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John Gartside
University of Queensland Business School

Jon Heales
University of Queensland Business School

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A Model of Music Piracy

John Gartside

University of Queensland Business School
j.gartside@business.uq.edu.au

Jon Heales

University of Queensland Business School
j.heales@uq.edu.au

ABSTRACT

Music piracy has evolved from a minor concern in technology magazines to a major issue discussed almost daily in the media. The industry claims potentially billions of dollars are at stake and we seek to determine why extensive anti-piracy strategies don't appear successful. We propose a Model of Music Piracy and, using a survey, test and validate a section of the model using SEM. The majority of propositions were upheld, but contrary to expectations, age was not significant. All users are well aware of the law, prominent cases, and penalties incurred, however these deterrents do not change behaviour or attitudes to piracy. They feel online anonymity affords some protection, and there is safety in numbers (music companies cannot catch everyone). Our work and other studies suggest a certain level of music piracy is efficacious, and further research should confirm this notion and determine whether an optimum level exists.

Keywords (Required)

Music Piracy, Digital Rights Management, copyright, Illegal Downloads.

INTRODUCTION

Music piracy is not a new phenomenon. Until recently, however, the size of the music piracy problem has been limited by a set of physical bounds. The pervasiveness of the internet and rapid improvements in computer and information systems technology over recent years has dramatically increased the scale of the music piracy problem, and removed those previous limitations. Online music stores have nearly reached the one billion download milestone after over two years of operation. Current strategies and alternatives designed to stem the flow of pirated music are not working as desired. Thus, music piracy remains a big problem for the music industry (International Federation of the Phonographic Industry, 2004). Working toward understanding the relative success or failure of the music industry's initiatives in fighting music piracy is important for many businesses, beyond the US\$39 billion music industry (Gopal, 2004; Moe, 2004).

The behavioural dynamics behind music piracy are complex and this research stream considers it desirable to develop a 'unified' model to examine the variables regarding law and technology issues that are likely to explain piracy behaviour. Therefore, this research asks, "What law and technology factors make users choose music piracy over legal music downloading?" This stream of research contributes to the existing body of research into music piracy by testing part of a unified model of music piracy, building on established work, and developing further explanatory variables in the unified model (this paper does not cover the development of the complete model, only a subset of the model). It provides support for the new explanatory variables by testing that section of the model that relates to those variables. The framework developed may serve as a basis for future research into the music piracy phenomenon.

This paper then examines the portions of the model dealing with the deterrent effect of the law and technical limitations and begins with a review of the literature relating to music piracy. Propositions are developed relating to the deterrent effect of the law and technical limitations and how those factors affect the intent to engage in music piracy. A survey is used to collect data that is analysed using SEM techniques. Implications are then drawn from the results of the analysis.

LITERATURE REVIEW

When an individual makes a copy of a piece of recorded music without permission from the copyright holder, it is known as Music Piracy. The technology to enable the copying of recorded music has been available for over forty years. The requirement for a physical recording to be copied, social networks to provide access to such recordings, and the drop in audio quality of copied music, provided natural limits to the impact of music piracy via analogue technology (Fisher, 2004; Gopal, 2004; Liebowitz, 2002).

Although music piracy threatens the business model of the music industry, research into music piracy is limited, starting around five years ago when piracy evolved into an online phenomenon. Current research has three approaches. One is a series of papers that investigate piracy using behavioural intention models derived from software piracy research (Kwong, 2002; Lin, 1999). Another direction of research focuses on the ethical nature of the decision to engage in music piracy, examining responses to the anti piracy arguments put forward by the music industry (Bhattacharjee, 2003a; Bhattacharjee, 2003b; d'Astous, 2005; Gopal, 2004). Finally there is some empirical analysis of the impact of downloading behaviour on sales of recorded music products (Oberholzer, 2004).

