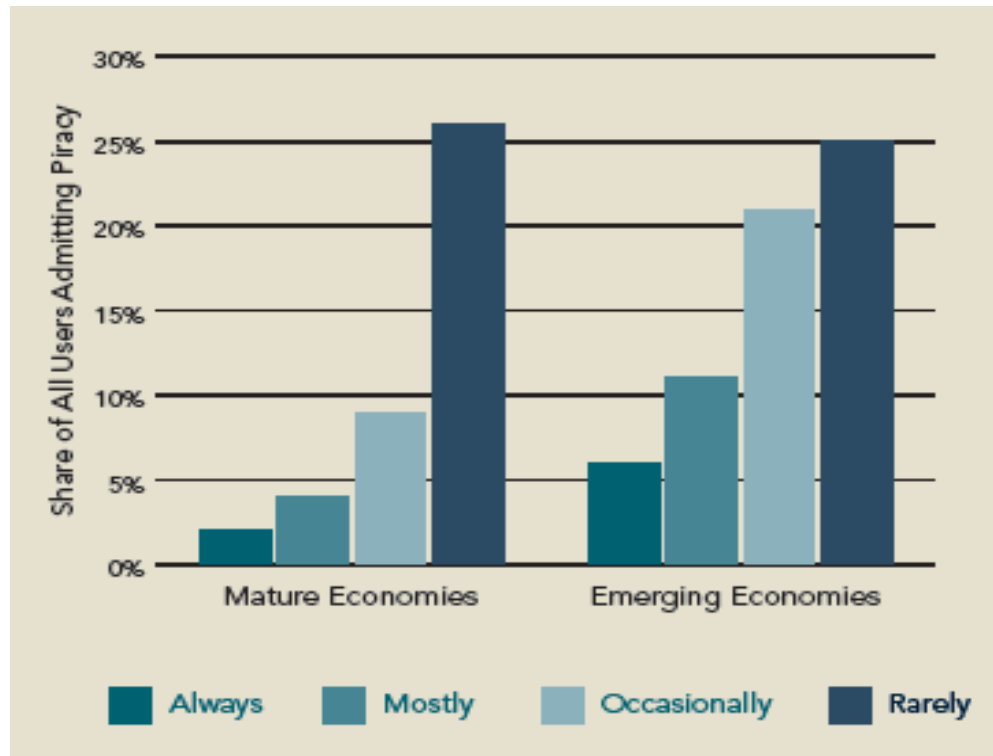


Figure 3. Self-Reported piracy habits by markets. Reprinted from BSA (2011). [12, 2]

2.4 Risks of pirated software

There are several risks of using pirated software to individuals and enterprises. Apart from the legal consequences, the pirated software does not have any warranty to protect itself as well as it increases the chances of not functioning correctly. It increases the risk of exposure to malware and data loss. [15, 1-2] This section discusses on the consequences of using pirated software to individuals and enterprises.

2.4.2 Risks to individuals

Most of the computer users look for counterfeit software products thinking that they are cheaper than the legitimate software and they will never get caught. When they are purchasing counterfeit software, they are not only violating the copyright law of software companies but they are also putting their smart phones, tablets or PCs at higher risk of security threats and possible damages. Counterfeit software is more likely to cause a computer to crash or even cause irreparable damages in the worst

case. Counterfeit software loaded in the devices can steal personal information and data without one's knowledge. For example it can steal bank credentials, address books and passwords and cause serious problems to users. Real software vendors regularly provide a small piece of software called a patch which is often used to fix problems in operating system and software programs. But, counterfeit software does not receive such patches which can make a PC or any installed devices more vulnerable to attacks. [15, 9]

Counterfeit software contains malware which often comes in different forms such as viruses, worms, spyware and adware, rootkit and Trojan that can cause serious problems to machines. Viruses are typically small sized programs which infect computers when any illegitimate software is obtained from auction sites or downloaded using crack tools and peer-to-peer networks. Viruses are composed of dangerous files which harm computers destroying or altering some parts of computer systems and causing the hard drive to crash itself. They are more likely to alter a system, as a result it is unable to access certain functionality and the system might be unable to install any anti-virus software. Counterfeit software is sometimes loaded with Trojan horses by the developers, so once they are installed in computer they will send the information from computer over the Internet to the developers who essentially control the computer, slowing the system's activities or even causing the system to crash. Trojan horse is very dangerous as it claims to make the system rid of viruses but instead it introduces other new viruses into the computer system. [13, 9-10]

According to a survey by IDC in 2013 in 10 countries with 1,104 consumers, 973 business users and 268 CIO/IT managers, most of the counterfeit software had malware such as Trojan horses, spyware, viruses and keystroke-capturing software. The survey stated that 60 percent of the downloaded software does not come with their activation keys, which means that users have to go back to the download site to get illegal keys that will create chances of Trojan and adware infection. In the study, altogether 270 websites and peer-to-peer networks were checked during downloading of counterfeit software. It was found that just by visiting those websites 14 percent of Trojan/adware and 75 percent of tracking cookies and spyware were detected. [13, 6] Figure 4 shows the percentage of the downloaded programs or CDs that can install malicious code on the basis of the survey done by IDC.

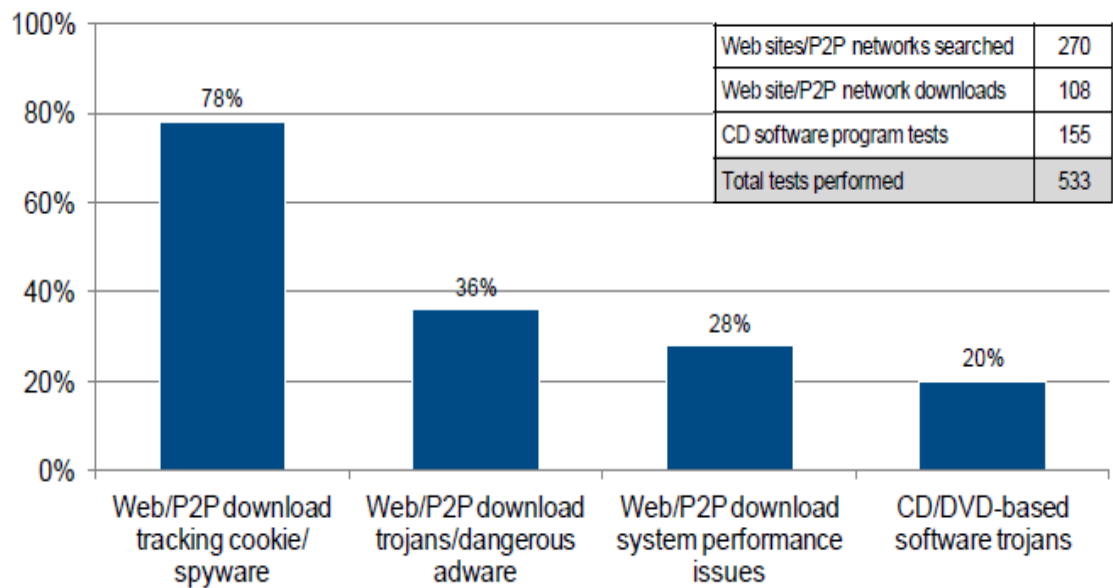


Figure 4. Percentage of downloaded programs/CDs installing malicious code. Reprinted from IDC (2013). [13, 7]

Besides this, duplicating any software product for a profit, lending an unauthorized copy to others and making multiple copies of single licensed software for multiple uses within an organization is considered to be copyright infringement. According to the U.S. Copyright Act, for any wilful infringement act, one will be penalized as much as \$150,000 per infringed work. If the infringer was found innocent as he/she had no reasonable way for infringing, the penalties would be \$200 per infringement and if the infringement work was not wilful, infringer would be penalized by \$750 to \$30,000 depending on the infringed work. In extreme cases, an infringer would be penalized as well as sentenced to jail terms up to five years. [2, 14] In the most recent enforcement action, Microsoft South Africa in co-operation with the Hawks in South Africa arrested the suspects involved in selling unlicensed Microsoft software. In the raids, hundreds of counterfeit disks containing the Microsoft software were seized and the suspects were penalized by R5,000 per disc and six months imprisonment. [14]

2.4.3 Risks to Enterprises

IDC and the National University of Singapore (NUS) conducted a study, "The Link Between Pirated Software and Cyber Security Breaches" in early 2014 and revealed that the enterprises worldwide were expected to spend \$364 billion and 1.2 billion hours in order to deal with data recovery and repair on pirated software. The study was conducted on 203 computers in 11 countries worldwide including the US, Turkey, Brazil, China, Mexico, Russia, South Korea, India, Thailand, Indonesia and Ukraine. The study was supported by 951 consumers and 450 CIOs/IT professionals. Software is considered the most valuable asset in any business organization. BSA mentioned that 94 percent of business across Europe considered IT technology as a key factor to the successful operation of a company. It also reported that 36 percent of software use in business organisations across Europe was being used without a valid licence. A forensic analysis of 203 PCs found that 61 percent of those computers purchased with pirated software in 11 different countries were infected with malware, including hack tools, viruses, worms, Trojans, adware and rootkits. This is the most severe case as IDC reported that enterprises worldwide will have to spend a total of \$491 billion on dealing with issues due to malware, where \$127 billion would be spent on dealing with security issues and \$364 billion on dealing with data losses. [15, 1-2]

