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UNIVERSIDADE DO PORTO

Digital Piracy:

Factors that Influence the Intention to Pirate

By

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Master's Dissertation in Economics and Business Administration

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2015

Biographical Note

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Acknowledgements

To my family, indeed time truly passes by, it seems like was only yesterday that this educational journey was starting, and today it is in part the end of it. I am truly grateful for all the opportunities given to me, without your help, encouragement and support none of this could be possible, but most importantly I would not be you I am.

I would like say thank you to all of my friends. You guys know who you are and I am truly glad for the support, patience, participation, and most of all simply for being present.

To my dissertation advisor, Prof. Dr. Pedro Campos I am grateful for the opportunity to work with you and appreciate the time and effort dedicated. Also, thank you for the suggestions, advices and knowledge transmitted.

I am much obliged to all the people that filled out the questionnaire, all of you made a huge contribution. However, a special thank you has to go to Prof. Maria Matias.

Abstract

This dissertation uses behavioral and economic theories to help understand some of the factors (attitude, subjective norms, perceived behavioral control, moral obligation, past piracy behavior, punishment severity, punishment certainty, digital media cost and perceived value) that may influence an individual's intention to pirate digital material. It is used an expanded framework based on the theory of planed behavior, addressing not only factors capable of influencing intention, but also using antecedents of these factors, capable of influence intention in an indirect fashion.

This work assists to fulfill the need to study digital piracy across different cultures, helping to understand how intention is differently affected and how policy makers should adjust policies between cultures. Although most of the factors employed are not new in piracy research there is an exception, perceived value, this factor was never analyzed in this context. Another innovation of this work is the development of two models: the first one considers the full sample and the second considers only those who had pirated before. A student sample has been used and the data was analyzed using structural equation modeling.

There were some different results between the models however, 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.

Among the factors that were not significant predictors of intention was attitude. 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 results and implications are discussed and forms of intervention are suggested.

Resumo

A presente dissertação tem como objetivo fornecer um melhor entendimento sobre alguns dos fatores que podem afetar a intenção de um indivíduo piratear. Usando a *theory of planned behavior* como ponto de partida e complementando-a com outras teorias e variáveis relevantes, foram desenvolvidos dois modelos capazes de analisar a intenção de piratear.

Esta investigação vem contribuir para a necessidade de estudar a pirataria digital entre culturas, colaborando para um melhor entendimento de como a intenção de piratear é afetada e como os decisores devem ajustar as políticas entre países. A maioria dos fatores analisados não são novos nesta linha de investigação, contudo a exceção é o fator *perceived value*. Outra inovação é o desenvolvimento de dois modelos: um que engloba toda a amostra (modelo geral) e outro apenas os indivíduos que já piratearam no passado (modelo pirata). Esta separação permite ainda analisar o impacto do factor *past piracy behavior* na intenção de piratear e comparar resultados entre modelos. Os dados necessários foram recolhidos junto de estudantes e examinados utilizando a análise de equações estruturais.

Os resultados mostraram a existência de diferenças significativas entre os modelos, no entanto alguns fatores apresentaram um efeito significante sobre a intenção em ambos, nomeadamente os fatores *perceived behavioral control* e *moral obligation*. Todavia o fator *subjective norms* apenas apresentou um efeito significativo no modelo geral. O fator *punishment certainty* teve em ambos os modelos um efeito significativo sobre o fator *perceived behavioral* control.

De entre os que não apresentaram um efeito significativo em ambos os modelos encontra-se o fator *attitude*. Porém, os seus antecedentes demonstraram alguns resultados distintos entre os modelos. Os fatores *punishment certainty* e *severity* não revelaram um efeito significativo em ambos os modelos, contudo os fatores *digital media cost* e *perceived value* demostraram um efeito significativo sobre a *attitude*, mas apenas no modelo que considera a amostra completa. O modelo pirata confirmou ainda a existência de um efeito significativo e forte do comportamento passado na intenção futura de piratear.

Por fim os resultados são discutidos e são propostas formas de intervenção.

Table of Contents

List of Tables

List of Figures

List of Appendixes

List of Abbreviations

ATT	Attitude
AVE	Average Variance Extracted
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
DMC	Digital Media Cost
DRM	Digital Rights Management
EFA	Exploratory Factor Analysis
GDP	Gross Domestic Product
GFI	Goodness of Fit Index
GNP	Gross national product
INT	Intention
Ku	Kurtosis
MI	Modification Indices
ML	Maximum Likelihood
MO	Moral Obligation
PBC	Perceived Behavioral Control
PC	Punishment Certainty
PLS	Partial Least Squares
PPB	Past Piracy Behavior
PS	Punishment Severity
PV	Perceived Value
RMSEA	Root Mean Error of Approximation
SEM	Structural Equation Modeling
Sk	Skew
SN	Subjective Norms
SR Model	Structural Regression Model
TPB	Theory of Planed Behavior
TRA	Theory of Reasoned Action
U.S.	United States

1. 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: digital piracy.

Al-Rafee and Cronan (2006, p. 237) defined digital piracy as "the illegal copying/downloading of copyrighted software and media files", such files may be Hollywood movies, TV series, music albums, eBooks and video games. Commonly, unless looking for a very specific software program or a very old movie/music album, it's very easy to download (or watch online) this digital content. For that purpose, users usually depend on warez sites or peer-to-peer (P2P) networks[1].

Previous limitations like internet bandwidth, storage space and quality (Bhattacharjee *et al*, 2003; Wang, 2005) are now a problem of the past, as Hasshi Sudler (2013, p.156) said, "digital revolution has allowed consumers to copy pure information content with superb quality, making it nearly impossible to distinguish between the real and the reproduction".

This form of piracy, goes beyond the broadly studied illegal copying of software, which gain traction in the mid-80s when Richard Mason's (1986) identified intellectual property rights as one of the four major ethics issues for the information age. However, almost thirty years later software piracy still is a major problem. The Business Software Alliance estimates that around the world 43 percent of the software installed in personal computers is unlicensed, representing a commercial value of USD 62.7 billion (BSA, 2014). Their report suggests that the recent migration for cloud solutions may help lower this rate, however this kind of services are still young, adding up to 9.3 percent of the USD

[1] P2P networks allow users (peers) connect directly to other users to download and share files (Becker and Clement, 2006; Neglia *et al.*, 2007). Websites like Kickass Torrents only provide torrents, these are files that contain metadata about the files that users want to share and indicate the location of trackers that coordinate the distribution (Neglia *et al.*, 2007), in doing so they don't host any unlicensed material, making them very difficult to control.

398 billion global software market, but it seems clear that an increase in the use of cloud services will lower piracy, by giving developers greater control of the distribution, enabling lower prices and continuous updates.

Portugal constitutes an interesting example, being a country with approximately 10.5 million habitants, and where 99.9 percent of the companies are considered of small and medium size: a decrease of 10 percentage points in the software piracy rate[2] over 4 years would have a positive impact in the gross domestic product (GDP) of 0.6 percent (nearly € 1150 millions), create 4244 new jobs and increase tax revenue in € 320 million (Centro de Estudos Aplicados da Universidade Católica Portuguesa, 2012).

In the music industry, Napster Inc. was the revolutionary agent, leading to the mainstream expansion of music piracy, supplying people with an easy and fast way to download unlicensed content (Becker and Clement, 2006). The music industry reacted and sued Napster, ending in its shutdown and filing for bankruptcy (Dansby, 2002). On the other hand it led to the development and growth of alternative P2P file sharing networks such as eMule and BitTorrent.

Today P2P networks are used to download any type of copyrighted material. For example in 2013 the most downloaded movie was "The Hobbit: An Unexpected Journey" with 8.4 million estimated downloads on BitTorrent (Ernesto, 2013). De Vany and Walls (2007) found that a single widely-released movie stands to lose around $40 million in revenue due to digital piracy, thus the 8.4 million downloads most likely represent a huge revenue loss (although it's possible to argue that some of these downloaders would never see this movie if not for piracy).

Digital piracy affects a huge number of industries, being estimated that "each year, digital piracy from motion pictures, sound recordings, business and entertainment software

[2] At the time (2011) Portugal presented a software piracy rate of 40%. The most recent data available shows that this rate remains correct (BSA, 2014).
Piracy Rate = (A×B-C)/(A×B), with the following notation: A= PCs getting software; B= Installed software units per PC; C= Legitimate software units; A×B= Total software units installed; A×B-C= Unlicensed software units (BSA, 2012, 2014). However, the notation here exposed is the one used by Centro de Estudos Aplicados da Universidade Católica Portuguesa (2012).

and video games costs the U.S. economy $58.0 billion in total output, costs American workers 373,375 jobs and $16.3 billion in earnings, and costs federal, state, and local governments $2.6 billion in tax revenue in the U.S." (Siwek, 2007, p. i).

It is however noteworthy to reveal, that some argue that digital piracy doesn't have a significant impact on sales and that it even has beneficial traits, like enhancing exposure (e.g. Smith and Telang, 2010). Oberholzer-Gee and Strumpf (2007) found that file sharing of music has had no significant impact on sales, although there have been some significant concerns about their methods (e.g. Liebowitz 2007, 2010). Nevertheless the great majority of researchers found evidence that piracy harms sales (Danaher *et al*., 2014).

In the fight against piracy, following Danaher's *et al.* (2014) work, interventions can be classified in two axes. The first regarding regulatory or voluntary interventions, the second whether the intervention targets the supply or demand. The same authors suggest that when considering the academic literature as a whole, antipiracy regulation affecting the demand and (or) the supply can be an effective instrument to increase media sales by reducing the utility obtained by an individual consuming digital pirated goods as opposing to proper licensed material. Additionally they conclude that copywriter companies can develop many market-based strategies in order to make their products more attractive to downloaders. In spite of this good news leading to a new approach on piracy, the effectiveness of anti-piracy technology has not been as effective as one might think. Digital rights management (DRM) has proven to be an ineffective tool that not only does not help preventing piracy but it discourages legitimate consumers and may even have a negative impact in company's profits (Sudler, 2013).

More alarmingly, consumers still do not consider piracy as an inappropriate behavior and they do not believe that their friends and superiors think it is inappropriate, 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).

As we can see, piracy of copyrighted material has a huge impact on a country's economy, being a major issue for the whole society and not only content creators. A lower rate of piracy would most likely mean more earnings, more jobs and taxes. All this shows how important it is to investigate digital piracy, making this line of investigation truly important and with an actual impact in the real world, by helping policy makers (these may be governments or copyright organizations) to develop policies capable of reduce piracy.

As such, the aim of this dissertation 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. Therefore, the research question is: What factors affect an individual's intention when it comes to pirate digital media?

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. This factor was never analyzed in this context. Another interesting innovation is the development two models, where one considers only those who had pirated before, with the results then being compared to the general model, 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 (e.g. Peace *et al.*, 2003; Cronan and Al-Rafee, 2008; Al-Rafee and Dashti, 2012), and presents the following structure. Section 2 reviews the related digital piracy literature and introduces the model development. The research methodology is in Section 3 and data analysis starts in Section

4. The results discussion and implications are in Section 5. Limitations and future research directions are in Section 6 and Section 7 concludes.

A better understanding of consumer's behavior will help develop new strategies and ideally reduce piracy.

2. Literature Review

Digital piracy is not a new subject. It has been around us for quite some time now. As is indispensable, this section takes on previous research and shed a light on the literature that has been produced so far.

It starts by looking to specific areas of piracy, like software, music, movies and culminates on digital piracy. While in this first part the focus is on results, employed variables and theories (all in a brief manner), the second part emerges from the first one, which helped select the research constructs that will be used. This second part is where the model development starts, the theoretical foundations are lay down and hypothesis are developed. It is indeed a more specific and in-depth analysis, that truly dictates this investigation path.

2.1. Piracy Research

2.1.1. Early Piracy Research

The first major concern regarding copyright infringement was software piracy. Researchers have been investigating this phenomenon since the late 1980s, but the first studies were mostly descriptive surveys (Peace *et al.*, 2003; Limayem *et al.*, 2004). One of the first empirical works examining software piracy, using a model based on a theoretical framework was Christensen and Eining (1991), applying the Theory of Reasoned Action[3] (TRA) (Fishbein and Ajzen, 1975). They found that attitudes toward piracy and subjective norms were both related with the student's propensity to pirate. Their investigation indicated as well that this kind of behavior was not seen as inappropriate and that individual's believed that others shared the same view.

Gopal and Sanders (1997) investigated the impact of deterrent and preventive measures on software developer's profits, and found that preventive controls may have a negative impact on profits, but on the other hand deterrent strategies can potentially increase them. They also found that deterrence measures, ethics, sex and age are related to

[3] The TRA exposes human behavior as function of attitude toward the behavior and social norms. Further explanation is provided in the second part of this section.

an individual's propensity to pirate. In a posterior study the authors concluded that the size of a software industry is positively related to the government propensity to be an active force in the fight against piracy, and that it is inversely related to piracy rates (regardless of a country wealth) (Gopal and Sanders, 1998). Consequently the existence of domestic software industry may be a determinant factor against piracy.