Research on the impact that legal deterrents have on music piracy is limited and this research attempts to contribute to this shortfall. Lin et al (1999) and Kwong and Lee (2002) both use Ajzen's (1985, 1989) Theory of Planned Behaviour (TPB), and the Davis et al (1989) adaptation of the Theory of Reasoned Action (TRA) to identify factors affecting the attitudes and behavioural intentions of possible music pirates. Lin et al examine the issue of software piracy by surveying a sample of computer systems students, and establish the importance of anonymity as a factor for an individual's decision to engage in piracy. Kwong and Lee (2002) add Computer Deindividuation to embody the concept of user anonymity.

Reducing the incidence of music piracy involves persuading users to switch to a different technology that is legally acceptable to the music industry and involves paying for the music downloaded. To accomplish this, users must accept and use that new technology. The Technology Acceptance Model (TAM) (Davis, 1989) posits that Perceived Ease of Use has a direct bearing on the Behavioural Intention to use a new technology. TAM, although widely used (Gefen, 2003; Gefen, 2000; Heales, 2004; Heales, 2005), does not appear to have been used in the music piracy context before, although it is derived from the same TPB and TRA theory foundation as much of the current research reviewed here. Note that only part of the unified model is tested in this research.

The strategies employed by the industry to reduce music piracy include extensive anti piracy educational campaigns, anti piracy marketing, and a vigorous legal prosecution policy toward offenders (Recording Industry Association of America Inc., 2005). The same strategies may be considered to apply to the situation in Australia because the music companies employ the same strategies, campaigns and policies as their American counterparts as they are the same companies. This can be seen by examining the list of plaintiffs in the recent legal case of Universal Music Australia Pty Ltd v Sharman License Holdings Ltd (2005) (Kazza) (2005; ACC, 2005). These strategies combine to form the Deterrent Effect construct, Deterrent Effect of Law.

PROPOSITIONS

The copyright enforcement that music companies and industry groups pursue by litigation has become more difficult against pure P2P systems. The Napster case was a clear copyright violation, as that P2P platform used centralized server architecture to provide information about where illegal file downloads could be obtained directly to its users. (Barry, 2001; Recording Industry Association of America Inc., 2005).

DETERRENT EFFECT OF LAW

Legal proceedings against other P2P systems, that use hybrid or de-centralized architecture without central servers, have been more complicated and difficult to prosecute. This has led to some losses for the legal aspect of the music industry's attack on music piracy. Consequently, the publicity around these less successful cases is likely to have a negative effect on users' perception of the effectiveness of copyright law (Fisher, 2004; Liebowitz, 2002). The Deterrent Effect of Law is composed of two factors: Online Anonymity and Knowledge and Perception of the Law.

Anonymity

In keeping with findings in Kwong and Lee's work, that showed that the Anonymity variable significantly affected the intention toward music piracy but only exhibited weak impact on Subjective Norms, the Anonymity factor is moved to load onto the Deterrent Effect of Law variable. Kwong and Lee found that when a user feels that they are anonymous online, they tend to dissociate from others and are more likely to engage in aberrant behavior. This supports the notion that if a user has successfully engaged in music piracy in the past, they feel insulated by anonymity, therefore reducing the Deterrent Effect of Law.

This leads to the first Proposition:

Proposition 1 Online Anonymity will reduce the Deterrent Effect of Law on user's Intentions to Engage in Music Piracy Behavior.

Knowledge and Perception of Law

The music companies have prosecuted individual offenders as well as companies. These actions range from the prosecution of a 12 year old girl in New York, to a Yale professor. The publicity around cases such as these form part of the strategy employed by the music company to reduce music piracy, in addition to education and marketing campaigns. Such publicity operates to form individual's Perception of Law, that in turn influences their perception of the Deterrent Effect of Law (ABC, 2005; ACC, 2005; Fisher, 2004; Miles, 2004; Montgomery, 2005). To further decompose the Deterrent Effect of Law construct, another variable, Knowledge and Perception of Law, is proposed, and was tested by Gopal (2004).

