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Digital piracy: factors that influence the intention to pirate - A structural equation model approach

Rúben Meireles[1]
Pedro Campos[1,2]

[1] **FEP-UP, School of Economics and Management, University of Porto**
[2] **LIAAD INESC TEC**

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DIGITAL PIRACY: FACTORS THAT INFLUENCE THE INTENTION TO PIRATE – A STRUCTURAL EQUATION MODEL APPROACH

Rúben Meireles[1]
Faculty of Economics, University of Porto
R. Dr. Roberto Frias, 4200-464, Porto, Portugal
Pedro Campos
Faculty of Economics, University of Porto and LIAAD INESC TEC
R. Dr. Roberto Frias, 4200-464, Porto, Portugal

Abstract

Faster internet connections are breaking most of the geographic barriers. At the same time, the huge digital content that have been generated in last years is motivating new forms of digital piracy. We know that piracy of copyrighted digital material has a huge impact on countries' economy, being a major issue for the whole society and not only for content creators. The purpose of this paper is to investigate digital piracy intention. For that purpose, we have expanded the framework of the theory of planned behavior using the utility theory, the deterrence theory and other relevant constructs**.** Using data from students of a Portuguese university and high school, a sample of 590 questionnaires has been collected. Two models were developed and analyzed using structural equation modeling. The first considers the full sample (Full Model), while the second considers only those who had pirated (Pirate Model). The pirate model confirmed the existence of a significant and strong relation between past behavior and intention towards digital piracy.

Keywords Information and Internet Services; Computer Software, Digital Piracy, Theory of Planned Behavior, Deterrence Theory, Structural Equation Modeling

[1] Corresponding author: 201300080@fep.up.pt

Introduction

In the last fifteen years the world changed dramatically. With increasingly higher internet connections and computing technologies all of us became closer, breaking most of the geographic barriers. Nevertheless, in spite of all the obvious benefits, there is one major problem that still torments the copyright industry: the digital piracy.

This form of piracy, defined by Al-Rafee and Cronan (2006, p. 237) as "the illegal copying/downloading of copyrighted software and media files", goes beyond the broadly studied illegal copying of software, which gain traction in the mid-80s with Richard Mason's (1986). However, almost thirty years later digital piracy still is a major problem, where previous limitations like internet bandwidth, storage space and quality (Bhattacharjee *et al*, 2003; Wang, 2005) are now a problem of the past.

Digital piracy has a huge impact on a country's economy, with most studies finding that piracy harms sales, a lower rate of piracy would most likely mean more earnings, jobs and taxes (BSA, 2014; Centro de Estudos Aplicados da Universidade Católica Portuguesa, 2012; Danaher et al., 2014; Siwek, 2007; De Vany and Walls, 2007). As such, piracy of copyrighted material is a major issue for the whole society and not only the content creators. Alarmingly, consumers still do not consider piracy as an inappropriate behavior, furthermore there is a strong believe that this kind of behavior is not ethically wrong and the fear of consequences for many does not concern them much (Christensen and Eining, 1991; Wang, 2005; Lysonski and Durvasula, 2008; Jacobs *et al*, 2012).

All such literature shows how important this line of investigation is, having an actual impact on real world. The aim of this work is to use behavioral and economic theories to help understand some of the factors that may influence an individual's intention to pirate digital material. As far as this research goes, digital piracy intention was never analyzed in Portugal. A broader model (in comparison with previous research) is analyzed, addressing not only factors capable of influence intention to pirate, but also factors capable of influencing intention in an indirect fashion, being mediated by the previous ones. Although most of the

factors employed are not new in piracy research there is an exception, perceived value. Another interesting innovation is the development of two models from the same sample, one considering only those who had pirated before, and other considering everyone.

Culture also implies the need to study digital piracy across different cultures, as demonstrated by Al-Rafee and Dashti (2012). This is an important variable that should be taken in account, the study of digital piracy across cultures employing a set of identical base factors will help understand how intention is differently affected and how policy makers should adjust policies between cultures.

This research will replicate and extend on previous piracy work (Peace *et al.*, 2003; Cronan and Al-Rafee, 2008; Al-Rafee and Dashti, 2012). A new factor in piracy research, perceived value, is also analyzed. This allowed us to specify and estimate all the hypothesized relations, as well to evaluate the resulting structural regression models. These were estimated using the maximum likelihood method. The factors perceived behavioral control and moral obligation were significant predictors of intention in both models, but subjective norms only presented a significant effect in the full sample model. Punishment certainty was also a significant predictor of perceived behavioral control in both models. Attitude was not significant predictor of intention and its antecedents also showed some mixed results, punishment certainty and severity did not present a significant effect in both models, however digital media cost and perceived value were significant predictors of attitude but only in the full model. The pirate model confirmed the existence of a significant and strong relation between past behavior and intention towards digital piracy.

The relevance of this study is related to the fact that better understanding of digital piracy behavior will help develop new strategies and ultimately reduce piracy. This investigation assists to fulfill the need to study digital piracy across cultures. The development of two broad models that addresses not only factors capable of influencing intention directly, but also antecedents of those factors, capable of influence intention in an indirect fashion is a new contribute that helps to understand how intention is differently affected and how policy makers should adjust policies to our culture .

The paper is structured as follows: first, in Section 2, we focus on literature overview of digital piracy; Section 3 is devoted to the Research Methodology and model development, where we describe the theoretical foundations of previous models namely, Theory of Planned Behavior, Moral Obligation, Past Piracy Behavior, Deterrence Theory, Software and Media Cost and Perceived Value. We also include the hypotheses of our model. Section 4 contains the results; Finally, in Section 5, the conclusions are presented: we start by the discussion and implications, followed by limitations, and future research directions.

1. Software Piracy Research

The first major concern regarding copyright infringement was software piracy. Christensen and Eining (1991), applying the Theory of Reasoned Action (Fishbein and Ajzen, 1975) found that attitudes toward piracy and subjective norms were both related with the student's propensity to pirate. Gopal and Sanders (1997, 1998, 2000) found that deterrence measures, ethics, sex and age are related to an individual's predisposition to pirate, and that the size of a software industry is inversely related to piracy rates (regardless of a country wealth). The authors also established the existence of a significant effect between income and global piracy rates, proposing global price discrimination as the first line of defense against piracy. Their work was also supported by Shin *et al.* (2004) finding that not only "poor countries are more involved in software piracy, but also that high collectivistic countries are involved in piracy" (p.105).

Tan (2002) focused his attention on the ethical judgment associated with software piracy. His results supported the hypothesis that both perceived risks and moral judgment have a negative impact on intention. Peace *et al.* (2003) investigated software piracy in the workplace relying on expanded a model using the Theory of Planed Behavior (TPB). It showed that the TPB constructs (attitude, subjective norms, and perceived behavior control) significantly influence people's intention. Attitude presented the strongest effect on piracy intention, and its predicted antecedents (software cost, punishment severity and certainty) were found to have a strong relationship with attitude, also the hypothesis of punishment certainty as a control belief for perceived behavior control was strongly supported. Similar

results were found by D'Astous *et al.* (2005) for online music piracy, with all the factors derived from the TPB having a positive and statistically significant impact on the intention to engage in piracy; additionally past piracy behavior also had a strong influence on intention. Al-Rafee and Cronan (2008) also using an extended TPB model considering moral obligation and past piracy behavior, sought to analyze digital piracy intention. The results showed that only subjective norms were not being a significant predictor of intention.

Limayem *et al.* (2004) found that social factors, along with perceived consequences had a positive relationship with intention to pirate software, and that habits and facilitating conditions affect the actual software piracy behavior. Surprisingly intentions did not led to engagement.

Another theory that has been used to explain human behavior and software piracy in particular is the equity theory. Douglas *et al.* (2007) using reciprocal fairness, procedural fairness and distributive fairness as antecedents of equity found that the first two factors were significant determinants, and that equity (perceived fairness/justice of the exchange by the consumer) had a negative and statistically significant impact on software piracy.

