

Understanding consumers' digital piracy behaviour: Explanation and prediction

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Abstract

This research aims to examine the explanatory and predictive power of seven theoretical models based on neutralisation theory, perceived risk theory, the theory of interpersonal behaviour, the theory of reasoned action, the theory of planned behaviour, the theory of self-regulation, and the norm activation theory. A total of 247 usable data were collected through a survey and analysed using partial least squares structural equation modelling. The in-sample and out-of-sample predictive power of each model was assessed. The results indicate that there are different factors influencing consumers' intentions to pirate digital products. Among the seven theories, the theory of interpersonal behaviour ranks first, and perceived risk theory last in terms of explanatory and predictive power. This study is the very first to examine the explanatory and predictive power of seven different theoretical models using advanced PLS-SEM techniques.

Contents

- [1. Introduction](#)
- [2. Literature review](#)
- [3. Methodology](#)
- [4. Data analysis](#)
- [5. Discussion](#)
- [6. Conclusion](#)

1. Introduction

Digital piracy in its many forms (unauthorised online and mobile network delivery and consumption of copyrighted works such as films, television programmes, software, music, video games, electronic books, and journals) remains a serious global issue for the protection and enforcement of intellectual property rights (International Intellectual Property Alliance, 2022; Koay, 2023). Since the copyright owner is not granted proper permission and compensation, digital piracy is detrimental to the revenue of the digital media industry and discourages relevant industry stakeholders from investing in the creation of new digital products, resulting in stagnant innovation (Casidy, *et al.*, 2017; Koay, *et al.*, 2020). Recent statistics indicate that more than 33 percent of music consumers engage in music piracy; lost revenues due to music piracy have caused more than 70,000 employees to lose their jobs annually in the United States alone; pirated movies receive approximately 230 billion views per year; the global movie industry loses between US\$40 and US\$97 billion per year due to digital piracy; and approximately 57 percent of the surveyed respondents in the Asia-Pacific and Central/Eastern Europe regions admitted to illegal file sharing despite being undetected; and in the majority of nations, unlicensed software usage remains above 50 percent (Business Software Alliance, 2018; Spajic, 2024). Although digital piracy is widespread everywhere, it is significantly more prevalent in developing countries than in developed countries (Martinez-Sánchez and Romeu, 2018). This is due to the fact that many developing countries (including India, Indonesia, and China) have not yet established transparent and consistent legal frameworks to combat digital piracy (Arli and Tjiptono, 2016; Bender and Wang, 2009).

Despite the fact that the phenomenon of digital piracy has been studied in specific contexts, such as software piracy, music piracy, movie piracy, and video game piracy, as well as other forms of digital piracy in general, the theoretical frameworks tend to be limited in scope, where a single-based theory was examined (Higgins and Marcum, 2011; Koay, *et al.*, 2020) and the empirical findings are fragmented, mixed, and inconsistent (Eisend, 2019; Lowry, *et al.*, 2017; Taylor, *et al.*, 2014). According to previous research, seven relevant explanatory theories are used to investigate the antecedents of digital piracy intentions: neutralisation theory, perceived risk theory, the theory of interpersonal behaviour (TIB), theory of reasoned action (TRA), theory of planned behaviour (TPB), theory of self-regulation (SRT), and norm activation theory (NAT) (Eisend, 2019; Lowry, *et al.*, 2017). However, specific studies systematically evaluating the merits of a wide variety of competing theoretical perspectives systematically are scarce to date (Koay, *et al.*, 2020). It is essential and intriguing to examine how well these theories perform in predicting digital piracy intentions (Taylor, *et al.*, 2014).

Two major contributions can be made to this study. This study's primary objective is to compare the explanatory and predictive power of the seven theories in order to identify the best theoretical framework for comprehending why consumers engage in digital piracy. Second, the findings will

enable the study to identify the significant factors that influence consumers' intentions to engage in digital piracy based on the various theories. The findings will serve as the basis for the development of strategies to combat digital piracy by governments and practitioners. Malaysia is a suitable context for this study because digital piracy has been a recurrent problem in the country, resulting in enormous economic and financial impacts. For instance, the Malaysian media and entertainment industry suffers a loss of RM3 billion annually as a result of digital piracy (Marketing-Interactive, 2021).

2. Literature review

2.1. Neutralisation theory

Neutralisation theory was developed to explain how juvenile delinquents can rationalise their involvement in criminal acts (Sykes and Matza, 1957). Sykes and Matza (1957) asserted that juvenile delinquents oscillate between law-abiding and law-breaking despite being aware that law-breaking conduct is illegal. However, they strive to discover exceptions to the rule or policy, effectively permitting themselves to commit the wrongdoing. Since its inception, the theory has expanded beyond juvenile delinquents to encompass all offenders and technology-driven crimes (Kirwan and Power, 2013). Digital piracy is enabled by technological advancements and is not the result of a deliberate effort to commit serious crimes (Brewer, *et al.*, 2018; Harris and Daunt, 2011). In comparison to physical crimes such as robbery and theft, digital piracy is viewed as a less violent act. Digital piracy has less severe consequences than other digital crimes such as child pornography, cyberbullying, and hacking (Hinduja, 2007; Malin and Fowers, 2009). In fact, consumers of digital piracy products are typically "regular consumers, who would not otherwise be involved in other activities considered criminal, but they do regularly access copyright-infringing sources" [1].

The neutralisation technique plays a significant role in facilitating the intentional performance of illegal or unethical acts (Gruber and Schlegelmilch, 2014), such as illegally downloading music. Multiple studies have shown that neutralisation plays a crucial role in fostering attitudes and intentions to engage in digital piracy (*e.g.*, Phau, *et al.*, 2014; Sahni, *et al.*, 2017; Vida, *et al.*, 2012). Sykes and Matza (1957) proposed five neutralisation techniques: denial of responsibility; denial of injury; denial of the victim; condemnation of the condemners; and appeal to higher loyalties. Denial of responsibility occurs when the offender provides an excuse for his or her actions, absolving the offender of responsibility and allowing him or her to avoid censure from others. Offenders believe that they are victims of circumstances and were forced into situations over which they had no control. Thus, they were not responsible for the crime. Denial of injury occurs when people rationalise their actions by downplaying the perceived harmful effects of their actions. Denial of the victim means that offenders can justify their immoral behaviour by marginalising the victim's existence, which results in a "victimless crime." Alternatively, the offender justifies the action by claiming that the victim deserved the outcome. Condemnation of the condemners occurs when offenders attempt to shift the condemnation of their actions onto their opponents, such as by claiming that their opponents are acting out of pure spite. An appeal to higher loyalties occurs when criminals violate the law by acceding to the demands of their acquaintances or superiors. In addition to these five techniques, additional research has identified two others: the metaphor of the ledger (Eliason and Dodder, 1999) and the defence of necessity (Thurman, 1984). The metaphor of the ledger refers to the notion that individuals weigh their criminal behaviour (a debit) against their lawful and ethical behaviour (a credit). Thus, individuals are able to justify their criminal conduct based on their overall ethical behaviour. The defence of necessity allows a person to justify a criminal act as necessary to be done without any guilt. These seven techniques were used by Siponen, *et al.* (2012) in their research on software piracy.

