

Research Article

Software Piracy Awareness, Policy, and User Perspective in Educational Institutions

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Software theft and piracy are rapidly ever-increasing problems of the present-day software industry. Software piracy is the illegal copy and use of software in a way other than that is officially documented by exclusive rights of the developer in the form of an individual or organization as described in the relevant sale agreement (license). Owing to the evolution in software development and Internet, software piracy has become a main concern for many software companies. Software companies are confronted with extremely high losses due to the piracy of software. Pirates achieve a lot of money by doing business with pirated software. General end-users of the software are not aware of this serious crime and of the legal consequences of breaking the law. Even most of the time, end-users and consumers think that it is none of their concern and not an important issue for them. Although, in reality, if an organization is working with pirated software, there is a risk of failure of the software, and it might put their organization at risk as pirated software does not receive any support from the development organization. This ultimately puts the consumer organization in huge financial loss. Due to these reasons, software piracy has turned out to be a major concern, more emergent due to the extravagant development of the software industry and the availability of software(s) on the Internet. In this paper, we analyzed and identified the ratio of software piracy, awareness regarding piracy, and the policy of the licensed software provided. Based on the results of the study, some suggestions are proposed by which the level of piracy can be reduced.

1. Introduction

Software piracy is the illegal copying, installation, use, distribution, or sale of software in any way other than that is expressed in the license agreement. The software industry is facing huge financial losses due to the piracy of software. Piracy of software is performed by end-users as well as by the dealers. It causes serious problems that hinder the success of the software industry nationwide and globally. The pirates gain effortless benefits from the sale of pirated software and this ultimately affects the business of the software industry. Piracy of software is the legal consequences of breaking the law. Piracy is performed in different ways, such as hard-disk

loading, soft lifting, counterfeit goods, rental software, and bulletin board piracy [1–4]. The original licensed software offers a number of high valued benefits to the customers and users, like upgrades are available, assurance of quality and reliability, technical support, manuals or documentation, no exposure of your network to security breaches, while the pirated software fails to do so [5]. An organization with the use of pirated software might put them at a huge financial loss, as they are using pirated software that does not provide the mentioned benefits.

Researchers have been attempting to develop techniques to easily detect, prevent, and identify piracy performed in the software [6–10]. Still, there is a shortage of knowledge about

the intricate details of piracy and methodologies, which could aid to notice software piracy in a resourceful way. Along with this, there is a need to create social awareness about the piracy of software and to create a culture of being honest by using only original and legal software. Piracy of software is an observable fact that causes problems for all stakeholders involved, from owners to developers, distributors, vendors, to end-users as well. Organizations and end-users are to be disheartened from consuming pirated software which is not only the theft of rights of the owners and developers of the software, but it might also put them in serious difficulty and high losses. With this kind of social awareness, along with the technical protection against piracy, there will be a gradual decrease in the use of pirated software which will ultimately result in bringing lost profits back to the software industry and the industries will work in a better way.

The cognition process behind software piracy and one of the main reasons for piracy is the psychological factor for not considering it as a crime, which is ultimately a threat to the software industry. So, in order to reduce the piracy of software, it is more important to address that, what are the cognitive reasons or psychological factors behind it. In order to tackle these limitations, the proposed study identifies the main factors of piracy, and then based on these factors, some suggestions are proposed.

The contribution of this paper is to find the existing level of software piracy performed by customers and users, awareness of the piracy, policy of the licensed software, and user perspectives in educational institutions of Pakistan. Furthermore, the main contribution of this paper is given below:

- (i) To identify the level of existing software piracy in educational institutions done by users
- (ii) To quantify the existing awareness regarding the use of illegal software
- (iii) To find the level of awareness of the policy regarding original and licensed software
- (iv) To identify the reasons behind software piracy in academia
- (v) To propose suggestions/solution for how to reduce software piracy based on the above discussion

Based on the experimental results, some suggestions are proposed by which the level of piracy can be reduced. These suggestions include “suitable methods of payment for software purchasing,” “availability of Internet in academic institutions,” “conducting seminars on software piracy in academia,” “awareness of piracy,” “HEC visits for ensuring the implementation of their policies in the academia,” “decreasing software costs and licenses prices,” and “implementation of software policy in academia.”

The remainder of the paper is organized as follows. Section 2 represents related work to software piracy issues and their possible solutions. Section 3 shows the details of the proposed methodology carried out. Section 4 gives results and discussions of the proposed methodology. Section 5 mentions the conclusions of this research.

2. Related Work

The software industry and community of researchers have been attempting to develop techniques that can easily detect, prevent, and identify piracy in software. Several diverse techniques are available for the same, but still, there is a lack of knowledge about piracy and the methodologies used for piracy to detect software piracy in an efficient way. Apart from this, there is a need to create awareness for avoiding software piracy and to develop a tradition of being honest by using only original, legal, and licensed software.

The existing methodologies provide enough details for piracy detection and avoidance. Peukert et al. [11] have evaluated the heterogeneous effects of online copyright enforcement. Robertson et al. [12] analyzed the patterns of software piracy for the 20 nations of Latin America. Gan and Koh [2] used a survey technique at the three universities of Singapore for examining the perception of software piracy and to discover the mentioned factors. Mumtaz et al. [13] developed a methodology for piracy protection of secure electronic software distribution.

Mo et al. [14] investigated the opportunity and the setting for their revenue sharing by online content piracy monitoring for Internet service providers and content providers. They further investigated the ISP’s piracy monitoring cost level, the value of contents, and control provider access fee. Lowry et al. [15] conducted a meta-analysis of the literature and analyzed 257 studies with 126,622 participants for investigating the main constructs and covariates. Their meta-analysis results suggest four key sets of factors maximize predictions which are outcome expectations, social learning, self-efficacy, and moral disengagement. Kumar et al. [16] presented a secure split test with functional test capability to mitigate the counterfeits coming from untrusted foundries.

Huang et al. [17] presented a study that considers a single supplier who may sell pirated goods through two independent and different retails channels (traditional and digital). A Stackelberg game is utilized to determine the optimal gain sharing ratio and the equilibrium price for all channel members. Their study found that an increase in piracy would force retailers to compete in a smaller market and lead to a decrease in profits for members of the channel. Chang et al. [18] presented a study that examines the factor effects of software piracy at the country level. From their study, it was found that economic development, trade, education, freedom, regulatory protection, and computer penetration all drastically affect the level of software piracy within the country.