Later on Gopal and Sanders (2000) established the existence of a significant effect between income and global piracy rates, and they proposed global price discrimination as the first line of defense against piracy. Shin *et al.* (2004), analyzed software piracy rates for 49 countries, considering per capita GDP and national collectivism as independent variables. Finding evidence of a negative correlation between per capita GDP and the software piracy of a country; on the opposite the relationship is positive with a country's collectivism. This supports Gopal and Sanders (2000) results and implies that not only "poor countries are more involved in software piracy, but also that high collectivistic countries are involved in piracy" (Shin *et al.*, 2004, p.105).

Tan (2002) focused his attention on the ethical judgment associated with software piracy, constructing a research framework that incorporated several behavioral theories and moderating variables capable of influencing ethical decision-making. His model[4] considered the effect of moral intensity, perceived risk and moral judgment, taking also in account the influence of some moderating variables[5]. Results supported the hypothesis that both perceived risks and moral judgment have a negative impact on intention, in other words, the higher the perceived risk/moral judgment of consumers, the lower will be their intention to pirate.

Peace *et al.* (2003) proposed a framework based on the theory of planed behavior[6] (TPB), complemented with the expected utility theory and deterrence theory[7]. Using central

[4] The estimation method used was the two-step hierarchical regression analysis.
[5] Price, gender, age, educational attainment, income and past purchase experience.
[6] The TPB exposes human behavior as function of attitude toward the behavior, subjective norms and perceived behavioral control. Further explanation is provided in the second part of this section.
[7] This theory proposes that as punishment probability and punishment level are increased, the level of illegal behavior should decrease (Peace *et. al.*, 2003).

factors identified by these theories, Peace *et al.* (2003) proposed a model to evaluate the impact on software piracy done by individuals in their workplace. Each factor identified by the expected utility theory and deterrence theory (punishment severity, punishment certainty and software cost) was included as an antecedent to the attitude factor. Punishment certainty was also considered as an antecedent of perceived behavior control.

Their model was tested using a structural equation modeling[8] (SEM) technique called partial least squares (PLS) path modeling [9] and accounted for 65 percent of the variance (R^2) in software piracy intention. It showed that attitude, subjective norms, and perceived behavior control significantly influence people's intention. Attitude presented the strongest effect on piracy intention, and its predicted antecedents 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.

Analyzing factors that affect software piracy intentions and its subsequent result on behavior, Limayem *et al.* (2004) constructed a model[10] based on Triandis' behavioral model (Triandis, 1979, cf. Limayem *et al.* , 2004), and 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. A possible explanation is that intention is being override by habits and facilitating conditions. Their model analyzed using PLS only explained 17 percent of the variance in piracy, with the authors defending that further research is need before starting questioning previous research.

Similar to Limayem *et al.* (2004), Phau *et al.* (2014) proposed not only to identify factors capable of influencing intention, but also the actual engagement in digital movies

[8] A detailed explanation of SEM is provided on section 3.
[9] Also referred to as PLS-SEM.
[10] Their model relied on following factors to explain the behavioral process: habit, affect, perceived consequences/beliefs, social factors, facilitating conditions and intention.

piracy[11], using the TPB. The theory was used in an unusual way, since attitude toward behavior were measured by one's attitude towards digital piracy of movies and their moral judgment. Subjective norms were measured by social habit and perceived behavior control by self-efficacy.

Their data was analyzed using SEM[12] and they found that from the TPB original determinants only attitude towards digital piracy of movies presented an unexpected result, having a negative impact on intention. According to the authors this may be attitude being override by the positive influence coming from moral judgment. Moral judgment, as expected, had a negative impact on intention (supporting Tan (2002)) and engagement. Contrarily social habit positively influenced individuals to pirate.

At last, but not least important, Phau's *et al.* (2014) research showed a positive (but weak) relation between intention and the actual act of pirating digital movies. This result clearly shows the need to further study the relation between intention and engagement, at least in digital piracy. Since previous authors (e.g. Ajzen (1991)) found intention as an accurate predictor of behavior itself.

Another theory that has been used to explain human behavior and software piracy in particular is the equity theory[13]. Douglas *et al.* (2007) using reciprocal fairness, procedural fairness[14] and distributive fairness[15] as antecedents of equity found that the first two factors were significant determinants, and that equity had a negative and statistically significant impact on software piracy, in other words, the higher the perceived fairness/justice of the exchange by the consumer, the lower software piracy will be.

While many previous studies have focused on software piracy, others have dedicated their attention to study different formats of digital piracy, such as music, movies,

[11] An important limitation presented by this research is that, the actual behavior was measure through a proxy.
[12] However they fail to specify the SEM technique used, appearing to be a covariance-based SEM.
[13] Equity theory addresses human pursuit of fairness and justice in a social exchange (Douglas *et al*., 2007).
[14] Procedural fairness "is represented by the involvement and interaction of the producer with the consumer" (Douglas *et al.*, 2007, p. 505).
[15] Distributive fairness "relates to purchase of software by different groups of consumers" (Douglas *et al.*, 2007, p. 505), for example price discimination strategies between consumers.

video games, and other digital media. An important characteristic of digital goods is that they "have high initial production costs, and very low - approaching zero - reproduction costs. They also have characteristics of a public good in that sharing with others does not reduce a consumer's utility for the product" (Bhattacharjee *et al.*, 2003, p. 108). These properties facilitated the widespread of pirated content worldwide.

Bhattachrjee *et al.* (2003) suggested that music piracy shows a number of similarities with software piracy. According to this author, 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) sought out to have a better understanding of the behavior dynamics that drive individuals to pirate digital audio files, using the concept of piracy club size[16] as a proxy of piracy level. They found that ethics has a very strong relationship with club size (ethical individual's will be less likely to share pirated files), 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. The author concludes that the high price of a proper licensed audio CD is an incentive to piracy, indicating that users are extremely price-sensitive when presented with the possibility of illegally download an audio file. However, income did not influence the club size.

Their results are consistent with Bhattachrjee *et al.* (2003) that found that income has a negative effect on piracy but only for unknown songs, when the choice is made relatively to a known music, income doesn't affect the decision. Furthermore they indicate that the general ethical model of software piracy is broadly applicable to digital audio piracy.

[16] Individuals with similar beliefs join together to share unlicensed material, benefitting from sharing the costs incurred when buying the proper licensed material at market price, which is then distribution for all the club members.

2.1.2. Digital Piracy Research

More recently Al-Rafee and Cronan (2006), while examining factors that influence an individual's attitude toward pirating digital material, found that subjective norms (influence of significant others), cognitive beliefs about the outcome of behavior, perceived importance of the issue, machiavellianism, age, happiness and excitement were all significant predictors of attitude. Moral judgment, distress, and sex were not significant variables influencing attitude. Their investigation was supported on the construct that attitude is the most significant factor influencing behavioral intention (e.g. Trafimow and Krystina, 1996; Peace *et al.*, 2003); therefore attitude toward digital piracy was treated as a dependent variable. According to them, understanding these factors is important because attitude can be changed through persuasion and other means, making it possible to influence behavior (in an indirect fashion). Thus, a better understanding of these factors could be essential in lowering piracy. This study also supports previous research by showing that consumers believe that digital material is overpriced and that they will not be caught.

In 2008, the same authors (Cronan and Al-Rafee, 2008), using a student sample from a business college, sought to analyze factors that influence an individual's intention to pirate software and media, attempting to offer a better understanding of digital piracy behavior. Antecedents to digital piracy behavior were investigated using an extended TPB model, which included moral obligation and past piracy behavior in addition to the original TPB determinants. It was (separately) hypothesized that individuals with higher attitude, subjective norms, perceived behavioral control and past piracy occurrences will correspond with a greater intention to pirate; on the contrary, higher moral obligations correspond with a lower intention. The result of the SEM analysis indicated that their model explained 70.8 percent of the variance in digital piracy intention, with only subjective norms not being a significant predictor of intention.

Al-Rafee and Dashti (2012) also 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. The model (analyzed using PLS) presented substantial explanatory power in both cultures, with only the variable subjective norms in the U.S. not being a significant predictor of intention. As expected the variables had a different impact on people's intention: in the U.S. sample, intention was strongly affected by their ability to pirate and moral obligation, where in the Middle East sample one's attitude was the foremost important factor, followed by the ability to pirate.

Their work shows that culture may have a significant impact in intention, and subsequently in individuals' behavior when it comes to pirate digital media. It also highlights the need to study digital piracy across different cultures, since policies should be adjusted (fine tuning) to each country by governments and copyright organizations.

This research will examine digital piracy using the TPB as framework, since it shown itself as a reliable model to investigate behavioral intentions associated with digital piracy. However TPB will be extend using the expected utility theory, the deterrence theory, as well as other proven behavioral constructs like ethics and past behavior.

People still may ask why investigate digital piracy as a whole. The answer is that it's reasonable to assume that any individual capable of download a music file is capable of download any other type of file. Although some might say that downloading software and video games is only half of the job, because the next step is to install them, it is also true that most uploaders include tutorials that teach how to install the illegal material. Thus this additional barrier is easily overtaken. It is also very common for an individual to find in the same website links/torrents to download music, movies, software and other digital material. Finally, storage capabilities and internet connection speed, barriers pointed in the past as deterrents to piracy, are no longer a problem (at least in developed countries). Even more the storage barrier is now totally obliterated since the streaming of unlicensed material like music, movies and TV shows is becoming commonly used.

2.1.3. Summary

The following table synthesizes the presented piracy research.

Table 1: Piracy behavior research (source: author)

Ethical Issue	Researcher	Factors Influencing Intention or Piracy	Theoretical Underpinning	Methodology	Main Results
Software Piracy	Christensen and Eining (1991)	Attitude Subjective norms	Teory of reasoned action	Chi-square statistics Multiple regression analysis	Attitude toward piracy and subjective norms were directly related to software pircy.
Software Piracy	Tan (2002)	Moral intensity Perceived risk Moral judgment	Rest's four-component model Jones' issue-contingent model	Two-step hierarchical regression analysis	Perceived risks and moral judgment had a negative impact on intention.
Software Piracy	Peace *et al.* (2003)	Attitude Subjective norms Perceived behavioral control Punishment severity Punishment certainty Software cost	Teory of reasoned action Theory of planned behavior Expected utility theory Deterrence theory	PLS-SEM	$R^2 = 0.65$; TPB components presented a positive impact on intention. All the anticipated hypotheses were supported.
Software Piracy	Limayem *et al.* (2004)	Habit Affect Perceived consequences/beliefs Social factors Facilitating conditions Intention	Triandis' behavioral model	PLS-SEM	Social factors and perceived consequences had a impact on intention. Habit and facilitating conditions had a impact on the actual behavior.
Software Piracy	Douglas *et al.* (2007)	Reciprocal fairness Procedural fairness Distributive fairness Equity	Equity theory	Covariance SEM	Equity had a negative and statistically significant impact on piracy.
Music Piracy	Gopal *et al.* (2004)	Age Gender Ethical Index Justice Money Saved	Expected utility theory Deterrence theory	Covariance SEM	Club size is positively influenced by gender and money saved, while negatively influenced by the remaining factors.
Music Piracy	d'Astous *et al.* (2005)	Attitude Subjective norms Perceived behavioral control Past behavior Personal consequences Ethical predispositions	Theory of planned behavior	Multiple regression analysis Test of mediation procedure	TPB components presented a positive impact on intention. Personal consequences and ethical predispositions presented a negative relationship with attitude. Past behavior showed a positive relationship with attitude and intention.

Ethical Issue	Researcher	Factors Influencing Intention or Piracy	Theoretical Underpinning	Methodology	Main Results
Movies Piracy	Phau *et al.* (2014)	Affect Attitude Moral judgment Social habit Self-efficacy Intention	Theory of planned behavior Neutralisation theory	SEM	Attitude and moral judgment had a negative impact on intention. Moral judgment also had a negative impact on engagement. The actual act of pirating was positively influenced by social habit and intention.
Digital Piracy	Al-Rafee and Cronan (2006)	Subjective norms Cognitive beliefs Perceived importance Machiavellianism Age Happiness and excitement Moral judgment Distress Gender	Theory of planned behavior	Stepwise regression analysis	$R^2 = 0.436$ Only moral judgment, distress, and sex were not significant variables influencing attitude.
Digital Piracy	Cronan and Al-Rafee (2008)	Attitude Subjective norms Perceived behavioral control Moral obligation Past piracy behavior	Teory of reasoned action Theory of planned behavior	SEM	$R^2 = 0.708$ Only subjective norms were not a significant predictor of intention.
Digital Piracy	Al-Rafee and Dashti (2012)	Attitude Subjective norms Perceived behavioral control Moral obligation	Teory of reasoned action Theory of planned behavior	PLS-SEM	Only subjective norms in the U.S. sample were not a significant predictor of intention.