2.2. Perceived risk theory

Simply put, risk is the possibility that something negative will occur. People's subjective evaluation of the characteristics, probability, and severity of a risk is referred to as "risk perception" (Paul, 2016). Hence, people's perception of risk reflects their uncertainty regarding the loss, specifically the action, and this uncertainty will influence their intentions regarding the action. In the area of software piracy, studies have consistently found that the perception of risk is a significant factor in discouraging digital piracy intentions (*e.g.*, Akbulut and Dönmez, 2018; Chiou, *et al.*, 2005; Tomczyk, 2021). In a study on the topic, Jeong, *et al.* (2012) identified seven aspects of consumer piracy risks: 1) "Social risk" refers to a person's perception of societal pressures and the loss of one's social standing as a result of piracy, such as the loss of respect and the negative image acquired; 2) "Prosecution risk" refers to the possibility of being prosecuted for digital piracy; 3) "Psychological risk" refers to the potential adverse effect on the consumer's mental state, such as guilt, shame, and embarrassment; 4) "Privacy risk" signifies the risk of confidential and private information being compromised; 5) "Time risk" refers to the potential time and effort lost as a result of technological issues. For example, people reduce their use of peer-to-peer networks because they are unable to find the movies they desire; 6) "Performance risk" refers to the possibility that the illegally downloaded file will not perform as well as the licenced product; and finally, 7) "financial risk" denotes the potential for monetary loss as a result of piracy, such as the need to recover virus-infected data due to illegal downloads.

2.3. Theory of reasoned action

The theory of reasoned action (TRA) was developed by Fishbein and Ajzen (1975) to explain an individual's behaviour. It holds that the best predictor of a person's behaviour is his or her intentions to carry out a given behaviour. In other words, when a person demonstrates high levels of intention to engage in a desired behaviour, he or she will most likely act accordingly. Furthermore, a person's intentions to execute the target behaviour depend on his or her attitudes towards the behaviour and subjective norms. In this study, attitudes refer to the extent to which a consumer has a positive or negative evaluation of pirating digital products (Khang, *et al.*, 2012), and subjective norms are defined as the degree to which a consumer regards pirating digital products as acceptable among his or her social circle, including family members, friends, and colleagues (Pham, *et al.*, 2020). Consumers are more likely to exhibit a higher tendency to pirate digital products if they have positive attitudes toward piracy and believe that others accept it. Several studies have found that subjective norms have a significant positive influence on consumers' intentions to pirate digital products (*e.g.*, Akbulut, 2014; Al-Rafee and Dashti, 2012; Arli and Tjiptono, 2016; Hashim, *et al.*, 2018; Koay, *et al.*, 2020; Meireles and Campos, 2019; Olivero, *et al.*, 2019; Pham, *et al.*, 2020; Sang, *et al.*, 2015), whereas other studies discovered that subjective norms do not have a significant influence on intentions (*e.g.*, Koay, *et al.*, 2020; Pham, *et al.*, 2020). A meta-analytic study has consistently found that subjective norms are not strong predictors of intentions in general (Armitage and Conner, 2001).

2.4. Theory of planned behaviour

The theory of planned behaviour (TPB) is the extended version of the TRA (Ajzen, 1991). Similar to the TRA, the TPB postulates that an individual's intentions and behaviour are highly correlated. However, the TPB suggests that attitudes and subjective norms should not be the primary predictors of a person's intentions (Ajzen, 2020). This is due to the fact that behaviour is not always entirely voluntary and controllable (Ajzen, 1991). For instance, consumers may have good intentions toward pirating digital products, but if they lack the necessary skills, they may not be successful. Hence, perceived behavioural control was added to the TPB in order to predict intentions and behaviour (Ajzen, 1991). This inclusion significantly improves the ability to predict behavioural intentions (Ajzen, 1991). This theory has also been extensively applied to comprehend various types of human behaviour (e.g., Koay and Cheah, 2022; Koay, *et al.*, 2023, 2022; Leong and Koay, 2023). In the context of digital piracy, perceived behavioural control refers to the extent to which consumers believe they can easily pirate digital products (Koay, *et al.*, 2021). When consumers have the capability and resources to pirate digital goods, the likelihood of piracy will be high. For instance, downloading illegal software or cracking legitimate software requires a certain level of IT skills. Several empirical studies have examined the effect of perceived behavioural control on consumers' intentions to pirate digital products and found it to be statistically significant (e.g., Koay, *et al.*, 2020; Pham, *et al.*, 2020). Numerous empirical studies have used the TPB to comprehend digital piracy (e.g., Akbulut and Dönmez, 2018; Al-Rafee and Dashti, 2012; Arli, *et al.*, 2018; Hashim, *et al.*, 2018; Koay, *et al.*, 2020; Meireles and Campos, 2019; Olivero, *et al.*, 2019; Pham, *et al.*, 2020; Phau, *et al.*, 2014; Yoon, 2012).

2.5. Theory of interpersonal behaviour

The theory of interpersonal behaviour (TIB) was developed by Triandis (1980) to explain human behaviour and belongs to the same school of cognitive models as the TRA and the TPB. The TRA and the TPB aim to explain human behaviour in a concise manner, whereas the TIB's theoretical model includes more constructs to account for the dynamics of behaviour. The TIB differs slightly from the TRA in that it goes beyond attitudes, norms, and intentions to predict behaviour. Triandis (1980) postulated that perceived consequences, affect, and social factors are crucial intention-determining factors. Perceived consequences are the subjective probability that certain consequences will result from the piracy of digital products and that these consequences will have either a positive or negative value for the individual (Robinson, 2010). Affect is defined as the emotional response of a consumer to digital product piracy. Social factors refer to "an individual's internalisation of the reference groups' subjective culture, the specific interpersonal agreements that the individual has made with others in specific social situations" [2]. Consumers' decisions to engage in digital piracy are primarily influenced by the consequences of digital piracy, their feelings regarding digital piracy, and the opinions of their significant others regarding digital piracy. However, as discussed previously, social factors or subjective norms are not significant predictors of intentions (e.g., Koay, *et al.*, 2021). In addition to intentions, the TIB suggests that habits and facilitating conditions are predictors of behaviour. Habits reflect how frequently a consumer pirated digital products in the past, whereas facilitating conditions refer to the conditions that make digital product piracy easier. Some view habits and facilitating conditions as direct predictors of intentions or future behaviour (Gagnon, *et al.*, 2003; Moody, *et al.*, 2018). When a person repeatedly performs a behaviour over a period of time, he or she is less likely to deliberate consciously to perform the desired behaviour. In a similar manner, consumers who frequently pirate digital products have developed a habit that allows them to circumvent cognitive processes related to thought and planning (Akbulut, 2014; Koay, *et al.*, 2021).