While many previous studies have focused on software piracy, others have dedicated their attention to different areas of digital piracy or investigated it as a whole. Bhattacharjee *et al.* (2003) pointed out that the general ethical model of software piracy is broadly applicable to digital audio piracy, and that despite the significant price difference between software and music albums, it is reasonable to admit that demand is quite elastic for both, since increasing the price of digital material has a strong positive effect on piracy. Furthermore, with increasingly higher internet connections consumer's price sensitivity increases. Gopal *et al.* (2004) also analyzed music piracy, but using the concept of piracy club size as a proxy of piracy level. They found that ethics has a very strong relationship with club size, and that justice is positively related to ethics, but having a very small effect on club size. In addition, the amount of money saved by using pirated content was a moderately strong predictor of piracy.

More recently Al-Rafee and Dashti (2012) argue that individual's intention regarding digital piracy could change between cultures. Using two samples from different cultures (United States and Middle East) they developed a model expanding the TPB framework with

moral obligation. Only the variable subjective norms in the U.S. was not a significant predictor of intention, and as expected all the variables had a different impact on people's intention Their work shows that culture can have a significant impact in intention, and also highlights the need to study digital piracy across different cultures, since policies should be adjusted to each country.

2. Research Methodology: Development of the Hypotheses, Data and Methods

In this section we introduce the Research Methodology. For that purpose, we need to go back to the theoretical foundations of previous models, namely the Theory of Planned Behavior, Moral Obligation, Past Piracy Behavior, Deterrence Theory, Software and Media Cost and Perceived Value. We also include the hypotheses that are comprised in our model.

Theory of Planned Behavior

The theory of planned behavior (Ajzen, 1985, 1991, 2002a) is a well known, recognized and empirically supported theory for predicting intentions and behavior (Armitage and Conner, 2001). The theory emerged from the theory of reasoned action (Fishbein and Ajzen, 1975), which was designed to predict behaviors that are under volitional control. However, it is clear that most of the behaviors are not under volitional control and in response to this limitation, the TPB was developed.

The TPB postulates that intention to perform a certain behavior is the immediate antecedent of any behavior, being guided by three determinants: attitude toward the behavior, subjective norms and perceived behavioral control. The first is a personal factor, and evaluates an individual's predisposition toward performing the behavior. The second determinant of intention represents the perceived social pressures to perform (or not) the behavior in question, this pressure may be from friends, family members, authority figures, or any significant others. Finally, perceived behavioral control simply denotes people's perceptions of how easily or difficult it is for them to perform the behavior. It is in this last construct that the TPB differs from the TRA. Perceived behavior control was added to deal

with actions where people may lack complete volitional control over the behavior, and this addition greatly improved prediction of behavioral intentions (Ajzen, 1991; Ajzen and Madden, 1986).

The theory also deals with the antecedents of attitudes, subjective norms and perceived behavioral control, antecedents which ultimately determine intentions and actions. "At the most basic level of explanation, the theory postulates that behavior is a function of salient information, or beliefs, relevant to the behavior" (Ajzen, 1991, p. 189). Three kinds of beliefs are distinguished: behavioral beliefs, which are expected to influence one's attitude towards a behavior, in a positive (favorable) or negative (unfavorable) way. The person's beliefs about what significant others (for example parents, friends and colleagues) think he should or should not do, these are the underlying determinants of subjective norms and they are referred to as normative beliefs. Control beliefs, denotes a person's beliefs about their own capabilities and opportunities, thus determining perceived behavioral control, usually greater perceived resources and opportunities should be associated with a greater perceived control over performance of a behavior.

The TPB presents itself as good and solid frameworks to study the behavior associated with digital piracy and the first three research hypotheses follow directly from the theory:

> **H1**: A higher positive attitude towards piracy will correspond to a greater intention to pirate digital materials.
>
> **H2**: A higher level of subjective norms supportive of piracy will correspond to a greater intention to pirate digital materials.
>
> **H3**: A higher level of perceived control over performance of digital piracy will correspond to a greater intention to pirate digital materials.

Moral Obligation

It seems that the use of an ethical construct in piracy behavior is generalized, this being moral obligation (Cronan and Al-Rafee, 2008; Al-Rafee and Dashti, 2012), or moral judgment (Tan, 2002). This conveys the idea that subjective norms aren't able to capture all moral influences. Finding moral obligation a significant predictor of intention, some previous

researchers suggested that there is a need to consider not only social pressures but also personal feelings of moral obligation (Gorsuch and Ortberg, 1983; Conner and Armitage, 1998).

Moral obligation "refers to the feeling of guilt or the personal obligation to perform or not to perform a behavior" (Cronan and Al-Rafee, 2008, p. 530). Ajzen (1991) suggested that moral obligation could be added to the TPB, influencing intention in parallel with the other determinants. Therefore a measure of perceived moral obligation could add predictive power to the model. It is then expected that individuals with a higher sense of morality exhibit less intention to pirate digital material, as such it can be hypothesized that:

> **H4**: The higher the moral obligation of the individuals, the lower is their intention to pirate digital materials.

Past Piracy Behavior

Several studies have examined the impact of past behavior on intention and some proposed to incorporate past behavior in the TPB (or TRA), arguing that the relation between prior and later behavior is not fully mediated by the variables contained in the model (Bentler and Speckart, 1979; Ajzen, 1991; Conner and Armitage, 1998).

Ajzen (2002b) analyzed these residual effects of past on later behavior and pointed out that past performance may help to improve model predictions particularly when people's attitudes and intentions are relatively weak and uncertain, when underlying expectations are inaccurate, or when a plan of action is not clearly established.

Previous investigators have considered this factor and showed that indeed individuals that pirated digital material in the past are more likely to incur in the same intentions (D'Astous *et al.*, 2005; Cronan and Al-Rafee, 2008). Therefore, it is hypothesized that:

> **H5:** There is a positive relationship between past piracy behavior and intention to pirate digital materials.

The study of past piracy behavior creates an additional barrier, since we can only study the past behavior of those who had already pirated some sort of digital good. As such, two models will be developed from the sample, one considering the full sample and another with only

the individuals who had pirated before. This segmentation will allow to observe if the results are consistent between models and may also help policy makers who for some reason would like to target only the pirate population.

Deterrence Theory

Deterrence theory has been used broadly across the literature, from criminology to psychology and economic literature. The theory postulates that individuals are rational agents looking to maximize their expected utility, reacting to negative incentives capable of deter their potential criminal acts: certainty of punishment and the severity of punishment. If an individual believes that the cost incurred is inferior to the potential gain he should commit the criminal act. Thus individuals are deterred from committing criminal acts only when they perceive legal sanctions as certain, swift, and/or sever (Williams and Hawkins, 1996).

Criminological literature has generally found that punishment certainty produces a stronger deterrent effect than punishment severity (Nagin and Pogarsky, 2001). In economic research Ehrlich (1996) tells us that empirical evidence is consistent with punishment and other incentives presenting a deterrent effect on criminal acts. Gopal and Sanders (1997) found evidence that preventive controls may have a negative impact on software developer's profits but on the other hand deterrent strategies can potentially increase them. Peace *et al.* (2003) showed that punishment certainty and severity have a strong negative impact on attitude towards software piracy and that punishment certainty also has a negative effect on perceived behavior control.

According to the TPB, attitudes toward behaviors are developed from the beliefs about the likely consequences or outcome associated with the behavior. This means that rational individuals will select the behavior that they believe is associated with the most desirable outcome, forming a positive attitude. Therefore, it is likely that a person's beliefs about the probability of getting caught illegally downloading digital material and the punishment severity associated with such an act will influence his attitude, intention and ultimately the behavior. Then it's reasonable to hypothesize that:

> **H6:** Punishment certainty will have a negative influence on attitude toward pirate digital materials.

H7: Punishment severity will have a negative influence on attitude toward pirate digital materials.

There is also the possibility of a person's beliefs about their opportunities (control beliefs), being undermined by the perceived punishment certainty, thus increasing the perceived difficulty of performing digital piracy and making the perpetrator incur in higher efforts/costs keep undetected. Therefore, it is hypothesized that:

H8: Punishment certainty will have a negative influence on perceived behavioral control.