The study reported that huge numbers of employees were found to bring their own software to working places. 27 percent of office employees responded that they were installing their own software on office computers and on the basis of the number of programs installed on the office computers, it was estimated that 20 percent of pirated software was installed by employees. This figure was found high in Latin America, 38 percent, while the lowest percentage was found in North America, 3 percent. Figure 5 shows the percentages of employees installing their own software on office computers. The survey was done with 951 business employees worldwide. [15, 10]

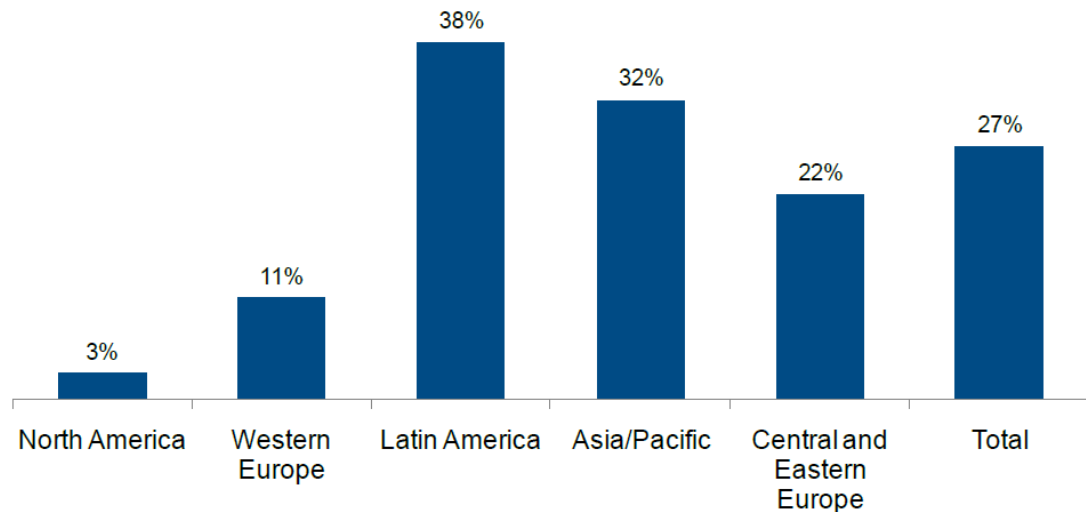


Figure 5. Percentage of employees installing their own software on work computers. Reprinted from IDC (2014). [15, 10]

Many of the employees working in the enterprises could be unaware of the security issues of the pirated software that could cause huge losses of data and damages to computer hardware and software. Although most of the enterprises secured their computer systems with highly trained IT staff, this might not be possible in small enterprises. When pirated software infected with malware is installed on a computer, it will possibly disrupt the smooth functioning of the computer and the user might remain unknown of it. Deployment of non-genuine software can adversely affect the system security infrastructure. According to a study by IDC and the National University of Singapore (NUS), 71 percent of CIOs and IT managers responded that 51 percent of their employee-installed software increased security threats and the total cost to fix those threats could be \$127 billion. Figure 6 shows the percentage of the problems arising due to employee-installed software at work. [15, 11]

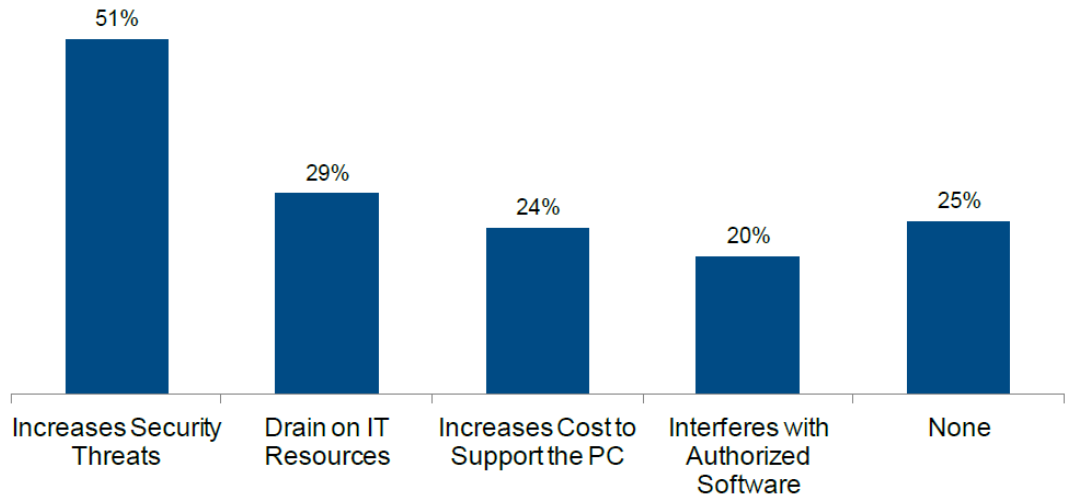


Figure 6. Problems with employee-installed software at work. Reprinted from IDC (2014). [15, 11]

Over the past few years, cybercriminals have been relying on software piracy business rather than hacking business networks and consumers' PCs, from which they easily steal confidential information including data, identities, passwords and login details. According to a study by IDC, 60 percent of consumers responded that their greatest fear for infected software is the loss of data, files and personal information. Similarly, 50 percent of consumers had a fear of hijacking of email, bank accounts and social networking. Figure 7 shows consumers' biggest fears for infected software. [15, 13]

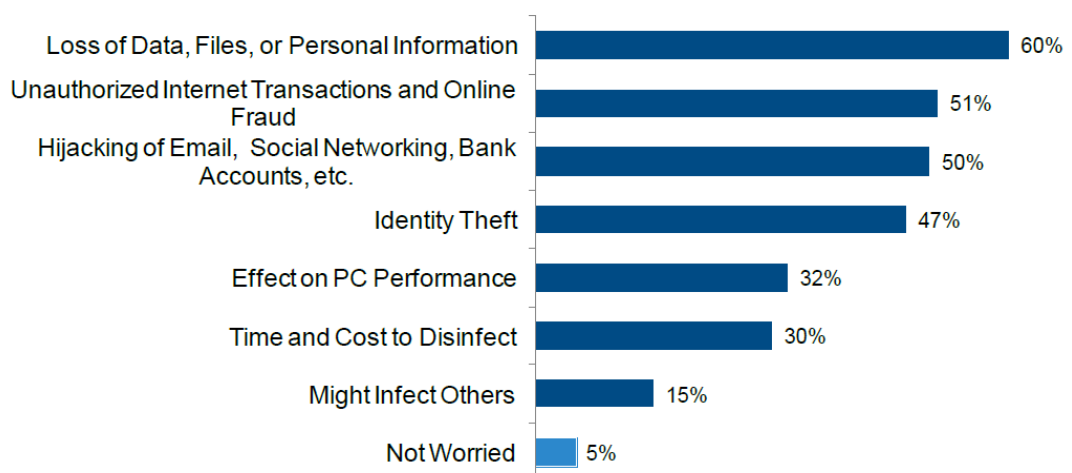


Figure 7. Biggest fears for infected software. Reprinted from IDC (2014). [13, 13]

In addition to security issues by the installation of pirated software, enterprises have a greater risk of potential financial and legal penalties. If enterprises are found guilty of using illegal software, BSA is responsible to take action. On breaching the software copyright legislation, enterprises have to pay substantial damages and legal costs. Furthermore, they have to destroy all those unlicensed software and replace them with licensed versions. Recently in 2014, a Melbourne recruitment firm had to pay \$11,190 as found to be using unlicensed Microsoft office 2007 Enterprises. The firm was caught in a raid by BSA and was forced to purchase the licensed software to legalise its ongoing software deployments. [16] A similar case occurred in South Korea in 2013; the Seoul High Court filed lawsuits against two companies for illegal use of computer software. The companies were found using pirated Windows XP, Microsoft and some other software on their office computers. Two companies had to pay \$41,800 and \$104,625 individually to Microsoft and six other software vendors. [17]

2.5 Different organizations' actions against software piracy

Several efforts have been made to minimize the growing software piracy worldwide. Stop Online Piracy Act (SOPA) was introduced in the United States by Lamar S. Smith in 2011, intended to address the growing problem of piracy and counterfeit goods. It is a crucial effort to enforce and protect intellectual property (IP) rights, which can mitigate the losses of many software vendors. [18] Likewise, the National Intellectual Property Law Enforcement Coordination Council (NIPLECC) was formed in 1999 to investigate and prohibit intellectual property violations over the Internet. In 2001 as part of its operation, it conducted simultaneous searches in different parts of the United States and five other foreign countries. In the search process several computer sites were found to have thousands of pirated copies of software, computer games, music and movies. Seventeen defendants were suspected and ten of them were found guilty and sentenced to 30-40 months in jail. [19, 7] Apart from them, there are several other organizations dedicated to stop worldwide growing piracy, such as BSA, CAAST, SIIA, IACC and FFAST, that describe the intellectual property rights and penalties for abusing legitimate software.