2.6. Theory of self-regulation

Bagozzi (1992) argued that the TRA and the TPB were insufficient to fully explain a person's intentions to engage in a particular behaviour. Specifically, attitudes and subjective norms are deemed insufficient predictors of intentions, and intentions are deemed insufficient as a catalyst for action. Hence, Bagozzi (1992) proposed the theory of self-regulation (SRT) by incorporating desires into intention-based theories. Desires are interpreted as emotional or cognitive tendencies that direct one's conduct. Furthermore, cognitive and emotional self-regulatory processes are hypothesised to govern intention-based theories. Although the SRT provides extensive theoretical explanations for comprehending a person's intentions, it has not yet widely been applied to digital piracy. An exception has been Herjanto, *et al.*'s (2020) study on the significant role of shame and virtues in people's self-regulation of their decision to engage in digital piracy. Despite its limited use in digital piracy, the SRT has frequently been used as a supplement to both the TRA and the TPB in psychological research (Frattaroli, 2006; Leone, *et al.*, 1999).

2.7. Norm activation theory

Originating with Schwartz (1977), the norm activation theory (NAT) attempts to explain prosocial behaviour such as purchasing green products or recycling. Prosocial behaviour is regarded as beneficial to others (De Groot and Steg, 2010). This model was predicated on personal norms. Schwartz (1977) asserted that personal norms are characterised as feelings of moral obligation and primarily determined by two precursors: the awareness of the action's consequences and the attribution of responsibility for carrying out the specific action (Munerah, *et al.*, 2021; Schwartz, 1977). In the literature, there have been various inferences regarding whether the NAT should be reflected in a mediator model or a mediation model. According to the mediator model, awareness of consequences (and/via ascribed responsibility) influences personal norms. To moderate personal norms, the moderation model proposes an awareness of consequences and ascribed responsibility. De Groot and Steg (2009) examined these two models and, on the basis of substantial evidence, recommended that the NAT be used as a mediator model. Even within the mediator model, the nature of the relationship between awareness of consequences, attribution of responsibility, and personal norms is contested. Steg and De Groot (2010) juxtaposed the various perspectives through five empirical studies and reached the conclusion that a more robust and holistic interpretation is required for awareness of consequences and attribution of responsibility to jointly determine personal norms, which in turn determines prosocial behaviour.

All the research models are shown in Figures 1a–g.

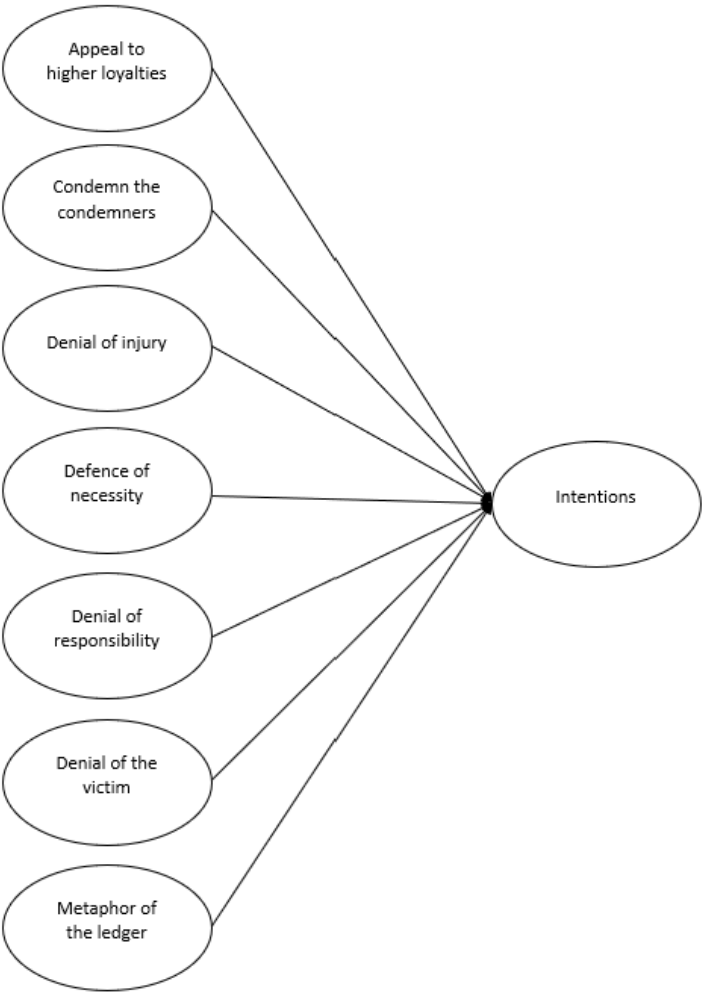


Figure 1a: Neutralisation theory.