Software and Media Cost

Economic incentives play a major role in consumer's behavior decision, with software and media price being a determinant factor. Software piracy rate was found to have a significant negative correlation with per capita GDP (and per capita GNP) mainly in poor countries (Gopal and Sanders, 2000; Shin *et al.*, 2004). According to Gopal and Sanders (2000) this reveals an important problem: people with low income cannot afford high software prices, thus piracy is influenced by the significant price differential between legal and pirated content. They propose address this problem through global price discrimination. Peace *et al.* (2003) also found evidence supporting this type of strategies, with software cost having a strong positive relationship with one's attitude toward piracy.

It is then expected that software price will have an important role in the decision-making process, since usually they are the most expensive digital goods, but this is also true in music. The higher the price, the stronger is the positive effect on piracy, pointing to a quite elastic demand, as in software (Bhattacharjee *el al.*, 2003; Gopal *et al.*, 2004). In the motion picture industry, consumer's perceived cost-benefit has a positive impact on intention to buy pirated content, indicating as well that reducing the prices of movie DVDs would most likely have a negative impact on piracy (Wang, 2005).

In a general way, consumers seem to believe that digital media is overpriced, using piracy as a mean to save money (AI-Rafee and Cronan, 2006). So it appears that even when the

price of a digital good is low, and probably does not represent an economic burden, it still has an impact on the decision-making process.

If utility is used to describe preferences among the alternatives associated with digital piracy, this is, illegal download, purchase, or do without the digital good, a rational agent will choose the utility function that maximizes his expected utility. Considering the expected costs/risks and benefits if piracy yields a positive surplus a lower price would decrease the payoff, ceteris paribus.

The perceived cost of digital material can be incorporated into the TPB as an antecedent of attitude by the same reasons appointed in the deterrence theory. As such, based on expectations it is hypothesized that:

> **H9:** Digital media cost will have a positive influence on attitude toward pirate digital materials.

Perceived Value

Perceived cost may not be enough to evaluate a digital good, and in this way another factor was added to capture a broader set of perceived characteristics. This factor is perceived value, and helps us understand if consumers perceive digital goods as high value products, that are worthy of their financial cost, or on the other end, the time, effort and risk associated with pirate them. So what is value? When someone is evaluating the value of a certain good, they are forming their own construct, thus perceived value is an abstract concept that is highly personal and individualistic (Zeithaml, 1998;Chu and Lu, 2007). Zeithaml (1998, p.14) defined it as the "consumer's overall assessment of the utility of a product based on perceptions of what is received and what is given". Therefore, if a consumer believes that a product has a low (or high value), it is the net result between the assessed gains (e.g. intrinsic attributes, volume, quality) and sacrifices (e.g. money, time, effort).

Previous authors have studied perceived value in very diverse products or services, and found evidence of a positive relation between perceived value and consumer willingness-to-buy (or purchase intentions) (Dodds *et al.*1991, Chu and Lu, 2007). However, no one ever (at least as far as we know) applied this concept to digital piracy and so we may expect that

the higher the perceived value, the lower will be one's attitude to pirate. Therefore, it is hypothesized that:

> **H10:** Perceived value will have a negative influence on attitude toward pirate digital materials.

An easy and simple way to summarize all the postulated hypotheses is to observe the conceptual model (Figure 1). This conceptual model truly represents not one, but two models: a first one will consider the full sample, but not evaluating the effect of past piracy behavior in intention (Full Model); and a second one, that has been obtained by adding past piracy behavior and, as consequence, will only considers those who had pirated (Pirate Model).

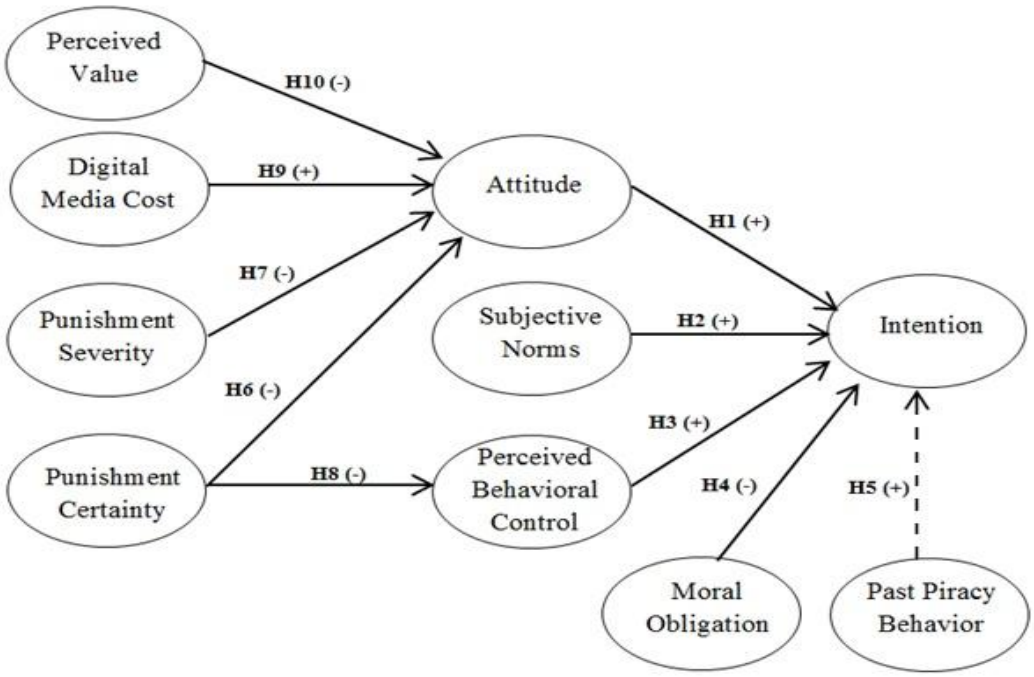

Figure 1: Conceptual Model. Expanded from Peace *et al.* (2003) and Cronan and Al-Rafee (2007).

Data and methods

After the theoretical model is defined, we need to assess it using two structural regression models (SR model). Structural Equation Models (SEM) are extensions of General

Linear Models (GLM), and are covariance-based models (Anderson and Gerbing, 1988; Gefen et al., 2000). SEM is a technique of generalized modelling using theoretical models that describe the way how the different latent variables or constructs are related. In our model, the latent variables are the ten variables considered in Fig 1 and described above. We compute each of the ten latent variables of the model through the observed variables of the questionnaire. The questions were created in Portuguese and adapted from other studies (see Table 1 and Appendix A).

Data was collected using a paper and electronic questionnaire (Appendix A). Respondents are University and high school students that were asked to voluntarily participate, their anonymity and confidentiality being assured by the author. A preliminary version of the questionnaire was developed and pre-tested. Overall the feedback was positive, with some punctuation and words/sentences changed due to their ambiguous statement.

The URL to the online questionnaire was sent by e-mail to 28 715 students of a Portuguese University during May 2015, while the paper one was administered to 79 Portuguese high school students in June 2015. A total of 590 questionnaires were collected, however twenty-seven had missing data which led to a final sample of 563 questionnaires.

All the factors and correspondent indicators that will be used are listed in Table 1, with all the items being scored on a seven-point Likert scale, ranging from "strongly agree" to "strongly disagree" in almost all indicators.

Table 1: Questionnaire instrument scale factors

Factor	Source	No. of indicators
Intention (INT)	Cronan and Al-Rafee (2008); Peace *et al.* (2003)	3
Attitude (ATT)	Cronan and Al-Rafee (2008)	4
Subjective Norms (SN)	Cronan and Al-Rafee (2008)	3
Perceived Behavioral Control (PBC)	Cronan and Al-Rafee (2008)	5
Moral Obligation (MO)	Cronan and Al-Rafee (2008)	3
Past Piracy Behavior (PPB)	Cronan and Al-Rafee (2008); Author	2

Factor	Source	No. of indicators
Punishment Severity (PS)	Peace *et al.* (2003)	2
Punishment Certainty (PC)	Peace *et al.* (2003)	2
Digital Media Cost (DMC)	Peace *et al.* (2003)	3
Perceived Value (PV)	Dodds *et al.* (1991)	3

Note: The complete questionnaire is on Appendix A

3. Results

The analysis will proceed with the development of two structural regression models (SR model). These are considered a covariance-based SEM models (Anderson and Gerbing, 1988; Gefen *et al.*, 2000), and will be estimated using the maximum likelihood (ML) estimation. All the results were obtained using SPSS Statistics 21 (essentially for descriptive data analysis) and subsequently AMOS 21 for Structural Equation Modeling (SEM).