2.5.1 Business Software Alliance (BSA)

BSA is the leading advocate for global software and hardware industries with its headquarters in Washington, DC. It was established in 1988 and has been promoting legal software use in more than 60 countries. It works on behalf of the largest software companies including Adobe, Microsoft, McAfee, Autodesk, Intuit, Symantec, Apple, Bentley Systems, Borland, Macromedia, Unigraphics Solutions and many others. It has collected millions of dollars in restitution from different companies in the United States alone that were caught with illegally copied software. Every year, it conducts worldwide study in collaboration with IDC and estimates the level of software piracy as well as the total losses to the software companies. If any company or individual is suspected of using illegal software, it will first send an audit letter asking to provide proofs of purchases for each of the software products installed on computers and if the company or individual is unable to provide the proof of legal purchase, then they could be liable to pay penalties as much as \$150,000 depending upon the illegal software found in the company.

BSA uses different techniques to detect and remove the illegal software in online and cloud environments. It works together with hosts to remove pirated software files from their sites. BSA's Internet enforcement has removed thousands of download links offering illegal software. One of the factors increasing software piracy rates in emerging countries is considered to be a high-speed Internet access. There are several auction sites, peer-to-peer (P2P) networks and internet channels which have thousands of illegal software files. BSA has been working to remove illegal software and to shutdown such illegal auction sites. According to BSA, in 2009 it removed 36,921 illegal software auctions globally. The auctions were involved in the distribution of illegal software with the total value of \$430 million. It removed 883,221 software products from its member software companies. In addition to this, it sent more than 7.3 million takedown notices to Internet Service providers (ISPs) and 152,286 takedown notices to BitTorrent indexing sites to remove illegal distribution of software products. [20, 2]

2.5.2 Software and Information Industry Association (SIIA)

SIIA is the principal trade association that advocates the software and digital content industries for more than 800 companies worldwide. It was formed in 1999 in an association with software publishers and information industry. Its members range from start-up companies to the largest companies such as Adobe, McAfee, Symantec, Autodesk, FileMaker and Borland. It promotes the importance of copyright protection and intellectual property to businesses, consumers and education. It takes legal action against illegal software use and illegal selling of software. It runs the Corporate Anti-Piracy Program and Internet Anti-Piracy program. Through the Corporate Anti-Piracy program, it handles cases of software and digital content piracy taking place within an organization. In the Corporate Anti-Piracy Program, it has described some possible piracies, listed below taking place within an organization. [19, 3]

1. An organization purchases single licensed software and installs it on many computers, which violates the terms of the license agreement.
2. An employee makes a copy of business software and installs it on his or her home computer violating the terms of the license agreement.
3. An organization copies a software program on an organization's servers and clients can freely access the software.
4. An organization purchases computers with preloaded software and the vendors fail to provide the purchase documentation to verify the legitimacy of the preloaded software.
5. Posting any newsletter articles, magazines or news by an organization on a website without any permission is termed as content infringement.

SIIA's Corporate Anti-Piracy program is mainly driven by source reports. Usually the source refers to a vendor, member company, current or former employee, or any other person with reliable information about illegal use of software or digital content by a business organization. In order to encourage sources, SIIA offers rewards of up to \$1 million. Before pursuing a case against any target organization that is using illegal software, it will first verify the information provided by its sources. It thoroughly investigates and collects credible information that shows the nature and extent of the piracy. It notifies software vendors whose products were identified by the sources and

waits for their authority to pursue the case on their behalf. When the authorization is received, SIIA will contact the reported organization and conduct an investigation of all its workstations and servers to determine the extent that the software was distributed or copied illegally. Once the organization is found to be using software illegally or violating the terms of the license agreement, the organization must remove all the infringing software and replace them with licensed software. In addition, the organization is penalized for using illegal software. The case will be closed if no unauthorized software or content is found. If any company refuses to conduct the requested investigation, then SIIA may sue the company on behalf of the publishers for violating the software license agreement. [21, 3-4]

Internet piracy is an illegal reproduction and distribution of copyrighted digital files over the Internet. In recent years, the high-speed Internet has rapidly progressed and so as the Internet piracy. Internet piracy occurs through several channels such as auction sites, peer-to-peer (P2P) technology, business-to-business (B2B) sites, file transfer protocols (FTP), social networking sites and other websites. Among these channels, online auction sites are the most common destinations on the web where millions of people buy and sell their products. Many legitimate products are sold on these sites. The sites have also been abused when it comes to software sales. The most popular auction sites which have been abused to sell illegal software are eBay, UBid, Taobao, QXL, Yahoo! and many more. P2P technology is another common method that has been increasing Internet software piracy. Using P2P technology, users download and install many digital files on their computers. The most popular P2P protocols facilitating Internet piracy include BitTorrent, FastTrack, Gnutella and eDonkey.

Pirates not only distribute software among themselves, but nowadays they are reaching out to the public through different online auction sites. They are selling illegal copies of genuine software for a fraction of the original price. SIIA has addressed the illegal selling of software on auction sites by conducting several case studies. In 2006 SIIA launched a new program called Anti-Piracy Litigation Program (ALP) to combat the illegal sale of software on several auction sites. Under this program SIIA monitors auction sites, identifies groups or individuals involved in selling illegal software or contents and sues them on behalf of the association's member companies. SIIA's team of investigators work together and conduct an investigation by making test purchase from

popular auction sites to verify the product is pirated. Under these investigations, SIIA works closely with its member companies to distinguish pirated software from original software. When the products are verified as illegal, it will then issue takedown notices to the auction site providers to dismiss those listings. [21, 7]

As an enforcement program, SIIA shut down more than 24,000 online auction sites worldwide under the Digital Millennium Copyright Act (DMCA) in 2012. According to a report, Craigslist.org was found to be listing the maximum number of illegal software in the United States and got the largest portion of takedown notices to remove the listings. Figure 8 shows the most popular online auction sites and individual sellers getting takedown notices for listing illegal software into their websites in 2012. [21, 6]

Marketplace	% Compliance	Listings Found	Sellers
DHgate	100%	14	95
Taobao	89%	757	551
eBay	100%	5,419	2,712
Craigslist	100%	16,354	N/A
Amazon	72%	1,225	999
iOffer	100%	203	75
EC21	100%	1	1
marktplaats	100%	84	43
Sell.com	21%	61	19
Total		24,118	4,495

Figure 8. SIIA's notices and takedown programs. Reprinted from SIIA (2012). [21, 6]

In addition to these enforcement programs, SIIA has been conducting complementary educational programs to promote the legal use of software. It is also active on intellectual property policy matters that relates to anti-piracy issues. [21, 2]

2.5.3 Microsoft Corporation

Microsoft Corporation is the world's leading software industry founded by Bill Gates and Paul G. Allen in 1975 to develop computer software applications and systems. Its headquarter is in Redmond, Washington and it has nearly 90,000 employees working in more than 100 countries. [22, 2] Besides developing software applications and systems, it also publishes books, offers email services and sells computers peripherals,

electronic game systems and portable media players. It also performs researches and has research centres and laboratories in countries such as China, Germany, England, India, Egypt and Israel. Having best known products such as Microsoft Windows series of operating systems, Internet Explorer web browser and Microsoft Office packages, its products and services are well supported by worldwide from large multinational computer manufacturers to small and local system developers. [23]

Like other software industries, Microsoft is also facing software piracy as a serious threat to the company. Many of its products have been illegally used and distributed by software pirates that cause them a loss of millions of dollars and thousands of jobs every year. In addition, the company has to spend billions of dollars and hours to fix the problems created by malware on pirated software. According to a study, 'Addressing Global Software Piracy' conducted by Microsoft in partnership with government agencies and customers in 2010, software piracy resulted \$750 billions of dollars in lost revenues and millions of lost jobs to software industries. In order to combat against software piracy, Microsoft has built a worldwide anti-piracy team of forensics experts, IP specialists, government agencies and intelligence analysts that work on tracking and tracing digital criminal activities in over 150 countries. It also participates in making laws and policies in collaboration with other software companies and law enforcement agencies that promote legal use of any software products. [22, 2]

Microsoft has been running several anti-piracy programs in different countries from time to time to warn customers about the dangers of using counterfeit software. To address the risks of using pirated software in terms of money and security, Microsoft conducted a study in the United Kingdom in 2010. The study conducted in 30 mid-size companies found that over one-third of them were unknowingly using counterfeit software and they spent approximately \$10,000 on buying software. Another study by the Harrison Group found that nearly 4 percent of the pirated Microsoft operating systems became infected to malware at installation and were unable to download automatic updates. Recovery from data loss due to infected software cost a single workstation more than \$1,000. [22, 3]

In order to trace counterfeit discs, Microsoft has opened nine forensic crime laboratories around the globe where forensics experts examine and process the suspected

counterfeit software. If any individuals or companies are suspected of using illegal software, Microsoft will conduct an investigation in collaboration with local government agencies and law enforcement officials. An investigation team will collect all the information and present it to the juries to demonstrate the extent and nature of damages that have been caused due to use of counterfeit software. [22, 7] Some computer users around the globe may seek for counterfeit software in hope of saving their money, but using such counterfeit software may cost them even more money to fix the security issues caused due to such malware infected software.