2.2. Model Development: Theoretical Foundations and Hypotheses

2.2.1. 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, this is, behaviors that a person can decide at will to perform. However, it is clear that most of the behaviors are not under volitional control, internal factors (e.g. information, skills, abilities, power of will) and external factors (e.g. lack of time and opportunity) can compromise intention and ultimately the behavior. In response to this

limitation, the theory of planned behavior was developed, and it is considered as an expansion of the TRA.

The TPB postulates (as the TRA), that intention to perform a certain behavior is the immediate antecedent of any behavior; this means that a greater intention is associated with a superior effort by the individual to perform the behavior. Thus, a strong intention to engage in a behavior is associated with a high probability of an action to be performed.

According to the theory, a person's intention is 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, a simple way to avoid misunderstandings is to read it as "perceived control over performance of a behavior" (Ajzen, 2002a, p. 668). 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). It is also important to note that the theory accommodates the possibility that perceived behavioral control directly influences behavior.

The theory of planned behavior 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. This means that attitudes evolve from a set of salient beliefs people hold about an expected outcome. 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.

Briefly, the theory allows us to understand and predict particular behaviors in specific contexts, assuming that human behavior is guided by beliefs (behavioral, normative and control) that in their respective aggregates behaves as antecedents of attitudes, subjective norms and perceived behavioral control. The last ones are expected to vary across situations and combined lead to the formation of a behavioral intention, being intention the immediate antecedent of any behavior.

A review of previous studies by Icek Ajzen (1991) ascertained that TPB determinants account for a considerable amount of variance in intentions. This is also true in this review, the models analyzed (6 in total used TPB as framework) explained a minimum of 47 percent of the variance in piracy intention and a maximum of 70.8 percent.

Very recently and surprisingly, some authors defended that it's time to retire the TPB (Sniehotta *et al.*, 2014). However Ajzen (2014) considers that they display a profound misunderstanding of the theory, fail to interpret negative findings, with some of their arguments being misguided "while others are illogical or patently wrong" (Ajzen, 2014, p. 1). Thus he concludes that the theory of planned behavior is "alive and well and gainfully employed in the pursuit of a better understanding of human behaviour" (Ajzen, 2014, p. 6).

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. It is proposed that a more positive attitude toward digital piracy, a higher level of subjective norms toward committing digital piracy and a higher level of perceived behavioral control will all lead to greater intention to commit digital piracy. As such, the following research hypotheses are presented:

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.

As the first part of this section pointed out many other factors are capable of influencing a person's intention and, as a result, there is a need to expand the framework. The TPB is flexible to the inclusion of additional predictors, as long as they are significantly capable of improving the variance in intention (Ajzen, 1991). Two such variables appear to be of interest: moral obligation and past piracy behavior.

2.2.2. Moral Obligation

It seems that the use of an ethical construct in the decision making process is now generalized (at least in piracy behavior), this being moral obligation (Cronan and Al-Rafee, 2008; Al-Rafee and Dashti, 2012), or moral judgment (Tan, 2002; Phau *et al.*, 2014). 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.

2.2.3. Past Piracy Behavior

Several studies have examined the impact of past behavior on intention and some proposed to incorporate past behavior as one of the predictor 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 "existing evidence suggests that the residual impact of past behavior is attenuated when measures of intention and behavior are compatible and vanishes when intentions are strong and well formed, expectations are realistic, and specific plans for intention implementation have been developed" (Ajzen, 2002b, p. 107). So according to the author, 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.

In the context of this study others have included a component measuring past piracy behavior, and showed that (as expected) 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, the data will have to be divide in two samples and in consequence there will be two models, one considering the full sample and another with only the individuals who had pirated before.

2.2.4. 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. As an individual choose between engaging in a legal or illegal activity he will weigh the consequences of his actions due to the probability of getting caught and the severe punishment. Moreover if he 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 since Becker (1968) many economists have examined the relation between crime and deterrence measures. Ehrlich (1973) developed an economic model where individuals are rational agents seeking to maximize their expected utility. He takes into account the costs and gains from legitimate and illegitimate actions and recognizes that individuals react to incentives, making them susceptible to deterrent strategies. The author found that the rate of specific crimes is positively related to the expected gains and negatively related with the costs associated with criminal activity, additionally all felonies rates are positively related with income inequality. More recently the same author tells us that empirical evidence is consistent with punishment and other incentives presenting a deterrent effect on criminal acts (Ehrlich, 1996). However, we must look carefully to early studies. Cameron (1988) in a review of several economists' work on deterrent effects, postulates that much of the literature may be impaired by bias due to measurement error.

Gopal and Sanders (1997) as previously stated investigated the impact of deterrent and preventive measures on software developer's profits and found evidence that preventive controls may have a negative impact on profits but on the other hand deterrent strategies can potentially increase them. Peace *et al.* (2003) hypothesized that punishment

certainty and punishment severity have a negative impact on attitude towards software piracy and that punishment certainty may also have a negative effect on perceived behavior control. Their results showed a strong negative relation between the determinants postulated by the TPB and its antecedents, indicating the use of deterrent strategies as a mean to fight piracy. Hence a decrease in intention to commit software piracy is expected, but only as long the individuals perceived high levels of punishment.

According to the theory of planned behavior, attitudes toward behaviors are developed from the beliefs that underlie a person's attitude, this is, 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 assume (as previously observed) that a higher perceived punishment certainty/severity will correspond to a lower attitude towards piracy. Thus, it is hypothesized 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. Then a higher perceived probability of detection will most likely correspond to a lower perceived behavioral control, 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.

2.2.5. Software and Media Cost

It appears that economic incentives play a major role in consumer's behavior decision, with software and media price being a determinant factor. Although other economic factors like income, money saved and perceived cost-benefit are not the target of this investigation, they were used by previous researchers and represent an important insight to a consumer's decision process.

Software piracy rate was found to have a significant negative correlation with per capita GDP (and per capita GNP) mainly in poor countries, with investigators finding an inflection point at USD 6000, where income level below the inflection point reveal a stronger negative relation (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[17]. They propose address this problem through global price discrimination, which according to them is capable of maximize developer's profits[18] and create incentives to government action (e.g. enforcement of copyright laws). 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 software packages usually are the most expensive digital goods, but surprisingly in music, price is also an important factor. 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).

[17] At the time was usual to buy physical pirated content (e.g. CDs) as opposed to downloading. These direct costs are the one's referred by the authors, however today pirates usually download all their unlicensed content from the internet, incurring only in indirect costs, as having a PC with internet connection (we believe these are indirect costs because the ordinary person will not primarily use their PC to pirate digital material).
[18] If developers make their software more affordable, it's expected that more people will buy it.

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 piracy behavior is modeled through the expected utility from choosing between illegal download, purchase, or do without the digital good, a rational agent will choose the utility function[19] that maximizes his expected utility. Therefore utility is used as a way to describe his preferences among the alternatives, and the correspondent characteristics of each alternative (Varian, 2009). Considering the expected costs and benefits, he will select the alternative that he believes is associated with the most desirable outcome. If piracy yields a positive surplus, despite being negatively affected by the risk inherent to punishment certainty and severity (among other factors), a lower price would decrease the payoff, ceteris paribus.

The cost of digital material can be incorporated into the TPB as an antecedent of attitude by the same reasons appointed in the deterrence theory. It is therefore expected that a higher the financial cost will correspond to a higher attitude towards piracy, due to the higher expected payoff. As such, can be hypothesized that:

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

2.2.6. Perceived Value

It is expected that the higher the price the higher will be the attitude towards piracy, however the perceived price 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

[19] We may look at this function as an ordinal utility function, however the utility function only exists if a consumer preferences respect the following axioms: completeness, reflexivity, transitivity and continuity. The first tree axioms render the behavior of a rational agent.

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.

It is also expected that price will have an influence on perceived value however, the direction (positive or negative) of that influence is uncertain. Dodds *et al.* (1991) told us that price has a double function, it may serve has an indicator of sacrifice, leading to a negative impact on the perceived value, and at the same time can be an indicator of quality, since higher prices lead to higher perceived quality and as a result to a higher perceived value. This tradeoff forms an individual's perception of value, with the authors finding some mixed results for the relation price-quality, but support for a negative relation between price and a buyer's perception of value, as the price increases the perceived value decreases.

2.2.7. Conceptual Model

An easy and simple way to summarize all the postulated hypotheses is to observe the conceptual model presented in the next page. 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). The dashed path between past piracy behavior and intention is meant to indicate exactly this, since this factor will only be in one of the models.

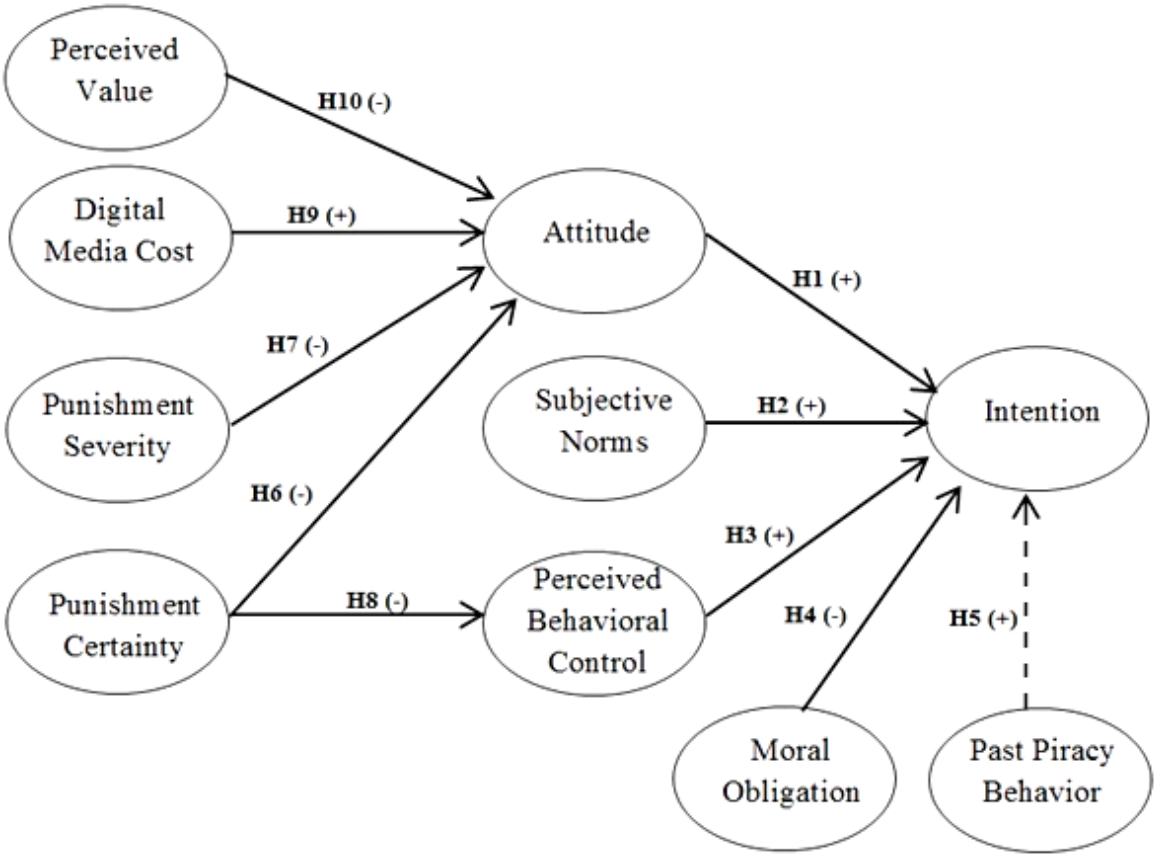

Figure 1: Conceptual Model. Expanded from Peace *et al.* (2003) and Cronan and Al-Rafee (2007).

3. Research Methodology

After a review of piracy research and the structural theories on which this work is built, it is now time to bring the conceptual model out of the paper. This section makes this required next step, to put it simply, answers to the following three questions: how was the questionnaire developed; how the latent variables (factors) will be measure using primary data; and how the collected data will be analyzed.

This section is divided in three parts. In first one is covered the development of the questionnaire, being highlighted the measured factors as well the corresponding sources. The second part addresses data collection and the last one explains a technique called structural equation modeling. This technique will be used to validate the data and elaborate the models thus, an in depth look to SEM is indispensable.

3.1. Questionnaire

The data used in this research was collected using a questionnaire written in Portuguese, which can be found on Appendix A. It was also created an online version[20] to facilitate distribution and reach as many people as possible. In order to avoid misinterpretations the initial page explained what digital piracy is, and how the questionnaire should be filled.