Rasch and Wenzel [19] worked on a two-sided market setting of the impact of software piracy, which includes software platforms that attract developers and users to maximize their profits. Banerjee [20] analyzed the impact of instantaneous increase in piracy and network externalities on research and development investment. Siponen et al. [21] developed a model that explains the effects of neutralization techniques on the intention of software piracy. The results showed that appeal to higher loyalties and condemn the

condemners highly predict the intention of software piracy. Andrés and Goel [22] examine the effect of software piracy on medium term growth using cross-country data from 2000 to 2007. Their findings suggest that piracy of software reduces economic growth over the medium term. Kariithi [23] describes the related work to music, film, and piracy of software around the globe, with the attention to data sources, research scope, and generic findings. The author finds that the absence of methodologies utilizing critical theory in this broad literature has constricted the world view of piracy.

Marti'nez-Sanchez [24] analyzed the government and incumbent role in preventing the pirate entry. The framework used a sequential duopoly model of vertical product differentiation with price competition. The results show that both the government and the incumbent have a major role in preventing pirate entry. Al-Rafee and Rouibah [25] reports experiments to prevent digital piracy in Arab and Middle Eastern countries. The experimental results showed that only the religion and awareness treatments contributed to turning down piracy. Nill and Shultz [26] provided an overview of international legal, systematic, and economic considerations and shared an analysis of the drivers of software piracy consumers. The authors discussed strategic considerations and a decision-making typology is introduced which helps legitimate companies to plan strategies in the face of widespread piracy. Peitz and Waelbroeck [27] provided a critical review of the theoretical literature which addresses the economic consequences of end-user copying.

Hamade [28] described the legal and political aspects of software piracy in general and specifically in the Arab world. Banerjee [29] used a framework to address the issue of public policy regarding anticommercial piracy. Bae and Choi [30] developed a model of software piracy to analyze the short-run effects of piracy on the usage of software and the long-run effects of development incentives. Fung and Lakhani [31] analyzed the potential end-user copyright violations linked with peer to peer file sharing and anti-piracy efforts. Png [32] concluded that the consultant and methodology change in Business Software Alliance in 2002-2003 had systematic effects on published piracy rates. The decrease trend rate of piracy falls from 2.0% to 1.1% points per year. The proposed research is an endeavor toward identifying the level of existing software piracy in educational institutions done by users, finding the level of how much information is there about awareness of software piracy, finding the level of awareness of the policy regarding original and licensed software, identifying the reasons behind software piracy in academia, and proposing suggestions/solution for how to reduce software piracy based on the above discussions.

3. Proposed Approach

The following sections discuss the proposed approach and experimental study.

3.1. Software Piracy. The piracy of software causes serious problems that hinder the success of the software industry in

the national and international markets. The comparison of original licensed software with pirated software shows what benefits the user gets. The original software offers a number of high valued benefits to the customers, including assurance of software quality, availability of upgrades, technical and manual documentation, and less bandwidth consumption. On the other hand, pirated software fails to do so. There might be a risk of failure of the system if an organization was using pirated software, and pirated software might put the organization at the risk of huge financial loss. Some software is available in the form of open-source. But this open-source software is mostly licensed and needs a proper license agreement. Pirates are doing piracy of such software, which ultimately gives loss to the owners [9].

3.2. Protocol of the Study and Experimental Setup. The proposed study was conducted to identify the impact of software piracy in educational institutions. The first step of the study is to find the current level of piracy, its awareness, and the reasons behind why people are doing piracy. This paper addresses the following research questions which are based on a study of the literature and market:

- (a) Is the software piracy rate high in academia?
- (b) Are people aware of the software piracy issue?
- (c) Why do people commit piracy and what are the main reasons behind this issue?
- (d) What could be the possible solutions to reduce software piracy in academic institutions?

The study has the following research hypotheses:

- (i) Null hypothesis = Ho: piracy rate is not high in educational institutions
- (ii) Alternative hypothesis = H1: piracy rate is high in educational institutions
- (iii) Null hypothesis = Ho: people do have much awareness of software piracy
- (iv) Alternative hypothesis = H2: people do not have much awareness of software piracy
- (v) Null hypothesis = Ho: academic institutions are fully utilizing the Higher Education Commission (HEC) software facilities for its employees
- (vi) Alternative hypothesis = H3: academic institutions are not fully utilizing HEC software facilities for their employees

Rejection of the null hypotheses will lead to the acceptance of our alternative hypotheses which will validate the need and relevance of the conducted study. Figure 1 shows the protocol followed in the proposed study.

In this context, a survey has been conducted through a questionnaire consisting of total of 38 questions related to software piracy. Questions are divided into five sections, which are shown in Table 1.

For conducting a survey of proposed research work, a questionnaire was designed and sent to the faculty members, students, and administrative staff of different universities of

