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# Software Piracy

Metropolia University of Applied Sciences

Bachelor of Engineering

Information Technology

Bachelor's Thesis

30 January 2019

Author Title	Manish Das Software Piracy
Number of Pages	33 pages + 1 appendix
Degree	Bachelor of Engineering
Degree Programme	Information Technology
Professional Major	Software Engineering
Instructors	Janne Salonen
<p>Software piracy is a subject that has challenged the software market and its entities for a very long time. Every year billions of revenues are invested to develop various software but also billions of revenues are lost due to the illegal and unauthorized use of that software. The Software Alliance (BSA) has stated that, the unlicensed software use accounts for 37% globally in a recent study. This was only 2% drop from 2016. The aim of this study is to have comprehensive understanding of software piracy, its effect on global software market, methods of piracy, security perspective and measures that can contribute to drop the piracy rate. This thesis is a brief excursion to the issues of software piracy. It provides an overview to the types of piracy, effects and possible measures that can be implemented to reduce the piracy rate. The thesis also provides an insight to the studies performed by different organizations that have been playing a vital role on decrement to software theft globally and comparison between the past and present scenarios piracy.</p> <p>The study has incorporated a research to get the view on software piracy from students and some professionals. An online survey was conducted where total of 40 respondents took part. A questionnaire was created using Google Forms and was circulated among the participants via email and Facebook messages. The result of the survey illustrated that majority of participants thought the high software prices and easy accessibility of illegitimate copies of software on internet was a major cause of software piracy. It also showed that majority of the respondents were aware about software piracy and risks and effects involved with it but continued to commit it because of the lack of strong copyright law enforcement.</p> <p>The thesis does not provide any concrete option to eradicate the issue but makes an attempt to aware the reader about unauthorized ownership and distribution of software. Besides, it is an interesting topic to learn and discuss about.</p>	
Keywords	software piracy, methods, causes, affects, possible measures, illegal software

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Appendix 1. A view on software piracy

## Abbreviations

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

## 1 Introduction

Over the period of time, information technology has played a vital role in advancement and achievements of today's world. Different software has brought the world to fit in a small screen wherever and whenever. Technology has led to finding of water on mars to doing small household chores. With all these development, there has been increment in software industries to a huge number. However, a very big threat known as software piracy has also been growing simultaneously over the decades. Software piracy is done in different forms. Despite of various measures being taken to lessen the rate of piracy, the cost of piracy is worth billions worldwide every year.

The unauthorized use such as possession, copying, distribution, buying and selling of software without the consent of the developer or the developing company is termed as software piracy. Technological advancement has made it easier for anyone to replicate and distribute software anywhere. It has affected not only the software industries but also the creative and content workers. In spite of the fact that, much software today are available as single-user license and many users are aware about violation of license terms and conditions, software piracy has still stood up as strong threat. There are organizations working against software piracy. The Software Alliance (BSA), Software & Information Industry Association (SIIA), International Data Corporation (IDC) are some of the organizations who have been working to diminish and eradicate software theft. According to a recent study carried out by BSA with IDC 37 % of unlicensed software are installed on personal computers. This is just a 2 % drop from study conducted two years before. The malware associated with the unlicensed software is estimated to cost \$359 billion worldwide. The global survey was carried out on more than 20,000 respondents. [1]

The aim of this study is to have comprehensive understanding about software piracy, the methods of piracy, current scenario of the piracy rate, its effect on the global software market and the possible preventive measures that can be taken to at least diminish the software piracy rate. However, the study is based on the previous studies and survey performed in the near past which provides some limitation to this thesis.

## 2 Types of Software Piracy

### 2.1 Counterfeiting

Software counterfeiting is the illegitimate replication and distribution of software. This type of piracy, includes the package, manuals and all designs made exactly the same as the original. Microsoft is one of the major victims of counterfeiting as they have most widely used software globally. Sometimes the end users are unaware of the fact that the software they are buying is not authentic as everything is replicated exactly the same. The counterfeit software has high risk if malware. [2]

### 2.2 Internet Theft

The development and easy access of internet today has made it very easy to download and upload unauthorized software. There are hundreds of websites available which allow free downloading of software or also in exchange of other software. Another technique of internet piracy is the peer-to-peer (P2P) networks, that allow to illegal transfer of copyright software. [2] Most of the times, software provided through the illegitimate websites are cracked to eliminate any copyright protection schemes. [3]

### 2.3 Client–Server Overuse

This is the type of piracy where many users use the same copy of software without caring if the license agreement allows doing so or not. This mostly occurs in the places which have Local Area Network (LAN). The software is basically installed into a server and everyone else uses the same in different computers. [3]

## 2.4 Hard-Disc Loading

This form of piracy is often committed by hardware shops and dealers. The illegal copy software is loaded into the hard-disk to make the deal more promising to the end user. In this type of piracy the buyer is not provided with any kind of CD or manuals. Mostly operating systems are theft using this form of piracy. [2] Software & Information Industry Association (SIIA) suggests buyers to make sure that the software preloaded in the machine are licensed copies. [4]

## 2.5 End User Piracy

The unauthorized replication, distribution and use of software by an individual are termed as end user piracy. This type of piracy has different forms.

### 2.5.1 Renting

When someone rents the copy of software for temporary use, without the consent of the authorized copyright holder, it is considered as software piracy. This type of piracy is not common form of piracy but it still has its existence. [2] The “Computer Software Rental Amendments Act” strictly prohibits the unlicensed rental of any computer software for commercial gain without the consent of the owner. [4]

### 2.5.2 Academic software misuse

The misuse of academic software involves the use of provided software for personal or commercial use. It is considered as violation of the copyright agreement when any software is labeled for educational or academic use. Many times the software is used installed onto different machines. This misuse also affects the institution that was intended to use the software. [4]

### 2.5.3 Softlifting

Softlifting involves illegal copying and distribution or resale of the software to friends, relatives, organizations without any authorization of the license bearer. Many users do it unknowingly and many do not care about any copyright agreement. This sort of piracy cost billions of revenues for the software developing companies. Generally, small and medium scale organizations are found to be committing this form of piracy when they grow in the number of computers. [2]

## 3 Causes and Risks of Software Piracy

### 3.1 Causes

It is an undeniable fact that software piracy is a serious affair however, has been continuing for a long time. There are various reasons for this. The socio-economic difference between nations is one of the major reasons for software theft. In addition cyber law or copyright infringement laws are not uniform all over the world. It is the consumer's belief also that they think once they buy software they are entitled to make the copies of it. The price of the software also adds to the higher rate of software piracy. According to the model of piracy "Theory of Reasoned Action" built by Christensen and Eining, the individual's intention was a major factor of software piracy. [5] Some of the vital reasons for piracy are discussed below.

#### 3.1.1 Global internet access

The easy access of internet has made life easier globally but also it has become one of the causes of software piracy. People can find the copies of pirated software easily on the internet to download or upload. Advanced internet speed has helped more to piracy very quick.

#### 3.1.2 Public awareness

One of the main causes of software piracy is public awareness. Like any other issues, software piracy is also proportional to amount of people's understanding. Software

companies have been trying to aware its users by providing long license agreement during the installation process but many do not even bother to read it. [4] While some do not know about the copyright law, some ignore about it. Many do not think copyright law and software piracy are a serious issue and just believe they can get away easily without any sort of punishment or penalty. In addition, some consumers think if others are doing it why can't I? This attitude is not positive.

### 3.1.3 Law enforcement

In comparison to North America and Europe, software piracy rate seems to be higher on Asia and Africa. People are more aware about copyright rules and regulation in the former areas. They have strict laws implemented and software piracy is considered as a crime. Nevertheless, software piracy is still a threat and problem in those areas. World Intellectual Property Organization (WIPO), Trade Related Aspects of Intellectual Property Rights (TRIPS) international agreement and European Union Council Directive 91/250/EEC, protects computer software under the copyright law as “literary works”. [6] Copyright law enforcement has been on the weak side among the countries in Asia and Africa. People also believe that there is low chance of being caught while using pirated software.