Exploratory Results

A first descriptive analysis shows that more than half were female students and 37.8% (213 students) were male, the average age was 23 years. The majority of the students (83.3%) were either bachelor or master students, and with 79.9% of the students revealing that, they do not do anything else besides studying. About 75% of the students reported having pirated previously, from these 40.4% disclosed that they do pirate a lot, and 25.4% does it in a daily base or almost daily. Another interesting way to look at piracy past behavior is to break it down by education level. Only 9.6% of the high school students admitted that they never had pirated, which represents the lowest value of all, as for Doctoral, Master's and Bachelor's students they all presented similar values, between 25% and 27.6%.

Multivariate Analysis – The Full Model

As decided the analysis continues with two models: the first considering the full sample, but not evaluating the effect of past piracy behavior in intention (Full Model); and the second one considering only those who had pirated (Pirate Model). As a result, there will be one measurement model and one SR model for each sample.

A SEM model combines a measurement model and a structural model. The measurement model is an a priori model (developed from theoretical expectations) that identifies the latent variables and their correspondent indicators, while the structural model represents the hypothesized effect priorities, being very similar to a path model, however dissimilar from path models these effects can, and usually involve latent variables (Gefen et al., 2000; Kline, 2011).The measurement model is usually validated with a confirmatory factor analysis. This technique is used to evaluate the measurement model fit quality towards the observed correlational structure between the indicators (Marôco, 2014). The final CFA model is presented in Figure 2. To get to this model many steps were taken, following Marôco (2014). The first one is to analyze factor validity.

Factor validity occurs when indicators correctly reflect the construct that they are supposed to measure and is usually tested by looking to factor loadings (Marôco, 2014). Unfortunately three indicators (SN2, PV1, DMC3) did not fulfill the required conditions and were removed. Not a single variable presented Skew and Kurtosis values that indicate a severe violation of normal distribution (|Sk| >2-3 and |Ku| > 7-10, see Marôco (2014)). The existence of outliers was assessed by Mahalanobis square distance, unfortunately thirteen cases reported values suggesting that these were outliers, so the CFA was done without them.

The model was then adjusted using the modification indices (MI) provided by AMOS. MO1r and PBC2 loaded on more than one factor and so were removed from the model. A second set of suggested modifications were related to the covariance between the error terms of indicators that belongs to the same factor, the correlation between the errors may be occurring because of the similarity of wording and content, as so, the trajectories were added to the model.

The fit between the data and the final CFA model was analyzed through a series of model fit tests, with the overall CFA model fit being considered good (see Figure 2). Established a good model fit it is time to assess the construct reliability and validity, in particular convergent and discriminant validity.

Construct reliability pertains to the consistency and reproducibility of a measure (Marôco, 2014). This was evaluated as described in Fornell and Larcker (1981), being generally considered as adequate a reliability ≥ 0.7 (Marôco, 2014). All factors presented an adequate reliability (see Appendix B) except the variable perceived value however, the reliability value (0.682) was so close to the threshold that it was considered as enough.

Construct validity is used to assess if the used variable truly measure/represents the construct that we want to evaluate (O'Leary-Kelly and Vokurka, 1998; Marôco, 2014). Since factor validity was already examined remains to establish convergent and discriminant validity. The first one occurs when indicators load significantly on their corresponding factors, this means that the behavior of an indicator is essentially explained by its correspondent factor, the last one is a measure of how unique each set of indicators is, thus discriminant validity assess the correlations between the factors (Marôco, 2014). Convergent and discriminant validity were analyzed using the average variance extracted (AVE) for each construct, as described in Fornell and Larcker (1981). According to Hair et al. (1998) an AVE ≥ 0.5 is an adequate indicator of convergent validity, and as we can see. On the other end, we fulfill the required condition for discriminant validity when the squared correlation between two factors is equal or lower than the individual AVE for them (Fornell and Larcker, 1981). All factors demonstrated convergent as well discriminant validity, see Appendix B.

Given an acceptable measurement model, the second step is to identify and specify the structural model, this type of strategy (two-step) helps ensure that the measurement model is correctly validated (Marôco, 2014).

The final adjusted SR model (structural model + measurement model) exhibited overall a satisfactory fit $(\mathrm{X}^2/\mathrm{df} = 2.14; \mathrm{CFI} = 0.970; \mathrm{GFI} = 0.934; \mathrm{RMSEA} = 0.046; \mathrm{P}[\mathrm{rmsea} < 0.05] = 0.890$ however, it fails the model chi-square test ($\chi^2 = 447.852, \mathrm{df} = 209, \mathrm{p} = 0.000$. According to Marôco (2014) the χ^2 test is heavily influenced by the sample size (among other factors, e.g. correlation between observed variables), so when the sample has

a considerable dimension ($n > 400$) this test very often leads to the wrong conclusion. This may be happening on the presented model. GFI presented a good value at 0.934, while RMSEA was acceptable at 0.046. The relative fit index CFI was 0.970, thus showing evidence of a good model fit.

Analyzing each specific path in Figure 3, we can see that three of the paths were not significant (5% was considered as the critical level of significance) and that the final full model explains 63% of the variance in digital piracy intention.

