Software Piracy in Vietnam: Analysis of Key Factors

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Abstract

This research focuses on the development and empirical validation of a model of software piracy behavior on the basis of deterrence theory, expected utility theory and the theory of reasoned action.
The total of sample numbered 86 and PLS (Partial Least Square) was utilized for analysis. The test of this study revealed that punishment severity was the greatest significant factor to influence to software piracy and subjective norms was also significantly related to it. However punishment certainty and software cost do not significantly affect to software piracy.

Keywords:

Software piracy, Deterrence theory, Subjective norm

Introduction

Software piracy refers to the use of uncertified computer software and the illegal distribution of the illegal copied software. According to the report of the Business Software Alliance (BSA) in 2006, lost revenues due to software piracy could reach $5 billion, increasing 15 percents compared to 2005. Moreover weighted mean of piracy rate over all nations is 35 percents and sub-mean of mid groups is 62 percents, which presents that the rate of software piracy exceeds 62 percents in more than a half of the countries invested.
To combat the serious loss from software piracy, two general methods have been widely used; preventives and deterrents. The role of preventives is to make it very hard to copy software. This way is to make copying activities take so much time and effort and eventually users not want to do it and give up. Utilizing programs is an example.
In spite of various plans built through researches of industry groups such as BSA (Business Software Alliance) and SPA (Software Publisher Association), their reports say that piracy loss has increased year by year. The countries are in order of high piracy rate, Armenia (95 percents) Moldova(94 percents), Azerbaijan(94 percents), Zimbabwe(91 percents) and Vietnam(88 percents) and those are in order of estimates of loss from the piracy actions, United State ($7,289m), China ($5,429m), France ($2,676m), Russia ($2,197m) and Japan ($1,781m) (BSA, 2006).
Much of the previous studies into illegal software copying has been approached in the perspective of macro-economy or differences between groups. These researches proved how piracy rate is related to those variables like GNP, regional environments, gender, educational level and age [22,36]. Recently not only this economical analysis but also studies on the decision-making process into software piracy behavior are reported by many researchers [26, 28]. However such studies have been performed mostly in developed countries like the U.S. and on the contrary, few researches are conducted in Asian and South American nations in which software piracy rate is high.
According to BSA's report in 2006, while piracy rate in European countries has reduced from 35% to 34% and in South America from 68% to 66%, it has risen from 54% to 55% in Asia where Vietnam whose piracy rate is 88% is the highest.
Therefore it is essential to study on the decision-making process in those nations of different regional, social and cultural environments for the sake of preparing more effective methods to prevent software piracy.
Accordingly this research will target Vietnam with the high piracy rate and compare the context and result suggested in the researches in developed countries with a lower piracy rate. It will be identified that how the significantly important variables tested in the previous researches work differently in dissimilar situations. This study will refine and develop the variables which influence to software piracy behavior in developing countries, and consequently suggest ideas to prevent software piracy on the basis of the results.

Literatures reviews

Piracy

There are many studies about software piracy that explain the factors influencing to software piracy. While a SPA study (2006) found that per-capita income is not an issue in software piracy growth, Shimpson [34] found evidence that the high price of software is a driving force in piracy in low GNP nations where residents cannot afford high priced software. They noted that an increase in per-capita GNP is associated with a decrease in piracy rates. Other factors

have also been suggested, including availability of pirated software, less stringent implementation of copyright regulations [26].
According to Koen[24], software piracy can be classified into three classes: soft lifting, commercial piracy, and corporate piracy. Among them, soft lifting which refers to illegal copying of software by individuals for personal use usually occurs when a person copies a friend's software or brings a copy home from work for a personal use. This form of piracy is not intended for direct financial gain and it is incorrectly believed by many to be legal.
A prior research on software piracy has predominantly investigated software piracy related to individuals as the unit of analysis and the motivating factors for individuals to pirate or purchase software [15]. They demonstrated that affordability and price constitute the primary reasons for pirating software, whereas need for a supporting material to use the software is the primary reason for purchasing software.