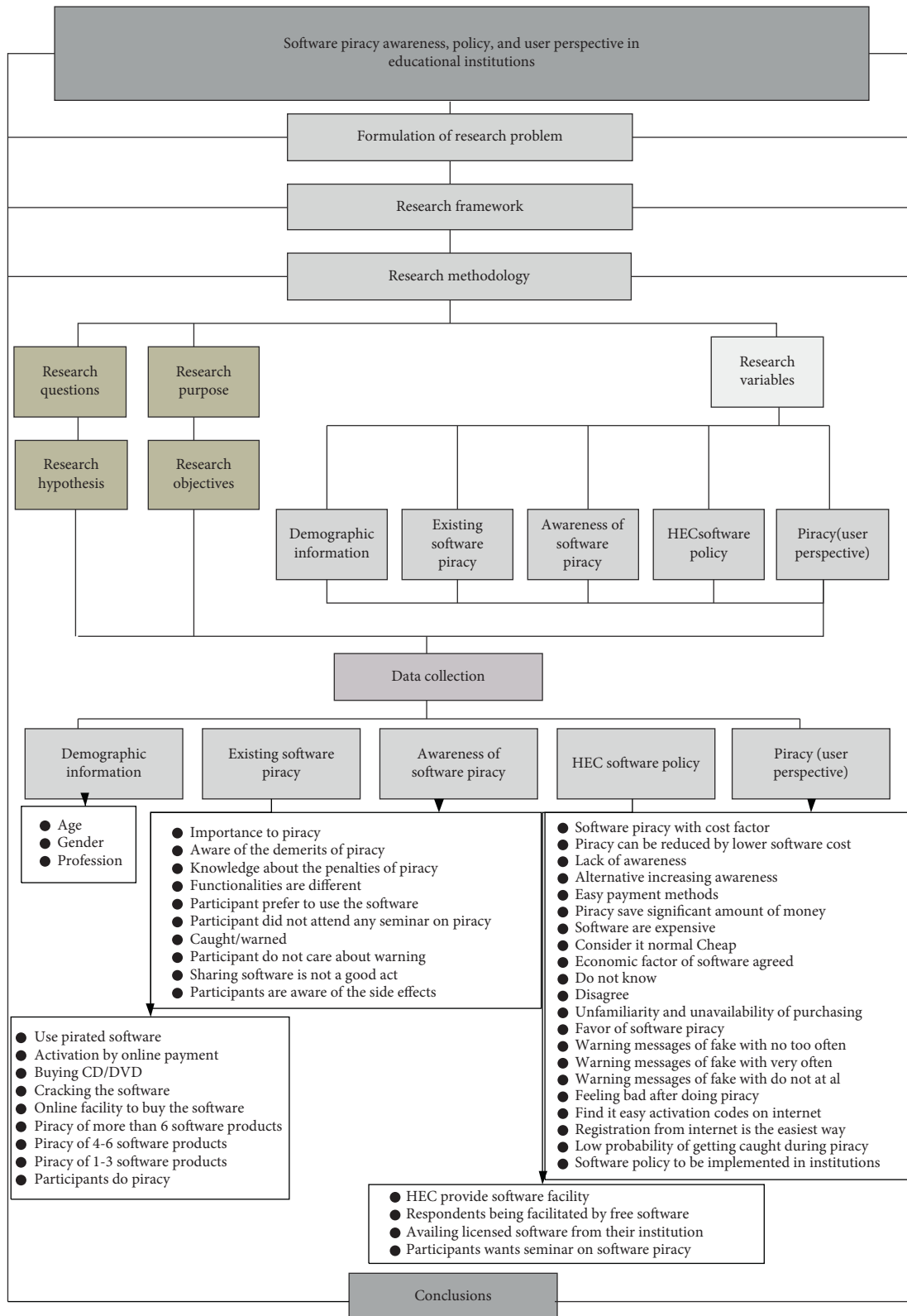


FIGURE 1: Protocol of the proposed study.

TABLE 1: Categories of questions.

S. no.	Section	No. of questions	Purpose
1	Demographic information	3	Information about age, gender, and profession
2	Existing level of software piracy	6	To identify what is the existing level of software piracy
3	Awareness of software piracy	12	To know how much people are aware of software piracy, its merits, and demerits, etc.
4	HEC software policy awareness and its availability	4	To identify the awareness of people about HEC policies for software facilities to academic institutions
5	Reasons behind software piracy	13	To know why people do software piracy

the country. A total of 110 responses were received. These responses were analyzed using SPSS software.

4. Results and Discussion

The questionnaire was sent to more than 500 hundred people including faculty members, students, and administrative staff of different universities. They were contacted through their official e-mail. A total of 110 responses were received from 37 universities in Pakistan. The data has been analyzed by means of the SPSS tool to determine whether the results had statistically significant differences. For the tests, we used a confidence interval of 90% and a significance level of 0.05. Null hypotheses H_0 became rejected when the p values were less than 0.05. Summary of the test for the existing level of piracy, piracy awareness, utilization of HEC software facilities, and reasons are provided in the following sections.

It is important to note that SPSS test summary tables are aimed to show whether the difference in the responses is significant or not. Null hypothesis terminology in Tables 2–5 refers to the different null hypotheses of the study represented as H_0 . Based on the responses received, the following subsections show the results achieved from the study conducted.

4.1. Existing Level of Piracy. Most of the people in universities are using pirated software. Statistics of the present study shows that 67.3% of people do use pirated software. The activation of the software is done by using fake (illegal) cracks and other activation methods. The fake key is used as an alternate for showing the software is original, while in the actual original software, it is allowed only to those users who purchased the license of the software. Using fake keys is the piracy of software is a serious crime. According to the statistics of the study, the activation by online payment is too low, which is 7.3%. Buying CD/DVD from the market is still less (38.2%) compared to activation by cracking the software (54.5%). The online payment facility in educational institutions shows that 81.8% of the participants do not have to buy the software online and pay for it, while only 18.2% have the facility to buy the software online. The rates of the total number of pirated software were identified to be much higher from the survey. According to the survey, 49.1% of each participant uses more than six pirated software. Other participants are not exempted from piracy but differ only in less number of pirated software, and their ratio is 18.2% for

(4–6) number of pirated software and 32.7% for (1–3) number of pirated software. The study shows that the existing piracy is too high and the majority of people use pirated software. About 80% of participants think that people do piracy. Figure 2 shows the details of a different aspect of the existing level of piracy.

The summary statistics for the existing level of piracy can be seen in Table 2. The null hypothesis has been rejected for each variable aimed at identifying the existing level of piracy which shows that the difference among the responses is significant. By summarizing the results, we can say that the Null hypothesis “piracy rate is not high in educational institutions” is rejected.

Figure 3 shows the representation of different groups of variables in the area from the current research perspectives. These variables include the use of pirated software, activation by online payment, buying CD/DVD, cracking the software, online facility to buy the software, piracy of more than 6 software products, piracy of 4–6 pieces of software, piracy of 1–3 software, participants doing piracy, importance of piracy, aware of the demerits of piracy, knowledge about the penalties of piracy, different functionalities, participant preferring to use the software, participants not attending any seminar on piracy, caught/warned, participants not caring about warning, sharing software not considered a good act, and participants being aware of the side effects. These variables were taken as important considerations of the proposed research. The relevant values of these variables are given in Figure 3.

