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Analysis of the Impact of Open-Source Software on Reducing the Use of Pirated Software by Educators

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ABSTRACT

Pirated software is often motivated by a need for more awareness regarding the importance of respecting intellectual property rights. Software piracy remains prevalent even within academic environments, such as colleges and universities. Educators and students frequently use illegal software despite these institutions being centers of intellectual and academic excellence. Such environments should ideally serve as role models for the broader community in respecting copyrights. One potential solution to reduce pirated software is adopting open-source, freely available software that can be used without violating intellectual property rights. This study aims to examine the influence of motivation for using pirated software on the adoption of open-source software. Data were collected from 86 randomly selected educators and analyzed quantitatively using regression. The results indicate that the motivational factor for using pirated software has a minimal effect on knowledge and adoption of open-source software, contributing only 14%, while other factors influence the remaining 86%. These findings highlight the need for targeted educational interventions to raise awareness about the benefits of open-source software and reduce reliance on pirated software.

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1. Introduction

Nowadays, software is present in people's lives, so it changes the public's perspective on this software as a technological advancement whose presence cannot be denied. These technological developments help increase the possibility of internet access and the technologies that support digital piracy. So, it makes it easier for users to do digital piracy [1]. Piracy is the illegal copying and distribution of a product protected by intellectual property (IP) rights [2]. Apart from that, some regulations apply regarding software licensing related to copyright. The issuance of regulations regarding copyright indicates the applicable law regarding the use of software or applications in society. It is a form of appreciation for other creations that took many pains to express all his ideas. So that a work that is beneficial to others is realized, and this deserves to be protected by law. It has become an issue in recent decades [3].

Pirated software is software used without permission from the copyright owner, and this practice has become a significant issue in the technology industry. Many users, especially in developing countries, pirate software due to high licensing costs and lack of access to legal alternatives. It not only harms developers but

also increases security risks for users, such as malware infections [4], [5]. It is important to raise public awareness about the negative impacts of using pirated software. Education about the ethics of software use can influence user behavior and encourage them to switch to safer alternatives, such as open-source software. In addition, the software industry needs to adapt to this challenge and develop more inclusive business models to reduce piracy [6], [7], [8].

However, the reality on the ground found that there were acts of violation and fraud perpetrators, namely software piracy. In Indonesia itself, piracy has become something that is considered commonplace. It is due to the need for more awareness of Intellectual Property Rights. The price needs to be lowered and challenging to reach for some people. It could be one of the motivations for committing fraudulent acts of software piracy. In the online market, we can find much software sold at relatively meager prices, and this is without the knowledge of the software's creators. Based on a survey by the Business Software Alliance (BSA), a formal international institution whose role is to carry out studies in the field of pirated software, explaining that as many as 59% of computer users in Indonesia admit that if these users obtain pirated or illegal software, this will increase the level of software piracy in Indonesia. in 2011 reached 86% [9].

Many pirated software violations in higher education have been found in supporting their activities by campus officials, educators, teaching staff, and students. Especially among campus educators often use pirated software in their work activities. This can be stated as stealing intellectual property rights [10]. This pirated software is easily obtained and available online; educators and students with only an internet connection can download the necessary software. The use of pirated software can be caused by motivational and attitudinal factors that can affect the use of pirated software at the student level. Other reasons are the relatively high price, the slight possibility of being caught, having no previous knowledge of pirated software, and the requirement for campus assignments. It prefers to use pirated rather than licensed software [11]. Although pirated software in higher education is often considered a violation of intellectual property rights, this phenomenon remains widespread for various reasons. According to recent studies, one main factor driving pirated software use is easy accessibility and high licensing costs. Students and educators tend to choose pirated software because they can easily download it for free via the internet without significant legal risks. In addition, [12] research shows that a lack of awareness of software piracy's legal and ethical consequences is also a significant cause. Research conducted by [13] added that cultural attitudes in the campus environment also contribute to the normalization of software piracy. In this context, educational institutions are responsible for raising awareness of the importance of respecting copyright and providing legal alternatives, such as open-source software, to support academic activities [12], [14].