Microsoft always cares about their consumers and business organisations; it launches several campaigns to address the security issues such as data loss and ID theft of using pirated software. In 2013 Microsoft launched a campaign, 'Play it safe' to warn computer users the connection between pirated software and malware. The campaign highlighted the cost of cyber security breaches in Asia-Pacific and also stated that the governments across the world could lose more than \$50 billion due to malware on pirated software. As part of the campaign, Microsoft released a study titled, 'The Dangerous World of Counterfeit and Pirated Software'. The study was conducted by IDC in collaboration with the National University of Singapore (NUS) in 10 countries with 1104 consumers, 973 business users and 268 CIO/IT managers. The study found that 61 percent of personal computers were infected with malware such as worms, viruses, Trojans, rootkits and adware. According to the study, consumers across the globe were expected to spend over \$25 billion and 1.2 billion hours on fixing malware on pirated software. On the other hand, enterprises could spend approximately \$114 billion on detection, repair and data recovery from malware. [13]

3 Empirical Study

3.1 Objective and Method

The objective of this study was to obtain students' perceptions towards software piracy. The study adopted a quantitative research method and it involved statistical analysis of data obtained through a survey. All the collected data were arranged in the form of charts and tables. Although only a small number of participants took part in the survey, the findings helped me to analyze and compare students' perceptions towards software piracy and related issues.

In order to gain students' opinions, an online survey was conducted among undergraduate students studying at Helsinki Metropolia University of Applied Sciences and Laurea University of Applied Sciences in different study disciplines in Finland. The students taking part in the survey were asked a set of questions. A questionnaire was created using the Google form which contained a total of 23 questions and statements as can be seen in appendix 1. Some questions demanded direct answers from the participants and some statements were designed to get the participants' opinions on a five-point Likert scale, which is commonly used in most surveys. The questionnaire was distributed to students in classes and also through email and Facebook messages. Altogether 46 students participated in the survey. The students participating in the survey represented different nationalities. In order to analyze the information obtained from the participants, MS-Excel was used to draw graphs and the Pie charts.

3.2 Results and discussion

Students studying in different universities in Finland were invited to take part in the survey. There were 24 (50%) participants from the IT discipline, 13 (27%) from Business Management and 9 (19%) from other disciplines including Media Engineering, Electronics Engineering and Tourism. Regarding the gender of participants, there were 40 (83%) male and 6 (13%) female respondents.

Regional distribution of participants

The majority of students participating in the survey were from Asian countries such as Nepal, India, Bangladesh, China and Vietnam. There were also participants from European, African and North American countries. Table 3 illustrates the distribution of the participants by regions.

Table 3. Distribution of participants by regions

Regions	Number	Percentage (%)
Asia	25	54
Europe	15	33
Africa	5	11
North America	1	2
Total	46	100

Using open source software

Participants were asked if they used open source software. The majority of the participants responded that they occasionally used open source software. An individual analysis of each response was done. Surprisingly, participants from the countries such as Germany, Finland, Spain and France responded that they always and mostly used open source software. While the participants from African and Asian countries responded that they rarely and occasionally used open source software. Figure 9 shows the respondents' behaviour towards using open source software.

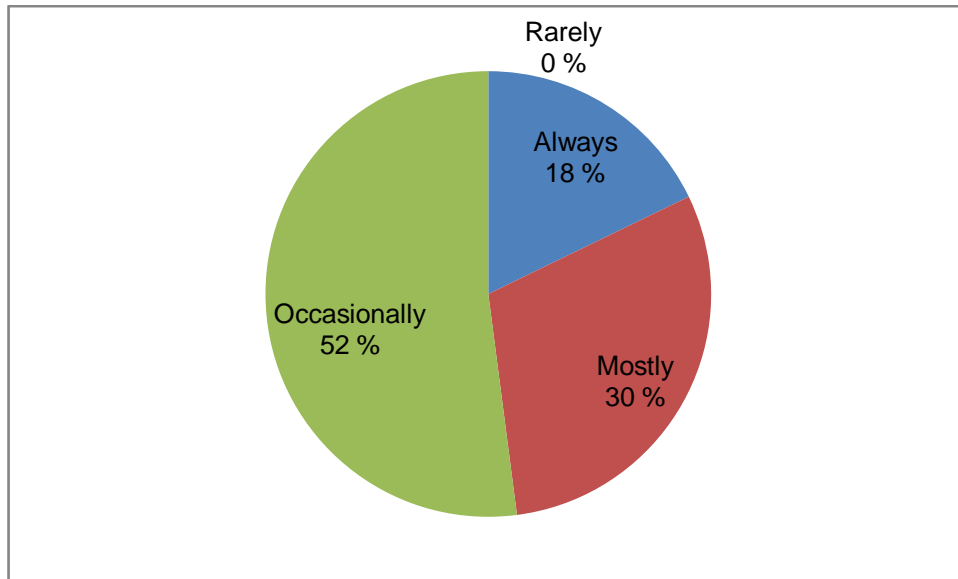


Figure 9. Respondents' behaviour towards using open source software

The survey did not ask participants why they used open source software. However, it is interesting to note that participants from IT discipline were mostly using open source software than the participants from other study disciplines.

Purchasing software

The participants were asked to mention their behaviours of purchasing software. As illustrated in figure 10, 54 percent of participants had rarely purchased software, 16 percent had mostly purchased software and 30 percent had occasionally purchased software. It is interesting to note that none of the participants responded that they had always purchased software.

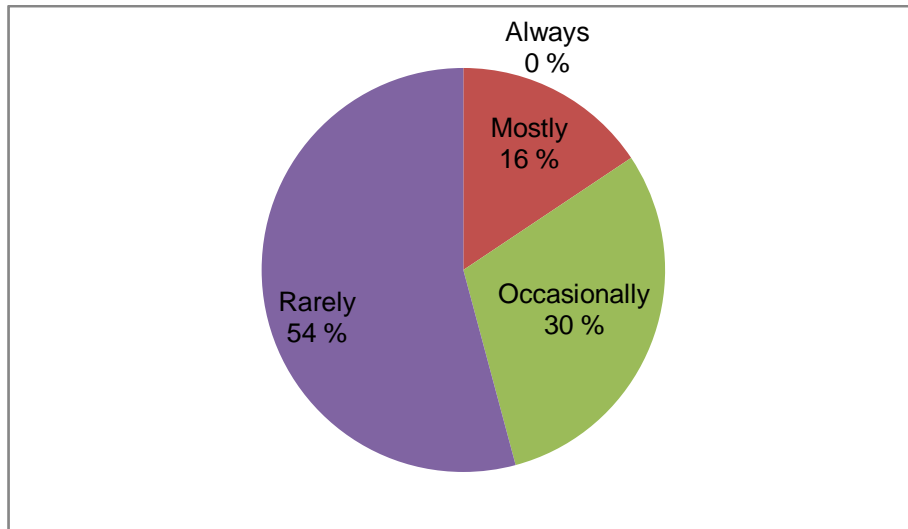


Figure 10. Respondents' behaviour towards software purchasing

Similarly, the participants were also asked to list the software programs that they had purchased. Most of the participants responded that they had purchased games only. Some participants responded that they had purchased Microsoft Office, Anti-viruses, Adobe Photoshop, Windows and Mac Operating System, Mobile Applications, Adobe Dreamweaver, Adobe Illustrator and Internet Download Manager.

Knowledge on types of software piracy

Participants were asked to respond a question about their knowledge on types of software piracy. All the participants were found to have knowledge on types of software piracy. Most of the participants responded that they were familiar with Internet piracy and renting. Less than half of the participants responded that they were familiar with softlifting, software counterfeiting and hard-disk loading. Figure 11 shows the respondents' familiarity with the types of software piracy.

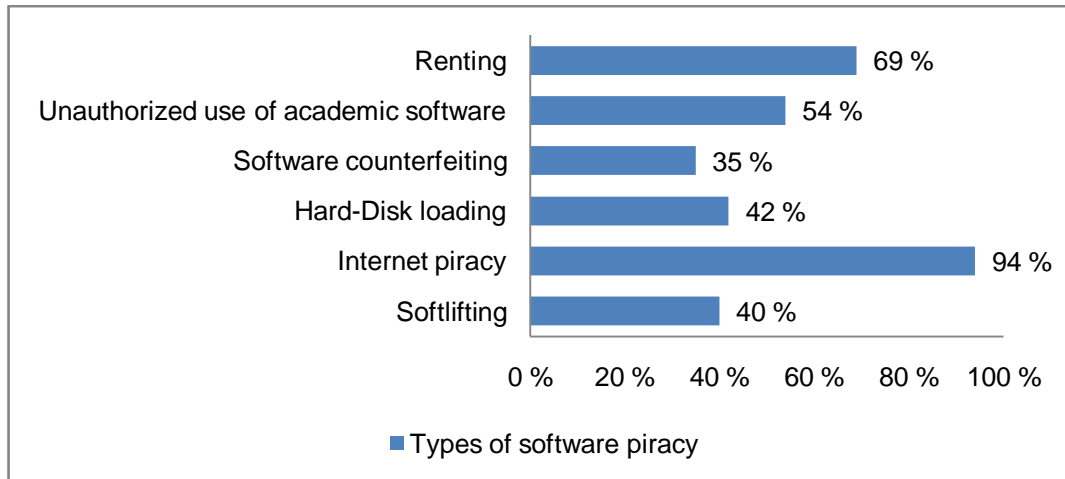


Figure 11. Respondents' familiarity with types of software piracy

Similarly, the participants were asked why they used pirated software. To this question, 98% of the participants responded that software prices were very high, 88% responded that they were easily available, 52% responded that everyone else was doing it and only 6% responded that they used pirated software because they did not know that it was illegal.