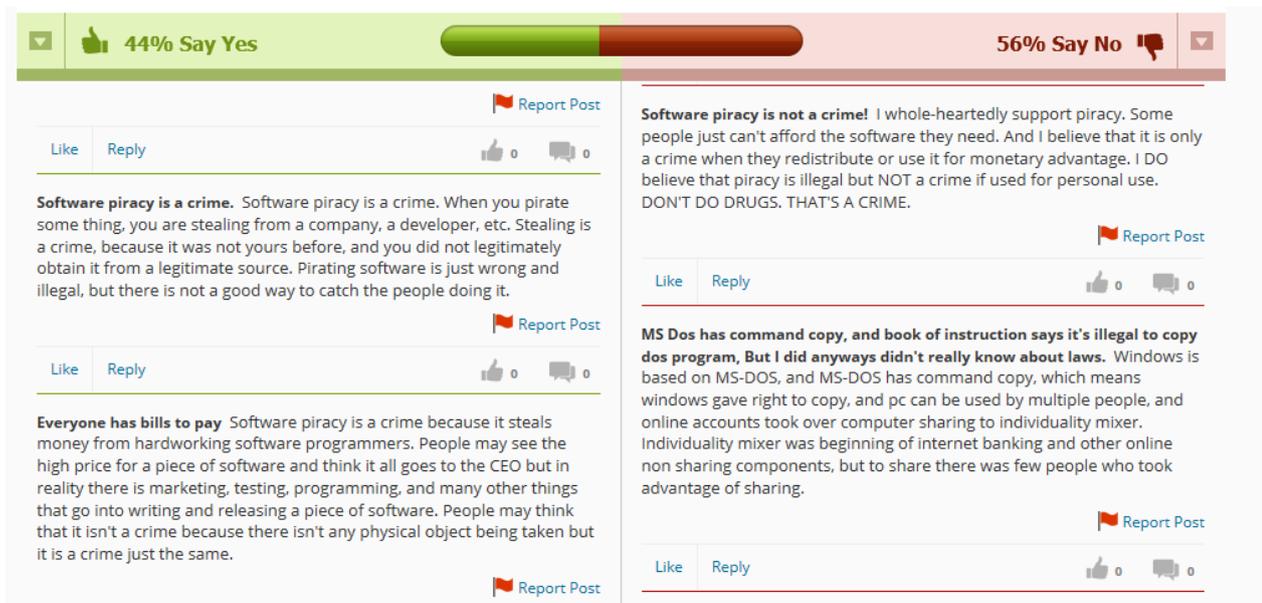


Figure 1. Public vote “Is Software Piracy a crime?” [7]

As the figure illustrates public perception towards piracy as crime is very different. It is not the best situation to see 56 percent of participant think software piracy is not a crime. This shows how uneven law enforcement plays in end users thinking and understanding.

#### 3.1.4 Price of software

Pricing of software is also a cause of software piracy. The uniform pricing i.e. keeping the price of the software same irrespective of region is a problem. The consumer living in some economically weak region may not be able to afford to pay for the program which lures him/her to rather go to the internet where the software is available for free or comparatively lower price.

#### 3.1.5 Quick profit

People use the pirated software to make a quick profit by not spending much on the computer program they need. [8]

#### 3.1.6 Supporting local business

The end users use the illegal copies of software to promote local businesses. The dealer will sale the pirated copy of software incorporated to the device. They are not much aware about the fact they are also aiding to the software piracy. This kind of situation is especially found in poorer countries in Asia and Africa. [8]

#### 3.1.7 Socio-economic and cultural factors

It has been often found through various studies that the rate of software piracy is higher in countries which are under developed or are developing. The consumers of these nations do not wish to spend more money on buying a computer program. According to recent study done by BSA, the software piracy rate in Asia pacific was at 57 percent, 56 percent in Africa and Middle East region and from 15% - 27% in Western Europe and North America respectively in the year 2017. [9] This result clearly illustrates the

scenario of software piracy on the basis of socio-economic and cultural factors. It has been found that in collectivistic society software is purchased by one member and its copy is shared with other members of society.

### 3.2 Risks and effects of Software Piracy

As discussed in the earlier topics, software piracy causes a remarkable amount of monetary losses. The billions of lost revenue can add to the economic growth of a nation. There are several other risks and effects associated with software piracy. Software Piracy not only affects the developer and the organization but also to the consumer of it. The lost revenue caused by the unlicensed software affects the profitability of software industry which leads them to have fewer resources to research and develop for the new product. Moreover, the software counterfeit and infringement also provides a reason for software vendors to keep the software prices high as they have to regain the cost with profit of developing the software. The illegal software users have not been able to stay away from the risks brought along by the pirated software. Although the user gets the pirated software in relatively cheaper price, the expenses coming with the unlicensed software is high in a long run. The chances are the software will not function as required or might not work at all. The counterfeit software does not allow the user to gain customer support, updates, training, technical documents and bug fixes. The pirated does not have any kind of warranty to help protect them. Unlicensed and illegal software of have higher risk of exposure to virus attacks and is vulnerable to cause data loss. The use of pirated software also contributes to malware. The devices with pirated copy of software are 28 times more likely to have malware than the ones with the legitimate software. They can slow down the device functioning. If found out by the original software vendor or any of the organization fighting against software piracy the user must be liable to huge amount of fines depending on the type and scale of software use along with which s/he or the company must face the embarrassment. If any company is found out using pirated software, it can also be subjected to negative publicity. [10]

According to study conducted by BSA, malware threats are found to be all time high in the present situation. It states in its report that eight new malware threats appears every second every day. The average malware attack has been estimated to cost \$2.4millions. Each infection cause by pirated software leads to costly downtime, loss in

productivity, loss in business opportunity and added costs to diminish the attack. BSA states in its report that malware costs \$600 billion from global economy. Report says 46% of corporate and personal data loss was reported by top enterprises. 40% unauthorized access, 25% of time and worth to clean, 24% loss of proprietary information and 21% impact on customer was subjected. With 66 % unlicensed software use, 40,000 institutions in China were haunted by malware attack. Electric payment systems at Petro China's gas station were halted throughout the country, ATM machines, China Telecom and even Hainan airlines were impacted. Similarly, the Russian Health Ministry, the state-run Russian Railways, the Interior Ministry and Telecommunication Company suffered cyber-attack because of the use of unlicensed out-of-date software in 2017. Russia hosts 62% of unlicensed software use which amounts to the commercial value of \$1.2 billion. [11 p.7] Despite the fact software piracy rate has been reduced a little, studies done in 2017 shows the computers and mobile networks are more vulnerable to attacks. 24,000 malicious mobile applications were blocked everyday with 54 percent increased malware in mobile devices. [11 p.3]

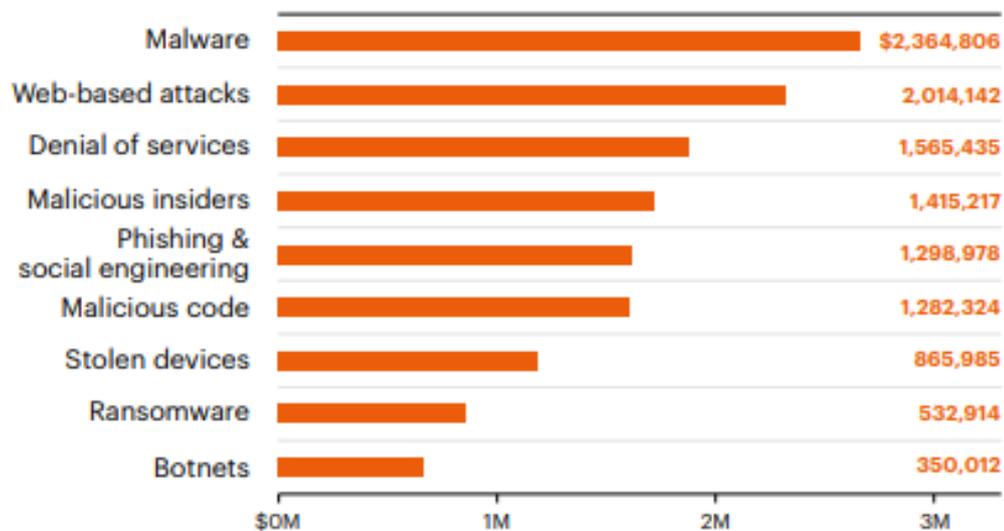


Figure 2. Types of risks and cost losses caused by pirated software.[12 p.27 ]