Individuals were asked to voluntarily participate, their anonymity and confidentiality being assured by the author. These aspects had to be assured because digital piracy is an illegal act and this research has a strong ethical component, as such these measures may help to facilitate responses but also, and more importantly, truthful ones. These concerns were also very important in the decision of not measuring behavior itself, but using instead intention as a proxy for their predicted digital piracy behavior, since it would be impossible to identify the respondents to a follow-up questionnaire.

[20] The online version was identical to the paper version, but with some visual modifications to better accommodate it to the online platform

To help ensure measurement reliability and validity, all the factors and measurement variables used were based on previous validated research, as we can see on Table 2, but some adjustments were necessary to conform the indicators to this research.

A preliminary version of the questionnaire was developed and pre-tested in one focus group discussion[21], as well distributed to individuals that gave their feedback. This was a necessary and very important step to ensure that respondents understand all the questions. Overall, the feedback was positive, with some punctuation and words/sentences changed due to their ambiguous statement. The instructions to fill in the questionnaire also emerged from the pre-test, considering that those who were not familiar with Likert scales did not understand immediately what was being asked.

3.1.1. Measured Factors and Correspondent Sources

Following the hypotheses developed and the theoretical foundations on that they are constructed, it is time to specify how the unobserved variables presented on the conceptual model (Figure 1) will be measured. 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 2: Questionnaire instrument scale factors

Factor	Source	No. of indicators	Indicator location on questionnaire
Intention (INT)	Cronan and Al-Rafee (2008); Peace *et al.* (2003)	3	Page 3; Set 1
Attitude (ATT)	Cronan and Al-Rafee (2008)	4	Page 2; Set 1
Subjective Norms (SN)	Cronan and Al-Rafee (2008)	3	Page 3; Set 2
Perceived Behavioral Control (PBC)	Cronan and Al-Rafee (2008)	5	Page 2; Set 2
Moral Obligation (MO)	Cronan and Al-Rafee (2008)	3	Page 5; Set 1

[21] The focus group discussion took place in early March, where four students colleagues participated.

Factor	Source	No. of indicators	Indicator location on questionnaire
Past Piracy Behavior (PPB)	Cronan and Al-Rafee (2008); Author	2	Page 2; Set 3
Punishment Severity (PS)	Peace *et al.* (2003)	2	Page 3; Set 3
Punishment Certainty (PC)	Peace *et al.* (2003)	2	Page 4; Set 1
Digital Media Cost (DMC)	Peace *et al.* (2003)	3	Page 4; Set 2
Perceived Value (PV)	Dodds *et al.* (1991)	3	Page 4; Set 3

Note: The questionnaire can be found on Appendix A

3.2. Data

Data was collected using an online questionnaire and a paper one. This decision may have a biasing effect on the results, however, it should be minor and negligible.

The URL to the online questionnaire was sent by e-mail to 28 715 students of University of Porto, while the paper one was administered to 79 students during regular class time in Carrazeda de Ansiães high school. The questionnaire was online during the month of April and the paper version was also distributed in the middle of the same month. A total of 590 questionnaires were collected. From these, twenty-seven had missing data which led to a sample of 563 questionnaires with complete data.

The use of a student sample was deemed appropriated in the context of this research for four main reasons:

a) Previous researchers have shown that digital piracy is generalized among the students (Im and Van Epps, 1991; Cronan and Al-Rafee, 2008);
b) Students samples have been used in several piracy studies (Peace *et al.*, 2003; Gopal *et al.*, 2004; Limayem *et al.*, 2004; D'Astous *et al.*, 2005; Wang, 2005; AI-Rafee and Cronan, 2006; Lysonski and Durvasula, 2008; Cronan and Al-Rafee, 2008; Al-Rafee and Dashti,

2012; Phau *et al.*, 2014), thus using a student sample will facilitate comparisons between studies;

c) Today's students will be tomorrow's work force; and
d) Since it is difficult to use random sampling methodologies due to the scope of the work, students constitute a good target population for convenience sampling.

3.3. Estimation Procedure

Structural Equation Modeling (SEM) was used in this investigation. SEM is a technique to "specify, estimate, and evaluate models of linear relationships among a set of observed variables in terms of a generally smaller number of unobserved variables" (Shah and Goldstein, 2006, p.149). However we should not look to SEM as a technique, but instead as set of related procedures design to evaluate how well a proposed conceptual model is consistent (fits) with the data (Kline, 2011). Furthermore, SEM allows multiple exogenous and endogenous variables to be estimated simultaneously (Anderson and Gerbing, 1988), this represents a major advantage over multiple regression.

Why use SEM? SEM has been considered a better (and best suited) technique for theory testing and development than estimation methods that analyze a single equation at a time, because (when all the prerequisites are fulfilled) the estimation methods employed by SEM provide a more efficient and consistent parameter estimates; it also deals with the overall model fit (Anderson and Gerbing, 1988; Kline, 2011). This technique is also commonly used in piracy research, for example, as we saw was used by Peace *et al.* (2003), Limayem *et al.* (2004), Douglas *et al.* (2007), Cronan and Al-Rafee (2008), and Al-Rafee and Dashti (2012).

Observed variables are usually used as an indirect measure of unobserved variables, and are typically referred to as an indicator (or measurement variable), while unobserved variables are normally called latent variables (factors or research constructs), and generally correspond to hypothetical constructs or factors (Gefen *et al.*, 2000; Kline, 2011).

A SEM model combines a measurement model and a structural model. The measurement model (a confirmatory factor analysis model) is an a priori model (developed from theoretical expectations) that identifies the latent variables and their correspondent indicators (Gefen *et al.*, 2000; Kline, 2011). The structural model (a path model) represents the hypothesized effect priorities, however dissimilar from path models these effects can, and usually involve latent variables (Gefen *et al.*, 2000; Kline, 2011).

The most common SEM model, that will be used in this work, is a structural regression model (SR model), also known as LISREL model. This is considered a covariance-based SEM (CB-SEM) (Anderson and Gerbing, 1988; Gefen *et al.*, 2000), where "model fitting to compare the covariance structure[22] fit of the researcher's model to a best possible fit covariance structure" is used (Gefen *et al.*, 2000, p. 26). The fit between the data and the conceptual model is assessed through a series of model fit tests, as the ratio of chi-square to degrees of freedom, the goodness of fit index (GFI), the adjusted goodness of fit index (AGFI), and the root mean residual (RMR). On the other hand (at the individual path level) construct validity and reliability are assessed using confirmatory factor analysis[23] (CFA) (see Gefen *et al.*, 2000; Kline, 2011; Marôco, 2014).

The default method of estimation in SR models is the maximum likelihood (ML) estimation, where "estimates are the ones that maximize the likelihood (the continuous generation) that the data (the observed covariances) were drawn from this population" (Kline, 2011, p.154). It is assumed that variables are continuous and normally distributed. However, as this assumption is frequently relaxed, the variables will be measured using a Likert scale. Therefore, it will be assumed (as Marôco, 2014) that as long as the number of categories or scale points used is high (at least five) and that the distribution is close to a normal distribution they can be treated as continuous variables.

[22] Covariance structure is the part of a SEM that represents hypotheses about variances and covariances (Kline, 2011).
[23] The CFA should show convergent validity and discriminant validity, otherwise the measurement model must be respecified.

4. Results

As the title above suggests, it is now time to focus on results. This section is divided in two parts, starting with a descriptive analysis. This type of analysis despite its simplicity is very important, allowing for a sample overview. First we take a look at sample demographics and then past piracy behavior. Past behavior was also segmented according to demographic characteristics.

The second part is where the multivariate analysis begins. An exploratory factor analysis is carried out (to have a deeper view at the data) followed by SEM. To validate the measurement models a confirmatory factor analysis is implemented. Given an acceptable measurement model, the second step is to identify and specify the structural model. The final SR models (structural model + measurement model) are then presented and evaluated.

All the results were obtained using SPSS Statistics 21 (essentially for descriptive data analysis) and subsequently AMOS 21 (for SEM).

4.1. First 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. Table 3 gathers all the presented information and offers a more detailed view.

The data also shows that almost 81% of the men admitted to pirate, while this number was lower for the women, but still very high (71.1%). 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 the reaming (Doctoral, Master's and Bachelor's students) they all presented similar values, between 25% and 27.6%.

This shows us that in this sample more male than female students had pirated in the past, and that piracy in more generalized between the youngest. Overall, the number of students reported having pirated previously is still very high, around 75%.

Table 3. Sample demographics

		Sample
Number of Students		563
Males/Females		M.: 37.8% F.:62.2%
Average Age		23.05
Education Level:		
	Doctoral Student	6.4%
	Master's Student	40.5%
	Bachelor's Student	42.8%
	High school student	9.2%
Occupation:		
	Full Time Student	79.9%
	Working Student	18.5%

4.2. Multivariate Analysis

To have a deeper view at the data, and look for latent factors an exploratory factor analysis (EFA) was conducted on all variables. EFA is a multivariate technique that is primarily used when there is no a priori information regarding the factor-indicator correspondence, this is indeed a truly exploratory technique that does not require any kind of hypotheses, testing both factors and indicators in a unrestricted way (Kline, 2011; Marôco, 2014). However, due to the nature of this study EFA was conducted in a more confirmatory mode, with the number of factors being extracted based on theory, this is fixed a priori.

Typically, EFA is not considered as part of SEM, yet it is commonly used to assess unidimensionality. As stated by Gerbing and Anderson (1998, p. 186) "unidimensionality refers to the existence of a single trait or construct underlying a set of measures". The EFA

results are on Table 4, where we have the correlation between indicators and factors, which helps us understanding and identify latent factors.

Table 4. Exploratory factor analysis

Indicator	Factor Loadings									
	1	2	3	4	5	6	7	8	9	10
INT1	,245	,253	,712			,329				
INT2	,336	,269	,724			,254				
INT3	,271	,354	,595			,353				
ATT1		,748								
ATT2		,817								
ATT3		,549								
ATT4		,840								
PBC1	,757					,232				
PBC2	,851									
PBC3	,823									
PBC4	,524									
PBC5	,706									
PPB1	,270		,279			,783				
PPB2	,277	,232	,313			,720				
SN1r		,244							,738	
SN2									-,398	
SN3	,286	,208							,496	
PS1							,760			
PS2							,973			
PC1					,766					
PC2					,922					
DMC1				,817						
DMC2				,915						
DMC3				,274						
PV1				,233		,239				
PV2				-,212				,959		
PV3								,464		
MO1r	-,275	-,360	-,324							,268
MO2		-,390	-,240							,834
MO3		-,450							-,205	,402

Notes: Small factor loadings were omitted. KMO=0.855; The extraction method was Maximum Likelihood, and the rotation method was Varimax with Kaiser normalization. Bartlett's Test of Sphericity p-value=0.000. Each indicator abbreviation makes reference to the corresponding factor and is accordingly numbered (see Table 2). Some present an r, this implies that the item was in reverse scale. All reversed indicators were reversed again to align them with the remaining ones.

To establish unidimensionality each indicator should relate to one and only one latent variable, this is, an indicator should load on a single factor. As we can see not all items loaded significantly on one factor, thus unidimensionality can not be ensured to all variables.

The objective of this analysis was just to have a first view of the data, and in that way was successful, leading to the important conclusion that we may have a unidimensionality problem. However, no corrections will be made based on these results since EFA has some serious disadvantages, and CFA can be used to check for unidimensionality, with the advantage of being considered a better technique for doing so (O'Leary-Kell and Vokurka, 1998).

The next sections will address this problem, and examine reliability and validity with the help of a confirmatory factor analysis. 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. All this was done because it is impossible to measure past piracy behavior for those who never had pirated before and to see if the results obtained from the full model are consistent with the pirate model. This may also help policy makers who for some reason would like to target only the pirate population.

4.2.1. Full Model

4.2.1.1. Measurement Model

A SEM model combines a measurement model and a structural model, the first one 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, while the initial one is presented in Appendix B. Model diagram symbols should be interpreted as follows: the latent variables

(factors) are represented inside ellipses; the observed variables (indicators) are represented inside rectangles, each indicator has a measurement error term, such as e1 for indicator INT1; the causal effect of the factor on the indicators is represented by the lines with the single arrowheads, while a curved line with two arrowheads represent the correlation between variables.

To get to a final 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. These should present values equal or greater than 0.5. Another necessary condition (but not sufficient by itself) is to analyze the percentage of variance in the indicator that is explained by the latent variable (this is simply the square of the factor loading), being considered values equal or greater than 0.25 appropriated (Marôco, 2014). Unfortunately three indicators (SN2, PV1, DMC3) did not fulfill these conditions and were removed.

The existence of outliers was assessed by Mahalanobis square distance (D^2), and normality was assessed using Skew (Sk) and Kurtosis (Ku) coefficients. Not a single variable presented Sk and Ku values that indicate a severe violation of normal distribution (|Sk| >2-3 and |Ku| > 7-10, see Marôco (2014)). Unfortunately, thirteen cases reported D^2 values suggesting that these were outliers, so the CFA was done without them.