4.2. Awareness about Software Piracy. The awareness of software piracy is analyzed through the questionnaire. Piracy of software is an important issue for participants to be stopped. The survey statistics show that only 1% does not give importance to piracy. The disadvantages and ethics of piracy show that most of the participants, 70.9%, are aware of the demerits of piracy, while the rest of the participants are not aware of the disadvantages of piracy. They agree that piracy is ethically wrong to do. The people know about the disadvantages of piracy but not their penalties for doing piracy. Only 34.5% have knowledge about the penalties of piracy, while the rest are unaware of it. The pirated software is functionally different from the licensed software. Among all participants, 58.2% agree that their functionalities are different, while 29.1% do not notice that they are different at all. The selection criteria for software products shows that

TABLE 2: Different aspects of the existing level of piracy.

S. no.	Null hypothesis	Test	Sig.	Decision
1	The categories defined by soft_use = Pirated and licensed occur with probabilities 0.5 and 0.5	One-sample binomial test	0.000	Reject the null hypothesis
2	The categories of friend_use occur with equal probabilities	One-sample chi-square test	0.000	Reject the null hypothesis
3	The categories of soft_active occur with equal probabilities	One-sample chi-square test	0.000	Reject the null hypothesis
4	The categories defined by online_pay = No and yes occur with probabilities 0.5 and 0.5	One-sample binomial test	0.000	Reject the null hypothesis
5	The categories of Pirated_soft_use occur with equal probabilities	One-sample chi-square test	0.000	Reject the null hypothesis
6	The categories of people_piracy occur with equal probabilities	One-sample chi-square test	0.000	Reject the null hypothesis

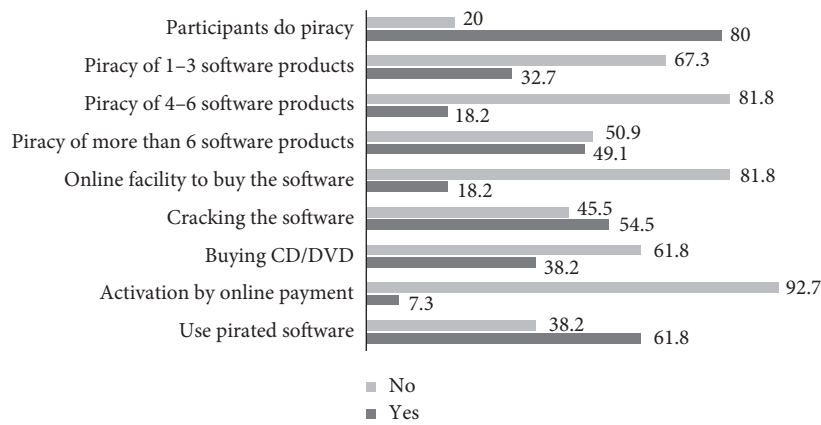


FIGURE 2: Different aspects of the existing level of piracy.

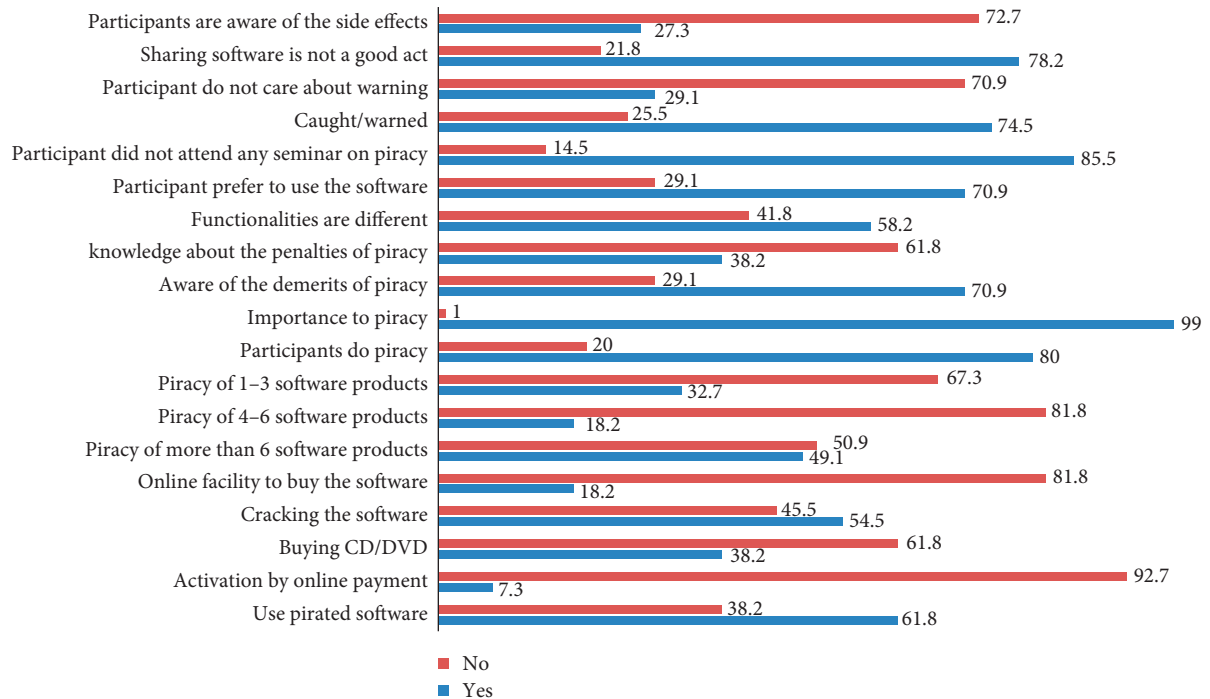


FIGURE 3: Tree representation of different groups of variables in the area.