Deterrence theory

Deterrence theory like exchange theory and utility theory roots in philosophical utilitarianism in viewing a man as a "profit maximizer, that is, a calculator of profit from estimates of gain and cost resulting from the projected act" [20]. Deterrence theory focuses on type of potential cost, the threat of legally imposed physical or material deprivation; and on one type of project act, law violation. Deterrence theory is about punishing criminal activity. Therefore, the expected cost is the probability of being punished, reflected in arrest and conviction rates, operating in conjunction with the severity of punishment. In the late 1960s, Gary Becker [16] incorporated into his formal model of deterrence theory, explicitly stating that the theory's components, that is, certainty and severity of punishment are more or less influential than others depending on an individual's preference for risk. The certainty of punishment is more influential than the severity of punishment in the decision of whether or not to commit crime if an individual is risk acceptant. However if a criminal is risk averse, then the severity of punishment is more important than the certainty of punishment.
Deterrence theory proposes that as punishment certainty and punishment severity are increased, the level of illegal behavior should decrease. In essence, the unwanted behavior can be deterred through the threat of punishment. Ehrlich [13] directly related this theory to economic factors and found that many crimes against property are related to the expected gains of the crime versus the expected costs at the margin. The author found that the rate of some crimes is positively related to estimated gains and negatively related to expected costs. Straub [35] noted that deterrence measures are a useful primary strategy for reducing computer abuses. These findings have a direct bearing on the illegal software copying problem. The low probability of being caught was listed in a recent survey as one of the most important reason in the decision to illegally copy software [9]. In addition, previous studies [28] use those variables which are punishment severity and punishment certainty to predict software piracy behavior. Following this kind of study we established the following hypotheses

H1 Punishment severity has a negative impact on attitude toward software piracy.

H2 Punishment certainty has a negative impact on attitude toward software piracy.

Expected Utility Theory

Expected utility theory has been used prescriptively in management science (especially decision analysis), predicatively in finance and economics, descriptively by psychologists as well as played a central role in theories of measurable utility. The expected utility model has consequently been the focus of many theoretical and empirical researches, including various interpretations and descriptive modifications as a mathematical form [30].
Expected utility theory is a fundamental theory of much of the analytical work undertaken in the area of software piracy from the beginning [7, 11, 21, 22]. Either implicitly or explicitly, the factors identified using utility theory have been clearly shown to have an impact on the software piracy decision. In a survey of graduate and undergraduate students, it was found that the leading reason for people to illegally copy software was that the software was too expensive to purchase, indicating that the benefits of purchasing the software were outweighed by the costs [9].
Peace [27] said that in most cases, computer users have three possible courses of action when to face with a situation in which software can be used: purchasing the software, doing without the software or illegally copying the software. It is possible to describe these choices in terms of expected utility theory. In order to do so, it is necessary to determine the costs and benefits involved. In the case of illegal copying, costs result not only from purchasing the software but also from the punishment level and the punishment probability. The expected utility of illegal copying is the expected benefit gained from the action less the expected cost (calculated using the punishment probability and punishment level). The individual will illegally copy the software when the expected utility of software piracy is greater than the expected utility of not committing software piracy. Our study is based upon these references, adopting a hypothesis that when software is necessary, software cost shall have a significant influence on the intention to commit software piracy.

H3 Software cost has a positive impact on attitude toward software piracy.

Theory of Reasoned Action

Fishbein and Ajzen [1, 2] developed the theory of reasoned action (TRA) which has been widely studied in social psychology to describe the link between psychological

factors and behavioral intention toward a specific behavior. The theory is based on the suggestion that one's behavioral intention to a specific behavior is the major drive to determine his/her action. Then behavioral intention which is one's intention to perform or not perform can be predicted by the one's attitude and subjective norm.

This is to say that one's performance of a specified behavior is determined by his or her behavioral intention, and behavioral intention is jointly determined by his/her attitude and subjective norm concerning the behavior in question [8]. This attitude refers to an individual's positive or negative feeling toward performing the target behavior. An individual who considers that a specific action will bring positive outcomes will have a favorable attitude toward the behavior. This favorable attitude will affect intention, which will lead to the actual behavior. Subjective norms describe "a person's perception that most people who are important to him think he /she should or should not perform the behavior in question [8]. This subjective norms acts as pressures to the individual from social environments such as family, peer groups like friends and authority figures and is often referred to as peer norms.

In the context of software piracy, many researchers [10, 14, 28] developed a model using TRA to find out the factors influencing individuals with regard to software piracy. In their studies, attitude and subjective norms were found to be directly related to software piracy behavior. According to their findings, if individuals intend to pirate software, they are likely to carry out the actual pirating behavior unless something intervenes.