Figure 2 demonstrates the types of risks of using unlicensed software and also the lost amount caused by each type of attack. Malware seems to be very costly risk of pirated software use. Web-based attacks cost \$2,014,142. This study was performed by Accenture in 2017. [12 p.27 ]

#### 4 Statistical analysis of software piracy

There have been various studies conducted time and again to get the picture of how software piracy rate exists around the globe in course of time. The statistical analysis helps to plan the measures that can be taken to at least diminish the growing software piracy rate. Many software industries contribute billions of revenues to the world economy every year. The amount could go higher if the software piracy rate was lower or null. Microsoft made revenue of \$110.36 billion in the year 2018. [13] Considering the use of technology in everyday life of people it can be said that the number could have been higher. However, the above mentioned revenue is a record amount for Microsoft. The revenue collected from information technology and its service was 1,136 billion euros worldwide.



Figure 3. Worldwide revenue from Software and IT industry from year 2005 to 2016. [14]

Along with the people's growing dependency on technology, the economy value has also boomed. Figure 3 exhibits the global revenue generated by software industries and information technology from the year 2005 to 2016. It can be learned that economy from information technology and software industries has dramatic growth in-between the period from 2012 to 2016. It can only be imagined how much more revenue could have been made in the absence of software piracy.

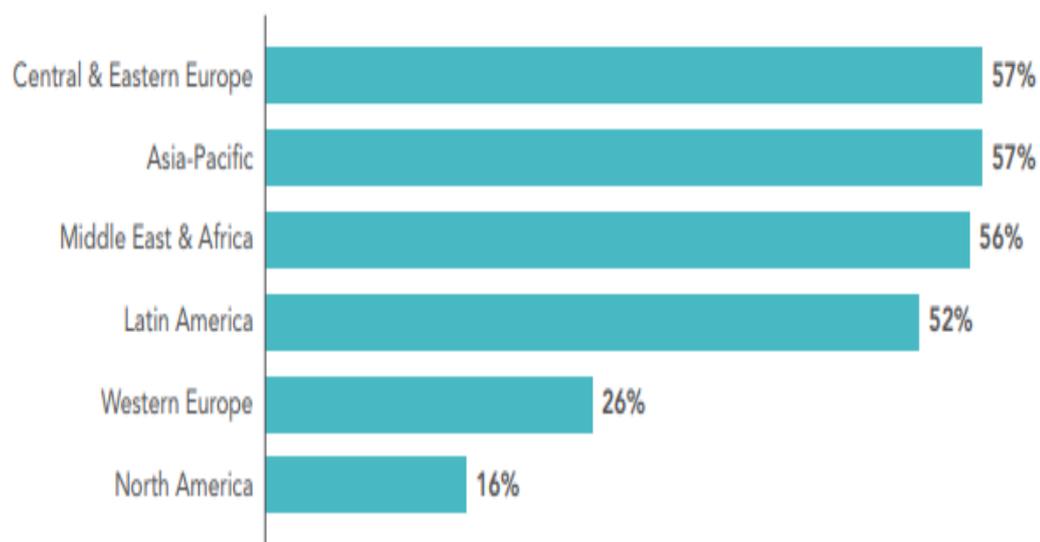


Figure 4. Average rate of unlicensed software use globally. [11 p.13 ]

The figure above illustrates the average rate of use of pirated software globally in 2015 according to the study made by BSA. It can be seen that Asia-Pacific has the highest piracy rate of 57 % which shows that most of the software demand are accomplished by pirated software in those region. However, this is a drastic drop of 5% as per previous survey. North America has made a fair 3% decrement from 19% to 16% of contribution to software piracy. According to the survey made by BSA in 2013, software piracy rate in Latin America was 59% whereas, the recent study shows it has dropped to 52%. Figure 4 illustrates the commercial value of pirated software across the globe.

Western Europe seems to have contributed more to the piracy value than Central and Eastern Europe. Asia-Pacific stays at the top once again with the loss of 16.4 billion US dollars. However, the statistics also illustrates that the piracy rate has dropped since past few years. This implies that there has been some positive effect of the efforts contributed by various organizations fighting against software piracy.

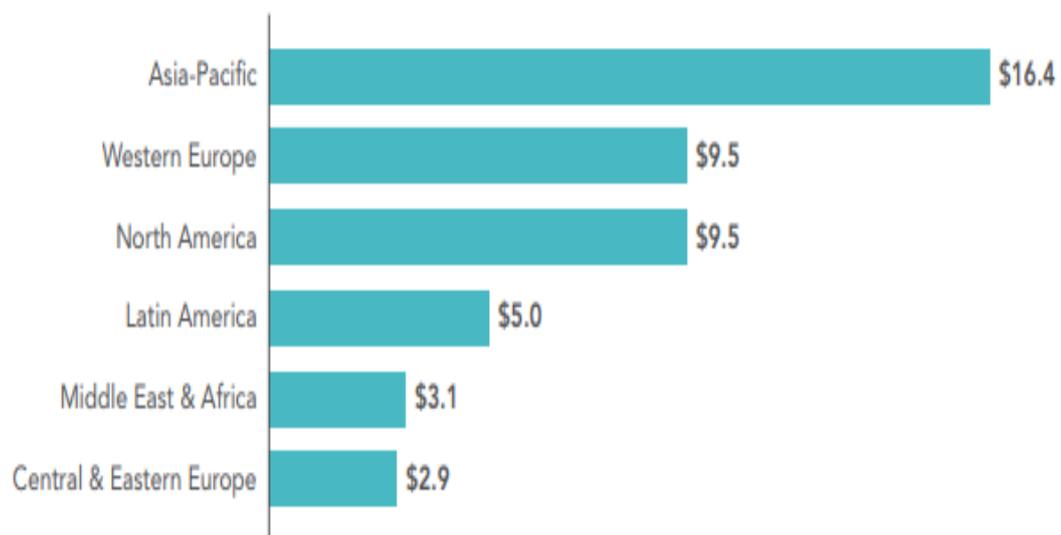


Figure 5. Commercial value of pirated software BSA 2016. [11 p.13 ]

Revulytics, an organization which provides software usage analytics has listed top 20 countries with the highest software piracy rate. Table 1 below illustrates the top 10 countries with the highest rate of unlicensed software installation and use. Among the listed countries China has been on the top of chart consistently for years. USA occupies the 2<sup>nd</sup> place followed by India and Russia on 3<sup>rd</sup> and 4<sup>th</sup> spots respectively. According to the studies, 66% of computers in China use pirated illegal copies of software which sums to 6,842 million US dollars. USA alone bears the loss revenue of 8,612 million dollars with 15% of software piracy rate. Turkey continues to stay at 10<sup>th</sup> position since 2014 contributing 56% of illegal software usage. The commercial value of unlicensed software installation in Turkey was 208 million US dollars. [11 pp.10-11 ]

Table1. Top 10 countries with highest software piracy rate and their commercial value in million dollars

Rank	Countries	Rate of illegitimate software installation	Commercial value of illegitimate software in Million
1	China	66%	\$6,842
2	United States	15%	\$8,612
3	India	56%	\$2,474
4	Russia	62%	\$1,291
5	Iran	85%	\$1,27
6	South Korea	32%	\$598
7	Italy	43%	\$1,278
8	Germany	20%	\$1,566
9	France	32%	\$1,996
10	Turkey	56%	\$208

It can be learned from table above, that software piracy behavior in Asian countries is comparatively on the higher end. However, USA alone has contributed a lot to lost revenue for North America. AS per Microsoft, India and South Korea are the capitals of its software. It has stated that 100% of computers bought from South Korea and 91% of computers in India had illegal pre-installed counterfeit software. China and Russia has been especially vulnerable to global cyber-attack and malware risks.