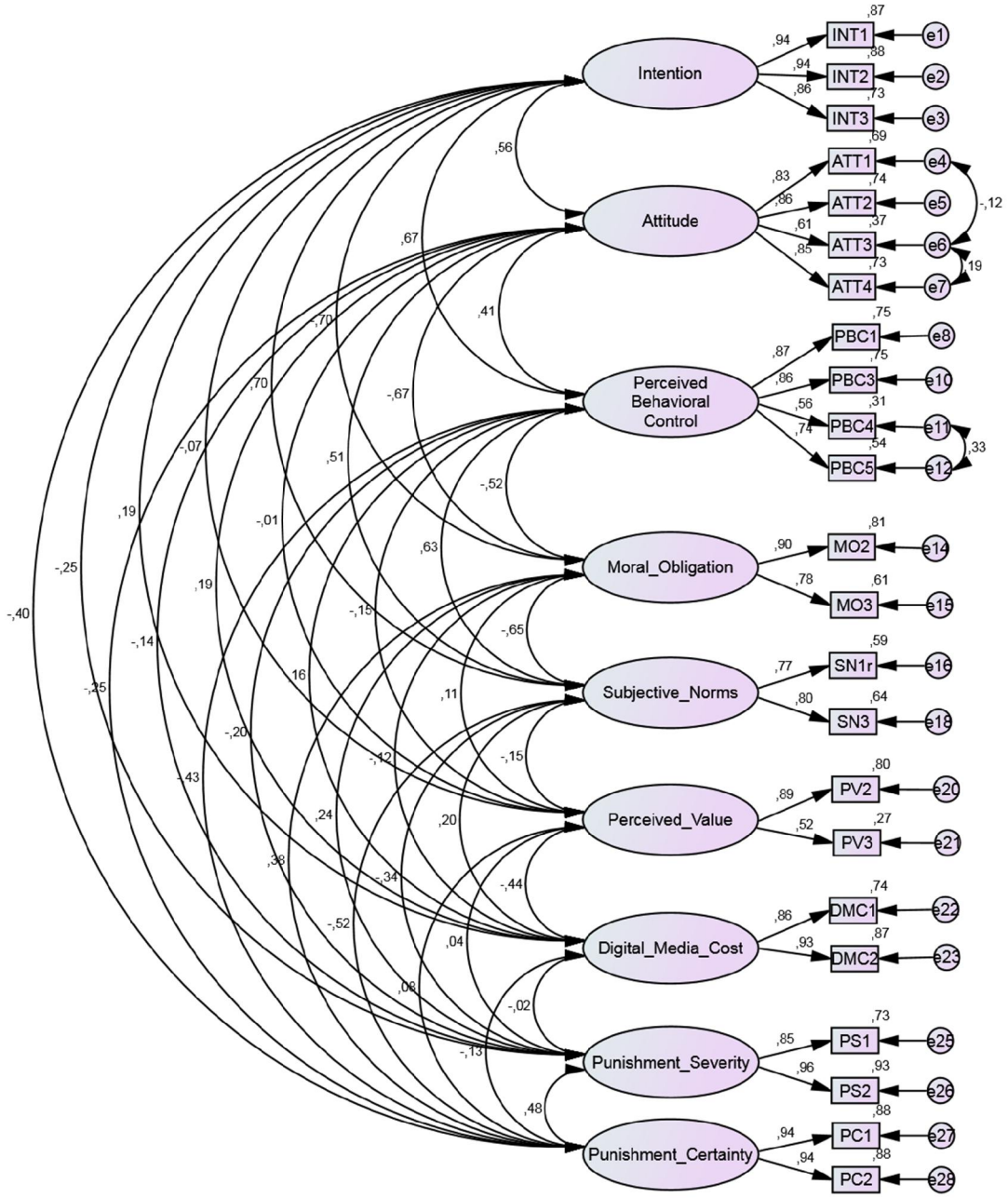

Figure 2. Final CFA Full Model ($X^2/df = 1.790; CFI = 0.948; GFI = 0.948; RMSEA = 0.038; P[rmsea < 0.05] = 0.999; MECVI = 0.946$).

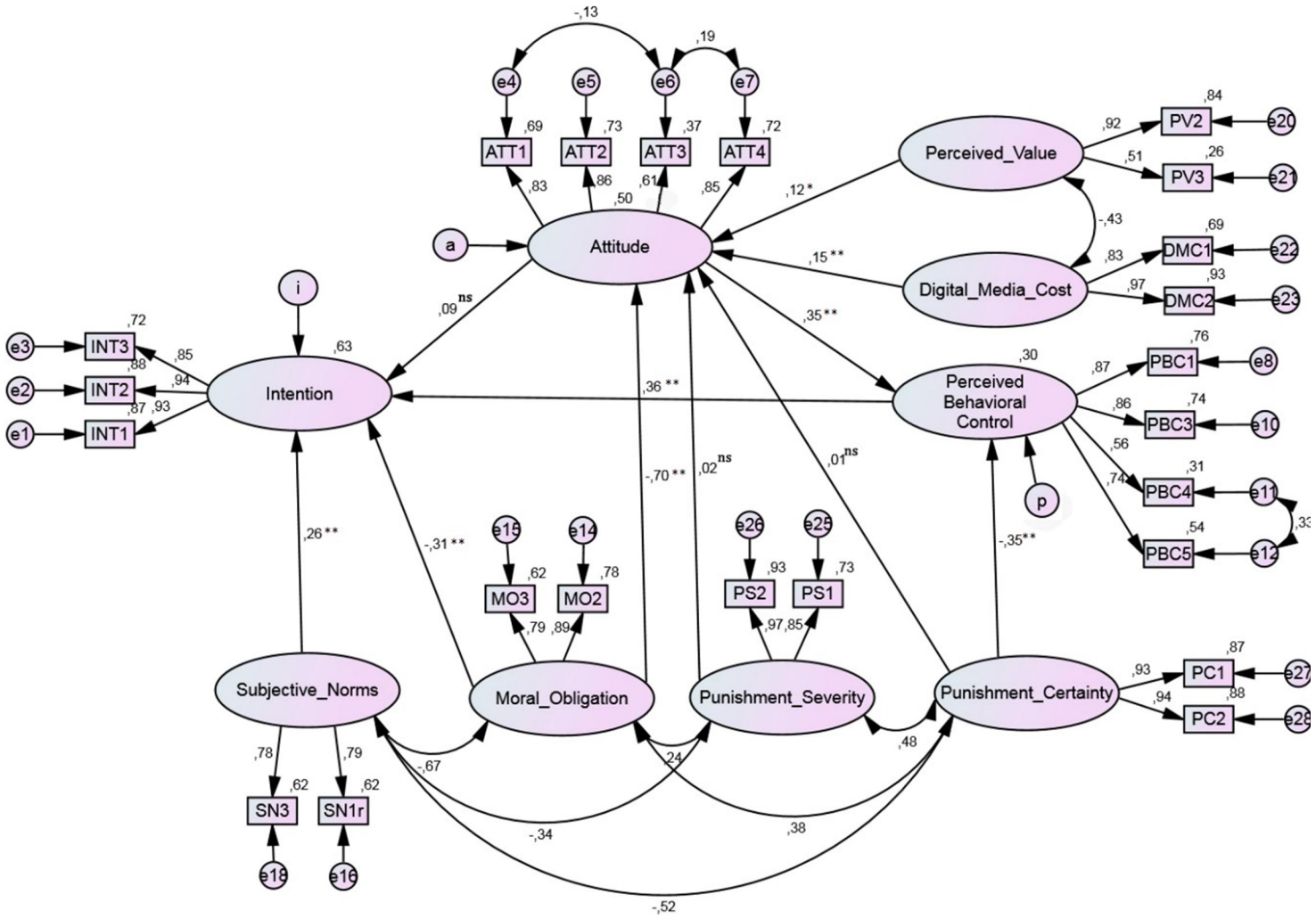

Figure 3. Full Sample SR Model. Path coefficient estimates are reported as standardized ($**_{p<0.01}$; $*_{0.01\leq p\leq 0.05}$; $\mathbf{ns\ (not\ significant)}_{p>0.05}$).

The Pirate Model

This second model considers only those students who had pirated and therefore, the sample was smaller adding up to 421 entries.

The final CFA pirate model is presented in Figure 4. To get to this final model we yet again follow Marôco (2014). The same three indicators failed again to fulfill the required factor validity conditions and were removed from the model. The Skew and Kurtosis coefficients showed adequate values that made possible to admit a normal distribution for almost all observed variables, the exception was PBC4 and consequently was removed. Five cases presented values suggesting that these were outliers, so the CFA was conducted without them. The model was then adjusted using the modification indices. A set of trajectories were added relating to the covariance between error terms of indicators that measure the same factor.

The fit between the data and the final CFA pirate model was overall considered as good (see Figure 3). Established a good model fit, construct reliability, convergent and discriminant validity were analyzed. All factors presented an adequate reliability and demonstrated convergent as well discriminant validity (see Appendix B).

The final SR pirate model (Figure 5) revealed a satisfactory model fit ($\chi^2 = 447.852, \mathrm{df} = 209, \mathrm{p} = 0.000; \mathrm{X}^2/\mathrm{df} = 1.960; \mathrm{CFI} = 0.957; \mathrm{GFI} = 0.910; \mathrm{RMSEA} = 0.048; \mathrm{P}[\mathrm{rmsea} < 0.05] = 0.694$. However, when we examine each specific path we can see that six paths were not significant. The final pirate model explains 70% of the variance in digital piracy intention.