However Al-Rafee and Cronan [37] showed subjective norms work as a predictor of attitude through their software piracy model. They claimed that what affects ethical decision-making could also affect attitude, that is, one's attitude towards a specific behavior is likely to be influenced by significant peer groups [4]. This is also supported by other studies [9, 32, 34, 39]. Based upon preceding studies and operational definition, our study established the following hypotheses

H4 Subjective norm has a positive effect on attitude.

H5 Attitude has a positive effect on software piracy intention.

Table 1. Hypothesis

	Hypothesis
H1	Punishment severity has a negative impact on attitude toward software piracy
H2	Punishment certainty has a negative impact on attitude toward software piracy.
H3	Software cost has a positive impact on attitude toward software piracy.
H4	Subjective norms has a positive effect on attitude toward software piracy.
H5	Attitude has a positive effect on software piracy intention.

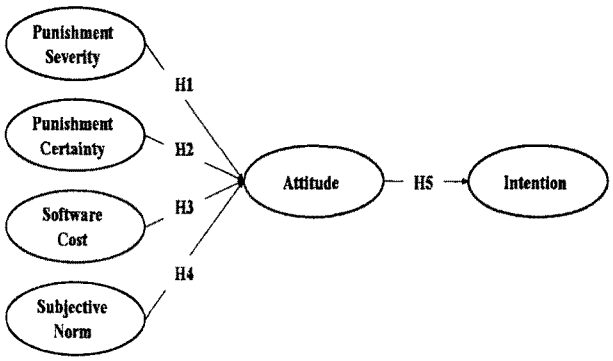

Figure 1 – Research Model

Research Model & Data Collection

This study develops a research model <Figure 1> based on deterrence theory, expected utility theory and the theory of reasoned action. It includes five hypotheses, as proposed above <Table 1>.

To study this research model empirically, 160 surveys were given out and 113 were returned (response rate: 70.6 percents). Among them some useless data were excluded and finally 86 data were used for analysis. 66percents of respondents are male (57) and 34percents of respondents are female (29). And average age of respondents is 21.2 and most of them are graduated from university or university students. 90.5 percents of respondents have experiences to commit software piracy contents more than twice.

The data were analyzed using PLS method, a structural equation modeling method. The measurement reliability and validity of the research variables and the structural model were tested to verify the proposed hypotheses. PLS has the advantage that it is quite robust with regard to several inadequacies (e.g. skewness or multicollinearity of the indicators, misspecification of the structural model) and that the latent variable scores always conform to the true values [23]. And there are no overall model fit statistics produced by PLS, it can estimate t-values for the loadings utilizing either a jackknife or bootstrap technique.

Reliability Test

Table 2. Mean, Cronbach's alpha, C.R, AVE

Variable	Mean	Alpha	C.R	AVE
AT	3.212	0.662	0.798	0.572
PS	5.132	0.681	0.831	0.621
PC	4.151	0.637	0.846	0.734
SC	4.829	0.743	0.833	0.626
SN	4.318	0.710	0.829	0.618
IT	3.814	0.678	0.922	0.855

*AT: Attitude, PS: Punishmnet Severity, PC: Punishment Certainty, SC: Software Cost, SN: Subjective Norm, IT: Intention

Cronbach's alpha was investigated in order to verify the internal consistency of each construct. As shown in Table 2., all the constructs passed the reliability test since an Cronbach's alpha value higher than 0.60 indicates that a construct has reasonable internal consistency.

Convergent Validity and Discriminant Validity Test

To test convergent validity and discriminant validity, confirmatory factor analysis was conducted. Values greater than 0.6 in factor loading imply that a construct retains convergent validity. Table 3. shows that all the factor loading vales are greater than 0.7. According to the confirmatory factor analysis, there exists reasonable convergent validity among all of the constructs. And when composite reliability is greater than 0.7, a construct retains both its internal consistency and convergent validity.

All the C.R values are over 0.8, which suggests that the parameter estimates are sound. Average Variance Extracted (AVE) was also investigated to examine the convergent validity. The criteria for the acceptable level of convergent validity is an AVE greater than 0.5. All AVEs for the constructs used in this study are between 0.572 and 0.855.