70.9% of the participants prefer to use the software that provides rich number of features and additional features come with more expensive license cost. The responses regarding the conduction of awareness seminars show that 85.5% of participants did not attend any seminar on piracy and its related issues. The users have been caught/warned while using pirated software. The statistics of this study for caught/warned participants show that most of them have been caught at least 1–3 times (74.5%) and 16.4% of participants have a much higher rate of warning (more than 6 times). People do not feel embarrassed while using pirated software. But the difference between the frequency of the response is not significant enough. People share their pirated software with other friends and colleagues, but still, they agree that this is not a good act, 78.2%. Participants are not aware of all side effects of software piracy and only a few of the participants have awareness, 27.3%, while 72.7% of participants are not aware at all. Figure 4 shows the awareness of software piracy.

The statistics of awareness about piracy are shown in Table 3. The null hypothesis is rejected for all the variables except feeling shame while using pirated software. From the results, it can be concluded that the null hypothesis “people do have awareness about software piracy” is not being fully retained; the results show that people have awareness about software piracy on the basic level. The awareness is lacking penalties that can be given to those who commit piracy of software. They do not know all the side effects of software piracy. They have not attended any seminars on software piracy and the most important thing they are involved in piracy because of only having basic knowledge.

4.3. HEC Software Policy Facility Utilization. The HEC provides the facility of the licensed software to use and have different plans for academic institutions. A total of 45.5% of the survey respondents know about this facility of HEC and 54.5% are not aware of it. The difference between their responses is not significant enough. So, it cannot be concluded that participants know about the HEC software facility. The institution’s role in software availability was studied. It has been noticed that people use their own software and the academic institutions do not provide them any free software facility. A total of 67.3% of respondents is not being facilitated by any kind of free software from their institution. Most of the academic institutions do not facilitate their faculty members, students, and other staff by purchasing licensed software. Only 29.1% of participants have been availing of licensed software from their institution. Participants do not have enough knowledge about software facilities that they can avail of and can be provided by their institutions. In this regard, almost all participants (96.4%) want to have a seminar on software piracy. Figure 5 shows the details of the HEC software facility policy utilization.

The statistics for utilization of HEC software facilities are shown in Table 4. HEC has software policies to provide software to academic institutions. From the statistics given in Table 4, the ratio of awareness about HEC software

facilities is not significant enough. Other measures for utilization of HEC software facilities by academic institutions are still the main point of concern. In Table 4, it can be seen that the null hypothesis is rejected for the similarity of the responses for variables. It shows that participants are not being facilitated by academic institutions and seminars are required to be conducted both for academic institutions, along with participants. So, the main null hypothesis “academic institutions are fully utilizing HEC software facilities to its employees” is being rejected, which means academic institutions are not fully utilizing HEC software facilities to its employees.

4.4. Software Piracy and Their Cause from User Perspective. High software cost is one of the reasons behind software piracy. From the survey statistics, about 70% of participants consider it because of the price, while another reason is lack of awareness that has statistics of 23.6%. Software piracy ratio can be reduced by lower software cost, as in survey its statistics are high (54.5%) as compared to other alternative increasing awareness (30.9%) and easy payment methods (14.5%). Piracy of software saves money and prices of paid software as most of the participants (72.7%) say that piracy saves a significant amount of money for them because software prices are high. From statistics, the software is expensive for 85.5% of the survey members, while others consider it normal (10.9%) or cheap (4.6%). The economic factor of software was studied and the study shows that economy is an incentive for purchasing pirated software. 52.7% of participants agreed, while others did not know (30.9%) or disagreed (16.4%).

Unfamiliarity and unavailability of online purchasing is a factor of the survey in which most of the people (67.8%) are not able to buy software directly from the Internet because they do not have an online buying facility. The participants were not in favor of software piracy. Only 32.7% of the participants are on the other side. The participants receive fake software registration notifications not too often (50.9%), while only 25.5% of participants receive notifications very often and 23.6% do not receive them at all. Receiving warnings and notifications also has a psychological bad effect on the participants. They do not like at all the warning they receive for doing piracy. A total of 61.8% of participants feel bad after this, while 29.1% do not care. Still, some of them feel happy to receive it.

Finding fake/pirated software activation codes and licenses on the Internet is easy and statistics do not differ significantly (54.5%). In contrast, 45.5% of participants find it easy to find activation codes on the Internet. The difference is not significant enough and we cannot say that activation codes can easily be found on the Internet based on the higher percentage of responses (54.5%). Also, registration of software from the Internet is the easiest way (70.9%) for people are compared to other alternatives. The low probability of getting caught during piracy is medium for 49.1% of participants, while 41.8% of the participants’ probability of being caught is low. Poor implementation of software policy has been studied and the execution of software policy needs

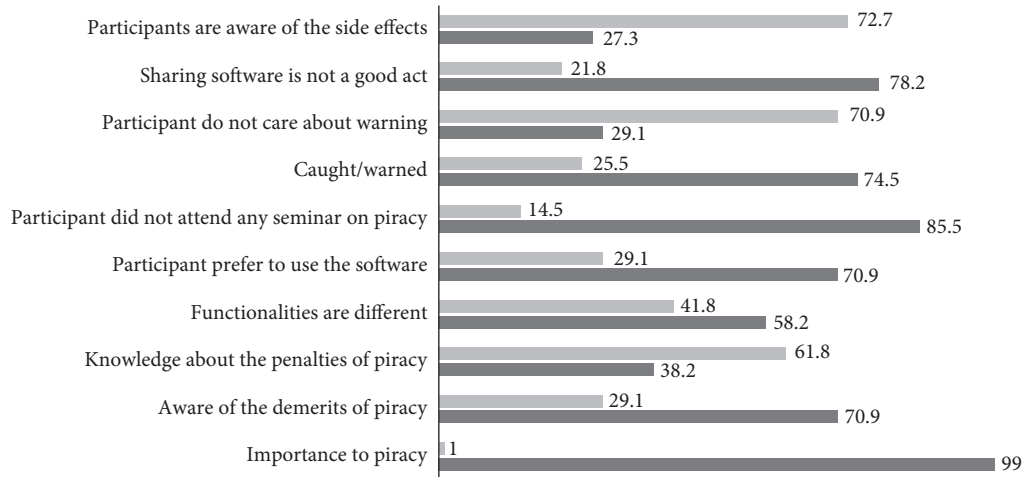


FIGURE 4: Awareness about software piracy.

TABLE 3: Awareness about software piracy.