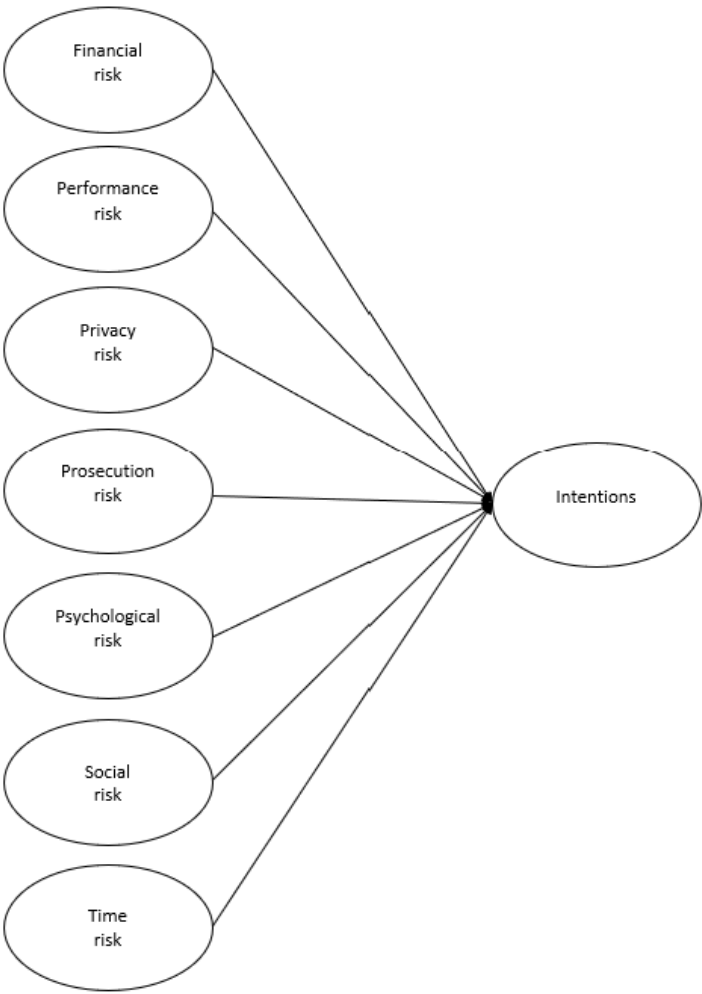


Figure 1b: Perceived risk theory.

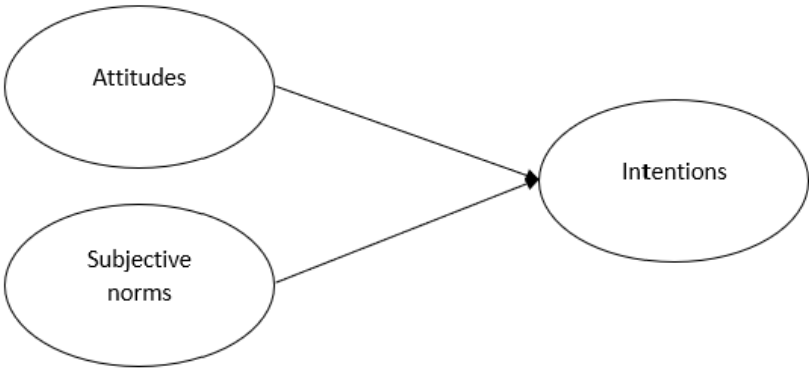


Figure 1c: Theory of reasoned action.

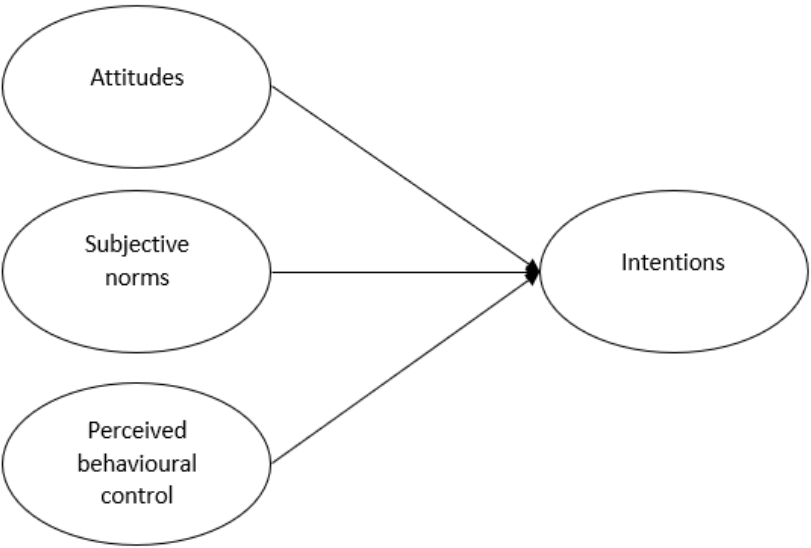


Figure 1d: Theory of planned behaviour.

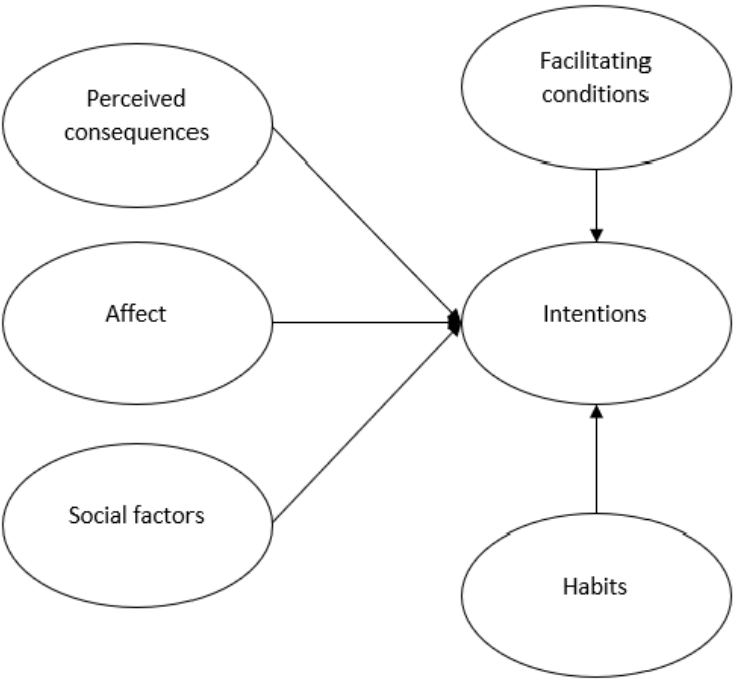


Figure 1e: Theory of interpersonal behaviour.

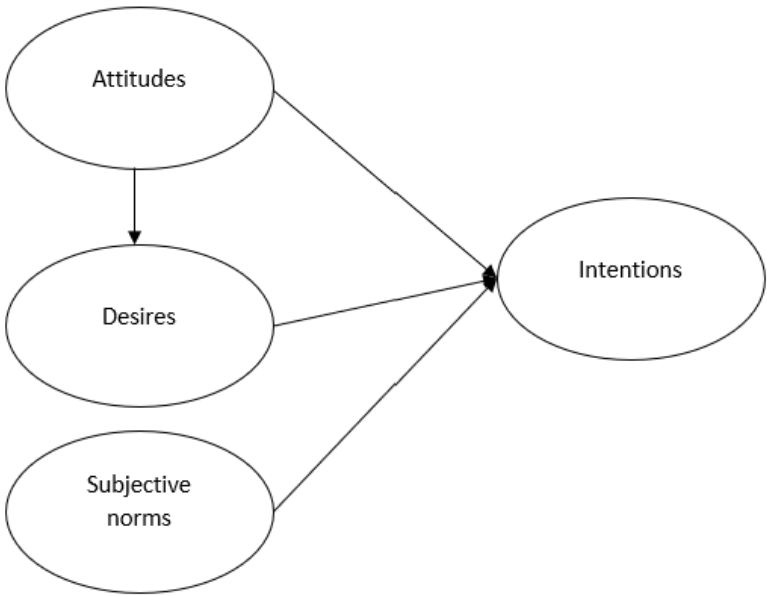


Figure 1f: Theory of self-regulation.