Reasons behind software piracy

The survey asked participants to list the factors influencing software piracy. As can be seen in figure 12, more than 80 percent of participants responded that high software prices, pirated software on the internet and poor people not being able to afford high software prices were the major reasons behind software piracy. In addition, participants also responded that the economic conditions of the country, lack of awareness and weak legal enforcement were the reasons behind software piracy.

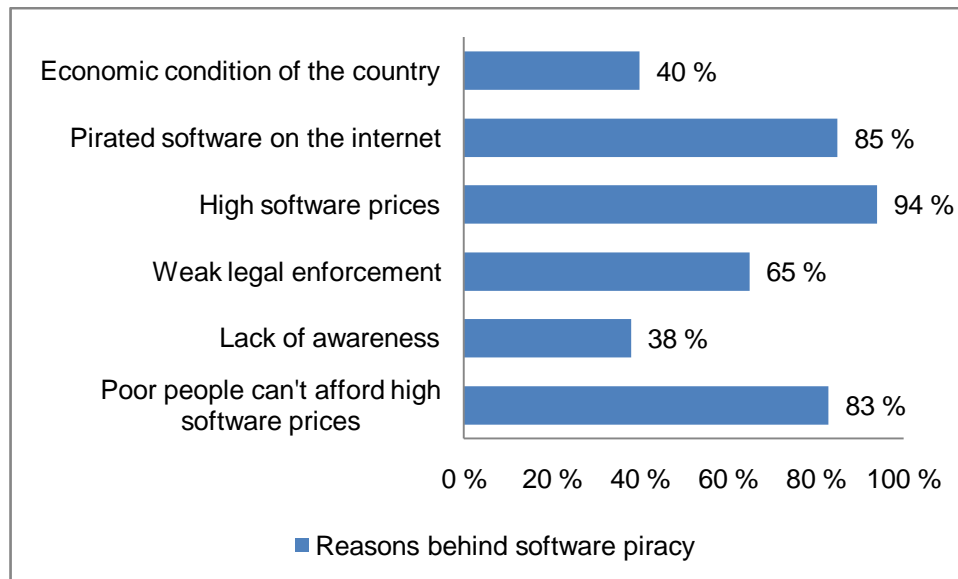


Figure 12. Respondents' perceptions of reasons behind software piracy

The questionnaire contained eleven statements. Participants were asked to give their opinions on various statements related to software piracy on a five-point Likert scale. An average score for each statement was calculated and is presented in Table 4. As can be seen in the table, the highest and lowest average scores among the eleven statements are 4.28 and 2.21 respectively. Most of the participants responded that they downloaded software from Internet sources. Similarly, it can be observed that most of the participants were not conscious of software piracy, with an average score of 2.21. Most of the participants thought that they would not get caught if they pirated software, with an average score of 2.34. Participants from different countries took part in the survey and most of the participants responded that copying software was common behaviour in their country. The study found that most of the participants believe that differential pricing strategy of software on the basis of a country's economic conditions could help in reducing software piracy, as it can be seen the average score to the statement is 4.21. Likewise, most of the participants believed that individuals with good knowledge and skill in computers were engaged more in software piracy than those with little knowledge in computers. The average score of all statements is shown in table 4.

Table 4. Average scores of statements related to software piracy

S.N.	Statements	Average
1	Individuals with good knowledge and skills in computers are engaged more in software piracy than those with little knowledge in computers.	4.28
2	Differential pricing strategy of software on the basis of country's economic condition can help in reducing software piracy.	4.21
3	I download software from internet sources	4.19
4	Sharing software with others is doing a favour to them	4.15
5	Public education and awareness regarding proper use and distribution of software can help in reducing software piracy.	3.89
6	Copying software is common behaviour in my country	3.78
7	Software industries are badly affected by software piracy as it reduces the sales of the legitimate software.	3.71
8	Intellectual Property law should allow the behaviour of downloading and uploading software from internet.	3.60
9	If you committed software piracy, the probability you would be caught is	2.34
10	I borrow software from others	2.23
11	I am conscious of software piracy	2.21

Security risks of using pirated software

Participants were asked to list the security risks of using pirated software. As it is illustrated in figure 13, most of the participants were aware of malware attacks of using pirated software.

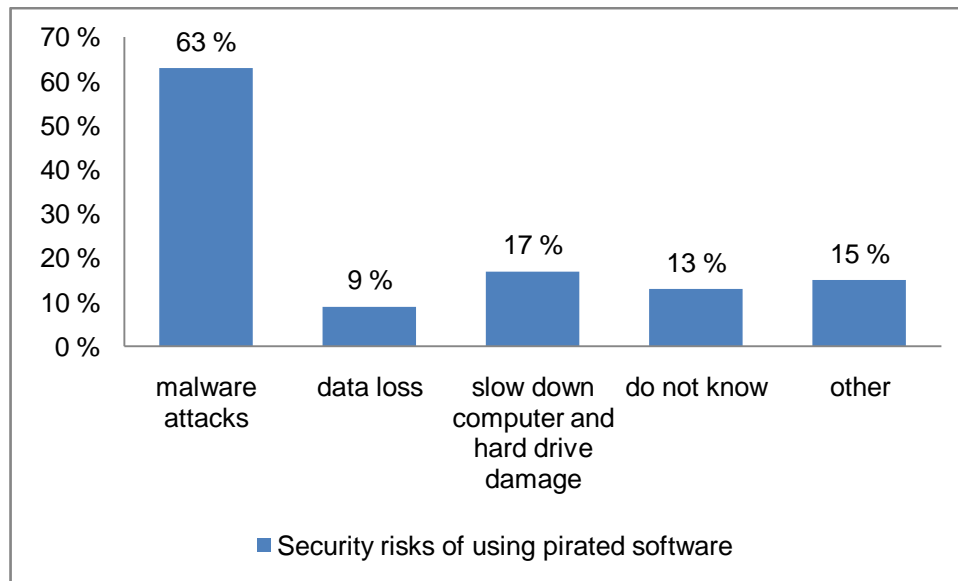


Figure 13. Respondents' perceptions of security risks of using pirated software

The study found that 13 percent of the participants did not know about the security risks of using pirated software and 17 percent were aware that pirated software could slow down computer performance and it could damage the hard drive. Similarly, 9 percent of participants responded that they were aware of data loss and 15 percent mentioned issues such as jail terms, fees and discourages developers to make and publish their products of using pirated software.

Knowledge of anti-piracy organisations

Figure 14 illustrates the participants' knowledge of organizations involved in anti-piracy. More than half of the participants responded that they did not know such organizations while others mentioned organizations such as CIAPC, WTO, RAPO, Microsoft, WIPO, BSA, ADOPI and SIIA. The results suggest that students need to know about these organizations so that they can avoid the risks and consequences of using pirated software. Anti-piracy organizations are working as advocates for many software publishers with a common goal to promote the legal use of software. Therefore, having knowledge of anti-piracy organizations and their policies regarding legal use of software is really important. These organizations provide guidance on legal use of software and also on the consequences when individuals or business organizations are found guilty of using and distributing illegal software. These organizations monitor the illegal

use and distribution of software on behalf of software publishers. For instance, when individuals have a fear of risks and consequences associated with software piracy, they will be less likely to be involved in software piracy. According to a study by Phau and Ng (2010), individuals who have a fear of being caught and penalized are more likely to have negative attitudes towards software piracy [24, 28].

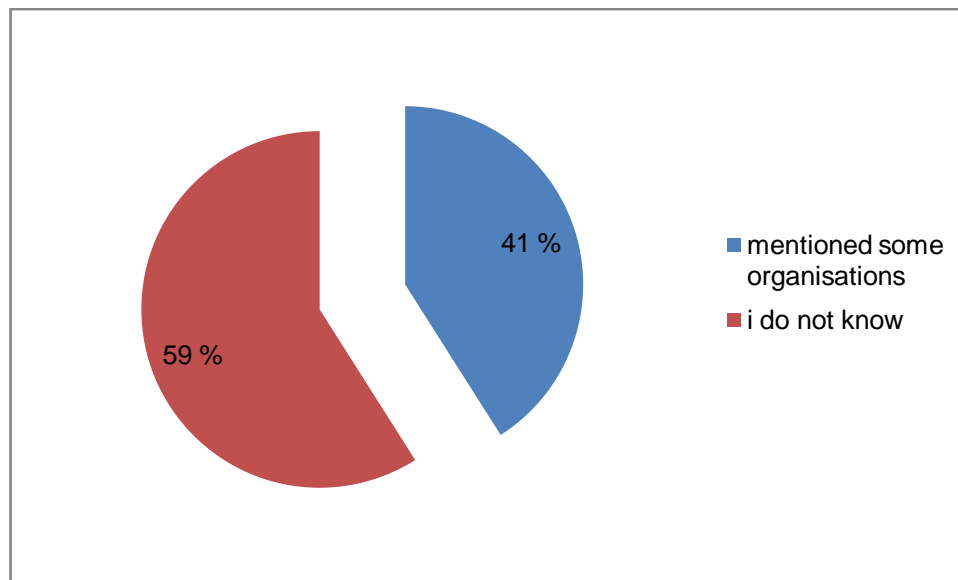


Figure 14. Respondents' knowledge of anti-piracy organisations

In summary, the survey found that most of the students were not aware of software piracy. The majority of students mentioned that they fulfilled their software needs by downloading from Internet sources and using open source software. Only few students mentioned they had bought software. More than 50 percent of students had rarely bought any software, while the others had occasionally bought software. In fact this is true in the case of students who have to depend on their family monthly income for their expenses. Besides, software prices were too high for them to purchase. This suggests that students would buy software if it was available at lower price. The result came as no surprise that most of the participants from countries such as France, Switzerland, Finland, Germany and Switzerland were found to be more conscious about software piracy as compared to participants from Asian and African countries. Regarding the copying of software, most of the participants from these countries responded

that copying software was not common behaviour in their country. Besides, they mentioned that they had a fear of getting caught if they committed software piracy.