To further evaluate the discriminant validity of the constructs, we conducted cross-loading analysis and ratio of the square root of the AVE for each latent variable over the correlations of this variable with respect to all the other variables. Table 3. shows that all items' cross-loading values are greater than 0.7 with same construct and less than 0.7 with other constructs. It implies that there exists discriminant validity.

AVE analysis is a comparison between the ratio of the square root of the AVE for each latent variable and the correlations of this variable with respect to all the other

Table 3. Cross-loading Table

	PS	PC	SC	SN	AT	IT
PS1	**0.82**	0.08	0.23	-0.33	-0.38	-0.11
PS2	**0.78**	0.30	0.25	-0.29	-0.31	-0.05
PS3	**0.75**	0.06	0.31	-0.15	-0.34	-0.07
PC1	0.15	**0.82**	-0.03	-0.40	-0.15	-0.15
PC2	0.16	**0.88**	0.03	-0.15	-0.19	0.00
SC1	0.30	-0.09	**0.74**	0.11	-0.10	0.09
SC2	0.32	0.10	**0.71**	0.06	-0.02	0.13
SC3	0.26	0.04	**0.90**	0.15	-0.16	0.11
SN1	-0.32	-0.21	0.14	**0.81**	0.32	0.36
SN2	-0.19	-0.14	0.05	**0.73**	0.14	0.20
SN3	-0.23	-0.33	0.14	**0.80**	0.29	0.34
AT1	-0.36	-0.16	-0.29	0.16	**0.63**	0.16
AT2	-0.36	-0.11	-0.07	0.28	**0.8**	0.52
AT3	-0.30	-0.20	-0.05	0.32	**0.77**	0.47
IT1	-0.12	-0.11	0.14	0.40	0.47	**0.91**
IT2	-0.07	-0.03	0.09	0.36	0.53	**0.93**

Table 4. Discriminant Validity

	(1)	(2)	(3)	(4)	(5)	(6)
(1)AT	(.756)					
(2)PS	-.445	(.788)				
(3)PC	-.204	.182	(.857)			
(4)SC	-.154	.339	.002	(.791)		
(5)SN	.353	-.334	-.310	.160	(.786)	
(6)IT	.549	-.104	-.078	.127	.411	(.925)

* The number in parenthesis is the square root of AVE

variables. When each construct is more highly correlated with its own measure than with any other constructs, it indicates that reasonable discriminant validity exists among the constructs. Table 4. shows that each square root of AVE is greater than any other correlation with other constructs, so it means that discriminant validity is confirmed with this result.

Assessment of structural model

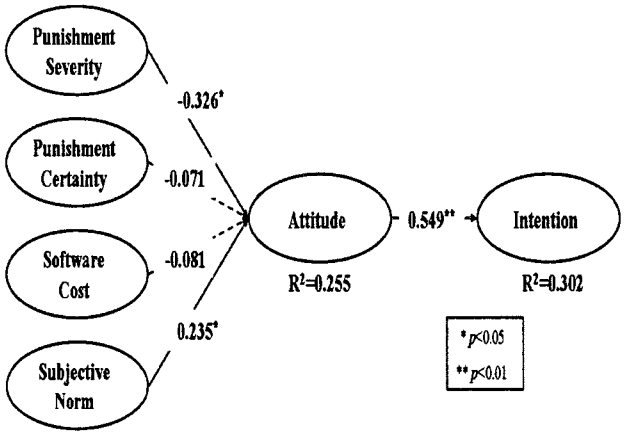

Figure 2 – Data Analysis Result

With an adequate measurement model, the hypotheses were tested by examining the structural model. The R^2 value was used to assess the proportion of variance in the endogenous constructs that could be explained by the antecedent constructs. Approximately 25.5percents of the variance in attitude was explained by the four antecedent factors, and 30.2percents of the variance in intention was explained by the attitude, making interpretation of the path coefficients meaningful.

Figure 2. represents data analysis results of this research. The significance levels of paths in the research model were determined using PLS bootstrap resampling procedures. Overall, the results suggest a satisfactory fit of the model to the data.