Multiple factors, including the constraints on academic institutions' finances and the difficulty of getting expensive legitimate software, frequently induce the use of counterfeit software in colleges and universities [15]. Numerous investigations indicate that the use of pirated software is affected by a lack of legal awareness among educators and students, along with the perception that using pirated software will not result in significant repercussions [16]. Moreover, within the educational framework, the requirements of assignments necessitating particular software, irrespective of licensing, frequently drive students and educators to opt for pirated alternatives that are more readily available[16]. Here, the situation is exacerbated by the lack of campus-wide regulation of copyright laws; many involved see this as a minor infraction that does not disrupt the educational process.

Furthermore, another study by [17] revealed that economic factors and a need for more knowledge about legal alternatives such as open-source software drive the motivation to use pirated software. Students and educators must often know that open-source software can meet their academic needs without breaking the law. In addition, the permissive culture in the campus environment, where software piracy is considered a common and harmless practice, exacerbates this problem. Therefore, according to [18], a holistic approach involving education, institutional policies, and providing access to legal software is needed to reduce the reliance on pirated software in higher education environments. Previously research explained that the motivational factors for using pirated software obtained results with the variable motivational factors influencing the variable use of pirated software with a percentage of 90%, and the remaining 10% was influenced by other factors [19]. In minimizing cheating that continues to occur, educators need to be aware of the use of official software, which has an owner and deserves appreciation. Another alternative to preventing pirated software violations is that, unknowingly, many open-source software can be used free of charge. The users can also use software with conditions of use up to a specific time limit (trial). This open-source software is made collaboratively without any legal coordination from the maker, and the coding is available on the Internet and is free to use.

Research by [20] shows that the primary motivation for using pirated software is often related to economic factors, such as the high cost of licensed software and the perception of low risk of legal consequences. Many educators and students consider pirated software a practical solution to meet their needs without high costs. Research by [21] also discusses the importance of applying ethical considerations in

software engineering through user stories to raise awareness of the impact of software-related actions. Research by Isa Akhlis related to using open-source software to increase academic activity in high school. It was explained that open-source software is a driving force to broadly and openly improve society's character, especially in academics. The characters contained in it are honest, trustworthy, and appreciate the values that develop in social life. Providing socialization and direction related to open-source software and training is one of the efforts to introduce official educational software [22]. From the results of the exposure of previous studies, there are related parties who socialize the use of licensed software, so they realize the importance of respecting the work of others. This effort is expected to be an excellent initial example for the general public to recognize its importance.

2. Research Method

Quantitative research is a method of analyzing variables using a predetermined formula. So it is necessary to test the specified attributes (Table 1), namely:

- Instrument test is the initial stage of testing data instruments to see the validity and reliability of data.
- Classical assumption test, as a condition before testing the simple regression stage. In this test, the Normality, Linearity, and Heteroscedasticity testing stages were carried out.
- Simple Regression Test, the main test of research data to see the effect of variable X on variable Y.
- Hypothesis Testing, the final stage is to test the hypothesis, accept Ha or reject it.

Table 1 Instruments

Variables	Items
Motivation to use	a. The price is too expensive
	b. Work requirement
	c. Follow others
	d. Low chance of being arrested for software piracy
	a. Long time use
Knowledge	a. Know
	b. Have use it before
	c. Willingness to try
	d. Open source

3. Result and Discussion

3.1. Validity & reliability test

The validity test results used SPSS version 22, with ten questions. So, with 100 respondents, it was found that rtable = 0.195 with a significance level of 5%. For the reliability test, the test criteria are if the variable has a Cronbach Alpha value > 0.60 so that it is called reliable. Furthermore, if each variable has a Cronbach Alpha value <0.60, it is called unreliable. From table 4, it is known that each instrument item is valid.