Based on the responses obtained from the survey, the participants from Asian and African countries had different opinions towards software piracy. Participants from these countries had rarely bought any software and they had fulfilled their software needs by downloading from Internet sources. The results from the study also showed that participants did not have a fear of getting caught if they committed software piracy. As discussed already, where there is low probability of being caught and penalised, an individual or business will continue using pirated software. It indicates that the severity of the punishment plays a significant role in individuals' intentions towards committing software piracy. Thus, it could be one reason that the software piracy rate is higher in these countries. It is interesting to note that the majority of the participants believed that high prices of software, availability of pirated software on the Internet and poor economic conditions of people were the major reasons behind the growing rate of software piracy. Majority of participants suggested that differential pricing strategy of software on the basis of the economy of country as well as public education and awareness regarding proper use of software could help in reducing software piracy.

4 Preventive measures

This section focuses on several efforts that have been made to reduce worldwide software piracy. Many government and non-government organisations are working at their best level to reduce piracy. The BSA and SIIA have undertaken two approaches, enforcement and enactment of laws, and educating individuals and organizations as to the legal use of legitimate software. Criminal enforcement against commercial users and resellers of illegal software has increased the legal software distribution in most countries. Many researchers have suggested that different pricing software strategies on the basis of a country's economy could be one approach to reduce piracy. A study by Peace, Galletta and Thong (2003) suggests that when there is high cost of software, an individual will be more likely to obtain the software illegally. Further, the study indicated that lowering the price of software in countries with a low per capita GNP could be an important effort to reduce software piracy. [25, 169] In addition, awareness and education programs against illegal use of software can be conducted from government as well as individual level to help in lowering piracy. Some of the potential measures based on some previous studies that can reduce software piracy are mentioned below.

4.1 Increasing public awareness and education

Awareness and education have always been key factors in promoting the value of software and its legal use. Without any proper education and intervention, computer users might not consider downloading or copying the software programs wrong. The act of pirating legitimate software hurts software publishers by lowering their profits on one hand and on the other hand it causes job losses and even loss of taxes to the government, which will in the end affect the economy of the country. Most people today are generally law-abiding by nature. People who would consider stealing a criminal act may not hesitate to commit a similar violation by breaking the copyright law. Governments, private organizations and education sectors need to increase their efforts in public awareness programs that using illegal software is a criminal act and make people understand what software piracy is, and be aware of the consequences of engaging in software piracy. Some people buy computer programs thinking that they are legitimate software. However, the computer programs they have bought might not be le-

gitimate ones. Below are some of the warning signs, as mentioned by SIIA, about an individual buying pirated software products. [26]

1. The software lacks proper documentation.
2. The serial number/CD key is printed on the sleeve or CD.
3. The manual may be missing, photocopied or includes handwritten labels.
4. The price of the software is below the retail price.
5. One CD contains multiple computer programs especially if the computer programs are from different companies.

4.2 Understanding proper use of software and the law

In general, it is a true fact that an individual's attitudes towards piracy are directly related to the level of punishment. According to a study by Peace, Galletta and Thong (2006), creating severity of the punishment in an individual against the illegal use of legitimate software could be one important approach to combat growing software piracy [25, 168]. Mostly, people think that when they purchase any software product, they become the owner of the software and they can do anything with the software such as making multiple copies and distributing it to others. This behaviour is against the copyright act as they are only purchasing the right to use the software under some restrictions imposed by the software publisher. Misuse of software without any authorization from the copyright holder is theft of intellectual property. Many international treaties had been made to protect the software. Some of the important international treaties include Berne convention (1986), WIPO Copyright Treaty (1996) and TRIPS agreement (1994). In addition, there are different organisations and associations in every country looking after the illegal use of software.

14.2.2 Copyright protection of computer software

Software is protected under the copyright law. The owner of the software determines the licenses for the use and distribution of his/her resources. The licenses dictate the proper uses, number of uses and the length of period until the licenses expire. The first suggestion regarding the legal protection of computer programs under the copyright law was introduced in the US in 1964. According to the Copyright Act, Title 17 of the US Code (Section 106), anyone who purchases a license to use a copy of software does not have right to make additional copies without the permission of the copyright owner. It also states that any additional distribution, reproduction or installation of the software is violation of the copyright law. Anyone violating the rights of the copyright owner is considered an infringer of the copyright (Section 501). Unauthorized use and distribution of software is a crime. If any organizations or individuals are convicted of such a crime for commercial or private gain, they will be subjected to pay fines up to \$250,000 and jail sentence of up to 5 years depending upon the nature of their criminal acts. [7, 3]

The European Union (EU) considered the copyright protection of computer programs later than the US. The first council directive, EU Council Directive 91/250/EEC was introduced on 13 May 1991 to protect computer programs under the copyright law. The content of Council Directive 91/250/ECC was amended and new Council Directive 2009/24/EC introduced on 23 April 2009. The Directive states that computer programs are protected under the copyright law as "literary works". It provides exclusive rights to the owner of software to control its use by others. Therefore, unauthorised reproduction and distribution of software without the permission of the copyright owner is considered illegal. [27]

Like the EU, the World Intellectual Property Organisation (WIPO) also provides legal protection for computer programs. WIPO was created in 1967 with an objective to protect intellectual property. Currently, WIPO has 188 member countries with its headquarters in Geneva, Switzerland. WIPO started the legal protection of computer programs in the 1970s with the "sui generis" system protecting all three elements of computer programs: source code, object code and documentation. Later in 1985, WIPO and UNESCO discussed protection of computer programs by copyright in their joint

meeting. After the meeting, several countries such as Germany, France, Japan and United Kingdom started protecting the software under the copyright law. The WIPO Copyright Treaty (WCT) of 1996 also includes a similar clarification as the sui generis system. Article 4 of the treaty states that computer programs, whatever the mode or form of their expression, are protected as literary works within the meaning of Article 2 of the Berne convention. [28, 1-3]

Trade-Related Aspects of Intellectual Property Rights (TRIPS) is another important international agreement that protect computer programs. It was introduced in 1994 and administered by the World Trade Organisation (WTO). According to Article 10 of the TRIPS agreement, all computer programs are protected as literary works under the Berne Convention (1971). Furthermore, Articles 41-61 of TRIPS Agreement explain enforcement provisions including civil and administrative procedures as well as criminal penalties. Article 45 provides the right holders a full right to claim damages of their property from an infringer who knowingly, or with some grounds to know, is involved in infringing activity. In addition, Article 61 provides criminal procedures and penalties to be applied in copyright piracy on a commercial scale including imprisonment and/or monetary fines. [36]

4.2.2 Software licensing

Software licensing is the procedure that specifies the general terms and conditions, and allows an individual or group to use any software with the agreement specified by software publishers. There are different types of licenses that software publishers or manufacturers use to distribute their software. The general terms and conditions are typically described in the end-user license agreement (EULA) that specifies what users can do and cannot do with the software and also the copyright notices. Different types of software like proprietary software and open-source software have their own terms and conditions for using them. Open-source software is free software, most commonly licensed under GNU General Public License (GPL) which gives legal permission to copy, distribute and modify the software. However, proprietary software or closed source software is licensed under the exclusive legal right of the copyright holder who specifies how users can use the software. Some proprietary software includes also free software. For example, Apple gives their media player for free as a promotional strat-

egy to sell more media contents on iTunes Store. However, the use restrictions of software vary by the type of licenses given to software. Table 5 shows the different license models that software publishers use to publish their software. [25]

Table 5. Different license types

License type	Description
Single-user license	Also known as named-user license and allows the use of software by one authorized user in one or more machines as long as the same licensee is the only user.
Network license	Also known as floating or concurrent license and allows the use of software by a specific number of users at a time. A software utility, Network License Manager (NLM) issues licenses to a computer depending upon the number of licenses purchased.
Volume license	Allows installation of software on a specified number of computers.
Original Equipment Manufacturers (OEM)	License type for software that is already installed in hardware.
Subscription license	License type that allows the user to use the software for a particular time period and the user needs to renew it for further usage.
Perpetual license	License type that is paid once and does not require renewal.
Free license	License type for free software
Trial license	Generally, trial versions of software use this license
Educational or Academic license	License type for software that is marked for distribution to students and educational institutions at low prices.
Site license	License type that allows access to software at a single location only and users cannot take copies of software outside the location specified in the license. Normally used by enterprises.
Open source license	License type that allows software to be freely modified, used and shared.