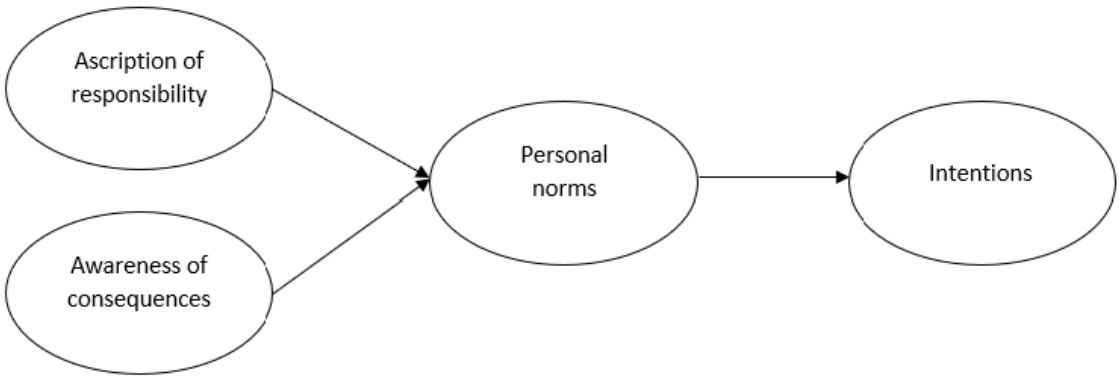


Figure 1g: Norm activation theory.

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3. Methodology

3.1. Procedure and sampling

A survey was used to collect the necessary data for the purpose of evaluating the explanatory and predictive power of the seven theoretical models. A survey questionnaire was designed to collect the necessary data for all variables involved in this study. Prior to collecting all of the data, the questionnaire was piloted with three doctoral students so that adjustments could be made. Some minor changes were made (*e.g.*, wording, instructions, and formatting) to the questionnaire based on their comments. To ensure that a sufficient level of statistical power was achieved for all the models, *a priori* power analysis using the G*power software was conducted (Faul, *et al.*, 2009). The minimum sample size was 103 for each model (*i.e.*, neutralisation theory and perceived risk theory) with the greatest number of predictors.

A research assistant was hired to collect data for this research project. Specifically, the research assistant circulated the online survey link to respondents via personal contacts and social media platforms. The online survey link was also posted on various social media groups to obtain more diversified respondents. A total of 247 usable data were collected for further analysis, with 68.4 percent having been completed by female respondents and 31.6 percent by male respondents (see [Table 1](#)). The majority of the respondents were Chinese (72.5 percent), followed by Malay (15.8 percent), and Indian (11.7 percent). Nearly 50 percent of the respondents held a bachelor’s degree. Regarding income, many respondents

were in the income group of RM 0–RM 2,000 (68.8 percent), followed by RM 2,001–RM 5,000 (23.5 percent), above RM 8,000 (5.3 percent), and RM 5,001–RM 8,000 (2.4 percent).

Table 1: Demographic profile

	Demographic	Frequency	Percentage
Gender	Female	169	68.4
	Male	78	31.6
Ethnicity	Malay	39	15.8
	Chinese	179	72.5
	Indian	29	11.7
Highest completed education level	High school	39	15.8
	Technical or vocational	13	5.3
	Pre-university	16	6.5
	Diploma	51	20.6
	Degree	120	48.6
	Postgraduate degree	8	3.2
Income level	RM 0 - RM 2000	170	68.8
	RM 2001 - RM 5000	58	23.5
	RM 5001 - RM 8000	6	2.4
	Above RM 8000	13	5.3

3.2. Measures

The questionnaire included three sections. The first section provided respondents with the necessary information regarding their participation in this research. The second section asked questions pertaining to the research topic, while the third section requested demographic information. All items were measured on a standard five-point Likert scale (1 = strongly disagree, to 5 = strongly agree). Intentions were measured by a three-item scale by Cronan and Al-Rafee (2008).

Neutralisation theory: This theory consists of seven neutralisation techniques, and all the scales were adapted from Siponen, *et al.* (2012). All constructs (*i.e.*, appeal to higher loyalties, condemn the condemners, defence of necessity, denial of injury, denial of responsibility, denial of the victim, and metaphor of the ledger) were measured by three items each.

Perceived risk theory: All the scales measuring the seven risk dimensions, including social risk (four items), performance risk (four items), prosecution risk (three items), psychological risk (four items), privacy risk (three items), time risk (four items), and financial risk (three items), were adapted from Jeong, *et al.* (2012).

The TIB: The scales to measure perceived consequences (six items) and affect (four items) were adapted from Robinson (2010). Furthermore, the scale consisting of three items by Morton and Koufteros (2008) was used to measure social factors. Facilitating conditions (three items) and habits (five items) were measured using the scales by Venkatesh, *et al.* (2012).

The TRA and the TPB: Attitudes and perceived behavioural control were assessed using a four-item scale and a five-item scale by Cronan and Al-Rafee (2008), respectively. In addition, the same scale used to measure social factors was also used to measure subjective norms.

The SRT: Similarly, the scales to measure attitudes and subjective norms were the same as those measuring the TRA and the TPB. Desires were measured using two items developed by Moody, *et al.* (2018).

The NAT: Awareness of consequences was measured using a four-item scale, ascription of responsibility using a three-item scale, and personal norms using a six-item scale. All the scales were adapted from Udo, *et al.* (2016).

4. Data analysis

This research employed partial least squares structural equation modelling (PLS-SEM) to examine which model had the most explanatory power and predictive power among the seven models. SmartPLS software (v.3.3.3) was used as the main analytical tool and was chosen because it offered researchers a statistical capability to “analyse competing models and select a model that achieves the best balance between explained variance and model parsimony” [3]. Furthermore, PLS-SEM provides some flexibility in the requirements of data distribution and sample size (Benitez, *et al.*, 2020).