These arguments lead to the second Proposition:

Proposition 2: Publicity of prominent prosecuted cases relating to copyright law will improve users' Knowledge and Perception of the Law, positively affecting the Deterrent Effect of Law

TECHNOLOGY LIMITATIONS

If a user's MP3 player is made by Apple, the software it comes with allows them to play either MP3 music files, or Apple's proprietary format that is only available from Apple's iTunes online store. Users are currently unable to download music from iTunes in Australia, as Apple have not yet come to the necessary agreement with the Australian music industry (Davidson, 2005; Young and Simon, 2005). Apple's iPod is one of the most popular portable music devices on the market. The limitations of its software leave a large group of music consumers with no option but music piracy, if they are to obtain music from anywhere but their own CD collection (Davidson, 2005; Hesseldahl, 2005).

This leads to the third proposition:

Proposition 3: Technology Limitations posed by digital music storage and copying devices will positively affect the user's Perceived Ease of Use regarding music piracy.

RESEARCH METHOD

This research uses a web based survey to gather information about music piracy attitudes and use. Because this research is framed around the question, "What makes users choose music piracy over legal music downloading?" Yin (1994) notes research questions with a 'what' focus are best served with a survey based strategy. The concern of self selection bias inherent in a web based survey is mitigated because the question of interest presupposes that an individual uses the internet, and has a desire to obtain music in a digital format.

Questionnaire

Survey items were adapted from in existing literature from Lin et al (1999), Gefen et al (2000), Kwong and Lee (2002), and Bhattacharjee et al (2003). Some new items were necessary to measure the new variables proposed in this model, for which no established survey items are available, and were designed to complement the pre-validated elements of the questionnaire.

PRE-TESTING THE QUESTIONNAIRE

Because the population of potential music pirates includes anyone who has an interest in music, ideally a cross section of society. The population of internet users was sampled, and to test the survey a diverse group was chosen; two professional musicians, one having recorded an album, a solicitor, two professional deejays, two academics, two business managers and four people under 18 who are known to have used Limewire and Kazaa P2P applications for downloading music.

Following changes made as result of the feedback obtained, a second version was tested on a group of people consisting of one musician, one music student, two university students, one academic, and four high school students. Following minor changes the final survey was set up on PHP Surveyor and released for data collection.

SAMPLE SELECTION

Because the music entertainment medium has a very broad audience the population that the sample is drawn from should therefore be correspondingly broad. The final sample of 112 responses to the survey has an age range of 12 to 75 years old, has a gender bias toward males (57%), a range of education levels from early high school through to post doctoral, and are located in several different countries. The sample is small, but it is considered representative for the purposes of this research, as it encompasses individuals from a wide variety of backgrounds. At 112 responses, the sample is large enough to meet the

minimum standards required for the analytical approach employed (Gefen, Straub and Boudreau, 2000; Tenenhaus, Vinzi, Chatelin and Lauro, 2005).

DATA ANALYSIS

Both Lisrel and Partial Least Squares (PLS) Structural Equation Model (SEM) techniques have been used in the analysis process. Confirmatory factor analysis was undertaken using Lisrel to help ensure the constructs were appropriately measured. Validity checks for content validity, convergent validity, discriminant validity, and unidimensionality, and overall fit were performed for the original model, and eight items were removed. Lisrel also provided acceptable measures of overall fit, and PLS used to triangulate and confirm the results. The results for Lisrel are presented in Figure 1, and for PLS in Figure 2.

The strength of Lisrel lies in the ability to statistically test the fit the entire model using the likelihood-ratio chi-square (χ^2), and the Adjusted Goodness of Fit Index (AGFI). The threshold for the AGFI measure is that it should be above .80.