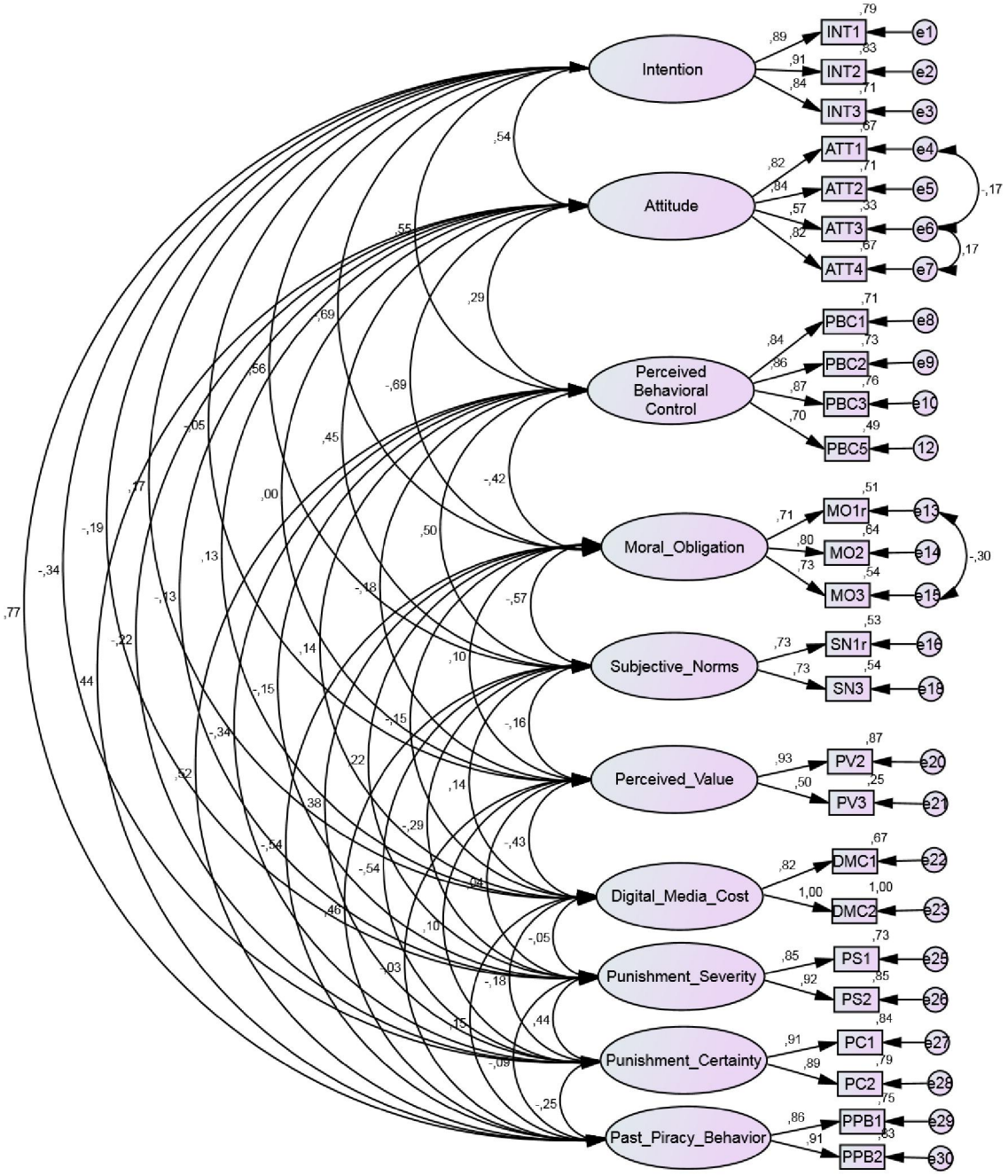

Figure 4. Final CFA Pirate Model ($X^2/df = 1.761; CFI = 0.969; GFI = 0.926; RMSEA = 0.043; P[rmsea < 0.05] = 0.966; MECVI = 1.580$).

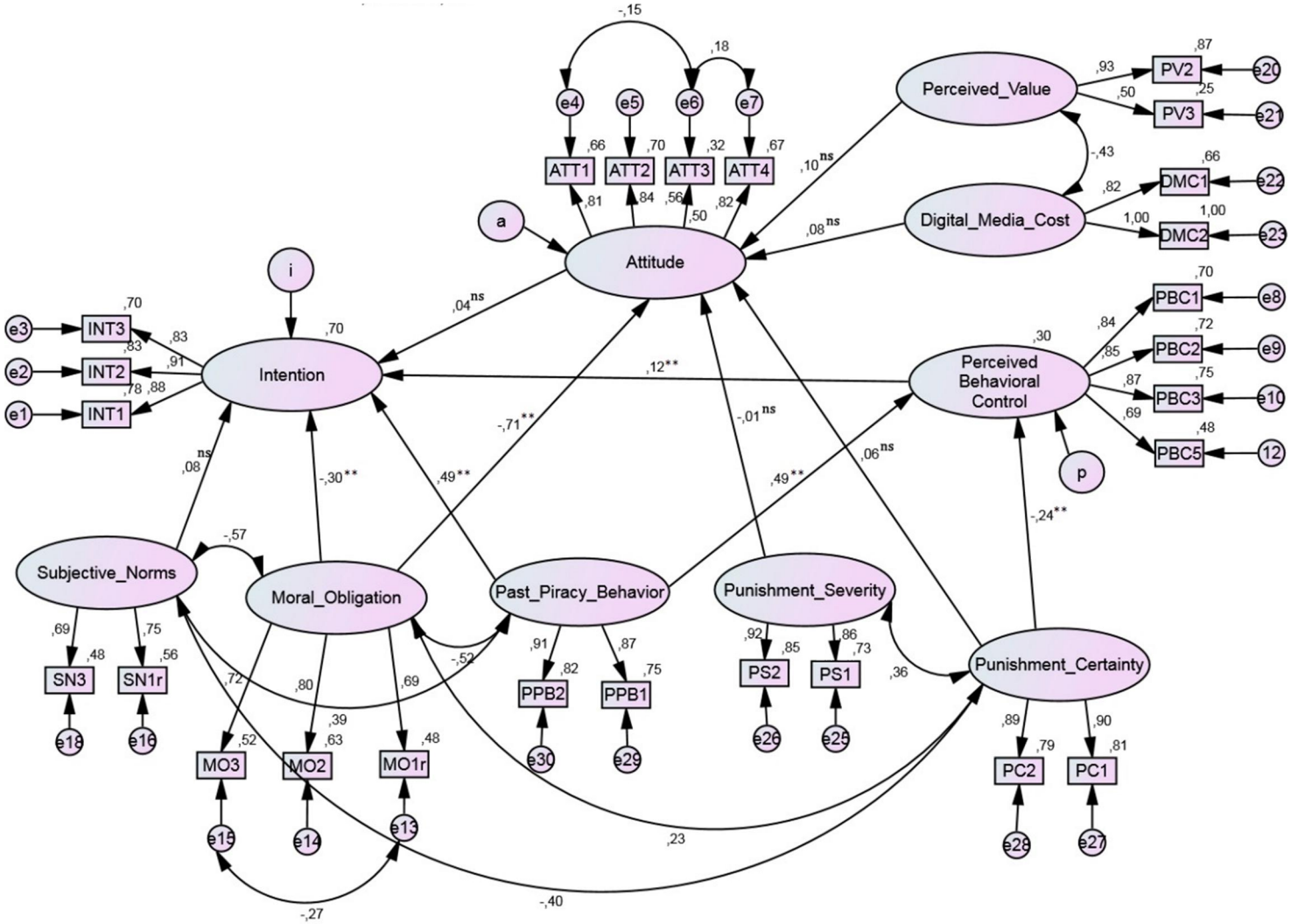

Figure 5. Full Sample SR Model. Path coefficient estimates are reported as standardized ($**_{p<0.01}$; $*_{0.01\leq p\leq 0.05}$; $\mathbf{ns\ (not\ significant)}_{p>0.05}$).

4. Discussion, Implications and Conclusion

TPB Variables, Moral Obligation and Past Piracy Behavior

Attitude toward the behavior is a personal factor that evaluates an individual's predisposition toward performing digital piracy. It was hypothesized that individuals with a more positive attitude towards piracy will correspond to a greater intention to pirate digital materials. However, contrary to expectations attitude was not a significant predictor of intention in both models, as so hypothesis H1 is rejected. This may be due to the influence of moral obligation, which had a strong negative effect on attitude in both models and might diminished attitude's positive effect on intention and correspondent significance. This effect was not expected, but it makes sense, suggesting that if someone views digital piracy as morally wrong, then his attitude would be negatively influenced.

The remaining TPB components in the full sample model presented the expected outcome. The results showed that subjective norms and perceived behavioral control had a significant but moderated effect on intention. As such, hypotheses H2 and H3 are not rejected, and we conclude that: i) the approval of digital piracy by friends, family (or any significant others) positively affect the individual's intention; ii) that subjects that find easy to pirate and have the opportunity to do so, will most likely have a greater intention to pirate digital materials. The pirate model yield a similar result regarding perceived behavioral control, but the other variable, subjective norms, was not a significant predictor of intention. Thus, it is possible that those who have pirated before may not be influenced by perceived social pressures.