4.1. Measurement model

Given that all the constructs in the seven research models were measured reflectively, the measurement models of all research models were evaluated based on three criteria: reliability, convergent validity, and discriminant validity (Benitez, *et al.*, 2020; Lim and Koay, 2024). First, the internal reliability was assessed by examining the values of Cronbach’s alpha (CA) and composite reliability (CR). All constructs achieved acceptable reliability as the values of CA and CR were all greater than 0.7. Furthermore, convergent validity was found to not be a concern in this research because the average variance extracted (AVE) and factor loadings of all constructs were greater than 0.5 and 0.7, respectively. Next, discriminant validity was tested using the Fornell-Larcker criterion and the heterotrait-monotrait ratio of correlations (HTMT) criterion. Based on the Fornell-Larcker criterion, the square root of the AVE of each construct was found to be greater than the correlation between the construct and any other construct in all the models. In addition, the HTMT values were all less than the recommended value of 0.85 in all the models (Henseler, *et al.*, 2015). It can be safely concluded that discriminant validity was ascertained.

4.2. Structural model

The relationships between each model were evaluated using the bootstrapping method, and the complete structural model results are presented in [Table 2](#). For neutralisation theory, condemnation of the condemners and denial of the victim had a significant positive influence on intentions, whereas appeal to higher loyalties, defence of necessity, denial of injury, denial of responsibility, and metaphor of the ledger had no significant influence on intentions. Surprisingly, for perceived risk theory, performance risk, and social risk had a significant positive influence on intentions, whereas privacy risk had a significant negative influence on intentions. Moreover, financial risk, prosecution risk, psychological risk, and time risk did not significantly predict intentions. For the TIB, four TIB variables, including affect, social factors, facilitating conditions, and habits, had a significant positive influence on intentions. However, perceived consequences had no significant influence on intentions as the confidence intervals contained a value of zero.

For the TRA, both attitudes and subjective norms had a significant positive influence on intentions. Similarly, for the TPB, attitudes, subjective norms, and perceived behavioural control had a significant positive influence on intentions. For the SRT, attitudes had no significant influence on desires but had a significant positive influence on intentions. Also, desires had a negative influence on intentions, and subjective norms had a significant positive influence on intentions. For the NAT, the ascription of responsibility and awareness of consequences had a positive influence on personal norms. Also, personal norms had a negative influence on intentions.

Table 2: Structural model results

Relationship	Beta	Std error	t value	p value	5.0%	95.0%	Remark
Neutralisation theory							
Appeal to higher loyalties -> Intentions	0.039	0.109	0.357	0.361	-0.150	0.212	Not significant
Condemn the condemners -> Intentions	0.251	0.097	2.605	0.005	0.088	0.400	Significant
Defence of necessity -> Intentions	0.007	0.117	0.061	0.476	-0.188	0.196	Not significant
Denial of injury -> Intentions	-0.111	0.118	0.934	0.175	-0.312	0.077	Not significant
Denial of responsibility -> Intentions	-0.052	0.084	0.615	0.269	-0.184	0.094	Not significant
Denial of the victim -> Intentions	0.393	0.087	4.543	0.000	0.241	0.528	Significant
Metaphor of the ledger -> Intentions	0.166	0.092	1.812	0.035	0.016	0.320	Significant
Perceived risk theory							
Financial risk -> Intentions	-0.028	0.133	0.213	0.416	-0.226	0.208	Not significant
Performance risk -> Intentions	0.454	0.149	3.056	0.001	0.281	0.613	Significant
Privacy risk -> Intentions	-0.273	0.162	1.681	0.046	-0.532	-0.016	Significant
Prosecution risk -> Intentions	-0.177	0.139	1.267	0.103	-0.406	0.038	Not significant
Psychological risk -> Intentions	-0.044	0.121	0.367	0.357	-0.303	0.102	Not significant
Social risk -> Intentions	0.234	0.143	1.638	0.051	0.016	0.398	Significant
Time risk -> Intentions	-0.124	0.141	0.878	0.190	-0.316	0.159	Not significant
Theory of reasoned action							
Attitudes -> Intentions	0.368	0.077	4.768	0.000	0.238	0.494	Significant
Subjective norms -> Intentions	0.387	0.080	4.811	0.000	0.249	0.514	Significant
Theory of planned behaviour							
Attitudes -> Intentions	0.303	0.082	3.702	0.000	0.166	0.435	Significant
Subjective norms -> Intentions	0.284	0.087	3.272	0.001	0.141	0.427	Significant
Perceived behavioural control -> Intentions	0.252	0.071	3.565	0.000	0.139	0.369	Significant
Theory of interpersonal behaviour							
Perceived consequences -> Intentions	-0.086	0.047	1.827	0.034	-0.143	0.014	Not significant
Affect -> Intentions	0.165	0.074	2.235	0.013	0.044	0.285	Significant
Social factors -> Intentions	0.150	0.075	1.995	0.023	0.031	0.273	Significant
Facilitating conditions -> Intentions	0.270	0.064	4.213	0.000	0.171	0.379	Significant
Habits -> Intentions	0.334	0.077	4.323	0.000	0.211	0.468	Significant
Theory of self-regulation							
Attitudes -> Desires	0.032	0.070	0.448	0.327	-0.090	0.136	Not significant
Attitudes -> Intentions	0.359	0.076	4.726	0.000	0.235	0.486	Significant
Desires -> Intentions	-0.111	0.048	2.323	0.010	-0.188	-0.030	Significant
Subjective norms -> Intentions	0.407	0.083	4.905	0.000	0.261	0.538	Significant
Norm activation theory							
Ascription of responsibility -> Personal norms	0.164	0.064	2.537	0.006	0.060	0.269	Significant
Awareness of consequences -> Personal norms	0.747	0.056	13.240	0.000	0.651	0.835	Significant
Personal norms -> Intentions	-0.323	0.277	1.166	0.122	-0.543	-0.218	Significant

4.3. Structural model comparisons

The assessment of the explanatory and predictive abilities of seven models was conducted in two stages. The first stage involved assessing the in-sample predictive power of all the models using the PLS criteria (R^2 , adjusted R^2 , and Q^2) and the information-theoretic model-selection criteria (FPE, Cp, AIC, AICc, AICu, BIC, GM, HQ, and HQc) (Sharma, *et al.*, 2021, 2019). The information-theoretic model-selection criteria offered information regarding how well a model achieved a balance between theoretical consistency and high predictive power (Sharma, *et al.*, 2021). The second stage examined the out-of-sample predictive power of all the models using the PLS-predict algorithm, which provided out-of-sample metrics (e.g., RMSE, MAE, and Q^2_{predict}) (Shmueli, *et al.*, 2016).