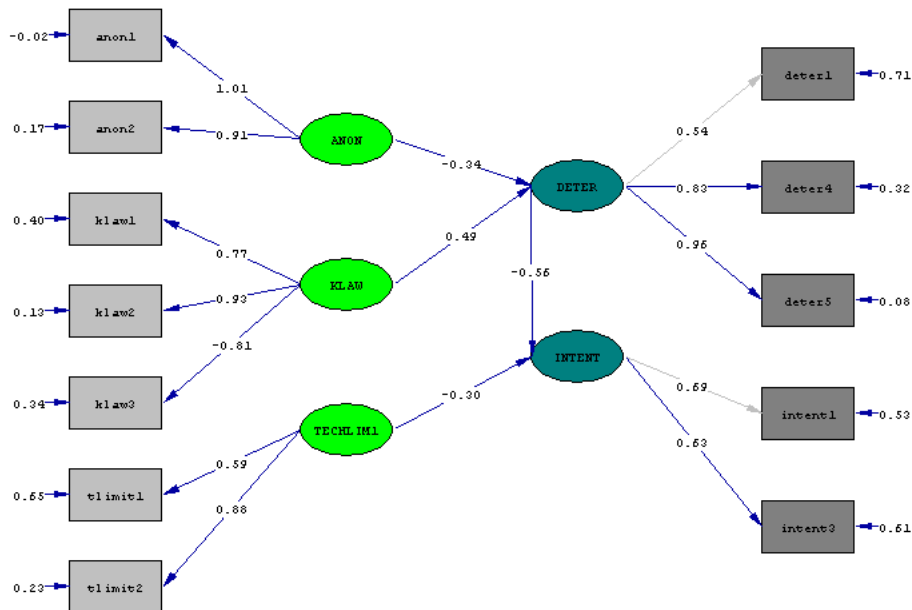
The χ^2 : df ratio of 1.45 comfortably meets the benchmark of 3 (Gefen et al., 2000). The GFI benchmark was also met, as the score of .846 is above the .80 threshold. Thus the model provides a good fit for the data. These fit statistics suggest the research model is plausible, given the sample data (Bollen, 1989; Gefen et al., 2000; Gefen, 2000).

Code	Construct	Items
ANON	Online Anonymity	Anon 1, 2
KLAW	Knowledge and Perception of Law	Klaw 1, 2, 3
TECHLIM	Technology Limitations	Tlimit 1, 2
DETER	Deterrent Effect of Law	Deter 1, 4, 5
INTENT	Intent to Engage in Music Piracy	Intent 1, 3, 4

Table 1. Explanatory Guide to Item and Construct Codes used in the Models.

STRUCTURAL MODEL

Having established the factor loadings using the measurement model, the structural model is now specified in Lisrel. This is illustrated in Figure 1.



AMCI82006b Chi-Square=68.16, df=47, P-value=0.02346, RMSEA=0.064

Figure 1. Structural Lisrel Model showing standardised loadings

The structural model details the interaction between the endogenous and exogenous latent variables, and tests the model for goodness-of-fit. Relationships are expressed in terms of their standardised coefficients, and all relationships have significant t-values. All relationships are in the hypothesised direction, however the Lisrel output shows some negative coefficients where a positive relationship is expected. These negative coefficients have arisen as a result of how the items were worded and coded (e.g., Yes = 1 and No = 2). There is a significant relationship between Anonymity and the Deterrent Effect of Law variables, and the relationship between Knowledge and Perception of Law and the Deterrent Effect of Law variable is also significant.

PLS MODEL

The SmartPLS version 2 computer program was used to rapidly assess adjustments to the Lisrel model because of its ease of use. The use of PLS also enabled the triangulation of the results from Lisrel. Two accepted PLS analysis measures were chosen to test the model in this research; the assessment of path specific validity using t-statistics from a bootstrap technique, and second is factor analysis by verifying that the Average Variance Extracted (AVE) for each latent variable is larger than its correlations with other constructs, and that each item loading is higher on its assigned construct than on other constructs (Tenenhaus, 2005). All tests were satisfactory.