#### 4.1 Empirical Study

The goal of the survey was to get people's opinions towards software theft and their sense of awareness regarding various aspects of software piracy. The study embraced a quantitative research technique and it included measurable investigation of information got through a survey. All the gathered information was sorted as graphs and tables. Despite the fact, a few numbers of people partook in the review, the discoveries helped to investigate and analyze at observations towards software piracy and coherent issues.

The study was performed by conducting an online survey amongst individuals from different profession and studies. The understudies participating in the study were solicited a set from questionnaire. A poll was made using the Google form which contained 15 questions. The form contained mostly objective and multiple-choice questions and a few proclamations were intended to obtain participants assessments on a 5-point Likert scale, which is generally utilized in many overviews. The questionnaire was circulated to participants through email and Facebook messages. A total of 40 respondents took an interest in the review. The questions were simple and direct so that it would be easier for all the respondents to understand and answer. The participants responding to the survey belonged to different nationalities.

Most of the participants were students or recent graduates. 20% of respondents belonged to information technology, 37.5% of participants' studied business and 42.5% responses was from students and professionals belonging to other study faculties such as nursing and engineering. As per the result obtained most of the participants resided in Finland and Nepal. A total of 38 respondents mentioned their country of residence among which 2 answered incorrectly. There was 1 response each from Australia and

Brazil. There were 2 participants' each from Qatar and Germany and a total of 4 responses from the USA. When the participants were asked if they are aware of software piracy, 90% of the respondents said they were aware about it. This result shows that software piracy rate should be much lower but the situation is not well.

### Open Source Software use

The respondents were asked whether they have used open source software. 61.5% of total respondents said they use open source software and 38.5 % denied using it. Mostly students and professional having IT knowledge seemed to be using it.

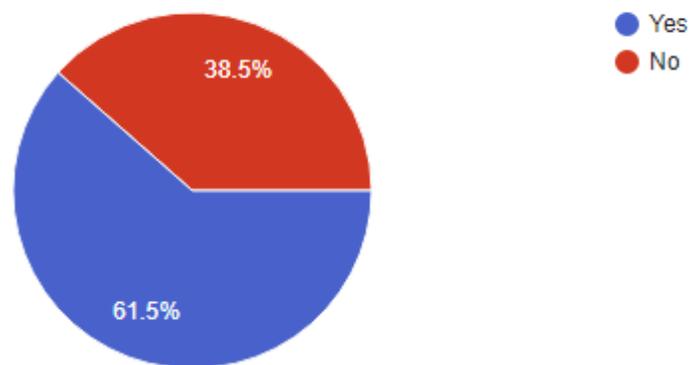


Figure 6. Open source software use result.

The figure above illustrates the division of participants over the use of open source software. Although the survey was conducted among small group, the result provides the popularity of OSS.

### Software Purchase

Participants were asked if they buy any kind of software to learn about their software purchasing behavior.

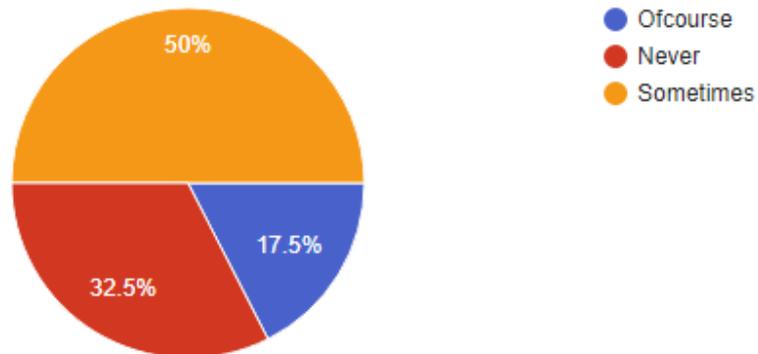


Figure 7. Software Purchasing Behavior.

As the figure above shows, 50% of the total respondents admitted buying any kind of software occasionally. The software piracy rate can be estimated from the result of the survey as 32.5% of users confirmed never buying software they use.

### **Software download from Internet**

The respondents were asked to mark their software downloading behavior on a scale of 1 to 5, 1 being never and 5 being always. 32.5% of participants chose 3 on the likert scale.

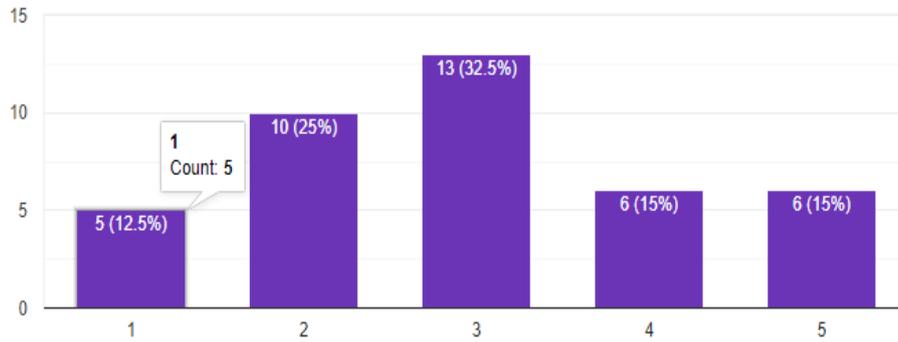


Figure 8. Software downloading behavior from internet.

The study showed that 15% of the participants' downloaded software from internet and 12.5% answered they have never done it. With the growing technology use and internet speed it can be supposed that internet software piracy rate will increase.

### Borrowing software from others

When the participants were asked if they borrowed software from others for their use, 27.5% said never and only 2.5% said always. It may be assumed that the result was also influenced by the country of resident of the participant.

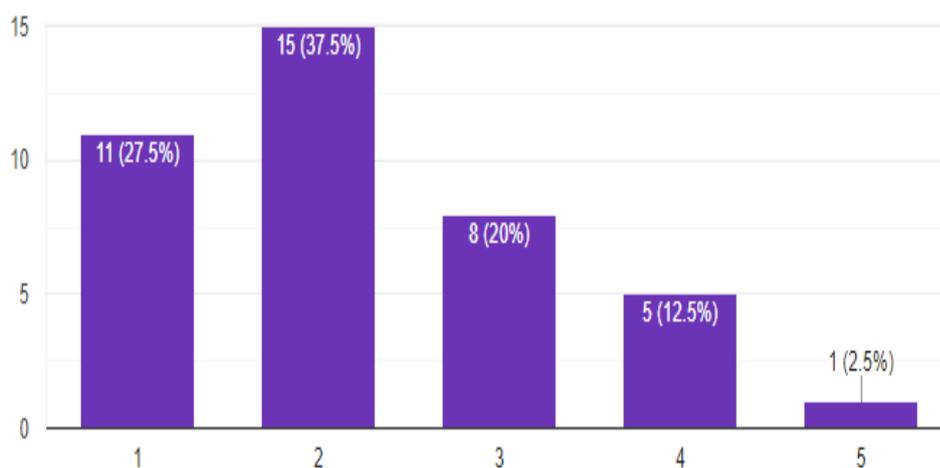


Figure 9. Respondent's behavior on borrowing software from others.

The figure above illustrates the participant's behavior on borrowing software from others. As per the various studies made before, borrowing software from others is not so common form software piracy and also it is mostly common in countries with weak economic state. It also depends on the socio-cultural aspect of the nation.

### Awareness on types of Software Piracy

One of the questions on the survey was about participant's awareness on the types of software theft. They were provided with multiple choice options. Majority of respondents seemed to know about internet piracy. Only 10% respondent admitted upon knowing about hard-disc loading. Academic software misuse marked to 52.5% in the chart.