Three of five hypotheses in the research model were statistically supported. The results also confirmed that punishment severity is one of the most influential antecedent factors affecting attitude toward software piracy in the Vietnam (β = -0.326, $p < 0.05$). Punishment certainty and software cost, on the other hand, appears to have no

significant impact on attitude. The path coefficients from the PLS analysis are shown in Figure 2. The coefficients in the model represent standardized regression coefficients. The suggested lower limit of them for regression coefficients is 0.05[29]. In a more conservative position, path coefficients of 0.10 and above are preferable.

Table 5. Result of t-Test* $p<0.05$, ** $p<0.01$

Hypothesis	Path	*t*-Value
H1	Punishment Severity → Attitude	2.557*
H2	Punishment Certainty → Attitude	0.629
H3	Software cost → Attitude	0.506
H4	Subjective Norm → Attitude	2.211*
H5	Attitude → Intention	6.193**

H1, H4 and H5 were supported. Punishment severity (H1) and subjective norms (H4) were shown to exert a significant negative and positive influence on attitude. In addition attitude (H5) was shown to have a significant effect on intention to commit software piracy.

Conclusion

The purpose of this research is to empirically test whether those variables utilized in surveys of developed nations can be applied in developing ones and if so, what differences exist between them.

Particularly based on deterrence theory, it was analyzed how punishment severity and punishment certainty which are social factors to prevent software piracy as well as subjective norms which is a cultural factor to promote the activity work on decision-making process of piracy.

The result shows that only punishment severity and subjective norms had significant influences on attitude toward software piracy, and punishment certainty and software cost were not significantly related to attitude. From this outcome, the followings are indicated ; Firstly, although in the existing studies [28], both punishment certainty and punishment severity are significant variables influencing attitude, in the case of Vietnam only punishment severity has a significant impact, which hints that little recognition has been taken of punishment against the software piracy activity in Vietnam. That is to say, regardless of the existence of punishment in case of getting caught, it is inferred that Vietnamese likely commit software piracy without regarding those activities as illegal. Punishment severity, however, gives a significantly negative impact on attitude at the path coefficient level of -0.326. In consideration of this fact, if the level of punishment severity increases and awareness on the higher level of punishment regulation are raised, those actions will work as an effective barrier for software piracy.

Secondly, software price does not significantly relate to attitude of the Vietnamese while in Peace et al.[28]'s survey of students in the U.S., the price was significantly related. From this result, it is assumed that because Vietnamese hardly hold a financial ability to purchase software properties from the beginning due to the gap of price, they would commit illegal copying of software irrespective of the level of software price.

Lastly, subjective norms is a highly significant predictor of attitude. This presents that there is little perception for Vietnamese that software copying is an inappropriate behavior. Accordingly attempts to foster anti-piracy norms in the society should be exercised such as introducing social campaigns, educating on intellectual property rights, promoting the use of certified digital products in organization and so on.

The main contribution of this research is that an attempt to apply an empirical test has been made targeting a country of different economical and cultural environments with the existing variables developed and tested in other one of specific environments. Through such a study, it can be learned that variables have different relations each other under dissimilar situations and useful lessons are derived from it.

Despite of such suggestions, the current study has a limitation that due to the small number of samples, the result may not be generalized. Also the low level of R^2 value at 0.255 shows that there are more significant factors which play a role of software piracy behavior. Therefore, not mentioning other specific factors in case of Vietnam can be one of the limitations of this study. Future research, consequently, should include a study to refine and develop appropriate variables which can explain the software piracy behavior in Vietnam.

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Appendix A. Questionnaire

Punishment Severity
1. If I were caught committing software piracy, I think the punishment would be very low.
2. If I were caught committing software piracy, I would be severely punished.
3. If I were caught committing software piracy, I think the punishment would be not significant.
Punishment Certainty
1. If I committed software piracy, the probability I would be caught is very high.
2. If I committed software piracy, I would probably be caught.
Software Cost
1. I feel that software prices today are very low.
2. In my opinion, software packages today are very expensive.
3. If I wanted to buy a piece of software today, it would cost me a lot of money.
Subjective Norm
1. If I committed software piracy, most of the people who are important to me would approve.
2. Most people who are important to me would look down on me if I committed software piracy.
3. No one who is important to me thinks it is okay to commit software piracy.
Attitude
1. To me, committing software piracy is bad.
2. To me, committing software piracy is unpleasant.
3. To me, committing software piracy is wise.
Intention
1. I may commit software piracy in the future.
2. If I had the opportunity, I would commit software piracy.