Hypothesis H4 states that the higher the feeling of moral obligation, the lower is an individual intention to pirate digital materials. Examining the results, this hypothesis is not rejected for both models, with moral obligation having a significant and negative effect on intention. This negative relation enables to conclude that individuals with a higher sense of morality will tend to have a lower intention towards pirating. As we can see, it appears that moral obligation and perceived behavioral control play a key role in digital piracy, being significant predictors of intention in both models. A possible approach is to use an individual's moral obligation or feelings of guilt to show that piracy is not only affecting company's earnings but ultimately is a major issue for the whole society with all of us losing,

not allowing more jobs (or even destroying current one's) and taxes that could be used to directly improve people's lives.

At last, it was hypothesized that there is a positive relationship between past piracy behavior and intention. This was indeed true, with past piracy behavior presenting a substantial effect on intention, hypothesis H5 was not rejected. As so, it is expected that individuals that pirated digital material in the past are more likely to incur in the same intentions. Past piracy behavior also revealed a significant and strong positive relation with perceived behavioral control, this relation shows that with experience we get comfortable doing a certain task, our sense of control gets higher. Indeed, 40.4% of the students disclosed that they pirate a lot, and 25.4% does it in a daily base or almost daily, all this indicates that past behavior has a strong and determinant influence on control and intention.

Nowadays we can access the internet virtually anywhere and download whatever we want, making pirating so easy that can become recurrent and ultimately a habit. A suggestion is to restrict the number of places where people can access websites that facilitate this content. For example, universities and high schools would be the ideal place to start, since students spend a lot of time at these locations where they have access to high-speed internet. A more generalized approach would be to contact internet service providers, however they usually only block these websites with a judicial order.

Punishment Certainty and Severity

As we know attitudes toward behaviors and perceived behavioral control are developed beliefs about the likely consequences or outcome and beliefs about capabilities and opportunities, respectively. Therefore, it was postulated that a person's beliefs about the probability of getting caught illegally downloading digital material and the punishment severity associated with such an act will have a negative influence on attitude, with punishment certainty also having a deterrent effect on perceived behavioral control (hypotheses H6, H7 and H8).

Contrarily to expectation punishment certainty and severity were not a significant predictor of attitude in both models, as so hypothesis H6 and H7 were rejected. However, it was found some evidence that punishment certainty can be a useful tool in the fight against piracy.

Punishment certainty in both samples had a moderated and significant negative effect on perceived behavioral control, as a result hypothesis H8 was not rejected and led to conclude that if people believe that there is a high probability of getting caught they should have a lower perception of control and ultimately a lower intention towards pirating.

To explore punishment certainty, people should be lead to believe that they are very likely to be caught, this perceived high level of punishment certainty will affect the sense of control and opportunity, and should make possible to reduce people's intention towards piracy.

Digital Media Cost and Perceived Value

As we saw, the financial cost even when small plays an important role in consumer's behavior. Accordingly it was expected a positive relationship between digital media cost and attitude (hypothesis H9). The results showed a positive relation in both models however, only in the full model was exhibited a significant relationship but with a small effect. With this mixed results we conclude that generally people do consider the price as an important factor, the higher the price the more likely is that the individual will pirate. The pirate model led to believe that some people may be so used to pirate that might be ignoring the financial cost, because piracy has become so recurrent that they simply do not know or do not care about the price.

The findings partially support suggestions to use price discrimination strategies (Gopal and Sanders, 2000; Peace et al., 2003) and this type of strategies are already being use by some companies. Another alternative could be to show people that digital goods are not as expensive as they might think and that already exist cheap alternatives. For example, to see TV shows and movies through the internet the streaming service provided by Netflix is considered a cheap alternative to piracy (Ramos, 2015).

Perceived value, the new addition to piracy research, became an interesting case since it ended up having a positive effect. However, this factor only presented a significant relationship using the full sample and had a small effect on attitude. It was expected that the higher the perceived value, the lower will be one's attitude to pirate, but it appears that a higher perceived value demonstrates that digital goods are worthy of pirating and the higher

will be the time, effort and risk that an individual is willing to invest/take due to the bigger assessed gains, this is they resort to digital piracy to maximizing their utility.

Digital media cost and perceived value did led to important conclusions. However, they were placed as attitude antecedents, but surprisingly attitude was not a significant predictor of intention and even though we are able to use these factors to modify people's attitude ultimately our effort may not have the desired effect on intention. To close this section a summary table is presented below.

Table 2. Model results summary

	Full Model		**Pirate Model**	
R^2	0.63		0.70	
Factors	**Beta**	**Hypothesis**	**Beta**	**Hypothesis**
Attitude	0.087	H1-Rejected	0.042	H1-Rejected
Subjective Norms	0.257**	H2- Not Rejected	0.084	H2- Rejected
Perceived Behavioral Control	0.358**	H3- Not Rejected	0.124**	H3- Not Rejected
Moral Obligation	-0.307**	H4- Not Rejected	-0.304**	H4- Not Rejected
Past Piracy Behavior	-	-	0.490**	H5- Not Rejected
Punishment Certainty (ATT)	0.009	H6- Rejected	0.056	H6- Rejected
Punishment Severity	0.021	H7- Rejected	-0.006	H7- Rejected
Punishment Certainty (PBC)	-0.348**	H8- Not Rejected	-0.237**	H8-Not Rejected
Digital Media Cost	0.155**	H9- Not Rejected	0.083	H9- Rejected
Perceived Value	0.118*	H10- Rejected	0.096	H10- Rejected

$^{**}p<0.01$; $^{*}0.01 \leq p \leq 0.05$

Limitations and Future Research

This research is no exception and as in all studies, there are limitations. First of all, it was used a student sample and as a result we should be careful when generalizing the results beyond the student population, even more so when the sample cannot even be considered as representative of the target population. Another concern is that intentions can change over time and these results can become outdated sooner than we might think. A third limitation is the number of indicators used per factor, which in many situations were only two and not the recommended minimum of three. At last perceived value, reliability value was lower than the threshold, but was so close to it that was considered as enough.

As for future research directions, multiple paths can be followed. A first suggestion would be to use a different sample, one that could be considered representative of the Portuguese population and possibly able to validate the achieved results. Research could also be undertaken to examine the actual behavior, and assess if intentions do lead to action. Another path would be to investigate why attitude (considered a key factor) was not a significant predictor of intention in both models, since usually is. Finally, a more comprehensive model could be designed to include other relevant theories, for example, the equity theory as employed by Douglas et al. (2007).

The goal of this paper is to investigate digital piracy intention. To do so the theory of planned behavior emerged as the ideal framework, being expanded with the help of other relevant theories and constructs. This expansion led to an innovating analysis with two models being developed from the same sample, one considered all the individuals, while the other investigated only those who had pirated before.

The sample focused on students and the data was analyzed using structural equation modeling. The results showed that while both models accounted for a good percentage (63% and 70%) of the variance in digital piracy, there were differences in the effect that each individual factor had in the model.

Perceived behavioral control and moral obligation presented a significant moderated effect on intention in both models, the first one having a positive effect and the second a negative. Punishment certainty also had a significant negative effect in both models, but influencing instead the variable perceived behavioral control. As for subjective norms and attitude, the first one was only a significant predictor of intention in the full model, while the last one surprisingly did not have a significant effect in both models. In the pirate model, past piracy behavior had as expected a significant and strong positive effect on intention, but also in perceived behavioral control.

At last, among the remaining antecedents to the TPB constructs, punishment certainty and severity were not significant predictors of attitude in both models. The same was also true for digital media cost and perceived value in the pirate model, in the full model this two antecedents to attitude presented a significant value but with a small effect. Digital media

cost revealed a positive effect, while perceived value, a new factor in piracy research, presented an unexpected positive effect.

In conclusion, this investigation was able to corroborate some of the antecedents used in previous piracy research to explain piracy intention. Despite some differences between models, there are common factors that make possible to address together the general population and specifically those who had pirated before, however, more options may be available for the general population. It is also important to note that by expanding on previous investigation this research contributed to the continuous study of digital piracy across countries and their culture.