Table 2 Uji Validitas Variabel X & Y

Item	r_{hitung}	r_{tabel}	Status	Item	r_{hitung}	r_{tabel}	Status
X1	0,471	0,195	Valid	Y1	0,844	0,195	Valid
X2	0,678	0,195	Valid	Y2	0,844	0,195	Valid
X3	0,522	0,195	Valid	Y3	0,714	0,195	Valid
X4	0,815	0,195	Valid	Y4	0,723	0,195	Valid
X5	0,723	0,195	Valid				
X6	0,715	0,195	Valid				

For the reliability test, the criteria for this test are that if each variable has a Cronbach Alpha value > 0.60, the instrument is declared reliable. And if each variable has a Cronbach Alpha value <0.60 then the

instrument is declared unreliable. From the table below, it is known that each instrument item has been declared valid.

Table 3. Reliability Test

Variabel	Cronbach Alpha	Status
Motivation to use	0,753	Reliable
Knowledge	0,788	Reliable

3.2. Classic Assumption test

This study used the Kolmogorov – Smirnov Normality test with a significant value of 5%. If the significant value is > 0.05, the variable is said to have a normal distribution. Conversely, if the significant value is <0.05, the variable is said to be not normally distributed.

Table 4. Normality Test

One – Sample Kolmogorov – Smirnov Test		
		Unstandardized Residual
N		100
Normal Parameters	Mean	.0000000
	Std. Deviation	4.18313696
Most Extreme Differences	Absolute	.071
	Positive	.071
	Negative	-.052
Test Statistic		.071
Asymp Sig. (2 – tailed)		.200

Based on table 5, the significant value is 0.200 > 0.05, so it can be concluded that the values are normally distributed.

Linearity test was tested to determine the influence of linear or insignificant between 2 variables. If the significance value is > 0.05, there is a linear relationship. Moreover, there is no linear relationship if the significance value is <0.05. Table 6 shows that the significance value is 0.068 > 0.05. So there is a linear and significant relationship between variables x and y with a value of only 0.068.

Table 6. Linearity test

			F	Sig.
Motivation to use * Knowledge	Between Groups	(Combined)	1.674	.061
		Linearity	1.892	.173
		Deviation from Linearity	1.662	.068
	Within Groups			
	Total			

The proper regression analysis is that there is no heteroscedasticity. The detection method is seen from whether specific patterns appear on the scatterplot graph. Based on graphic 1 shows a pattern that spreads below and above 0 on the y-axis. However, it is more widely spread below the number 0 on the y-axis. Only a few dots form a straight-line pattern. It shows that there is heteroscedasticity in this study.

3.3. Regression test

A simple regression test was carried out to predict how much positive relationship there is between motivation to use pirated software and knowledge of open-source software.

Tabel 5. Regression test

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	14.251	1.077		13.228	.000
Motivasi	.107	.082	.130	1.303	.196

From table 7, it can be seen that the constant value is 14.251. Furthermore, the value shown for the regression coefficient on motivation is 0.107. This value indicates that if there is an addition every 1% on the level of motivation to use, then knowledge will increase by 0.107. The equation of these results is:

Y = a + Bx + e

Y = 14.251 + 0.107

It means that if the value of the regression coefficient has a positive value of 0.107, it is stated that the direction of the influence of the x variable on the y variable is positive. Based on the significance value obtained from the table above, it is 0.196 > 0.05, so it can be stated that the motivational factor for using pirated software does not affect the variable knowledge of open-source software.

The t-test is applied to show the level of influence between the dependent variable and the independent variable. If the significant value is <0.05, then the variable can be significant and has influence and vice versa. The results of the t-test found that the tcount was 1.303 < from the ttable of 1.980 with a significant value of 0.196 > 0.05. So the motivational factors for using pirated software are not significant to the knowledge of open-source software, so Ho is accepted, and Ha is unacceptable.

Table 6 Test-t

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	14.251	1.077		13.228	.000
Motivasi	.107	.082	.130	1.303	.196

It can be done by calculating statistics using the coefficient of determination to determine the level of influence of motivational factors on knowledge.