S. no.	Null hypothesis	Test	Sig.	Decision
1	The categories defined by soft_use = Pirated and licensed occur with probabilities 0.5 and 0.5	One-sample binomial test	0.000	Reject the null hypothesis
2	The categories of friend_use occur with equal probabilities	One-sample chi-square test	0.000	Reject the null hypothesis
3	The categories of soft activate occur with equal probabilities	One-sample chi-square test	0.000	Reject the null hypothesis
4	The categories defined by online_pay = No and yes occur with probabilities 0.5 and 0.5	One-sample binomial test	0.000	Reject the null hypothesis
5	The categories of pirated_soft_use occur with equal probabilities	One-sample chi-square test	0.000	Reject the null hypothesis
6	The categories of function_diff occur with equal probabilities	One-sample chi-square test	0.000	Reject the null hypothesis
7	The categories defined by attend_seminar = No and yes occur with probabilities 0.5 and 0.5	One-sample binomial test	0.000	Reject the null hypothesis
8	The categories of caught_piracy occur with equal probabilities	One-sample chi-square test	0.000	Reject the null hypothesis
9	The categories of feel_shame occur with equal probabilities	One-sample chi-square test	0.000	Retain the null hypothesis
10	The categories defined by sharing_piracy = Agree and disagree occur with probabilities 0.5 and 0.5	One-sample binomial test	0.000	Reject the null hypothesis
11	The categories defined by side effect = No and yes occur with probabilities 0.5 and 0.5	One-sample binomial test	0.000	Reject the null hypothesis

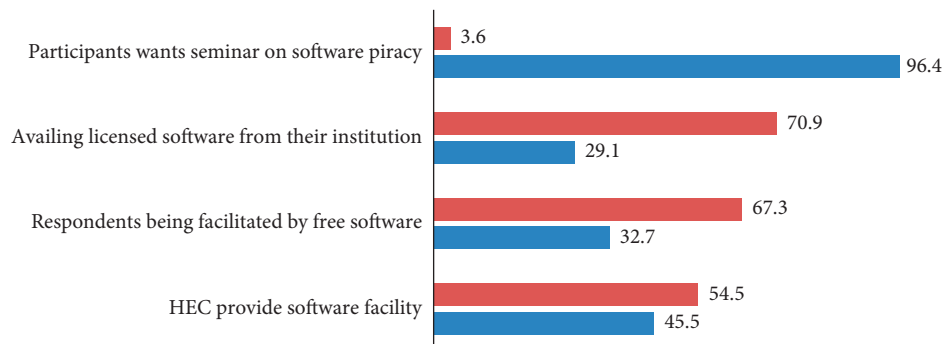


FIGURE 5: Details of the HEC policy facility.

TABLE 4: Awareness about software piracy.

S. no.	Null hypothesis	Test	Sig.	Decision
1	The categories defined by know_HEC_facility = No and yes occur with probabilities 0.5 and 0.5	One-sample binomial test	0.391	Retain the null hypothesis
2	The categories defined by institute_soft_facility = No and yes occur with probabilities 0.5 and 0.5	One-sample binomial test	0.000	Reject the null hypothesis
3	The categories defined by institute_provide_facility = No and yes occur with probabilities 0.5 and 0.5	One-sample binomial test	0.000	Reject the null hypothesis
4	The categories defined by want_seminar = No and yes occur with probabilities 0.5 and 0.5	One-sample binomial test	0.000	Reject the null hypothesis

to be implemented in the academic institutions. 90.9% of the respondent agreed to have a software policy to be implemented in academic institutions. Figure 6 shows software piracy and its causes from user perspectives.

A detailed discussion about the reasons behind software piracy is being discussed. Summary statistics are given in Table 5. We can see that difference among responses is significant for all variables (null hypothesis rejected) except the availability of software activation codes on the Internet. The reasons that retained after statistical analysis are high software cost, piracy being a way to save a significant amount of money, unavailability of online payment facilities, and poor implementation of HEC software policies in academia.

4.5. Issues Identified in the Study. Software piracy is a big issue to be considered. From the study conducted, it is obviously shown that piracy rates in academic institutions are high enough. This survey mainly includes faculty members and students from academic institutions. Although people were aware of the knowledge that piracy has several disadvantages, they do consider it an important issue and discourage piracy and also feel functionality differences between pirated and licensed software. However, there are still some issues in the awareness of software piracy. The main issues that have been identified in the survey regarding the high rate of software piracy and people awareness about software piracy are listed below:

(i) High rate of software piracy

The main issue found in the current study is the high rate of software piracy. The study aimed to focus on academic institutions where the participants are faculty members, students, and administrative staff. Still, it is observed that software piracy is high in educational institutions which are very important issues to be considered. It has been noticed that the majority of the people use pirated software and each of the faculty members uses pirated software in several different forms.

(ii) Unavailability of the online payment facility

Another issue is the availability of an online payment facility which is necessary to be available to at least faculty members of the institution. As a matter of fact, the latest and updated software are available on the Internet and mostly need online buying

procedure of purchasing. If one does not have an online payment facility, then the only choice seems to be piracy if available on the Internet because purchasing from the market is not a feasible choice. Cracks and activation codes are available on the Internet and with some searching and time spent, these can be downloaded, which is also a serious issue behind increasing software piracy.

(iii) Lack of awareness about software piracy

People are unaware of the penalties for software piracy. They only know piracy has disadvantages and licensed software provides rich functionality which is not enough. There is also a lack of knowledge about the advantages of licensed software. Similarly, almost all participants did not attend any workshop or seminar on the issue of software piracy that may lead to higher software piracy.

(iv) Poor utilization of HEC available software facilities

People know that HEC has a policy for software in academic institutions, but they do not have enough knowledge to avail their offers and benefit from it. Academic institutions do not get benefits from HEC services and we have seen in the study that these services are not facilitated for participants.

4.6. Main Reason for Issues behind Software Piracy and Awareness. We have identified some of the reasons behind software piracy. These are discussed in detail in the following subsections.

(i) Unsuitable payment methods for software purchasing

One of the reasons behind software piracy is the unavailability of online payment methods for people. Credit card or other ways are not widely being used by student(s) and all the faculty members for online transactions which forces them to use another way of registering or getting registered software.