Several implications were drawn and suggestions were made. This research contributes to a better understanding of digital piracy behavior, and hopefully will help develop new strategies and ultimately reduce digital piracy.

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Appendix A.: Questionnaire Instruments

Attitude (ATT) – Overall, I believe that digital piracy is:

ATT1:Favorable	☐	☐	☐	☐	☐	☐	☐	Unfavorable
ATT2:Harmful	☐	☐	☐	☐	☐	☐	☐	Beneficial
ATT3:Foolish	☐	☐	☐	☐	☐	☐	☐	Wise
ATT4:Good	☐	☐	☐	☐	☐	☐	☐	Bad

Perceived Behavioral Control (PBC):

PBC1: For me to pirate digital material, is/it would be								
Very Easy	☐	☐	☐	☐	☐	☐	☐	Very Difficult
PBC2: If I wanted to, I could easily pirate digital material								
Strongly Agree	☐	☐	☐	☐	☐	☐	☐	Strongly Disagree
PBC3: I believe that I have the ability to pirate digital material								
Strongly Agree	☐	☐	☐	☐	☐	☐	☐	Strongly Disagree
PBC4: I have the resources necessary to pirate digital material								
Strongly Agree	☐	☐	☐	☐	☐	☐	☐	Strongly Disagree
PBC5: If I want, I can find digital material to pirate								
Strongly Agree	☐	☐	☐	☐	☐	☐	☐	Strongly Disagree

Past Piracy Behavior (PPB):

I have pirated digital material in the past (If your answer is No, skip the next two questions)								
Yes	☐						☐	No
PPB1: How much digital material did you pirate?								
A lot	☐	☐	☐	☐	☐	☐	☐	Little
PPB2: How often did you pirate digital material?								
Daily	☐	☐	☐	☐	☐	☐	☐	Sporadically

Intention (INT):

INT1: I intend to pirate digital material in the near future								
Certainly Yes	☐	☐	☐	☐	☐	☐	☐	Certainly not
INT2: If I have the opportunity, I will pirate digital material								
Certainly Yes	☐	☐	☐	☐	☐	☐	☐	Certainly not
INT3: I will make all the efforts to pirate digital material in the near future								
Certainly Yes	☐	☐	☐	☐	☐	☐	☐	Certainly not

Subjective Norms (SN):

SN1r: Those who are important to me think I should not pirate digital material Strongly Agree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly Disagree
SN2: When considering digital piracy, I should do what people who are important to me believe is correct Strongly Agree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly Disagree
SN3: If I pirate digital material, then most people who are important to me would Not Care ☐ ☐ ☐ ☐ ☐ ☐ ☐ Disapprove

Punishment Severity (PS):

PS1: If I were caught committing digital piracy, I think the punishment would be Very High ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very Low
PS2: If I were caught committing digital piracy, I would be severely punished Strongly Agree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly Disagree

Punishment Certainty (PC):

PC1: When I / (if I committed) digital piracy, I believe that the probability of being caught is Very High ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very Low
PC2: When I / (if I committed) digital piracy, I would probably be caught Strongly Agree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly Disagree

Digital Media Cost (DMC):

DMC1: Overall, I feel that digital material prices today are Very High ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very Low
DMC2: If I wanted to buy a digital good, it would cost me a lot of money Strongly Agree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly Disagree
DMC3: I use (would use), piracy as method to save money Strongly Agree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly Disagree

Perceived Value (PV):

PV1: I perceive digital goods, as goods of high value Strongly Agree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly Disagree
PV2: I believe that digital goods offer a just/correct value Strongly Agree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly Disagree
PV3: I believe that buying digital goods is a good buy, this is, with benefits Strongly Agree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly Disagree

Moral Obligation (MO):

MO1r: I would not feel guilty if I pirated digital material								
Strongly Agree	☐	☐	☐	☐	☐	☐	☐	Strongly Disagree
MO2: Digital piracy goes against my principles								
Strongly Agree	☐	☐	☐	☐	☐	☐	☐	Strongly Disagree
MO3: It would be morally wrong to pirate digital material								
Strongly Agree	☐	☐	☐	☐	☐	☐	☐	Strongly Disagree

Appendix B.: Consistency statistics and squared correlation between factors

Factor	**Full Model**		**Pirate Model**	
	Reliability	**AVE**	**Reliability**	**AVE**
Intention (INT)	0,936	0,829	0,913	0,777
Attitude (ATT)	0,871	0,631	0,851	0,592
Perceived Behavioral Control (PBC)	0,848	0,588	0,891	0,674
Moral Obligation (MO)	0,831	0,712	0,773	0,534
Subjective Norms (SN)	0,763	0,616	0,697	0,535
Perceived Value (PV)	0,682	0,535	0,701	0,560
Digital Media Cost (DMC)	0,892	0,805	0,909	0,834
Punishment Severity (PS)	0,907	0,830	0,883	0,791
Punishment Certainty (PC)	0,936	0,880	0,898	0,815
Past Piracy Behavior (PPB)	-	-	0,883	0,791

Factors			**Full Model: Squared Correlations**	**Pirate Model: Squared Correlation**
INT	and	ATT	0,309	0,286
INT	and	PBC	0,452	0,303
INT	and	MO	0,484	0,493
INT	and	SN	0,49	0,309
INT	and	PV	0,005	0,003
INT	and	DMC	0,036	0,029
INT	and	PS	0,062	0,037
INT	and	PC	0,158	0,118
INT	and	PPB	-	0,593
ATT	and	PBC	0,172	0,082
ATT	and	MO	0,448	0,487
ATT	and	SN	0,259	0,199
ATT	and	PV	0,000	0,000
ATT	and	DMC	0,036	0,018

ATT	and	PS	0,02	0,017
ATT	and	PC	0,065	0,05
ATT	and	PPB	-	0,196
PBC	and	MO	0,266	0,171
PBC	and	SN	0,398	0,254
PBC	and	PV	0,023	0,032
PBC	and	DMC	0,026	0,02
PBC	and	PS	0,04	0,024
PBC	and	PC	0,184	0,114
PBC	and	PPB	-	0,27
MO	and	SN	0,423	0,34
MO	and	PV	0,012	0,009
MO	and	DMC	0,014	0,015
MO	and	PS	0,058	0,053
MO	and	PC	0,141	0,147
MO	and	PPB	-	0,299
SN	and	PV	0,022	0,026
SN	and	DMC	0,041	0,02
SN	and	PS	0,115	0,082
SN	and	PC	0,27	0,286
SN	and	PPB	-	0,208
DMC	and	PV	0,196	0,188
PS	and	PV	0,002	0,001
PC	and	PV	0,006	0,01
PV	and	PPB	-	0,001
DMC	and	PS	0	0,002
DMC	and	PC	0,017	0,033
DMC	and	PPB	-	0,024
PS	and	PC	0,231	0,19
PS	and	PPB	-	0,008
PC	and	PPB	-	0,062

Appendix C.: Model fit tests and correspondents reference values.

Model Fit Test	Reference Values
$\boldsymbol{X^2}$ and p-value	The lower the better; $p > 0.05$
$\boldsymbol{X^2/df}$	$5 -$ Bad fit $2; 5 -$ Acceptable fit $1; 2 -$ Good fit $1 -$ Very good fit
CFI GFI	$0.8 -$ Bad fit $0.8; 0.9 -$ Acceptable fit $0.9; 0.95 -$ Good fit $\geq 0.95 -$ Very good fit
RMSEA and p-value ($\boldsymbol{H_0: rmsea \leq 0.05}$)	$0.10 -$ Unacceptable fit $0.05; 0.10 -$ Acceptable fit $\leq 0.05 -$ Very good fit $p \geq 0.05$
MECVI	To compare models. The lower the better

Source: Marôco (2014, p.55).

Editorial Board (wps@fep.up.pt)
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School of Economics and Management, University of Porto
Rua Dr. Roberto Frias | 4200-464 Porto | Portugal
Telephone: +351 225 571 100