The model was then adjusted using the modification indices (MI) (greater than 11, as indicated by Marôco (2014)) provided by AMOS. It is important to disclose that a model can be artificially enhanced to perfection via modification indices, however all modifications must be theoretically supported. Thus, it is very important to know when to stop.

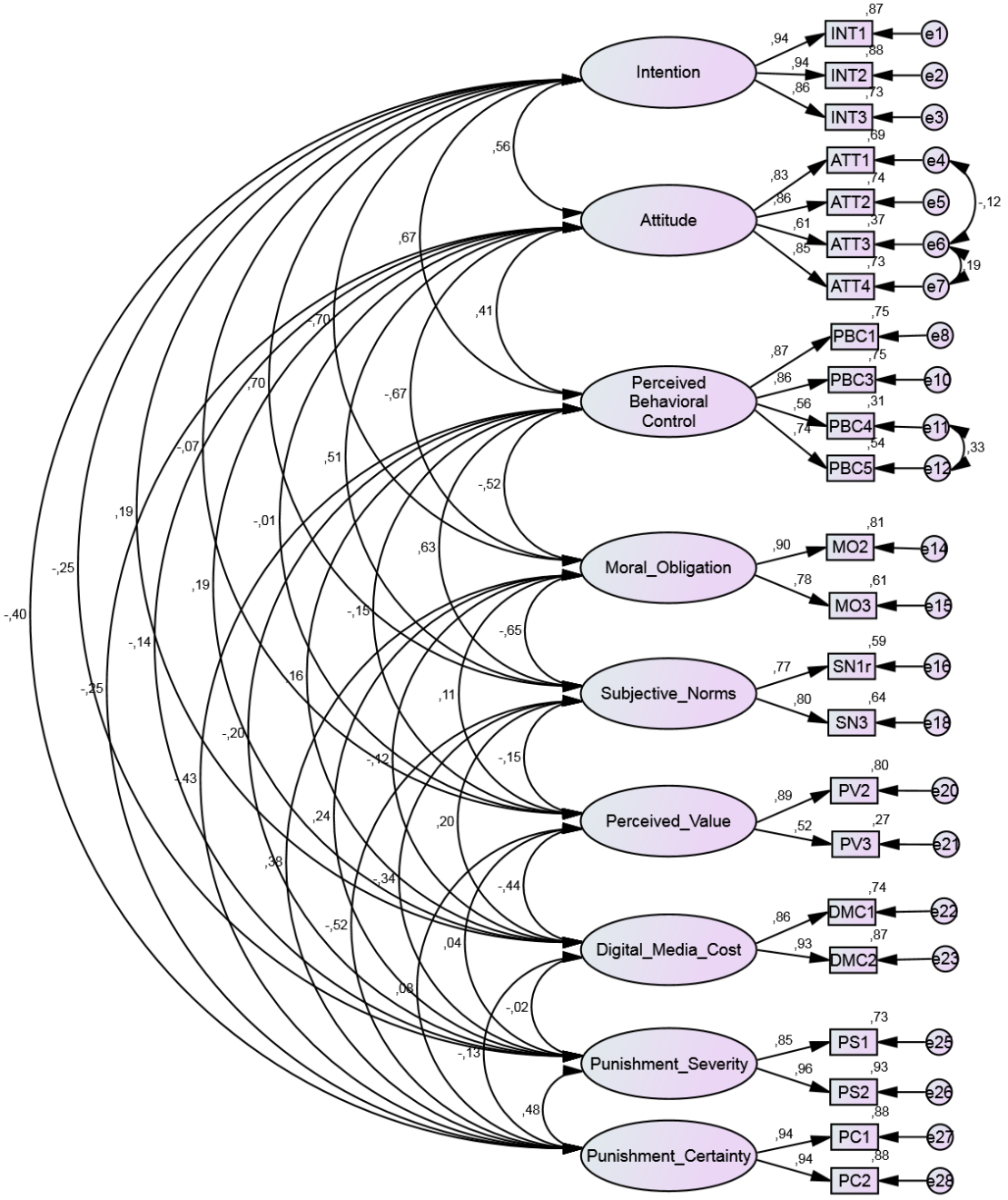

Figure 2. Final CFA Full Model ($X^2/df = 1.790; CFI = 0.948;\ GFI = 0.948; RMSEA = 0.038; P[rmsea < 0.05] = 0.999; MECVI = 0.946$).

The first conclusion analyzing the MI was that MO1r and PBC2 loaded on more than one factor and so were removed from the model, this helps ensure unidimensionality and supports in part the EFA. A second set of suggested modifications were related to the covariance between the error terms of the following indicators: ATT1 (e4) and ATT3 (e6); ATT3 (e6) and ATT4 (e7); PBC4 (e11) and PBC (e12). Since each set of indicators belongs to the same factor, the correlation between the errors may be occurring because of the similarity of wording and content, as so, the proposed 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 ($\chi^2/df = 1.790; CFI = 0.948;\ GFI = 0.948; RMSEA = 0.038; P[rmsea < 0.05] = 0.999; MECVI = 0.946$)[24]. 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 Table 5) except the variable perceived value however, the reliability value (0.682) was so close to the threshold that it was considered as enough.

Table 5. Consistency statistics

Factor	Reliability	AVE
Intention (INT)	0,936	0,829
Attitude (ATT)	0,871	0,631
Perceived Behavioral Control (PBC)	0,848	0,588
Moral Obligation (MO)	0,831	0,712
Subjective Norms (SN)	0,763	0,616
Perceived Value (PV)	0,682	0,535
Digital Media Cost (DMC)	0,892	0,805
Punishment Severity (PS)	0,907	0,830
Punishment Certainty (PC)	0,936	0,880

[24] For a better understanding, see the reference values in appendix E.

Construct validity is used to assess if the used variable truly measure/represents the construct that we want to evaluate (O'Leary-Kell 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 Table 5 all constructs presented and suitable AVE. 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). Comparing the average variance extracted per factor with the correspondent squared correlation values on Table 6 we can see that the previous condition is accomplished.

Table 6. Squared correlation between factors

Factors			**Squared Correlation**
Intention (INT)	and	Attitude (ATT)	0,309
Intention (INT)	and	Perceived Behavioral Control(PBC)	0,452
Intention (INT)	and	Moral Obligation (MO)	0,484
Intention (INT)	and	Subjective Norms (SN)	0,490
Intention (INT)	and	Perceived Value (PV)	0,005
Intention (INT)	and	Digital Media Cost (DMC)	0,036
Intention (INT)	and	Punishment Severity (PS)	0,062
Intention (INT)	and	Punishment Certainty (PC)	0,158
Attitude (ATT)	and	Perceived Behavioral Control(PBC)	0,172
Attitude (ATT)	and	Moral Obligation (MO)	0,448
Attitude (ATT)	and	Subjective Norms (SN)	0,259
Attitude (ATT)	and	Perceived Value (PV)	0,000
Attitude (ATT)	and	Digital Media Cost (DMC)	0,036
Attitude (ATT)	and	Punishment Severity (PS)	0,020
Attitude (ATT)	and	Punishment Certainty (PC)	0,065
Perceived Behavioral Control(PBC)	and	Moral Obligation (MO)	0,266

Factors			Squared Correlation
Perceived Behavioral Control(PBC)	and	Subjective Norms (SN)	0,398
Perceived Behavioral Control(PBC)	and	Perceived Value (PV)	0,023
Perceived Behavioral Control(PBC)	and	Digital Media Cost (DMC)	0,026
Perceived Behavioral Control(PBC)	and	Punishment Severity (PS)	0,040
Perceived Behavioral Control(PBC)	and	Punishment Certainty (PC)	0,184
Moral Obligation (MO)	and	Subjective Norms (SN)	0,423
Moral Obligation (MO)	and	Perceived Value (PV)	0,012
Moral Obligation (MO)	and	Digital Media Cost (DMC)	0,014
Moral Obligation (MO)	and	Punishment Severity (PS)	0,058
Moral Obligation (MO)	and	Punishment Certainty (PC)	0,141
Subjective Norms (SN)	and	Perceived Value (PV)	0,022
Subjective Norms (SN)	and	Digital Media Cost (DMC)	0,041
Subjective Norms (SN)	and	Punishment Severity (PS)	0,115
Subjective Norms (SN)	and	Punishment Certainty (PC)	0,270
Perceived Value (PV)	and	Digital Media Cost (DMC)	0,196
Perceived Value (PV)	and	Punishment Severity (PS)	0,002
Perceived Value (PV)	and	Punishment Certainty (PC)	0,006
Digital Media Cost (DMC)	and	Punishment Severity (PS)	0,000
Digital Media Cost (DMC)	and	Punishment Certainty (PC)	0,017
Punishment Severity (PS)	and	Punishment Certainty (PC)	0,231

4.2.1.2. SR Model

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). In this section is introduced the final adjusted (using the modification indices) SR model (structural model + measurement model) and evaluated its adjustment quality using a set of fit statistics.

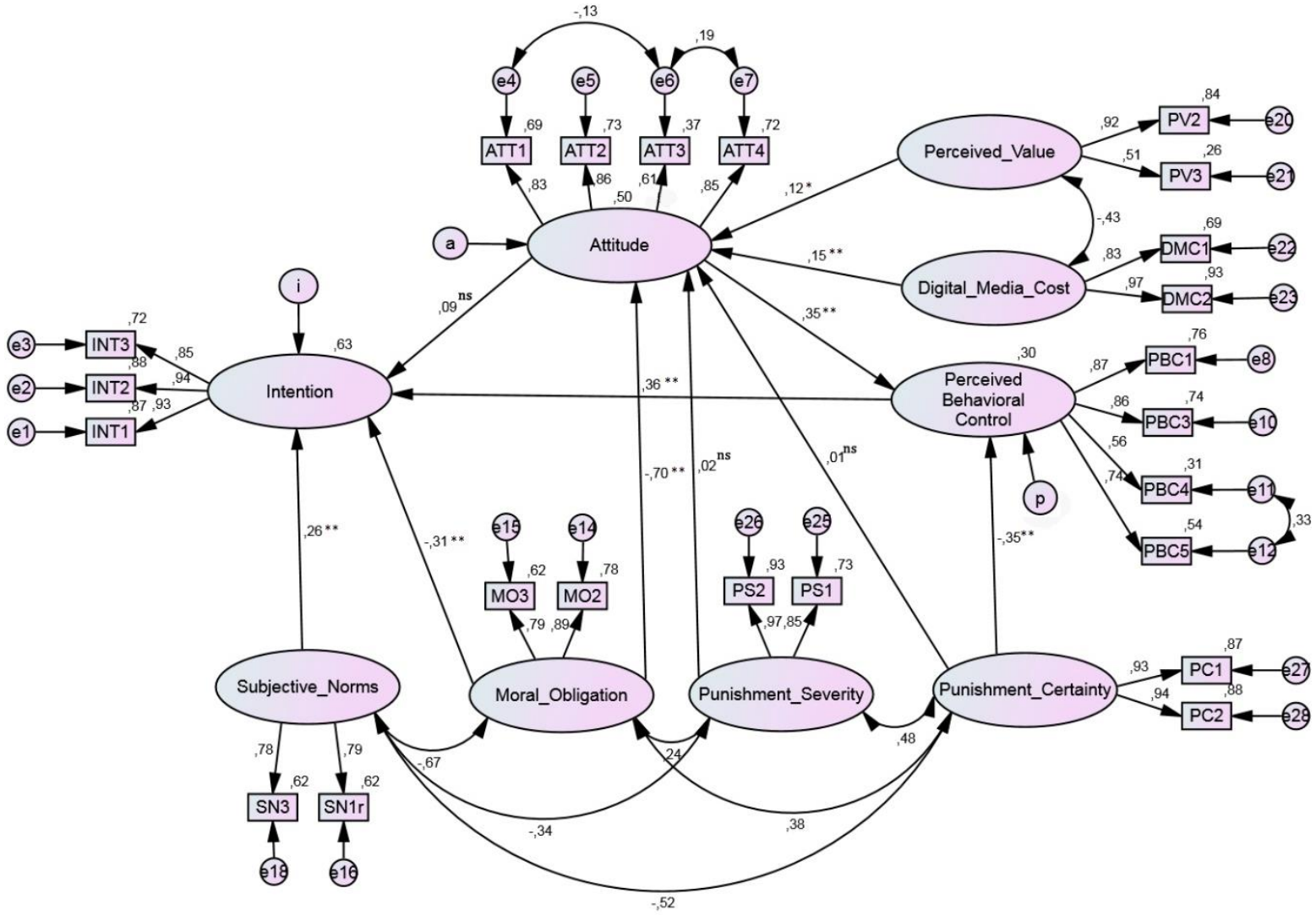

Figure 3. Final Full Sample SR Model. Path coefficient estimates are reported as standardized ($**_{p<0.01}$; $*_{0.01\leq p\leq 0.05}$; ns (not significant)$_{p>0.05}$).