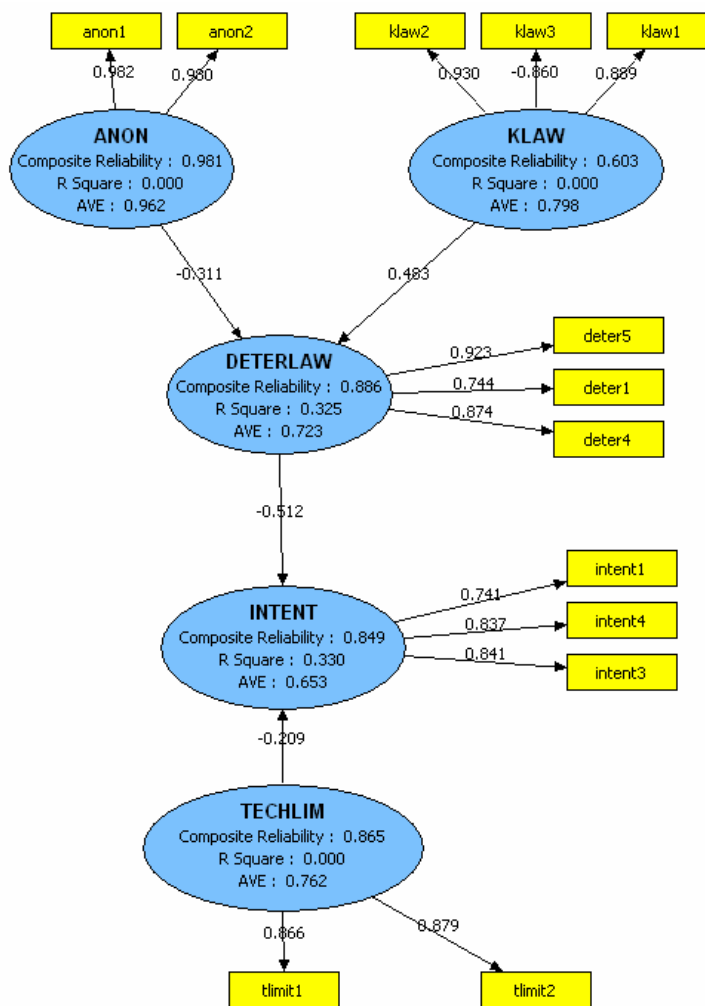


Figure 2. PLS version of Model of Music Piracy

A comparison of the results from Lisrel and PLS are presented in ** p<0.01; *p<0.05

Table 2. The results from Lisrel and PLS SEM techniques are in agreement, with all p-values <0.01 except TECHLIM->INTENT in the Lisrel model (p<0.05). This supports the significance of the relationships in the more rigorous Lisrel environment (Chin, 1995; Tenenhaus, 2005).

Path	T Statistics from PLS	T Statistics from Lisrel	Agreement
ANON->DETER	3.54**	3.37**	Yes
KLAW->DETER	7.07**	4.11**	Yes
DETER->INTENT	6.78**	3.59**	Yes
TECHLIM->INTENT	2.92**	2.30*	Yes

** p<0.01; *p<0.05

Table 2. Path Significance Comparison

In addition to t-statistics, the robustness of the PLS model was verified using the AVE values as noted above (Chin, 1995; Tenenhaus, 2005). In the model shown in **Figure 2** all standardised coefficient values were less than the AVE scores.

CONCLUSION

The overall model is found to be acceptable. When tested with Lisrel SEM estimation techniques, the model returns χ^2 and χ^2 : df scores for goodness-of-fit that are well within benchmark recommendations, as are the PLS t-values and loadings to AVE scores. This indicates that the model and hypotheses are valid at a global scale, although there is a possibility of construct validity problems with the measures.

DISCUSSION

PROPOSITION 1

The analysis of the relationship between the ANON and DETER constructs demonstrates consistent support for this proposition. The structural model found a significant loading of Anonymity onto the Deterrent Effect of Law. PLS analysis confirmed and strongly supported this finding, p<0.01.