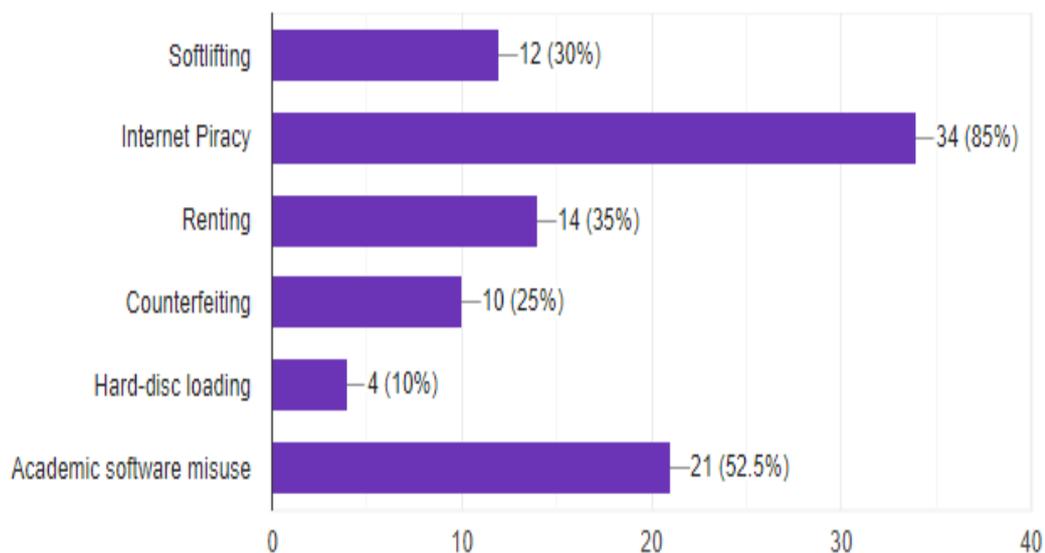


Figure 10. Participant's awareness on types of software piracy.

It can be understood from the result shown in the figure above that almost 100% of the participants know about at least one type of software piracy. The result illustrated hard-disc loading has become relatively uncommon than the past. Additionally, when the participants were asked why they use pirated software, 38.5% said the software is expensive and 48.7% of the respondents pointed that pirated software are easily available. 57.5% of the participants disclosed that software piracy is common in their country.

## Factors influencing software piracy

Participants were asked to present their view on what they think are the factors that influence software piracy.

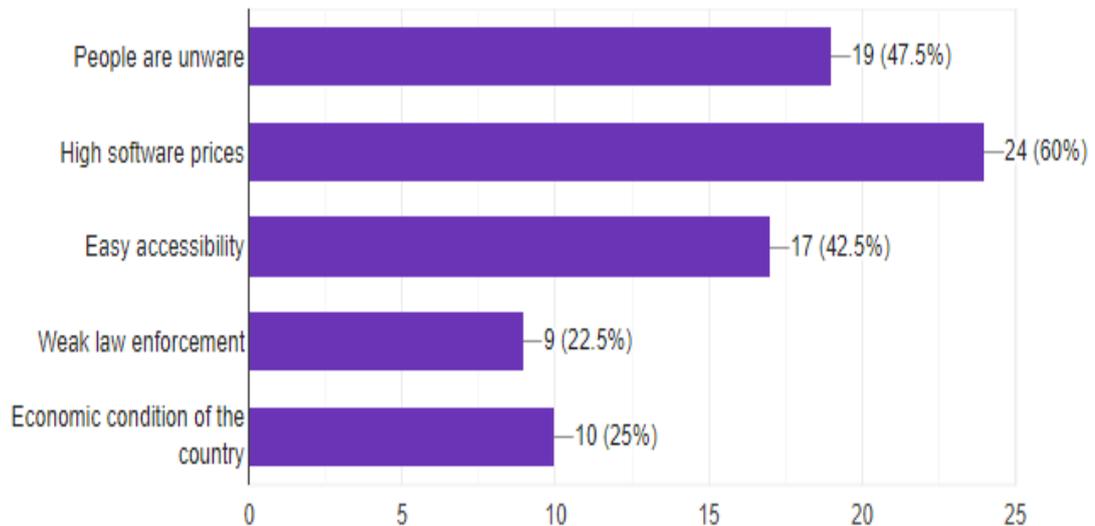


Figure 11. Survey result on factors influencing software piracy.

60% of the participants responded that one of the main factors that influence software piracy is high software price. 22.5% believed weak law enforcement also assist high software piracy rate. Furthermore, 23.1% of respondents did not think they are likely to be caught using pirated software. This also implies that strong copyright laws and cyber laws shall be enforced as well as promulgated among public. Public should be made aware that software piracy is also criminal act.

## Software piracy security risk

When the participants were asked if they were aware about the security risk involved in software piracy, 80% said they were aware about it. Following the question, they were also asked about the types of security risks they were aware of.

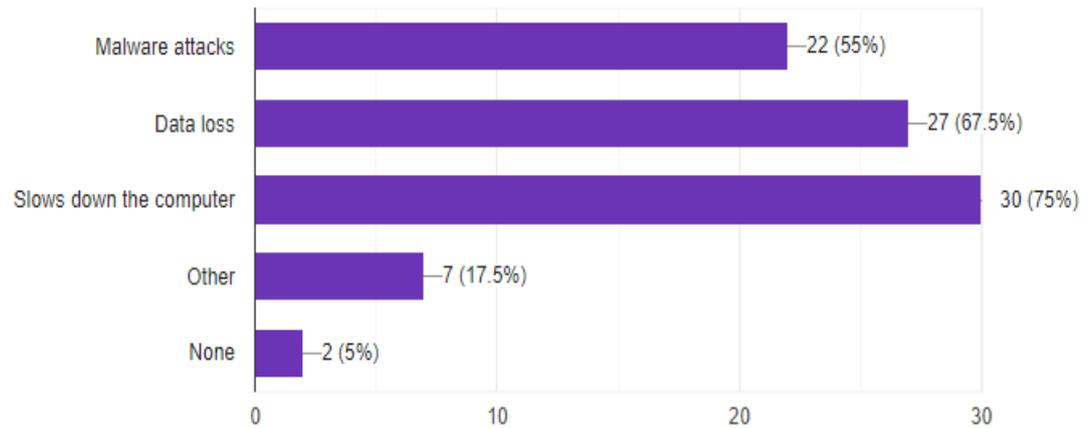


Figure 12. Respondent's awareness on security risks.

75% of respondents believed that pirated software slows down the computer whereas, 5% answered having no knowledge of security risks of using unauthorized computer programs. Moreover, majority of participants thought using illegal copies of software also causes data loss and malware attacks.

### Measures to reduce software piracy

The respondents were asked to present their views on what measures do they think can help reduce software piracy. They were provide with 3 options and were allowed to choose multiple answers.

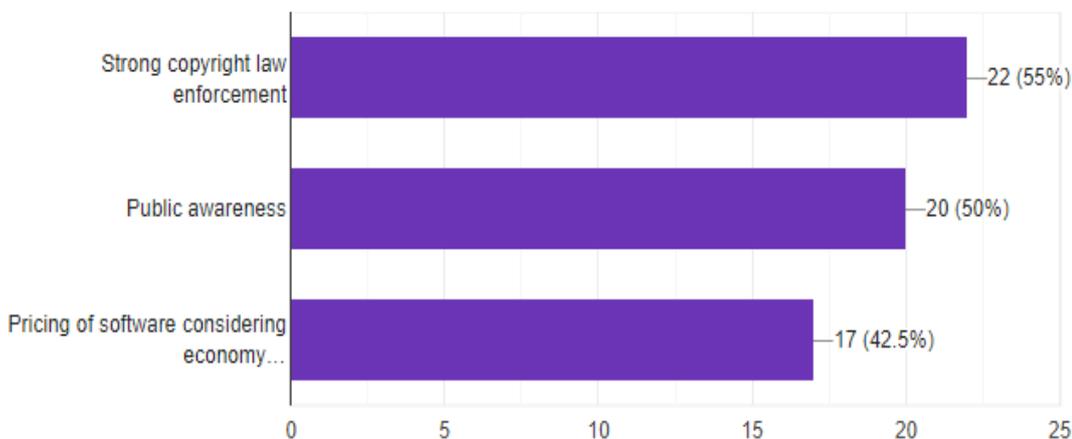


Figure 13. Preventive measures to reduce software piracy.