The overall model fit is satisfactory ($X^2/df = 2.14; CFI = 0.970; GFI = 0.934; RMSEA = 0.046; P[rmsea < 0.05] = 0.890$) however, it fails the model chi-square test ($\chi^2 = 447.852, df = 209, p = 0.000$). 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 a model can be rejected despite truly presenting a good adjustment to the data simply because of the sample size. When the sample presents a considerable dimension ($n > 400$) the χ^2 test very often leads to the wrong conclusion, in other words, it is very likely to be significant ($p < 0.05$).This may be happening on the presented model. Because of this problem and others, researchers have developed other absolute fit indices such as the goodness of fit index (GFI) and root mean error of approximation (RMSEA). GFI presented a good value at 0.934, while RMSEA was acceptable at 0.046. The relative fit index CFI (comparative fit index) 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), these were: "Punishment Certainty → Attitude" ($\beta_{Att.PC} = 0.009; \mathrm{p} = 0.846$); "Punishment Severity→ Attitude"($\beta_{Att.PS} = 0.021; \mathrm{p} = 0.624$); and "Attitude→ Intention"($\beta_{Int.Att} = 0.087; \mathrm{p} = 0.089$).

The remaining TPB components had a significant but moderated effect on intention($\beta_{Int.SN} = 0.257; \mathrm{p} < 0.01$; $\beta_{Int.PBC} = 0.358; \mathrm{p} < 0.01$), with moral obligation also having a significant but moderated effect on intention($\beta_{Int.MO} = -0.307; \mathrm{p} < 0.01$). Attitude had a significant but moderated effect on perceived behavioral control($\beta_{PBC.Att} = 0.349; \mathrm{p} < 0.01$), and attitude remaining antecedents exhibited a significant but small effect($\beta_{Att.PV} = 0.118; \mathrm{p} = 0.016$; $\beta_{Att.DMC} = 0.155; \mathrm{p} < 0.01$). Punishment certainty had a moderated effect on perceived behavioral control($\beta_{PBC.PC} = -0.348; \mathrm{p} < 0.01$). Finally, the path "Moral Obligation → Attitude" was the one that presented the higher path coefficient($\beta_{Att.MO} = -0.699; \mathrm{p} < 0.01$).

The final full model explains 63% of the variance in digital piracy intention.

4.2.2. Pirate Model

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

4.2.2.1. Measurement Model

The final CFA pirate model is presented in Figure 4, while the initial one is presented in Appendix C. To get to this final model we yet again follow Marôco (2014).

The first step was to analyze factor validity, unfortunately the same three indicators (SN2, PV1, DMC3) failed again to fulfill the required 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. The existence of outliers assessed by Mahalanobis square distance displayed five cases with values suggesting that these were outliers, so the CFA was conducted without them.

The model was then adjusted using the modification indices (greater than 11), a set of suggested modifications were related to the covariance between the error terms of the following indicators: ATT1 (e4) and ATT3 (e6); ATT3 (e6) and ATT4 (e7); MO1r (e13) and MO3 (e15). The suggested trajectories were added to the model since that all relations are between items that load on the same factor. The correlation between the errors may be occurring because of the similarity of wording and content.

The fit between the data and the final CFA pirate model was overall considered as good ($X^2/df = 1.761; CFI = 0.969;\ GFI = 0.926; RMSEA = 0.043; P[rmsea < 0.05] = 0.966; MECVI = 1.580$).

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 D).

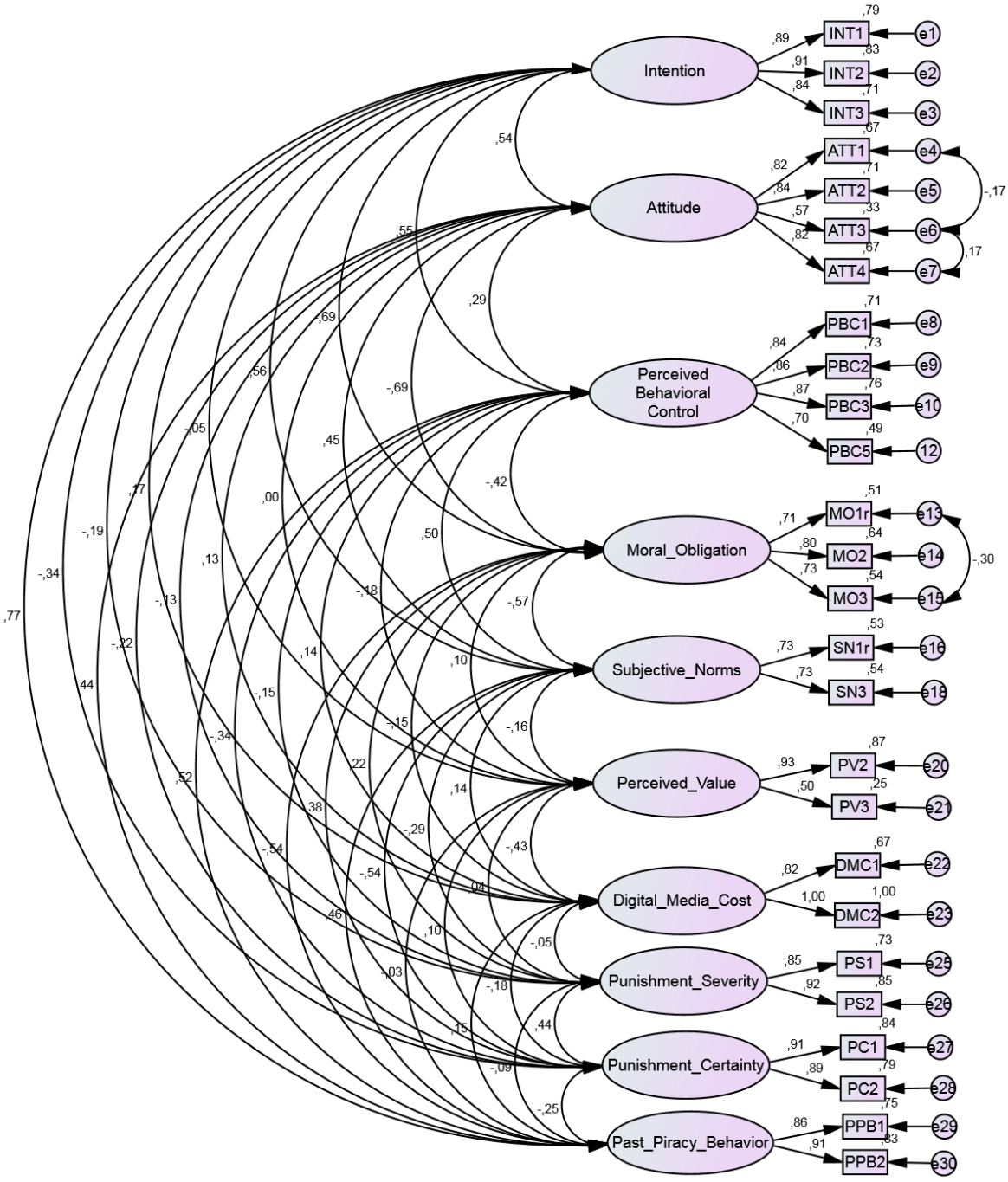

Figure 4. Final CFA Pirate Model ($\mathbf{X^2/df = 1.761; CFI = 0.969;\ GFI = 0.926; RMSEA = 0.043; P[rmsea < 0.05] = 0.966; MECVI = 1.580}$).

4.2.2.2. SR Model

The final SR pirate model (Figure 5) revealed a satisfactory model fit ($\chi^2 = 447.852, df = 209, p = 0.000;\ X^2/df = 1.960; CFI = 0.957;\ GFI = 0.910; RMSEA = 0.048; P[rmsea < 0.05] = 0.694$). However, when we examine each specific path we can see that six paths were not significant, these were:

i. "Perceived Value → Attitude" ($\beta_{Att.PV} = 0.096; \mathrm{p} = 0.078$);
ii. "Digital Media Cost → Attitude" ($\beta_{Att.DMC} = 0.083; \mathrm{p} = 0.083$);
iii. "Punishment Certainty → Attitude" ($\beta_{Att.PC} = 0.056; \mathrm{p} = 0.279$);
iv. "Punishment Severity→ Attitude"($\beta_{Att.PS} = -0.006; \mathrm{p} = 0.897$);
v. "Attitude→ Intention"($\beta_{Int.Att} = 0.042; \mathrm{p} = 0.465$); and
vi. "Subjective Norms → Intention" ($\beta_{Int.SN} = 0.084; \mathrm{p} = 0.118$).

The decision to use the standard level of significance instead of 10% culminated in the rejection of some hypothesis that otherwise would not be rejected, this is true for both models and it is important to take in account when comparing the conclusions here presented with other authors.

The remaining TPB component had a significant but weak effect on intention($\beta_{Int.PBC} = 0.124; \mathrm{p} = 0.003$). Moral obligation had a significant but moderated effect on intention($\beta_{Int.MO} = -0.304; \mathrm{p} < 0.01$), while past piracy behavior presented a substantial effect on intention ($\beta_{Int.PPB} = 0.490; \mathrm{p} < 0.01$). Punishment certainty and past piracy behavior had a significant effect on perceived behavioral control, the first having a moderated effect and the second a significant one ($\beta_{PBC.PC} = -0.237; \mathrm{p} < 0.01;\ \beta_{PBC.PPB} = 0.490; \mathrm{p} < 0.01$). Finally, the path "Moral Obligation → Attitude" was the one that presented the higher path coefficient($\beta_{Att.MO} = -0.712; \mathrm{p} < 0.01$).

The final pirate model explains 70% of the variance in digital piracy intention.

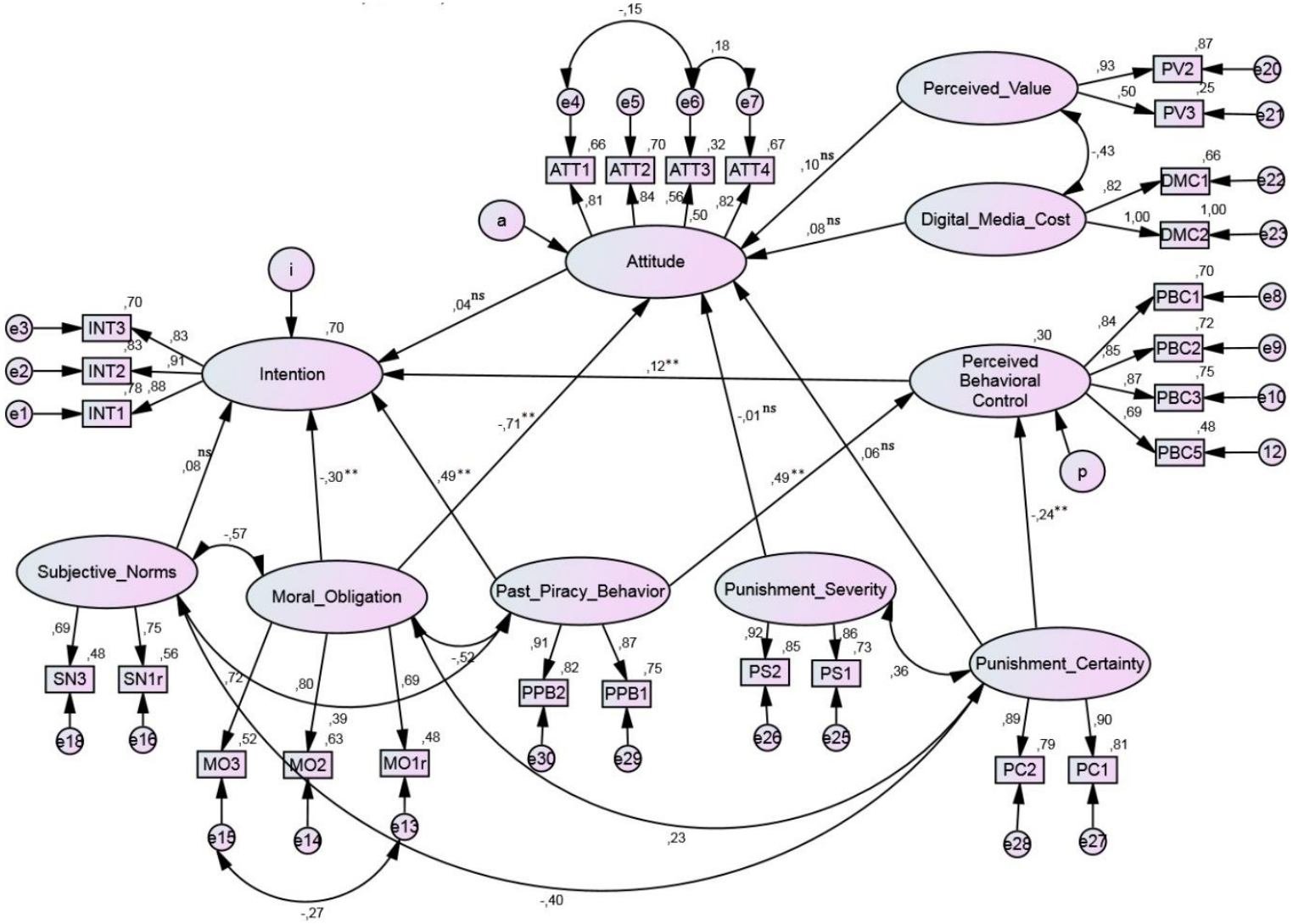

Figure 5. Final Pirate SR Model. Path coefficient estimates are reported as standardized ($**_{p<0.01}$; $*_{0.01\leq p\leq 0.05}$; ns (not significant)$_{p>0.05}$)

5. Discussion and Implications

5.1. 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.