4.3.1. First stage: Ranking models based on explanatory power (in-sample)

In this research, the in-sample predictive power of all seven models was compared using the PLS criteria and the information-theoretic model-selection criteria, and the full results can be seen in Table 3. Based on the PLS criteria, the TIB was on top of the list among the seven models with the highest R^2 , adjusted R^2 , and Q^2 values, whereas perceived risk theory was ranked last with the lowest R^2 , adjusted R^2 , and Q^2 values. Next, the information-theoretic model-selection criteria can “balance explanation and parsimony by rewarding higher fit but penalising unwarranted model complexity” [4], and can overcome the issues of overfitting. Each model was ranked based on the rank total, and the rank total was calculated based on the sum of the rankings for each criterion. The TIB appeared to be the best overall model that had a fair balance in terms of theoretical consistency and high predictive power, whereas perceived risk theory had the worst explanatory and predictive power compared to the rest of the theories.

Table 3: Model comparisons focusing on explanation and parsimony (in-sample measures).

Model	R^2	Adj. R^2	Q^2	FPE	Cp	AIC	AICu	AICc	BIC	GM	HQ	HQc	Rank total	Rank
Theory of interpersonal behaviour	0.632	0.624	0.538	0.385	11.000	-235.662	-229.588	13.807	-214.606	279.056	-227.184	-226.499	20	1
Theory of planned behaviour	0.500	0.494	0.426	0.515	7.000	-164.088	-160.055	85.161	-150.050	268.038	-158.436	-158.096	26	2
Theory of self-regulation	0.470	0.464	0.407	0.545	7.000	-150.009	-145.977	99.239	-135.972	268.038	-144.358	-144.018	39	3
Theory of reasoned action	0.459	0.455	0.396	0.552	5.000	-146.744	-143.726	102.421	-136.216	262.528	-142.505	-142.294	43	4
Neutralisation theory	0.371	0.352	0.301	0.669	15.000	-99.406	-91.274	150.353	-71.331	290.075	-88.103	-86.951	62	5
Norm activation theory	0.104	0.101	-0.004	0.907	-8.418	-24.244	-22.236	224.855	-17.225	245.601	-21.418	-21.306	65	6
Perceived risk theory	0.136	0.111	0.104	0.918	15.000	-21.214	-13.082	228.545	6.861	290.075	-9.911	-8.759	81	7

Note(s): Models are organised based on the overall rank total. Rank Total was calculated for each model as $\sum R_{mc}$; where R_{mc} is the rank of a model m according to a criteria c . Models with lower rank values are preferred over models with higher rank values in terms of explanatory power, parsimony, and in-sample prediction. Models with higher values of R^2 , adjusted R^2 , and Q^2 ; and lower values of information theoretic criteria (FPE, Cp, GM, AIC, AICc, AICu, BIC, HQ, and HQc) are preferred.

4.3.2. Second stage: Ranking models based on predictive power (out-of-sample)

The in-sample predictive assessment using the measures of R^2 , adjusted R^2 , and Q^2 might be subject to overfitting issues. Hence, in the second stage, the PLS-predict algorithm was used to generate k-fold cross-validated prediction errors and prediction error summaries statistics, which provide information on which model has the most out-of-sample predictive power (Shmueli, *et al.*, 2016). Each model was ranked based on the rank total, and the rank total was calculated based on the sum of the rankings for each criterion. As shown in Table 4, the TIB has the lowest values for the root mean square error (RMSE) and the mean absolute error (MAE), and the highest value for the Q^2_{predict} , indicating that it has the strongest out-of-sample predictive power (Shmueli, *et al.*, 2019). On the other hand, perceived risk theory showed the poorest performance in terms of out-of-sample predictive power because the RMSE and the MAE values were the lowest. The full ranking can be seen in Table 4.

Table 4: Model comparisons focusing on out-of-sample prediction

Model	RMSE	MAE	Q^2_{predict}	Total rank	Rank
Theory of interpersonal behaviour	0.633	0.461	0.607	3	1
Theory of planned behaviour	0.730	0.551	0.476	6	2
Theory of reasoned action	0.751	0.554	0.445	10	3
Theory of self-regulation	0.752	0.553	0.443	11	4
Neutralisation theory	0.837	0.624	0.313	15	5
Norm activation theory	0.978	0.786	0.045	19	6
Perceived risk theory	0.984	0.794	0.046	20	7

Note(s): Models are organised based on the overall rank total. Rank Total was calculated for each model as $\sum R_{mc}$; where R_{mc} is the rank of a model m according to a criteria c . Models with lower rank values are preferred over models with higher rank values in terms of out-of-sample prediction. Models with lower values of RMSE and MAE; and higher values of Q^2_{predict} are preferred.



5. Discussion

5.1. Theoretical contributions

The findings of this study indicated that the TIB was the best in terms of explanatory and predictive power. Consistent with Robinson (2010), some TIB predictors, including affect, social factors, habits, and facilitating conditions had a significant positive on intentions. Such findings indicate that consumers are more likely to engage in digital product piracy when they have positive feelings about it, their significant others view it as acceptable, they have regularly engaged in it in the past, and favourable conditions exist. Past studies have shown that habits play a very important role in affecting consumers' decision-making processes (e.g., Akbulut, 2014; Koay, *et al.*, 2021; Lowry, *et al.*, 2017).

Next, the TPB was another theory that demonstrates good explanatory and predictive power, outperforming the TRA and the SRT. This study's findings demonstrated that attitudes, subjective norms, and perceived behavioural control were precursors of intentions. Consistent with the TRA, the TPB, and the SRT, consumers' decisions to pirate digital products hinged on their positive or negative evaluation of the behaviour and how their important ones perceived the behaviour. In accordance with the TPB, consumers' intentions to pirate digital products may also be influenced by their perceptions of internal and external factors governing their behaviour (e.g., Arli and Tjiptono, 2016; Koay, *et al.*, 2020; Pham, *et al.*, 2020). To successfully and easily pirate digital products, consumers must possess the necessary knowledge and tools. Moreover, attitudes were found to have no influence on desires. Surprisingly, we found that desires decrease intentions.