4.3 Open Source Software

Using OSS (Open Source Software) could be another approach to combat growing piracy. It can be used on any number of computers with no limitations. Although the adoption of OSS alone cannot eliminate piracy, open source policies could be one approach to reduce software piracy. The software piracy rate has been found generally high in countries with emerging economies. People in such countries have lower income and they cannot afford high-price software. Ideas of using OSS can be introduced in those countries and that can help in reducing piracy on one hand and on the other hand it can fulfil people's computing needs. Adopting OSS is good for those people seeking to fulfil their software needs but unable to afford high software prices. OSS has grown to be a dominant type of software in some of the market segments. SourceForge.net, the largest hosting services provider for open source developers, listed more than 2 million registered users and over 230,000 open source projects in 2009. [30]

OSS is the model where the source code of the software is made available royalty-free to users and users can redistribute and modify the source code under limited restrictions. Regarding the legal terms of licenses, OSS differs from those of commercial software such as right to modify and redistribute the software. The GPL or GNU General Public License is mostly used by the open-source projects which specify that if anyone modifies and distributes a derivative work, they also need to distribute the source code for their derivative work. [31] Here, the idea to discuss on OSS is not to neglect the use of proprietary software but to raise interests in users to use freely available OSS rather than obtaining proprietary software illegally. This section discusses the history of Open Source development, free and open-source software packages and global trend of OSS adoption.

4.3.1 Historical background of development of OSS

The developments of UNIX, GNU and Linux operating systems are considered to be the great achievements in the foundation of open source movements. In the late 1960s, researchers at Bell Labs and MIT launched a joint project to create a new operating system for mainframe computers known as MULTICS (Multiplexed Information and Computing System). However, the MULTICS failed and Ken Thompson, a researcher at Bell laboratories wrote a simpler version of MULTICS on a PDP7 assembler and he called his attempt as UNICS (UNiplexed Information and Computing System). UNICS then shortened to UNIX and was eventually introduced as a new operating system in 1970. The next important achievement was to rewrite UNIX in programming language C and later in 1973, Ken Thompson joined Dennis Ritchie, the author of the first C compiler. They rewrote the UNIX kernel in C programming language, which was important in terms of the system's portability, and released the Fifth Edition of UNIX to universities in 1974. Licenses to use UNIX were distributed to universities as well as commercial institutions. The first edition distributed outside the Bell Labs was UNIX sixth edition, in 1976. Later in 1978, the seventh edition of UNIX was distributed to universities and commercial companies under SYSV (System 5) and BSD (Berkeley Software Distribution) distribution. [32]

The GNU project was founded by a programmer named Richard Stallman in 1984. The General Public License allows modifying the existing code and distributing the improved version to users. However, the GNU operating system still lacked a kernel. Linus Torvalds, a Finnish student studying at the University of Helsinki, invented the Linux kernel in 1991. Later in 1992, the Linux kernel was integrated within the GNU operating system. He released the first version of the Linux kernel under an open source license and everyone could download and modify the source code freely. After that several versions of the Linux operating system were introduced by software vendors such as Red Hat, Novell and Mandriva. [32]

Desktop Software

Freely available desktop software can be adopted as an alternative to proprietary software. There is no doubt that Microsoft Windows still occupies a huge space in the desktop environment. However, adoption of the GNU/Linux desktop has also been increasing in the last few years. The most popular Linux distribution is Ubuntu Linux. The availability of applications and comparable features to the proprietary software has increased the widespread adoption of the Ubuntu desktop. There are several OSS programs that are available for the Windows platform such as Mozilla Firefox, Google Chrome, Libre Office, VLC (VideoLAN Client)multimedia player, GIMP (GNU Image Manipulation Programme), PDFCreator, etc.

Individuals, educational institutions and enterprises can take the benefit of using OSS. Apache OpenOffice, the leading Open-source office software suite can be used for word processing, presentations, spreadsheets, databases, graphics and more. Apache OpenOffice is gaining popularity as it can run on various platforms including Microsoft Windows and contains features comparable to a proprietary office suite. Open-source browsers such as Mozilla, Chrome, Konqueror and Galeon can be downloaded and installed on a computer. Unlike Mozilla and Chrome, Konqueror and Galeon run only on Linux. The most known OSS for image editing and graphic design is GIMP (GNU Image Manipulation Programme). It is also available for the Windows platform and supports various image file formats. GIMP is considered to be alternative to the existing Photoshop software.

Server Software

Server software is primarily designed to be operated and managed on a computing server. Various services such as email, file, print services and many more require appropriate software and for this purpose there are different proprietary and open-source software packages. The most popular open-source Web server is Apache; it is used with MySQL as the database server, Linux as the operating system and PHP as the scripting language. The combination is often known as XAMP or LAMP. Some open-source server software such as Sendmail, Qmail and Postfix are deployed in many educational institutions and organisations for email services. These email servers are con-

sidered to be alternatives to proprietary email servers such as Microsoft Exchange. Similarly, there are various Content Management System (CMS) that can be used as a platform to create, publish and manage Web content. Some examples are Drupal, Wordpress, Joomla and Plone.

4.3.2 Adoption of OSS

Enterprises, educational institutions, government organisations and individuals can take advantage of using OSS. It is a low-cost and often free alternative to highly priced commercial software. Many enterprises, educational institutions and government organisations have shown their interests towards OSS solutions as they can modify the software to meet their needs as well as adopting OSS can reduce the amount that will be spent on licensing the commercial software. [33]

Many European countries are encouraging more use of OSS. Countries such as Spain, Germany and Italy have shown significant numbers of OSS users. European Commission published a report, "Open Source Migration Guidelines" in 2002 which focused on the benefits of migration to open source software. One of the best examples of OSS migration is that of the city of Munich. In 2003, the local government in Munich announced to move 14,000 public administration computers over to Linux and other OSS applications. [33, 46] Likewise, the city of Helsinki has also adopted OSS in various departments. In 2007, the Ministry of Finance deployed OpenOffice in 10,000 workstations and made the Open Office Portable package publicly available. In addition, many universities and private companies are working together in OSS-based research and development. For example FILOSI (Finnish Linux and Open Source Initiative) is a joint venture between business organisations and academic institutions and promotes the development of open source technology in Finland. Also, the Ubuntu and Debian communities are carrying out important initiatives on local adoption of OSS. [33, 61-62]

A study conducted by Häme University of Applied Sciences and Häme Centre of Expertise in 2005 showed that 60 percent of Finnish schools were using open source software in their teaching and learning activities. The study further explained that the reasons behind using open source software in schools is because of the willingness to experiment with open source software as well as to reduce the costs needed to license

other commercial software [34, 2]. Similarly, adoption of OSS is also increasing in Spain. RedHat issued a report, "Worldwide Open Source Activity and Growth" in 2009 and pointed out that Spain is the second highest country in the world to involve in OSS activities. [33, 51]

In summary, the OSS strategy has been adopted in different countries to make low-cost technology available to low-income people. Developing countries are facing a bigger technology gap in comparison with the more technology-developed countries. Adoption of the OSS policies can be regarded as one possible solution for these countries to meet their computing needs and to be labelled as something else than the 'pirates'. The OSS strategy can provide a way to enter the It industry legally. Governments and education sectors are considered to be in a unique position in every country. These sectors should give emphasis on using OSS to avoid illegal use software. Their influential movements can have far-reaching effects in combating piracy. To give an example, the governments in the Philippines, Pakistan, Thailand and India are initiating an effort using OSS in government agencies, small businesses and schools. Although the software piracy rate is relatively high in these countries, this kind of effort can help in bringing down their piracy rate. [35]

5 Conclusion

This study provided an overview of software piracy and helped a deep understanding of the topic. Computers have become the most essential technology to the operations of education, government, enterprises, health services, individuals and many other sectors. Life would have been difficult without computers. However, as the human society depends more on computers, misuses and malfunctions of computers including software piracy are also increasing side by side. Several researchers have given different views on software piracy and there exist several factors that are increasing software piracy as already discussed in the paper. Nowadays, stealing legitimate software is an easy and simple activity. People rarely consider that stealing software is a criminal act, but it is. Software programs are protected under the copyright law and they become copyrighted as soon as they are created. Distributing and misusing of copyrighted software is considered a criminal act and those performing such activities are subjected to paying fines with criminal proceedings. Moreover, there is also a risk of spreading malware from the pirated software.

The increasing trend of software piracy is affecting the software distributors as it reduces the sales of the legitimate software and also the opportunity for the development and research of the new and improved software. Many software industries and government agencies are working at their best level to reduce piracy as by creating strong enforcement laws and several awareness programs, but the effect is not yet encouraging. Also, some studies have suggested differential pricing and strong legal enforcement strategies to stop piracy. However, effective reduction in software piracy needs a strong fundamental shift in people's attitudes towards software piracy. People might be unaware of the consequences of software piracy. Public education has been always an important component for any successful efforts. Increasing public awareness programs would work as a great inhibitor to reduce piracy and such programs should be focused on long term goals as social change does not happen instantaneously, but takes a period of time to bring about some effective changes.