This result does not support previous researchers that have found attitude a significant precursor to intention (see for example Peace *et al.*, 2003; D'Astous *et al.*, 2005; Al-Rafee and Dashti, 2012), presenting a moderated/high effect on it. Usually, is considered that by altering attitude it should be possible to reduce piracy, thus making attitude a very important variable in the fight against piracy and making it more difficult since attitude was not a significance factor. It may also indicate that individuals pirate despite presenting an unfavorable attitude toward digital piracy.

The remaining TPB components in the full sample model presented the expected outcome. It was hypothesized that individuals with a higher level of subjective norms supportive/(perceived control over performance) of piracy will correspond to a greater intention to pirate digital materials. 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, making the connection between them and presenting themselves as the ideal factors to "attack". 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 shows 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 or even give orders to our computer at home to start a download, making pirating so easy that can become recurrent and ultimately a habit. This makes past piracy behavior a very difficult factor to address. A suggestion is to restrict the number of places where people can access websites that facilitate the download or streaming of pirate 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. Another more generalized approach would be to contact internet service providers and ask them to block access to these websites however, the fear of losing customers may prevent them from doing so and usually when it happens is due to a judicial order.

5.2. Punishment Certainty and Severity

As we know attitudes toward behaviors and perceived behavioral control are developed from behavioral beliefs (beliefs about the likely consequences or outcome) and control beliefs (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, and presented an insignificant beta value. 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 copyright organizations (and/or governments) should lead people to believe that they are very likely to be caught, this high punishment certainty will affect the sense of control and opportunity, and should make possible to reduce people's intention towards piracy. It is imperative to note that perception is very important, if people are actually caught very frequently but the general public does not know they could believe that probability is indeed lower and not modify their behavior.

5.3. Digital Media Cost and Perceived Value

As we saw, multiple studies have analyzed economic factors, being digital media cost one of them, and concluded that financial cost (even when is small) play 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. Despite being a small effect, it was still almost twice as strong that the one found in the pirate model. 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 digital goods. 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, for example Microsoft on their online Portuguese store (Microsoft, n.d.) already has in place a price discrimination strategy for students. By lowering the financial cost, we can decrease the expected utility from using the pirated material, making the licensed content more desirable. Another strategy could be to show people that digital goods are not as expensive as they might think and that already exist cheap alternatives: a) Spotify has on their servers over 30 million songs that we can listen for free, but with some disadvantages (e.g. ads) or we can pay for a premium service and enjoy total liberty (Spotify, n.d.); b) to see TV shows and movies through the internet it will be soon available in Portugal (October 2015) a streaming service provided by Netflix that is considered a cheap alternative to piracy (Ramos, 2015).

Perceived value, the new addition to piracy research, became an interesting case since it was hypothesized to negatively influence attitude but it ended up having a positive effect. Furthermore, perceived value 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 due to the bigger assessed gains.

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. As so, it is important in future research to try to find out why is attitude not being a significant predictor of intention.

To close this section a summary table is presented below, where we have all the formulated hypotheses and the correspondent outcome for both models, as well all the beta values.

Table 7. 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

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

6. 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 as we all know 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. This would increase the generalization of the findings and could be used to validate the achieved results. Research could also be undertaken to examine the actual behavior, although more difficult it would be interesting to confirm if intentions do lead to action.

Because attitude is considered a key factor and was not a significant predictor of intention (in both models) and usually is (Christensen and Eining, 1991; Peace *et al.*, 2003; D'Astous *et al.*, 2005; Cronan and Al-Rafee, 2008; Al-Rafee and Dashti, 2012) it should be investigate why this is happening. Is it because of the relation between moral obligation and attitude?

As final suggestion, a more comprehensive model could be designed to include other relevant theories and its associated variables, for example, the equity theory as employed by Douglas *et al.* (2007).

7. Conclusion

This dissertation objective was to investigate digital piracy intention. To do so the theory of planned behavior emerged as the ideal framework, being expanded using the utility theory, the deterrence theory and other relevant constructs (moral obligation and past piracy behavior) that were expected to be capable of influencing intention. The expansion, more particularly the variable past piracy behavior 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 models addressed not only factors capable of influencing intention directly, but also employed antecedents of those factors, capable of influence intention in an indirect fashion.

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 as hypothesized a positive effect, while perceived value, a new factor in piracy research, presented an unexpected effect since it was hypothesized to

negatively influence attitude but it ended up having a positive effect. It appears that a higher perceived value demonstrates that consumers believe that by turning to digital piracy they are receiving more (e.g. quality, intrinsic attributes, money saved) than what they are sacrificing (e.g. time and effort to pirate, possible legal actions), this is they resort to digital piracy to maximizing their utility.

In conclusion, this investigation was able to corroborate some of the antecedents used in previous piracy research to explain piracy intention. Among the factors that did not present a significant effect was attitude, this relation should be further studied since usually attitude is a significant predictor of 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 put in place new strategies (or adapt current ones) and ultimately reduce digital piracy.

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9. Appendix

Appendix A.: Questionnaire

Questionário Sobre Pirataria Digital

Este questionário tem como propósito auxiliar o desenvolvimento de uma dissertação de mestrado, que procura investigar a pirataria digital no nosso país, tendo sido desenvolvido no âmbito do Mestrado em Economia e Administração de Empresas da Faculdade de Economia da Universidade do Porto. Mesmo que nunca tenha pirateado qualquer tipo de material digital poderá preencher o questionário sem qualquer dificuldade. Agradeço a sua participação, pois é indispensável para o desenvolvimento do meu trabalho e solicito que responda a todas as questões com a máxima sinceridade.

A participação neste estudo é voluntária, e será assegurada a confidencialidade de todas as respostas.

O que é a Pirataria Digital?

Entende-se por Pirataria Digital o download/cópia de forma ilegal de software e ficheiros de *media* protegidos por direitos de autor. Tais ficheiros podem ser filmes, musica, vídeo jogos, entre outros.

Idade:____ Sexo (M/F):____

Estudante de:

Ensino Secundário ☐ Ensino Profissional ☐ Licenciatura ☐
Mestrado ☐ Doutoramento ☐ Pós-Graduação ☐

Ocupação:

Estudante a tempo inteiro ☐ Trabalhador-Estudante ☐ Outra:_____

Como preencher o questionário?

- O seguinte questionário tem como objetivo avaliar o grau de concordância ou discordância com cada uma das questões/afirmações apresentadas.
- Todas as repostas serão medidas numa escala de 7 pontos. Ao selecionar a quadrícula próxima dos extremos, significa que concorda com o adjetivo (ou afirmação) próximo da sua escolha, à medida que se afasta dos extremos a sua concordância vai diminuindo, representando a quadrícula central, indiferença (ou neutralidade).
- Responda a cada questão selecionando a opção pretendida com uma cruz.

Considero que de um modo geral que a pirataria digital é:

Favorável	☐	☐	☐	☐	☐	☐	☐	Desfavorável
Benéfica	☐	☐	☐	☐	☐	☐	☐	Prejudicial
Sensata	☐	☐	☐	☐	☐	☐	☐	Insensata
Boa	☐	☐	☐	☐	☐	☐	☐	Má

O seguinte conjunto de perguntas procura aferir a sua capacidade para piratear

Para mim piratear material digital seria/é:								
Muito Fácil	☐	☐	☐	☐	☐	☐	☐	Muito Difícil
Querendo facilmente poderia piratear material digital								
Concordo Plenamente	☐	☐	☐	☐	☐	☐	☐	Discordo Completamente
Considero-me capaz de piratear material digital								
Concordo Plenamente	☐	☐	☐	☐	☐	☐	☐	Discordo Completamente
Tenho os recursos necessários (ex. computador, ligação à internet, etc.) para piratear material digital								
Concordo Plenamente	☐	☐	☐	☐	☐	☐	☐	Discordo Completamente
Se quiser sou capaz de encontrar material digital para piratear								
Concordo Plenamente	☐	☐	☐	☐	☐	☐	☐	Discordo Completamente

O seguinte conjunto de perguntas encontra-se relacionado com a sua atitude de pirataria no passado e a sua intenção de piratear no futuro

Pirateei material digital no passado (Se responder não, salte as duas próximas questões)								
Sim	☐						☐	Não
Quanto material digital pirateou?								
Muito	☐	☐	☐	☐	☐	☐	☐	Pouco
Qual a frequência com que pirateou material digital								
Diariamente	☐	☐	☐	☐	☐	☐	☐	Esporadicamente

Tenciono piratear material digital num futuro próximo								
Certamente que Sim	☐	☐	☐	☐	☐	☐	☐	Certamente que Não
Se tivesse a oportunidade, piratearia material digital								
Certamente que Sim	☐	☐	☐	☐	☐	☐	☐	Certamente que Não
Farei todos os esforços para piratear material digital num futuro próximo								
Certamente que Sim	☐	☐	☐	☐	☐	☐	☐	Certamente que Não

As questões abaixo procuram fornecer um melhor entendimento da opinião daqueles que considera como importantes na sua vida (exemplo: familiares e amigos)

As pessoas que considero importantes na minha vida pensam que não devo piratear material digital								
Concordo Plenamente	☐	☐	☐	☐	☐	☐	☐	Discordo Completamente
Relativamente à pirataria digital, penso que devo fazer o que as pessoas que me são importantes consideram como correto								
Concordo Plenamente	☐	☐	☒	☐	☐	☐	☐	Discordo Completamente
Se piratear material digital, a maioria das pessoas que me são importantes iriam:								
Não se Importar	☐	☐	☐	☐	☐	☐	☐	Desaprovar

O seguinte conjunto de perguntas está relacionado com a severidade da punição, no caso de ser apanhado a piratear

Se fosse apanhado a piratear penso que a punição seria:								
Muito Elevada	☐	☐	☐	☐	☐	☐	☐	Muito Baixa
Se fosse apanhado a piratear, seria severamente punido								
Concordo Plenamente	☐	☐	☐	☐	☐	☐	☐	Discordo Completamente

As questões abaixo encontram-se relacionadas com a probabilidade de ser apanhado a piratear

Quando pirateio/(caso pirateasse) material digital, penso que a probabilidade de ser apanhado seria:								
Muito Elevada	☐	☐	☐	☐	☐	☐	☐	Muito Baixa
Quando pirateio/(caso pirateasse) material digital provavelmente seria apanhado								
Concordo Plenamente	☐	☐	☐	☐	☐	☐	☐	Discordo Completamente

O seguinte conjunto de perguntas está relacionado com o custo financeiro associado aos bens digitais

Considero de forma geral que o preço dos materiais digitais é hoje em dia:								
Muito Alto	☐	☐	☐	☐	☐	☐	☐	Muito Baixo
Se quiser comprar um bem digital, este custar-me-ia muito dinheiro								
Concordo Plenamente	☐	☐	☐	☐	☐	☐	☐	Discordo Completamente
Utilizo/(Utilizaria) a pirataria digital como um meio para poupar dinheiro								
Concordo Plenamente	☐	☐	☐	☐	☐	☐	☐	Discordo Completamente

Questões relacionadas com o valor atribuído aos bens digitais

Os bens digitais representam para mim, um elevado valor								
Concordo Plenamente	☐	☐	☐	☐	☐	☐	☐	Discordo Completamente
Considero que os bens digitais são bens com um valor justo/correto								
Concordo Plenamente	☐	☐	☐	☐	☐	☐	☐	Discordo Completamente
Considero que a compra de bens digitais é uma boa compra, isto é com benefícios								
Concordo Plenamente	☐	☐	☐	☐	☐	☐	☐	Discordo Completamente