The result illustrated by the figure 13 above shows that majority of participant think software piracy can be reduced with the help of strong law enforcement all over the globe uniformly. 42.5 % of the votes were for the option emphasizing that the software prices should be marked according to the economic prospect of a country. Other studies has also obtained and analyzed that the economic prosperity should be taken into consideration while pricing the product.

## 5 Protection against Software Piracy

It is difficult to completely eradicate software piracy problem with the kind of advancement world is achieving in the field of technology. The easily accessible high-speed internet is one of the prime causes for software piracy. However, the piracy value can be diminished to lower numbers. With the efforts made by various government and non-government organizations on local and global scale, the figures have been brought down. The organizations such as BSA, SIIA, etc. are obtaining the positive results for their continuous fight against software piracy. These two organizations have special focus on strong enforcement of law and educating individuals and organization to legal software use. Several studies results show that software piracy is at higher end especially in developing and poor countries, which indicates countries with minimal GDPs cannot afford to buy costly software. Therefore, one of the ideas to reduce software

piracy can be pricing of the software in accordance to the region it is being sold to. In addition, awareness among the consumers is also significantly necessary.

Organizations fighting against software piracy have been emphasizing on much stronger copyright law enforcement. They urge software provider to apply strong license agreement on their product. Software Asset Management (SAM), a business practice has also been aiding to decrease the cyber-attack risks. A latest update to the International Organization for Standardization's (ISO), SAM provided a framework for inclusive IT asset management (ITAM) including software. SAM conveys added benefits in the form reduced downtime savings by confirming the software is fully licensed and optimized needs. Baltika Breweries which is a leading Russian beer producer with a combination of physical and cloud services introduced a SAM program to optimize their IT infrastructures and saved \$100,000 a year by shifting business applications to the cloud. The 2017 edition of the ISO/IEC 19770-1 standard provided a comprehensive technique for applying a competent ISO-aligned system for SAM putting into effect the standard enables continuous process improvement across 3 radical implementation tiers. [11 pp. 8-14] This tiered perspective enabled organizations to present their implementation as appropriate. The three tiers are as follows:

- **Trustworthy Data:** It is the 1<sup>st</sup> tier. It involves understanding what can be managed extensively. Here the software is assessed on the system to implement compliance with software license agreement. It also enables the organization to procedure needed for data and security management.
- **Lifecycle Integration:** The 2<sup>nd</sup> tier is lifecycle integration. It builds upon tier 1 and by improving management over the entire IT asset lifecycle, it aids organizations to achieve greater efficiency and cost effectiveness.
- **Optimization:** The third tier is optimization. This tier focuses on functional areas such as contracts and financial issues.

BSA developed a useful guide that government can use to enhance SAM. BSA suggests the government to stand strong on the use of licensed and authentic software and should do business with only those contractors who follow the same rule. This promotes the use of legitimate software in public and private sectors. BSA has suggested following points for governments to embrace to decline the software piracy rate.

- Lead by example: Encouraging governments to use fully licensed software since they are the largest software users.
- Increase Public Awareness: Governments and professional and consultants should educate organizations and individual about the use of legitimate software and the risks of using unlicensed software.
- Modernize Laws to account for new innovations: BSA suggests in its report that policymakers should ensure that software is protected regardless of being stored, delivered and used in clouds or in new innovative methods.
- Create a useful environment for enforcement: BSA urges government to ensure lawful frameworks to enable compelling ways for amends and promote collaboration amongst stakeholders to deduct software copyright breach. [11 p.15]

SIIA's internet anti-piracy program protects its members from software piracy by continuously monitoring internet in multiple languages to ensure protection in international scale. SIIA targets piracy on an extensive range of Internet protocols, including websites, classified ad sites, peer-to-peer networks, File Transfer Protocol sites, Torrent and other forms of circulation via Internet. SIIA staffs monitor these protocols using both automated and manual means including filenames and their contextual location to prompt a list of probable pirated sites. Then the outcomes are evaluated, and takedown notices are issued under Digital Millennium Copyright Act. [15] Public awareness is a vital aspect for the protection against software piracy. It is necessary to educate and aware each user about the risks of using illegitimate software. It should be made known to the public that pirated software not only harms the profit of the owner company but also can result in job losses. Also the users should be informed about the copyright law and the punishments and fines if found guilty. People may not be aware that software theft also implies the criminal act as any other kind of law violation. Consumers buy computers with pre-installed illegal software without knowing, it is important to encourage them to check about the differences between properly licensed and unlicensed software. For example, Microsoft has included in its sites a section on how to tell if the software purchased is legitimate or not. It urges its customer to inspect the software right with the packaging in case of counterfeit suspicion. Some of the indicators to look out for if the software is counterfeited or not are as follows:

- The packaging and delivery of the software
- The software does not include manual and other documentation.
- The software has handwritten labels.
- The cost and source of software.
- The product key if printed on the cover.

Software licensing is one the factor to be accounted for the preventing software theft. It provides the information about the general terms and conditions and legal guidelines for the use and distribution of software to its users in accordance to the agreement specified by the software developer organization. The user limitation and copyright notices are described generally in the end-user license agreement. Software licensing varies according to the type of software. Open Source software is mostly licensed under General Public License, which provides authorization to copy, modify and distribute the software whereas proprietary software and others are licensed under privilege of the copyright holder who specifies rules for the software utilization. [4]

Software can also be protected by copyright law. The creator of the software decides when, where and under what conditions his/her work can be used. The copyright law was proposed in the US in 1964 for legal protection of computer programs for the first time. In accordance to the Copyright Act, Title 17 of the US Code (Section 106), anybody purchasing licensed software does not hold a right to create duplicate copies in absence of the consent of copyright holder. It states that, any replication, distribution or installation of the software is contemplated as breach of the copyright law. Unauthorized distribution and utilization of software is a crime. Any individual or organization suspected and proven to do so commercially or for private gains, are exposed to fine of up to \$250,000 and jail up to 5 years depending upon the extent of the criminal act. [16]

The European Union (EU) introduced EU Council Directive 91/250/EEC on 13 May 1991 to secure PC programs under the copyright law. The content of Council Directive 91/250/ECC was amended and new Council Directive 2009/24/EC was introduced on

23 April 2009. It states that, copyright law known as “literary works” protects computer programs. It equips sole rights to copyright holder to specify its use. Hence, any unauthorized distribution and reproduction of computer programs without the consent of the copyright holder is contemplated as illegal. [17]

The World Intellectual Property Organization delivers legal protection for computer programs. WIPO was established in 1967 with an aim of protecting intellectual property. Today, WIPO comprises 191-member states with headquarter at Geneva, Switzerland. WIPO initiated the protection of computer programs in the 1970s with the “sui generis” system protecting all 3 elements of computer programs: object code, source code and documentation. In 1985, WIPO and UNESCO talked about assurance of PC programs by copyright law in their collective gathering. Subsequent to the gathering, a small number of nations began ensuring the product under the copyright law. The WIPO Copyright Treaty (WCT) of 1996 likewise incorporates a comparative interpretation as the sui generis framework. Article 4 of the arrangement expresses that computer programs, regardless of the method or sort of their trait, are secured as inventive works within the importance of Article 2 of the Berne tradition. [6 pp.1-3]

Trade Related Aspects of Intellectual Property Rights (TRIPS) is one more essential worldwide understanding that protects PC programs. World Trade Organization (WTO) presented and regulated it in 1994. As indicated by Article 10 of the TRIPS as-sentation, all PC programs are secured as scholarly works under the Berne Convention (1971). Besides, Articles 41-61 of TRIPS Agreement clarifies authorization arrangements including mutual along with authoritative methods just as criminal punishments. Article 45 provides the correct owner a full directly to guarantee harms of their property from an infringer who purposely, or with a few grounds to know, is associated with encroaching movement. What's more, Article 61 expresses criminal methodology and punishments to be linked in copyright theft on a business scale together with detainment or potentially fiscal fine. [18]

## 5.1 Organizations working against software piracy

### 5.1.1 The Software Alliance (BSA)

Formerly known as the Business Software Alliance, BSA was established in 1988 to represent and advocate for the worldwide software industries before governments and international market. It conducts and promotes the legal software use in more than 60 nations. BSA members are among the world's best innovative organizations such as Microsoft, Autodesk, Intuit, Symantec, Apple, Borland, Macromedia, Adobe and more that create software solutions. BSA's headquarter is in Washington DC, USA. It develops compliance programs that promotes for public policies that encourages technology innovation and drive digital economic increment.