(ii) Basic knowledge about software piracy

The people have only basic knowledge about software piracy which is not enough. The people do not

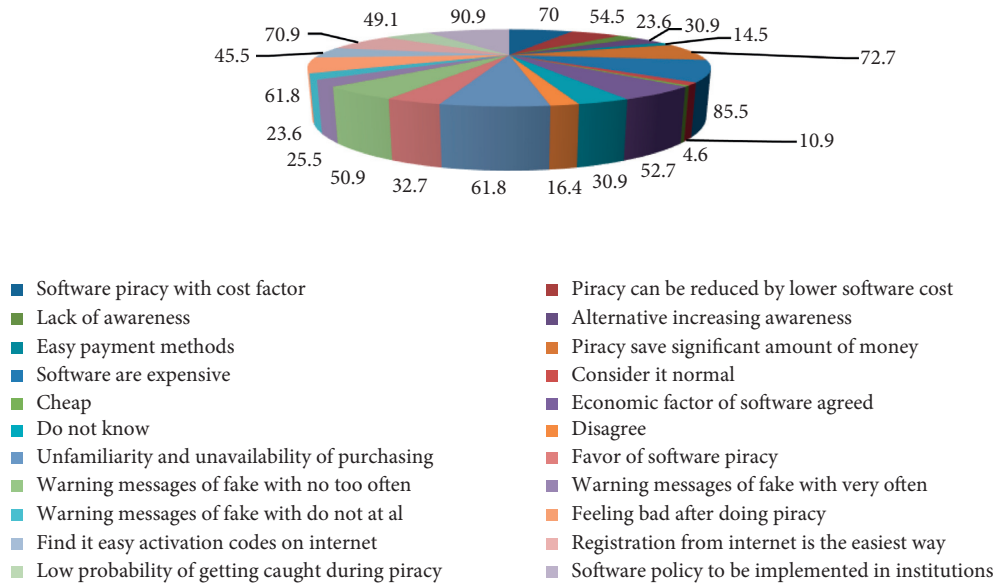


FIGURE 6: Software piracy and its causes from user perspectives.

TABLE 5: Awareness about software piracy.

S. no.	Null hypothesis	Test	Sig.	Decision
1	The categories of piracy_because occur with equal probabilities	One-sample chi-square test	0.000	Reject the null hypothesis
2	The categories of reduce_ratio_piracy_ occur with equal probabilities	One-sample chi-square test	0.000	Reject the null hypothesis
3	The categories defined by piracy_huge_money = Agree and disagree occur with probabilities 0.5 and 0.5	One-sample binomial test	0.000	Reject the null hypothesis
4	The categories of expensive_cheap occur with equal probabilities	One-sample chi-square test	0.000	Reject the null hypothesis
5	The categories of econo_incentives occur with equal probabilities	One-sample chi-square test	0.000	Reject the null hypothesis
6	The categories defined by online_buy_facility = No and yes occur with probabilities 0.5 and 0.5	One-sample binomial test	0.000	Reject the null hypothesis
7	The categories defined by favor_violation = Yes and No occur with probabilities 0.5 and 0.5	One-sample binomial test	0.000	Reject the null hypothesis
8	The categories of warning occur with equal probabilities	One-sample chi-square test	0.000	Reject the null hypothesis
9	The categories of notification_feel occur with equal probabilities	One-sample chi-square test	0.000	Reject the null hypothesis
10	The categories defined by find_active_code = Yes and No occur with probabilities 0.5 and 0.5	One-sample binomial test	0.391	Retain the null hypothesis
11	The categories of easy_soft_reg occur with equal probabilities	One-sample chi-square test	0.000	Reject the null hypothesis
12	The categories of piracy_caught_prob occur with equal probabilities	One-sample chi-square test	0.000	Reject the null hypothesis
13	The categories defined by implement_soft_policy = Disagree and agree occur with probabilities 0.5 and 0.5	One-sample binomial test	0.000	Reject the null hypothesis

know the penalties for software piracy and therefore, it seems like a normal act, although it is a crime too.

(iii) Conduction of seminar/workshops

One of the reasons for the lack of awareness includes less or lack of awareness program about software piracy. Not enough seminars or workshops have

been conducted to spread awareness about software piracy. As a result, they do not know the penalties that can be given to the person doing piracy.

(iv) Poor implementation of HEC software policies by academic institutions

The people use pirated software inside academic institutions, although the HEC provides facilities

TABLE 6: Questionnaire.

Question no.	Question description	Option (A)	Option (B)	Option (C)
<i>Demographic information</i>				
1	Age	10–25	25–35	>35
2	Gender	Male	Female	
3	Profession	Student	Faculty	Other
<i>Existing software piracy</i>				
4	Which type of software do you use?	Pirated	Licensed	
5	How many of your friends use licensed software?	All of them	Few of them	None
6	How you activate the software?	Online payment	Buying CD/DVD	Cracking it
7	Have you any facility for online payment for software?	Yes	No	
8	What are your selection criteria for choosing software?	Lower cost	Rich number of features	
9	How much pirated software do you use?	1–3	4–6	>6
<i>Awareness of software piracy</i>				
10	How much software piracy is an important issue?	Unimportant	Somehow	Very important
11	Do you think using pirated software has any disadvantages?	Yes	No	
12	Do you know about penalties for software piracy?	Yes	No	
13	Is piracy against ethics?	Yes	No	Do not know
14	Do you feel any functionality difference between pirated software and the original one?	No difference	Much difference	Do not know
15	Have you ever attended any seminar/workshop on software piracy?	Yes	No	
16	While using pirated software, the probability you will be caught is	Low	Medium	High
17	Majority of people use pirated software?	Agree	Disagree	
18	Do you feel ashamed/guilty while using pirated software?	Yes	No	Somehow
19	Sharing pirated software with others is a good act?	Yes	No	
20	Intellectual property law is beneficial for the customer	Agree	Disagree	
21	Do you know all the side effects of software piracy?	Yes	No	Somehow
<i>HEC software policy</i>				
22	Do you know about HEC software providing facilities?	Yes	No	
23	Is your academic institution providing any free software?	Yes	No	
24	Is any licensed software purchased by your institution for you?	Yes	No	
25	Are you in favor of organizing seminars/workshops on software piracy?	Yes	No	
<i>Piracy (user perspective)</i>				
26	People use pirated software because of?	Lack of awareness	High software cost	Other (please mention)
27	The ratio of software piracy can be reduced by	Increasing awareness	Decreasing software license prices	Easy payment
28	Software piracy saves a significant amount of our money?	Agree	Disagree	
29	Prices of the paid software are	Expensive	Normal	Cheap
30	The economic factor is an incentive for me to purchase pirated software	Agree	Disagree	
31	Do you have any facility for buying online software and products?	Yes	No	
32	Are you in favor of giving a violation of software piracy?	Yes	No	
33	How often you receive warnings about fake software registrations?	Very often	Few time	Never received
34	What is your feeling when you got a notification about pirated software	Normal		
35	Is it easy for you to find activation codes/cracks for software on the Internet?	Yes	No	
36	What is the easiest way to register your software?	From the Internet	From friends	Any other source
37	While using pirated software, the probability you will be caught is	Low	Medium	High
38	Employees & students need the implementation of S/W policy in an academic institution	Agree	Disagree	