Neutralisation theory was ranked number five in terms of explanatory and predictive power among the seven theories. The ranking was expected as Lee, *et al.* (2019) found that neutralisation as a whole was not significantly related to consumers' intentions to engage in music and software piracy. In this study, the impact of seven neutralisation techniques on intentions was explored. However, it was found that only three neutralisation techniques, including condemn the condemners, denial of the victim, and metaphor of the ledger, were significant to intentions. To overcome the guilt of pirating digital products, consumers (the offenders) minimised the focus of attention on their actions and maximised the focus of attention on the condemners' actions. Furthermore, consumers tended to think that pirating digital products would not result in any harm to anyone and justified their digital piracy behaviour by rationalising that their good behaviour should be compensated by other instances of good behaviour. Other neutralisation techniques like appealing to higher loyalties, defence of necessity, denial of injury, and denial of responsibility did not have any significant deterrent effect on intentions. This lack of deterrent effect could be attributed to various factors. Firstly, the individual nature of digital piracy means that actions are often not directly linked to broader social or moral causes, rendering appealing to higher loyalties irrelevant. Secondly, the defense of necessity is generally inapplicable because consumers do not perceive piracy as a necessity due to the wide availability of legal and affordable alternatives. Furthermore, the insignificant influence of denial of injury on intentions may stem from the fact that consumers often do not perceive any immediate or tangible harm to the creators or producers of the content. Lastly, consumers engaging in digital piracy may feel they are not directly responsible for the consequences since they are not physically taking something from someone else, thus justifying why denial of responsibility is not significant.

Compared to other investigated theories, the NAT performed relatively poorly in explaining and predicting intentions to pirate digital products. The findings of this study indicated that personal norms were a significant factor in predicting intentions, indicating that consumers with high levels of moral obligations will likely refrain from pirating digital products. In addition, the ascription of responsibility and awareness of consequences significantly affected personal norms. Unfortunately, although these two factors could increase consumers' personal norms, there was insufficient influence to prevent consumers from pirating digital products.

Among the seven theories, perceived risk theory demonstrated the poorest in terms of explanatory and predictive power. In particular, it was found that privacy risk had a significant negative influence on intentions. As pirating digital products may require consumers to download cracked programmes from unknown sources, consumers may be at risk of losing private and confidential information. Next, surprisingly, social risk was found to have a significant influence on intentions, indicating that consumers were more likely to engage in digital piracy when they perceived a high social risk. One possible reason for this is that digital piracy is a commonly accepted behaviour. Consequently, they may feel there is no need to conform to societal norms or legal regulations, resulting in higher intentions to pirate digital products. Counterintuitively, performance risk was found to have a significant positive influence on intentions. Despite the fact that pirated versions may not match the performance of the original digital products, consumers were still inclined to acquire them through piracy. This willingness stemmed from the absence of financial

commitment; consumers recognised the potential performance risk but were nonetheless willing to take a chance, as there were no associated costs (Aversa, *et al.*, 2019).

Next, this study's findings revealed that consumers' intentions to pirate digital products were not influenced by financial, prosecution, psychological, or time risks. Digital piracy has become more prevalent due to the ease with which consumers can access and pirate digital products. As piracy becomes more widespread, the perceived risks have diminished, making it a more appealing option for consumers. Technological advancements, such as VPNs and anonymous browsing, have played a significant role in facilitating piracy by reducing the risk of detection and prosecution. These technologies have enabled some consumers to hide their online activities, making it more difficult for authorities to track and prosecute those engaged in piracy. Moreover, the availability of user-friendly piracy tools and platforms has further simplified the process, encouraging more individuals to engage in piracy. These tools provide a seamless and low-risk experience, making it easier for consumers to pirate digital products without considering associated risks. As a result, the benefits of piracy, such as free access to digital content, have substantially outweighed the risks involved, driving more consumers to engage in piracy.

5.2. Managerial implications


This study provides useful implications that could be used as a foundation for combating digital piracy. First, digital companies are responsible for promoting the importance of consumers purchasing original digital products as opposed to pirating digital products through marketing campaigns and activities, stressing how piracy could hinder the digital industry's development. This is due to the fact that digital companies are victims of digital piracy, which means they lose profit and consequentially have diminished resources to invest in the development of new digital products. Furthermore, if consumers were conscious of the negative ramifications of digital piracy, their attitudes towards and emotions toward digital piracy may diminish.

Next, it is imperative for digital companies to emphasise the benefits of purchasing original digital products. By doing so, they can enhance the perceived value of legitimate products in the eyes of consumers. Creating certain essential features accessible only online enables digital companies to verify the authenticity of digital products, especially software. This approach significantly increases the likelihood that consumers will opt for original digital products over pirated versions. Furthermore, digital companies should take an active role in disseminating information to consumers via social media platforms, outlining the risks associated with pirating digital products by downloading from illegal sources. Piracy exposes personal information to malicious third parties, making it extremely dangerous. This recommendation is consistent with this study's findings, indicating that privacy risk is a significant predictor of consumers' intentions to engage in piracy. Therefore, by proactively educating consumers about the risks, digital companies can effectively deter piracy and promote the purchase of original digital products.

The perception of digital piracy by others plays a significant role in affecting consumers' decisions to pirate digital products. Hence, it is essential to educate individuals early on about the dangers of digital piracy. For instance, government agencies may add content related to anti-digital piracy to the curriculum. Perceived behavioural control and facilitating conditions are two additional similar factors that significantly affect consumers' intentions to pirate digital products. Digital companies should make it more difficult for consumers to crack their digital products and actively remove Web sites that offer free downloads for their products. In addition, some consumers may be unable to afford the original digital products, causing them to resort to pirated digital products. Accordingly, digital companies are advised to offer digital products with varying components based on consumer preferences and to implement a differential pricing strategy. This strategy enables consumers to acquire what they really need at affordable prices.



6. Conclusion

This study confirmed that the TIB was the superior theory to explain and predict consumers' intentions to pirate digital products, whereas perceived risk theory appeared to be the weakest compared to the other six theories. Several limitations of this study should be highlighted for further research. First, this study employed a cross-sectional research design, which limited the findings to drawing definitive causal inferences. This weakness could be rectified by using a longitudinal research design in future studies. Second, although this study validated the explanatory and predictive power of seven theories, other theories were not considered, such as religiosity, deterrence, and personality theories. Future studies are encouraged to examine the explanatory and predictive power of these theories. Third, it is important to note that the conclusions drawn from this study might not be universally generalisable due to the limited scope of data collected, which was solely from Malaysia. Therefore, future researchers are advised to gather data from multiple countries to confirm and validate these findings. By collecting data from various countries, researchers could ensure that the conclusions drawn are applicable across different cultural contexts and settings, thus enhancing the generalisability and reliability of the results. 

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Notes

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3. Sharma, *et al.*, 2018, p. 521.

4. Sharma, *et al.*, 2018, p. 522.

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