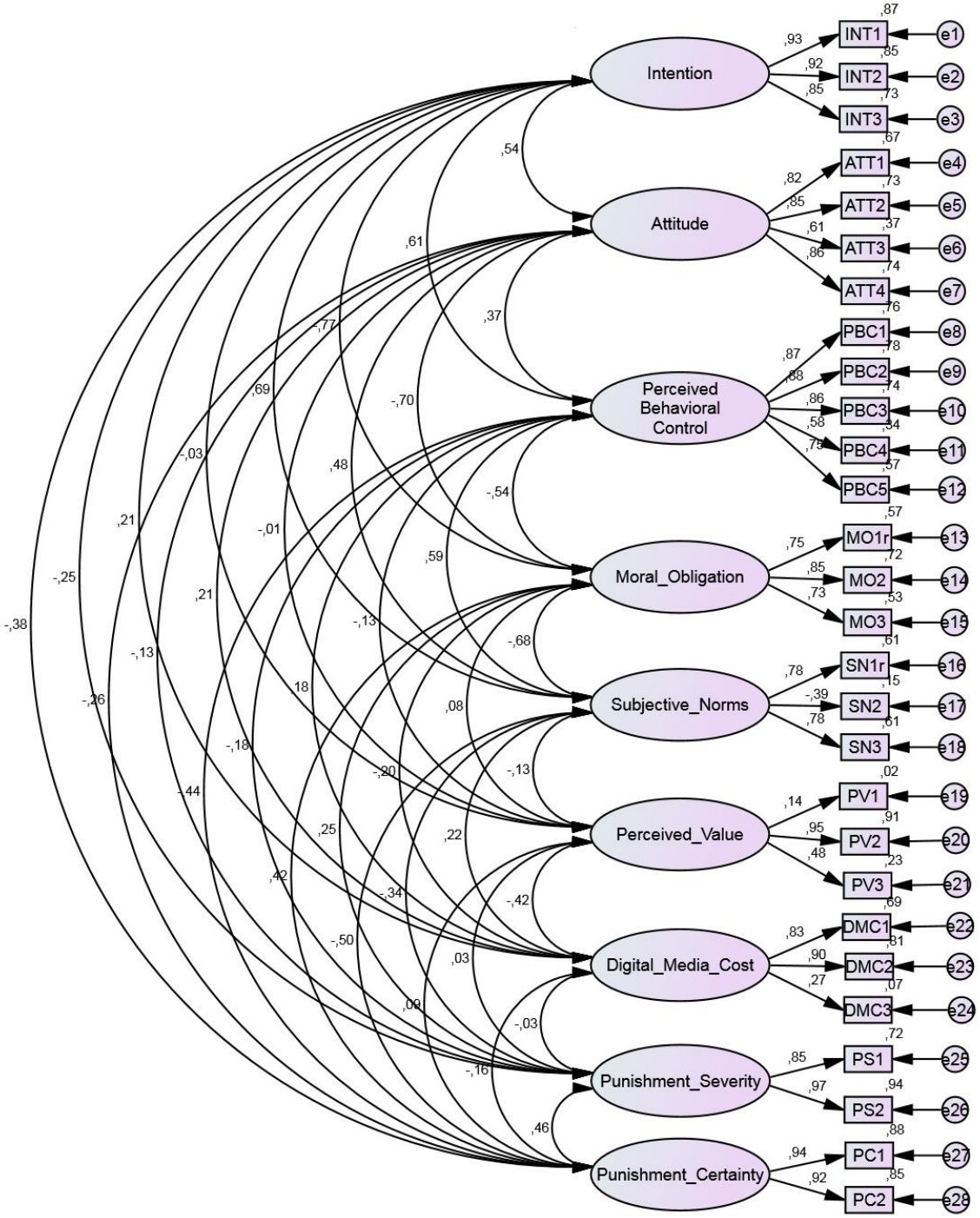
O seguinte conjunto de perguntas está relacionado com os sentimentos associados à pirataria digital

Não me sentiria culpado se pirateasse material digital								
Concordo Plenamente	☐	☐	☐	☐	☐	☐	☐	Discordo Completamente
A pirataria digital vai contra os meus princípios								
Concordo Plenamente	☐	☐	☐	☐	☐	☐	☐	Discordo Completamente
Considero moralmente incorreto piratear material digital								
Concordo Plenamente	☐	☐	☐	☐	☐	☐	☐	Discordo Completamente

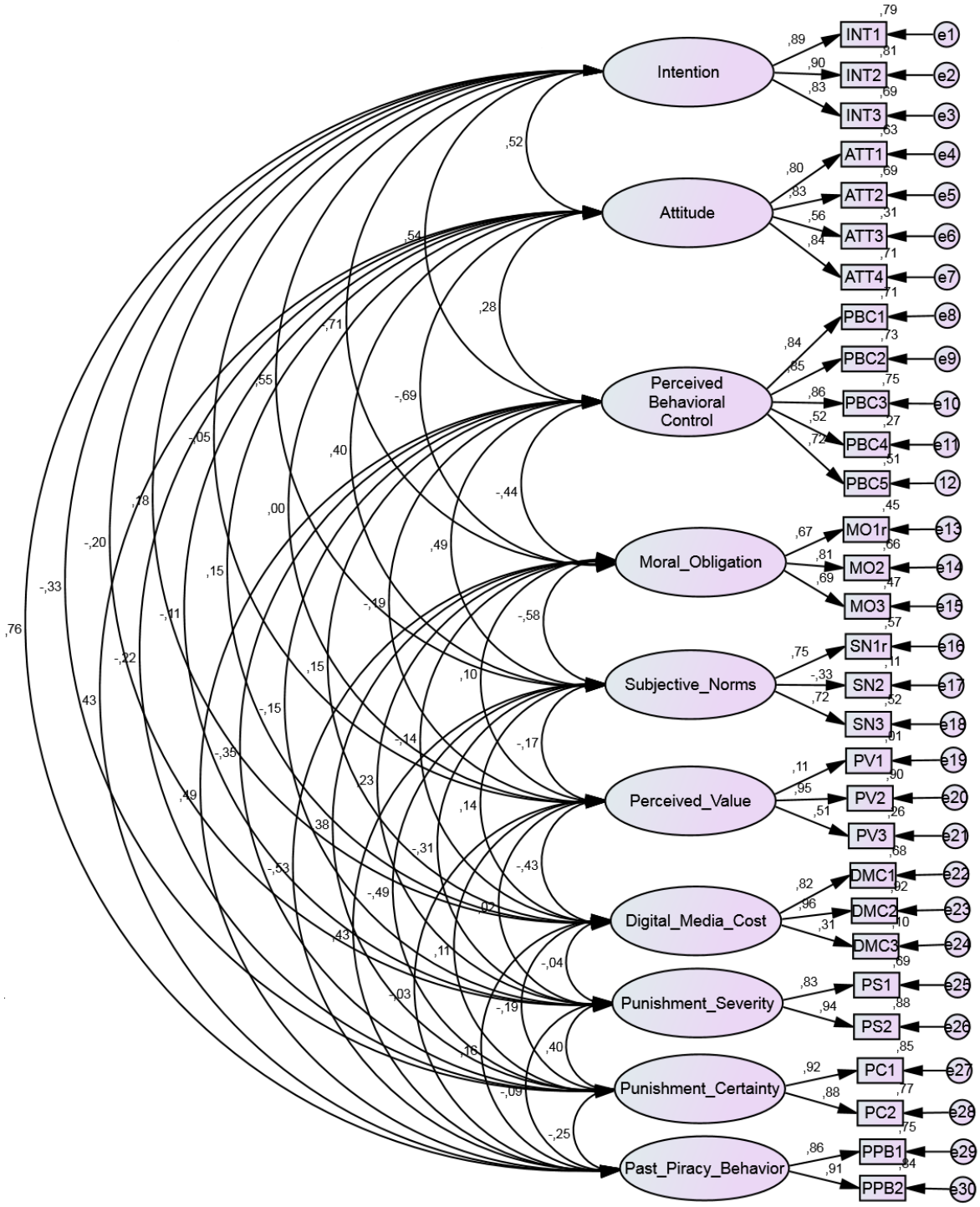
Mais uma vez, obrigado pela sua colaboração.

FIM

Appendix B.: Initial CFA full model ($X^2/df = 2.998; CFI = 0.933;\ GFI = 0.894; RMSEA = 0.060; P[rmsea < 0.05] = 0.000; MECVI = 2.020$).



Appendix C.: Initial CFA pirate model ($X^2/df = 2.196; CFI = 0.934;\ GFI = 0.892; RMSEA = 0.053; P[rmsea < 0.05] = 0.135; MECVI = 2.422$).



Appendix D.: Pirate Model - Consistency statistics and squared correlation between factors

Factor	Reliability	AVE
Intention (INT)	0,913	0,777
Attitude (ATT)	0,851	0,592
Perceived Behavioral Control (PBC)	0,891	0,674
Moral Obligation (MO)	0,773	0,534
Subjective Norms (SN)	0,697	0,535
Perceived Value (PV)	0,701	0,560
Digital Media Cost (DMC)	0,909	0,834
Punishment Severity (PS)	0,883	0,791
Punishment Certainty (PC)	0,898	0,815
Past Piracy Behavior (PPB)	0,883	0,791

Factors			Squared Correlation
Intention (INT)	and	Attitude (ATT)	0,286
Intention (INT)	and	Perceived Behavioral Control(PBC)	0,303
Intention (INT)	and	Moral Obligation (MO)	0,493
Intention (INT)	and	Subjective Norms (SN)	0,309
Intention (INT)	and	Perceived Value (PV)	0,003
Intention (INT)	and	Digital Media Cost (DMC)	0,029
Intention (INT)	and	Punishment Severity(PS)	0,037
Intention (INT)	and	Punishment Certainty (PC)	0,118
Intention (INT)	and	Past Piracy Behavior (PPB)	0,593
Attitude (ATT)	and	Perceived Behavioral Control(PBC)	0,082
Attitude (ATT)	and	Moral Obligation (MO)	0,487
Attitude (ATT)	and	Subjective Norms (SN)	0,199
Attitude (ATT)	and	Perceived Value (PV)	0,000
Attitude (ATT)	and	Digital Media Cost (DMC)	0,018
Attitude (ATT)	and	Punishment Severity(PS)	0,017
Attitude (ATT)	and	Punishment Certainty (PC)	0,050
Attitude (ATT)	and	Past Piracy Behavior (PPB)	0,196
Perceived Behavioral Control(PBC)	and	Moral Obligation (MO)	0,171
Perceived Behavioral Control(PBC)	and	Subjective Norms (SN)	0,254
Perceived Behavioral Control(PBC)	and	Perceived Value (PV)	0,032
Perceived Behavioral Control(PBC)	and	Digital Media Cost (DMC)	0,020
Perceived Behavioral Control(PBC)	and	Punishment Severity (PS)	0,024
Perceived Behavioral Control(PBC)	and	Punishment Certainty (PC)	0,114
Perceived Behavioral Control(PBC)	and	Past Piracy Behavior (PPB)	0,270
Moral Obligation (MO)	and	Subjective Norms (SN)	0,340
Moral Obligation (MO)	and	Perceived Value (PV)	0,009
Moral Obligation (MO)	and	Digital Media Cost (DMC)	0,015
Moral Obligation (MO)	and	Punishment Severity (PS)	0,053
Moral Obligation (MO)	and	Punishment Certainty (PC)	0,147

Factors			Squared Correlation
Moral Obligation (MO)	and	Past Piracy Behavior (PPB)	0,299
Subjective Norms (SN)	and	Perceived Value (PV)	0,026
Subjective Norms (SN)	and	Digital Media Cost (DMC)	0,020
Subjective Norms (SN)	and	Punishment Severity (PS)	0,082
Subjective Norms(SN)	and	Punishment Certainty (PC)	0,286
Subjective Norms (SN)	and	Past Piracy Behavior (PPB)	0,208
Digital Media Cost (DMC)	and	Perceived Value (PV)	0,188
Punishment Severity (PS)	and	Perceived Value (PV)	0,001
Punishment Certainty (PC)	and	Perceived Value (PV)	0,010
Perceived Value (PV)	and	Past Piracy Behavior (PPB)	0,001
Digital Media Cost (DMC)	and	Punishment Severity (PS)	0,002
Digital Media Cost (DMC)	and	Punishment Certainty (PC)	0,033
Digital Media Cost (DMC)	and	Past Piracy Behavior (PPB)	0,024
Punishment Severity (PS)	and	Punishment Certainty (PC)	0,190
Punishment Severity (PS)	and	Past Piracy Behavior (PPB)	0,008
Punishment Certainty (PS)	and	Past Piracy Behavior (PPB)	0,062

Appendix E.: 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 ≥ 0.95 – Very good fit
RMSEA and p-value ($\boldsymbol{H_0}: \boldsymbol{rmsea} \leq \boldsymbol{0.05}$)	> 0.10 – Unacceptable fit $]0.05; 0.10]$ – Acceptable fit ≤ 0.05 – Very good fit $p \geq 0.05$
MECVI	To compare models. The lower the better

Source: Marôco (2014, p.55).