Table 9. Determination Coefficient Test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.120[a]	.014	.004	1.80376

From the table, the value of R is known with a value of 0.120. The output result is a value of 0.014 as the coefficient of determination. So the impact of the independent variable, namely the motivation to use pirated software, on the dependent variable, namely knowledge of the software, is only 14%. Based on these results, it was found that the motivation to use pirated software positively affects knowledge of open-source software, but only by 14%. Because the significant value obtained is 0.196 > 0.05, the motivation to use pirated software is not significant to the knowledge of open-source software. The classic assumption test results, namely the Linearity test and the Heteroscedasticity test, found that the Linearity test was only 0.068,

and only 1 point differed from 0.05. Finally, on the Heteroscedasticity test, the results showed that there were symptoms of heteroscedasticity. Thus, the motivation to use pirated software is insignificant to the knowledge of open-source software, which means that Ho is accepted and Ha is rejected.

Based on the findings on the impact of motivation to use pirated software on knowledge of open-source software, several key points that require further discussion emerge. The coefficient of determination (R^2) value of 0.014 indicates that only 14% of the variance in knowledge of open source software can be explained by motivation to use pirated software, as explained by [23], highlighting that the relationship between these two variables is weak. It indicates that other factors may play a more significant role in influencing knowledge of open-source software. The remaining 86% of the variance remains unexplained, indicating the complexity of the factors contributing to software knowledge. The study also noted that motivation for software use is often multifaceted, involving personal, social, and contextual factors beyond the motivation to pirate alone.

Furthermore, the significance value of 0.196, more significant than the threshold of 0.05, indicates that motivation to use pirated software does not have a statistically significant effect on knowledge of open-source software. It is in line with the findings of [24], who showed that although there may be a positive correlation, it is not strong enough to be considered impactful in practice. Acceptance of the null hypothesis (Ho) strengthens the notion that motivation to use pirated software does not significantly improve knowledge of open-source software. Research conducted by supports this conclusion by emphasizing the need for a stronger educational framework to improve understanding of open-source software.

This finding is further supported by classical assumption tests, especially the linearity and heteroscedasticity tests. The linearity test result of 0.068 approaches the level of significance but does not confirm a strong linear relationship. In addition, the presence of heteroscedasticity indicates that the error variance is not constant, which can affect the reliability of the regression model. The research results [24] noted that regression models that do not meet this assumption may need to adequately capture the relationship between variables, thus affecting the validity of the results.

The limited impact of motivation to use pirated software on the understanding of open-source software has led to significant questions about the fundamental motivations and educational approaches. More research suggests that those who are likely to utilize software that has been illegally obtained may not necessarily make an effort to get a more in-depth knowledge of open-source products. This underscores the need for targeted teaching initiatives that emphasize the benefits and characteristics of open-source software, rather than solely addressing the motivations for piracy [25].

Future investigations should consider additional factors that may affect knowledge of open-source software. Research [26] has suggested that elements such as resource accessibility, formal education, and community participation in open-source projects could offer a more thorough understanding of how individuals gain knowledge in this domain. Moreover, qualitative research could provide deeper insights into the motivations behind software usage and the obstacles to learning about open-source alternatives.

4. Conclusion

The motivation for utilizing pirated software has a limited impact on the understanding of open-source software, accounting for only 14%, while the remaining 86% is influenced by other unidentified factors. This is evident from a t-count value of 1.303, which is less than the t-table value of 1.908, indicating that the null hypothesis (Ho) holds true. Consequently, the motivation to engage with pirated software does not have a significant effect on awareness of open-source alternatives. Nevertheless, this finding suggests that the reasons for using pirated software are complex and include perceived advantages, social pressures, and economic obstacles. These influences tend to emphasize immediate benefits or external factors rather than encouraging the exploration of alternative software options. Furthermore, issues like a lack of understanding regarding the advantages of open-source software and limited access to formal education contribute to the low level of familiarity with it. Therefore, there is a need for educational initiatives aimed at enhancing awareness of the benefits associated with open-source software, alongside strategies to minimize reliance on pirated versions. Future studies should investigate additional elements that may affect knowledge of open-source software, including community engagement, resource availability, and formal educational opportunities. A comprehensive approach is essential for comprehending how individual motivations relate to software knowledge and for creating more effective educational strategies.

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