References

- 1 Business Software Alliance. The Compliance Gap [online]. June 2014.
URL:http://globalstudy.bsa.org/2013/downloads/studies/2013GlobalSurvey_Study_en.pdf. Accessed 28 June 2014.
- 2 Software & Information Industry Association. What is Piracy ? [online].
URL: <http://www.faiithaca.org/SIIA.pdf>. Accessed 28 June 2014.
- 3 Musa Karakaya, Bulent Uluturk. Individual and social reasons behind software piracy: An analysis of previous studies. *International journal of security and terrorism* 2011; 2(2):59-72. Accessed 3 July 2014.
- 4 Report on computer software rental act [online]. United States copyright office; 14 January 2003.
URL:http://www.copyright.gov/reports/software_ren.html. Accessed 4 July 2014.
- 5 Benjamin Tan. Understanding consumer ethical decision making with respect to purchase of pirated software. *Journal of Consumer Marketing* 2002;19(6):96-111. Accessed 27 November 2014.
- 6 Business Software Alliance. Shadow market [online]. May 2012.
URL:http://globalstudy.bsa.org/2011/downloads/study_pdf/2011_BSA_Piracy_Study-Standard.pdf. Accessed 26 June 2014.
- 7 Software & Information Industry Association. Software use & the law. May 2004. Accessed 10 July 2014.
- 8 Kallol Bagchi, Peeter Kris, and Eobert Cervený. Global software piracy: Can economic factors alone explain the trend ? *Journal of Communication of the ACM* 2006;49(6):70-75. Accessed 4 December 2014.
- 9 San Jose. Adobe Reports Record Quarterly and Annual Revenue [online]. California; 23 December 2012.
URL:<http://www.adobe.com/aboutadobe/pressroom/pressreleases/201212/Q412Earnings.html>. Accessed 15 July 2014.

- 10 Jacqui Cheng. US singles out China and Russia on piracy watch list. 1 May, 2007.
URL: <http://arstechnica.com/tech-policy/2007/04/us-singles-out-china-and-russia-on-piracy-watch-list/>. Accessed 21 July 2014.
- 11 Jacqui Cheng. China signs agreement to crack down on piracy [online]. 15 December, 2006.
URL: <http://arstechnica.com/tech-policy/2007/04/us-singles-out-china-and-russia-on-piracy-watch-list/>. Accessed 21 July 2014.
- 12 Business Software Alliance. Shadow market [online]. May 2012.
URL: http://globalstudy.bsa.org/2011/downloads/study_pdf/2011_BSA_Piracy_Study-Standard.pdf. Accessed 26 June 2014.
- 13 International Data Corporation (IDC). The dangerous world of counterfeit and pirated software [online]. March 2013.
URL: <http://news.microsoft.com/download/presskits/antipiracy/docs/IDC030513.pdf>. Accessed 27 July 2014.
- 14 Staff Writer. South Africa: Software pirates brought to book [online]. 12 March 2014.
URL: <http://www.itnewsafrika.com/2014/03/south-africa-software-pirates-brought-to-book/>. Accessed 29 July 2014.
- 15 National University of Singapore and IDC. The link between pirated software and Cybersecurity breaches [online]. March 2014.
URL: http://news.microsoft.com/download/presskits/dcu/docs/idc_031814.pdf. Accessed 5 August 2014.
- 16 David Swan. Melbourne recruitment firm fined for illegal offices [online]. Melbourne, Enterprise Solutions; 28 July 2014.
URL: <http://www.itwire.com/business-it-news/enterprise-solutions/64900-melbourne-recruitment-firm-fined-for-illegal-offices>. Accessed 5 August 2014.
- 17 Kevin Kwang. S Korea court imposes strict penalties on software pirates [online]. 27 May, 2013.
URL: <http://www.zdnet.com/s-korea-court-impose-strict-penalties-on-software-pirates-7000015893/>. Accessed 9 August 2014.

- 18 George H. Pike. Stop Online Piracy Act [online]. January 2012.
URL: <http://www.aallnet.org/Documents/Government-Relations/Issue-Briefs-and-Reports/2012/SOPAonepager.pdf>. Accessed 15 August 2014.
- 19 The National Intellectual Property Law Enforcement Coordination Council. NIPLECC report [online].
URL: <http://www.uspto.gov/web/offices/dcom/olia/niplecc2002/niplecc2002.pdf>. Accessed 21 August 2014.
- 20 Business Software Alliance. Faces of Internet Piracy. 2009. Accessed 23 August 2014.
- 21 Software & Information Industry Association. SIIA Anti-piracy 2012 year in Review. 2013. Accessed 13 October 2014.
- 22 Microsoft Corporation. Addressing Global Software Piracy [online]. 2010.
URL: <http://www.microsoft.com/en-us/news/presskits/antipiracy/docs/piracy10.pdf>. Accessed 14 October 2014.
- 23 Microsoft Corporation. Microsoft research labs worldwide.
URL: <http://research.microsoft.com/en-us/labs/>. Accessed 14 October 2014.
- 24 Ian Phau and James Ng (2010). Predictors of Usage Intentions of Pirated Software. *Journal of Business Ethics* 2010;94:23-37. Accessed 4 December 2014.
- 25 Peace, Galletta and Thong. Software Piracy in the Workplace: A Model and Empirical Test. *Journal of Management Information System* 2003;20(1):153-177. Accessed 5 December 2014.
- 26 Software & Information Industry Association. SIIA IP protection [online].
URL: <http://www.siaa.net/Divisions/IPProtectionServices/About/FAQ.aspx>. Accessed 4 December 2014.
- 27 European Union. Council Directive of 23 April 2009 on the legal protection of computer programs [online].
URL: <http://www.wipo.int/edocs/lexdocs/laws/en/eu/eu133en.pdf>. Accessed 6 December 2014.

- 28 World Intellectual Property Organization. International IP Protection of Software. Accessed 2 November 2014
- 29 Tulane University. Software License Types [online]
URL: <http://tulane.edu/tsweb/software/software-license-types.cfm>. Accessed 2 November 2014.
- 30 A. Talha Yalta, A. Yasemin Yalta. Should Economists use open source software for doing research? January, 2010. Accessed 6 December 2014.
- 31 GNU Operating System [online].
URL: <http://www.gnu.org/licenses/#GPL>. Accessed 2 November 2014.
- 32 Unix Operating System overview [online].
URL: <http://www.mu.ac.in/unix.pdf>. Accessed 4 November 2014.
- 33 National Open Source Software Observatory (ONSFA). Report on the International Status of Open Source Software 2010. 2010. Accessed 12 November 2014.
- 34 Rahikainen Riikka and Vainio Leena. Open Source Software in Finnish education, 2005. Accessed 9 December 2014.
- 35 Dravis Paul. Open Source Software Perspectives for Development [online].
URL: http://www.infodev.org/infodev-files/resource/InfodevDocuments_21.pdf. Accessed 18 October 2014.
- 36 World Trade Organization (WTO). Agreement on Trade-Related aspects of Intellectual Property Rights [online].
URL: http://www.wto.org/english/tratop_e/trips_e/t_agm0_e.htm. Accessed 9 December 2014.

Students' opinions towards software piracy

The purpose of this study is to gain your opinions only. Please answer all of them.

* Required

My study discipline *

- IT
- Management
- Other:

Sex *

- Male
- Female

Home Country *

Do you use Open Source Software? *

- Always
- Mostly
- Rarely

I purchase software *

- Always
- Mostly
- Occasionally
- Rarely

List the programs that you have purchased with money. *

I download software from internet sources. *

1 2 3 4 5

low high

I borrow software from others. *

1 2 3 4 5

low high

I am conscious of software piracy. *

1 2 3 4 5

Disagree Agree

I am familiar with the types of software piracy. *

- Softlifting
- Internet piracy
- Hard-Disk loading
- Software counterfeiting
- Unauthorized use of academic software
- Renting

I use pirated software because *

- Everyone else is doing
- Software prices are high
- I didn't know that this is illegal
- They are easily available

How often do you use pirated software? *

- Always
- Mostly
- Occasionally
- Rarely

Which factors do you think influence software piracy? *

- Poor people can't afford high software prices
- lack of awareness
- Weak legal enforcement
- High software prices
- Pirated software on the internet
- Economic condition of the country

Copying software is common behavior in my country. *

1 2 3 4 5

Disagree Agree

Sharing software with others is doing a favor to them. *

1 2 3 4 5

Disagree Agree

Individuals with good knowledge and skills in computers are engaged more in software piracy than other individuals with little knowledge in computers. *

1 2 3 4 5

Disagree Agree

I am aware of the security risks of using pirated software. *

Mention some of the risks that are related to using pirated software.

If you committed software piracy, the probability you would be caught is *

1 2 3 4 5

Low High

Intellectual Property law should allow the behavior of downloading and uploading software from internet. *

1 2 3 4 5

Disagree Agree

Software industries are badly affected by software piracy as it reduces the sales of the legitimate software. *

1 2 3 4 5

Disagree Agree

Public education and awareness regarding proper use and distribution of software can help in reducing software piracy *

1 2 3 4 5

Disagree Agree

Differential pricing strategy of software on the basis of country's economic condition can help in reducing software piracy. *

1 2 3 4 5

Disagree Agree

Do you know any organisations involved in anti-piracy? Name them if you know. *