BSA conducts a global survey annually in collaboration with IDC to study the use of unlicensed software and estimates the revenue loss to the software companies. It studies the global software piracy trend and piracy modes. BSA recovers millions of revenues from various companies that have been making the illegal use of the software. It first questions the organization or individual for the proof of legal purchase of the software if suspected and if the party fails to provide the testimonials than BSA makes them liable to penalties of up to \$150,000. BSA's Internet enforcement has cleared out hundreds of platforms that renders illegitimate software for download. IT works in collaboration with the host to eradicate pirated software files. According to BSA, 36,921 illegal software auction sites were removed globally in 2009. 883,221 software products were removed. 7.3 million and 152,286 takedown notices to Internet Service Providers and BitTorrent indexing sites were sent to abolish illegitimate software distribution respectively. [19]

### 5.1.2 Software and Information Industry Association (SIIA)

SIIA is the principal trade association for the software and digital content industry. SIIA assists with global services in government relations, business development, corporate education and intellectual property protection to the leading companies that are setting the pace for the digital age. It operates with the motive of accelerating innovation in technology, data and media. SIIA was founded in 1990 in association with several soft-

ware publishers and information industry. SIIA comprises of very large scale organization such as Microsoft to the startup company as its members. It advocates the importance of copyright protection and intellectual property to business, consumers and education. [20] SIIA has following 3 missions:

- Promote the industry: SIIA conjoins the software industry having the common interests to a wholesome.
- Protect the industry: SIIA protects and advocates the legal aspects that benefit its member companies.
- Inform the industry: SIIA informs its member companies and public about the trends, technology, policies to contribute to bigger economy.

SIIA conducts various conferences and workshops to study, analyze and act against the illegal use and distribution of software. It missions to work with state, federal and international policy makers to protect the interests of its members in public and legal issues. It aims to participate in landmark legal decisions. SIIA is very keen to protect the interests of its member that it provides a reward of up to \$1,000,000 to whomever that informs it about software piracy. It has a policy to keep the informers identity confidential. Certainly, it verifies all the required testimonials with the target organization and the software vendor before taking any kind of legal actions. SIIA has different divisions to work for more organized manner. Each division works for the benefit of the member companies. Some of the divisions in SIIA are as follows:

#### 5.1.2.1.1 IP Protection Service

It conducts comprehensive, industry wide campaign to protect and enforce the intellectual property rights of participating software and content companies. It also conducts campaigns to educate public so that the enforcement is effective. [20]

#### 5.1.2.1.2 Public Policy and Advocacy Services

As the department name suggests, this division is responsible for promoting and advocating for its member companies in matters of legal and public debate. SIIA deals with state, federal or even international policy maker and participates in landmark legal decisions. [20]

#### 5.1.2.1.3 SIPA

SIPA was founded in 1977 with 18 members and now it represents nearly 150 members of all scale. It acts on the issues of copyright, freedom of information, libel and defamation, privacy, etc. SIPA serves its member through training, education, networking and advocacy to widen growth, profitability and professional supremacy. [20]

#### 5.1.2.1.4 SSD

SSD stands for Software and Service Division. It represents the companies that develop applications, services and tools urging the success of present high-tech technology. It provides professional insight and strategy, executive networking, exposure and business development opportunities. The SSD division assists executives from companies, large and small, public and private, come together in various forums to address strategic issues facing their companies. This leads to industry-leading best practices, case studies, standards guidelines, and business development opportunities. It encompasses the industry's ecosystem, creating an environment that fosters networking and ultimately the partnerships that drive business growth as it consists of big range of members including partners, customers and investors. [20]

#### 5.1.3 Federation Against Software Theft (FAST)

The Federation Against Software Theft was formed in 1984. It was the world's first organization to promote the legal use of software and to defend the intellectual property rights of software publishers. FAST has continued to influence government to bring

forward legislation to increase the protection of intellectual property in software and to make it easier for software developers to proceed along their rights through the courts. In Addition, FAST also works to raise awareness of the value of intellectual property to the United Kingdom economy in both revenue and employment. Originally FAST was known as ‘the software police’ because of its anti-piracy work. The Federation’s territory expanded into educating end-users about the laws relating to the use of software and the penalties for ignoring them.

The FAST works with its members, law enforcement communities, to detect and combat the sale of infringing software and also helps organizations regularize their software estates when reports of possible misuse or under-licensing have been received about them. It is also alliances with the Software and Information Industry Association (SIIA). [21]

#### 5.1.4 Microsoft Corporation

“Microsoft Corporation”, which is the world’s leading software industry was founded in 1975 by Bill Gates and Paul G. Allen. Microsoft operates in over 100 countries. It was established to develop computer system and software applications. In 1981 IBM introduced its personal computers with Microsoft’s 16-bit operating system. Microsoft Corporation has now a very large area of business and services. In addition to developing system software, Microsoft also develops computer and gaming peripherals, email services, books, and also started the production of mobile phones recently. Microsoft has been conducting various research and development projects at its labs and research centers all over the globe. [22]

Microsoft’s operating systems are the most popular computer operating systems in the world. It made a whopping amount of 110.36 billion US dollars in 2017 from its sales and services worldwide. Being the most widely known, used, and compatible software provider Microsoft could not be far away from software piracy. Microsoft loses its potential revenue due to the piracy prevailing across the globe. According to a study performed by Microsoft, government agencies and consumers in 2010, the lost revenue was 750 billion US dollars along with thousands of job lost in software industry. Microsoft has been fighting against software piracy individually and also by partnering

with various organization working for the same cause. It has active participations in making and amending legal decisions to reduce software piracy rate and promote the use of legal and authentic software. Microsoft owns forensic labs around the globe where they test and examine the suspected counterfeit software. Recently, Microsoft filed a lawsuit against an IP address, alleging that an individual or group of individuals has been using that IP address to illegally activate copies of Windows, Office, and other products without the proper license. [23]

Since Microsoft's Windows series operating system is very popular, it faces most of the piracy in retail PCs. Retail Pc sellers would sell the computer with pre-loaded copy of pirated unlicensed software. According to recent study conducted by Microsoft in Asian countries, it stated that India and South Korea are the capital for software piracy. The survey was performed by buying 166 PC in 9 Asian countries. Among those computers 100% of computers bought from South Korea, Vietnam, Malaysia and Thailand were loaded with pirated copy of Microsoft's software. In India the figure was 91% followed by Indonesia with 90%. 85% of computers bought in India did not only have the copy of illegal software but also malware and backdoor software. [24]

Microsoft has launched various programs to diminish and eradicate software piracy. It has incorporated stronger software license agreement. With the intention of imparting awareness to its customer Microsoft has a segment called "How to Tell" on its website. It suggests its user to find the difference between the licensed and unlicensed software starting with the type of packing. For example, Microsoft incorporates unique 3D hologram on the packing. Also it has also provided the software with the product keys that cannot be used multiple times. It encourages its customer to check the licensing terms and conditions. Microsoft also recommends the consumers to report about any kind of counterfeit software usage and offers reward to anyone who reports the illegal activity if proven. [25]