This result is consistent with the notion that a user who considers their online activity to be anonymous will not perceive the deterrent effect of the law to be a threat to them. This results in no change to individual users' habits regarding music piracy, resulting from the deterrent effect of law. Put simply user behavior relating to music piracy is not influenced by the threat of being sued because they feel protected by anonymity.

PROPOSITION 2

The loading of the KLAW construct onto the DETER construct in the structural model is strong at 0.48, and is considered significant. PLS analysis confirms this result, the t-value for this path is significant at the p<0.01 level. The AVE check conducted confirms that the path and proposition are significant.

The Deterrent Effect of Law is significant, as was outlined in Proposition 1. This result suggests that people are well aware of the law and associated punishments for infringing laws relating to music piracy. The result also shows that people are aware of the publicity around prominent music piracy cases, such as the recent Kazaa case in Australia. The analysis further suggests that the positive loading of DETER on INTENT suggests that deterrent effects of the law are making a significant impact on users' intent to engage in music piracy due to this improved knowledge and awareness.

In combination, the success of propositions 2 and 3 implies that although users are aware of headline anti-music-piracy legal cases, and the toughened copyright laws, and this has reduced the intent to engage in music piracy. In feedback from respondents and research groups, it is believed that there are so many million people who participate in P2P networks that it is simply not possible to prosecute them all. Further, that it is not economically rational for a music company to spend tens of

thousands of dollars to prosecute someone for a few thousand dollars, particularly if that person is a music company customer.

PROPOSITION 3

The relationship between the variables TECHLIM1 and INTENT in the structural model is significant at the $p < 0.01$ level. This supports proposition 3 indicating that the limitations of technology have an effect on the intent to engage in music piracy. For example, ownership of a specific type of MP3 player may mean that you cannot download music from certain online stores, as you would not be able to play the music on your device, owing to the complexity of the DRM requirements.

MODEL OF MUSIC PIRACY

This research supports in part a proposed structure of a Unified Model of Music Piracy. It is theoretically plausible and has been validated in part by this research. There propositions tested in this research were upheld, and thus validating part of a unified model of music piracy.

Secondly, due to Australia's trade agreements with the United States, the Digital Agenda Act is very similar to the Digital Millennium Copyright Act in the US, which is the legislation on which the legal pleadings of US music companies are based (ACC, 2005; Handelsmann, 2002).

IMPLICATIONS FOR INDUSTRY

Van der Heijden (2004) observes in his research into hedonic information systems use that Perceived Usefulness decreases in relevance when the decision to use a system is a pleasure seeking decision, as compared to a work related decision. The logical progression of this is that when a technology becomes ubiquitous, the decision becomes automatic, or reflex. The situation then becomes the same as the 'Tragedy of the Commons', in that the individual may gain in the short term by receiving free music, but at a long term cost to society of the collapse of the music industry. Whether the cost of litigation to the industry is effective enough in reducing the intent to engage in music piracy will determine the effectiveness of the music industry model. Further research is needed to examine the more detailed effects of piracy on the music industry model.

Digital Commons

Garrett Hardin's article, "The Tragedy of The Commons", (1968) illustrates the conflict between individuals acting in their own best interest for short term gain, but whose actions result in a long term loss for the society as a whole. The analogy with the music industry in a 'digital commons' era is that if each individual user's economically rational strategy is to engage in music piracy and not pay for music, this will lead to revenues for the music industry declining to the point that their business model is no longer sustainable. Consequently, this leads to a cultural loss to society in the collapse of the music production base and the loss of music supply for individual users to share over a network. This is the danger perceived by the music industry (Browne, 2004; Hardin, 1968; Liebowitz, 2002). Thus the actions by the music industry to reduce the propensity of users' to engage in music piracy appear to be working, at least to some extent.

This suggests that legal music download options involving DRM systems, although establishing the security of music downloaded legally, are part of the music piracy problem in that they are overly complex. This is due to the added barriers they present to legal music downloading so increase the probability of music piracy. Further research is needed to examine this phenomenon.

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