of free access for some important software products.

(v) High software cost

The main and key reason is software cost. People have to get paid a significant amount of money while getting pirated software to save much of it. As a result, along with some knowledge and awareness, the people do piracy.

4.7. Proposed Suggestions to Stop/Reduce Software Piracy.

Based on the experimental study of the proposed research and results obtained, we have proposed some of the solutions/suggestions that can help in reducing software piracy. Details of each one are discussed below.

(i) Introducing suitable methods of payment for software purchasing

As most of the people do not have payment facility or do not use online payment/transaction as a primary method for purchasing. So, new methods of payment need to be adopted to reduce software piracy. It is necessary to use other methods that are available in the current market like Easypaisa, Mobi cash, and so on in the context of Pakistan as an example.

(ii) Availability of high-speed Internet in academic institutions

Internet speed is also a limiting factor. Low speed of Internet also creates problems for downloading big size of software which compels people to take from other sources instead of wasting much of their time on downloading.

(iii) Conducting and arranging seminars on software piracy in academia

Different academic programs like seminars, workshops, and training for promoted awareness about software piracy need to be initiated. In this regard, workshops or seminars to be conducted in educational institutions like universities on the highest priority. These programs should be aimed to be more focused on highlighting the bright aspects of the licensed software product.

(iv) Awareness of need-based products

On one side, people do piracy because they think the price of licensed software is much high. On the other hand, they prefer software for a high number of features. As a matter of fact, it is not necessary that software with rich features will be the best for each and every user. Each and every user has different requirements and popular software products available on the Internet have different user plans too. So, if the user is aware of his/her work needs, then he/she will pay only for these features and not for all possible features. For example, windows have

different categories like home-edition, proedition, and ultimate-edition. Prices do vary for these products based on user-specific need. Another example is Microsoft Office, which has different prices product for different user's need like students and professionals.

It is important to highlight suitable product features for specific needs. If it is done, users will download and pay for customized products with lower prices and according to their needs.

(v) HEC visits for ensuring the implementation of their policies in the academia

The HEC need visits to academic institutions to ensure how much awareness about piracy of software people have. Based on the visits to the university, the needs of software can be identified and HEC can add more software products in their plan for the future or can exclude obsolete software products that could have less importance.

(vi) Decreasing software costs and licenses prices

As one of the suggestions to attract people to licensed software mentioned above is to pay for need-based customized software product. Another good step could be to decrease software licensing prices for the user. Because despite of the awareness, people still do piracy. They claim software prices are too high.

(vii) Implementation of software policy in academia

It is important for academic institutions to get benefit from the HEC software facility. From the survey, participants are not facilitated by institutions for software products and they buy or do piracy of it by themselves.

5. Conclusions

Software piracy is an ever-increasing problem of the modern-day software industry. Owing to the evolution in software development and the Internet, software piracy has become a main concern for many software companies. Software companies are confronted with extremely high losses due to the piracy of software. Pirates gain a lot of money by doing business with pirated software, and they do not think what they are doing is a crime. General end-users and the community of the software are not well aware of this serious crime. Even most of the time, end-users and consumers think that it is none of their concern and not an important issue for them to worry about. If an organization is using pirated software, there is a risk of failure of the software, and it might put the organization into a big loss of risk. Open-source software is available, but some of this software needs a proper license from the concerned owner agencies and the user needs to pay for it. Most people cannot afford these license charges which become a burden on them. So they do piracy of the software. On the other hand, people use crack software (registered by the user through unfair way) for their needs as they do not have enough

money to pay for licensing the software, although they are aware of the real problems that pirated software have which include upgrades are not available, no assurance of quality and reliability, no technical support, no manuals or documentation, exposure of network to security breaches, and many others.

The pirated software does not receive any technical support from the organization which is developed. Due to these reasons, software piracy has turned out to be a major concern—more emergent due to the extravagant development of the software industry and the availability of software(s) on the Internet. This paper elaborates on the awareness of piracy, policy of the licensed software, and user perspective regarding the original licensed and pirated software. A questionnaire of about 38 questions was given to the students, faculty members, and administrative staff of different intuitions, and after the collection of data, analysis was performed. These questions were designed and finalized as per the discussions of the members of the project approved by the higher education commission. The results of the analysis are shown in Figures 2–6 and Table 6.

The current study identified some of the reasons for software piracy. These reasons are “unsuitable payment methods for software purchasing,” “basic knowledge about software piracy,” “conduction of seminar/workshops,” “poor implementation of HEC software policies by academic institutions,” “high software cost.”

Based on the above reasons, some suggestions are proposed by which the level of piracy can be reduced. These suggestions include “introducing suitable methods of payment for software purchasing,” “availability of high-speed Internet in academic institutions,” “conducting and arranging seminars on software piracy in academia,” “awareness of need-based products,” “HEC visits for ensuring the implementation of their policies in the academia,” “decreasing software costs and licenses prices,” and “implementation of software policy in academia.” By adopting the proposed suggestions, the level of piracy can be reduced.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare no conflicts of interest.

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