## 6 Conclusion

The purpose of the thesis was to have overview about software piracy, it causes, effects and risks incorporated with it. This study helped profound comprehension of the topic. The various research and studies provided an insight to understand the past and present situation of software piracy which could assist in implementing stronger and

more competent measure to diminish software piracy rate. PCs and mobile phones have turned into the most basic innovation to the activities of instruction, government, endeavors, wellbeing administrations, people and numerous different segments. It is nearly impossible to imagine daily life without technology. In any case, as the human culture depends more on PCs, abuses and breakdowns of PCs including software theft are likewise expanding next to each other. A few analysts have stated distinctive perspectives on software theft and there exist a few factors that are expanding software piracy as of now talked about in the paper. It has become very easy to obtain and also replicate and distribute illegitimate software in the present scenario. Individuals seldom think about that pirating software program is a criminal demonstration although it is a criminal act and is punishable by law. Computer programs are ensured under the copyright law and taken as intellectual property. Replicating and abuse of copyrighted software is considered as a criminal action and those performing such exercises are exposed to paying fines with criminal procedures. Furthermore, there are other software piracy risks including malware attack, data loss which causes billions of revenue loss to the world. Despite the fact, software industries are booming globally, they have also been subjected to economic losses and creative obtuse. Various government and non-government agencies, software industries have been continuously fight against software piracy. They have been successful in reducing the numbers over the past decades. However, the challenges are also getting vigorous to eradicate software piracy. Studies have suggested there should be stronger copyright laws and punishments enforced globally. One of the measures suggested is pricing of the software in accordance with the socio-cultural and economic aspect of a country. Software industries have been encouraged to implement powerful license agreement on their product. Nevertheless, the most important measure to diminish and nullify software piracy is developing positive public attitude and awareness towards the issue. This can be done by educating public via advertisements, license agreement and campaigns. Big changes cannot be achieved in a day or two therefore, continues efforts should be made and positive hope must abide to fight software piracy.

## References

1. Business Software Alliance. [Internet]. BSA | 2018 Global Software Survey. Available from: <https://gss.bsa.org/>. Accessed 10 November 2018
2. Types of Software Piracy [Internet]. Cs.stanford.edu. Available from: <https://cs.stanford.edu/people/eroberts/cs201/projects/software-piracy/types.html> Symantec.com. Accessed 10 November 2018
3. Symantec. Types of Piracy | [Internet]. Symantec.com. Available from: <https://www.symantec.com/en/uk/about/legal/anti-piracy/types-piracy>. Accessed 11 November 2018
4. Khadka I. Software Piracy A study of causes, effects and preventive measures. 2015. Accessed 11 November 2018
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 12 November 2018.
6. World Intellectual Property Organization. International IP Protection of Software. Accessed 14 November 2018
7. Piracy it's a crime [Internet]. Debate.org. Available from: <https://www.debate.org/opinions/is-software-piracy-a-crime>. Accessed 14 November 2018
8. Why Software Piracy Happen? [Internet]. Software Piracy And The Pirates. Available from: <https://dotherights.wordpress.com/what-is-software-piracy/why-software-piracy-happen/>. Accessed 14 November 2018
9. Software piracy: global piracy rates 2017 | Statistic [Internet]. Statista. 2018 Available from: <https://www.statista.com/statistics/263161/percentage-of-pirated-software-in-several-global-regions/>. Accessed 15 November 2018
10. Consequences of Software Piracy [Internet]. Sii.net. Available from: <https://www.sii.net/Divisions/IP-Protection-Services/About/Consequences-of-Software-Piracy>. Accessed 15 November 2018
11. Software Management: Security Imperative, Business Opportunity [Internet]. The Software Alliance; 2018 p. 3-15. Available from: <https://gss.bsa.org/wp->

- content/uploads/2018/05/2018\_BSA\_GSS\_Report\_en.pdf. Accessed 16 November 2018
12. Accenture LLP. COST OF CYBER CRIME STUDY [Internet]. Accenture; 2017 p. 27. Available from: [https://www.accenture.com/t20171006T095146Z\\_\\_w\\_/fi-en/\\_acnmedia/PDF-62/Accenture-2017CostCybercrime-US-FINAL.pdf#zoom=50%20](https://www.accenture.com/t20171006T095146Z__w_/fi-en/_acnmedia/PDF-62/Accenture-2017CostCybercrime-US-FINAL.pdf#zoom=50%20). Accessed 18 November 2018
  13. Microsoft annual revenue. Microsoft: revenue 2002-2018 | Statista [Internet]. Statista. Available from: <https://www.statista.com/statistics/267805/microsofts-global-revenue-since-2002/>. Accessed 18 November 2018
  14. Global IT software and services revenue 2005-2016 | Statistic [Internet]. Statista. Available from: <https://www.statista.com/statistics/268632/worldwide-revenue-from-software-and-it-services-since-2005/>. Accessed 18 November 2018
  15. Software and Information Industry Association [Internet]. Siia.net. Available from: <https://www.sii.net/Divisions/IP-Protection-Services/Programs/Internet-Anti-Piracy-Program>. Accessed 19 November 2018
  16. Software & Information Industry Association. Software use & the law. May 2004. Accessed 2 January 2019.
  17. European Union. Council Directive of 23 April 2009 on the legal protection of computer programs [Internet]. Available from: <http://www.wipo.int/edocs/lexdocs/laws/en/eu/eu133en.pdf>. Accessed 2 January 2019
  18. World Trade Organization (WTO). Agreement on Trade-Related aspects of Intellectual Property Rights [Internet]. Available from: [http://www.wto.org/english/tratop\\_e/trips\\_e/t\\_agm0\\_e.html](http://www.wto.org/english/tratop_e/trips_e/t_agm0_e.html). Accessed 2 January 2019
  19. The Software Alliance. Faces of Internet Piracy. 2009. Accessed 2 January 2019
  20. Software and Information Industry Association [Internet]. Siia.net. Available from: <https://www.sii.net/About/About-SIIA>. Accessed 3 January 2019
  21. Federation against software theft | FAST [Internet]. Fast.org. Available from: <https://www.fast.org>. Accessed 8 January 2019
  22. Microsoft Corporation. Facts About Microsoft - Stories [Internet]. Available from: <https://news.microsoft.com/facts-about-microsoft/>. Accessed 9 January 2019

23. Tom Krazit. Microsoft just sued an IP address over Windows, Office piracy claims [Internet]. 2017. Available from: <https://www.geekwire.com/2017/microsoft-just-sued-ip-address-windows-office-piracy-claims/>. Accessed 15 January 2019
24. India and South Korea software piracy capitals say Microsoft - MSPoweruser [Internet]. MSPoweruser. 2018. Available from: <https://mspoweruser.com/india-and-south-korea-software-piracy-capitals-says-microsoft/>. Accessed 15 January 2019
25. Microsoft Corporation. How to Tell - Software [Internet]. Microsoft.com. Available from: <https://www.microsoft.com/en-us/howtotell/Software.aspx?tab=PackagedSoftwareTab>. Accessed 16 January 2019

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# A view on software piracy

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The purpose of this study is to get your view on software piracy. Please answer all the questions.

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## Field of study

- IT
- Business
- Other

## Country

Short answer text

---

## Do you use Open Source Software?

- Yes
- No

## Do you buy software?

- Ofcourse
  - Never
-

---

How often do you download software from internet?

	1	2	3	4	5	
Never	<input type="radio"/>	Always				

How often do you borrow software from others?

1	2	3	4	5
<input type="radio"/>				

Are you aware about software piracy?

- Yes
- No

What types of software piracy are you aware of?

- Softlifting
- Internet Piracy
- Renting
- Counterfeiting
- Hard-disc loading

Academic software misuse

### You use pirated software because

Everyone else does it

Software are expensive

They are easily available

I did not know it is illegal

I do not care about piracy

I do not use it

### How often do you use pirated software?

All the time

Occasionally

Very rarely

Never

---

Is copying software common in your country?

Yes

No

What factors influence software piracy?

People are unaware

High software prices

Easy accessibility

Weak law enforcement

Economic condition of the country

Are you aware of security risk of using pirated software?

Yes

No



Which of the following security risk are you aware of?

- Malware attacks
- Data loss
- Slows down the computer
- Other
- None

What do you think is the probability of getting caught using pirated software?

	0	1	2	3	4	5	
Very unlikely	<input type="radio"/>	Very likely					

What factors do you think can reduce software piracy rate?

- Strong copyright law enforcement
- Public awareness
- Pricing of software considering economy of a country