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Recommended Citation

Gartside, John and Heales, Jon, "Is Music Piracy Normal? Behavioral Effects of Social and Technological Barriers" (2006). *ICIS 2006 Proceedings*. 3.
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IS MUSIC PIRACY NORMAL? BEHAVIORAL EFFECTS OF SOCIAL AND TECHNOLOGICAL BARRIERS

Breakthrough Ideas in Information Technology

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Abstract

Music piracy, once a novel issue covered in technology magazines, has become an issue of considerable importance and is discussed regularly in mainstream media. Despite the strategies and alternatives aimed at reducing piracy behaviour, the phenomenon remains a major issue for the industry. This paper continues from previous work by testing a further section of the previously proposed model using Structural Equation Modelling (SEM). The Economic and Complexity factors were found to be relevant, but, surprisingly, age was unexpectedly found not to be significant. Users from lower income brackets were more likely to engage in music piracy, and the relative complexity of the legal process of music downloading was found to be a barrier to legally downloading music, thus operating to turn users toward music piracy. Our work and other studies suggest that some degree of music piracy is actually beneficial to the industry, and further research should confirm this notion and determine whether an optimum level exists.

Keywords: music piracy, copyright, digital rights management, file sharing, digital music, online music

Introduction

Although music piracy is not a new phenomenon, it has previously been confined by factors such as the deterioration of audio quality in the copied material and physical access to original material from which to copy. The extraordinary rise 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 recently reached the one billion download milestone after over two years of operation (Deutsch, 2006), yet file-sharing platforms are still facilitating billions of downloads every month (Lasica, 2005). The legal downloading alternatives do not appear to have made any difference to the scale of music piracy. Meanwhile, the industry strategy of education, anti-piracy marketing, and legal prosecution of copyright violators does not seem to have had the desired effect, and music piracy remains a major issue 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 multi-billion dollar music industry (Gopal, 2004; Moe, 2004).

Other than the legal consideration, “What social and process complexity technology factors lead users to choose music piracy over legal music downloading?”, this paper examines the age of the user, the economic concerns of the user, and the relative complexity of the legal alternatives to music piracy. The paper begins with a review of the literature relating to music piracy. Propositions are developed relating to the deterrent effect of age, income, cost effects, and download process complexity 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 and Previous Work

Music Piracy occurs when an individual makes a copy of a music recording without proper permission from the copyright holder. The technology to accomplish this process has been available since the 1960s. However, the technology involved required a physical recording to be copied and social networks to provide access to such recordings; , in addition, the audio quality of the copied music was also diminished. This provided natural limits to the impact of music piracy via analogue technology until recently, when improvements in technology allowed users to make perfect digital copies of recorded music, and do so with no need for an original recording, or social networks to provide access (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 investigates piracy using behavioural intention models derived from software piracy research (Kwong et al., 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 they 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. The UTAUT model (Venkatesh, 2003) places Age as a moderating factor on Effort Expectancy, with root constructs being Perceived Ease of Use, (Davis, 1989) Complexity, (Thompson, 1991), and Ease of Use (Moore, 1991). The Complexity construct in this paper compares the use of two *voluntary* processes, and as such combines the respective 'system' and 'innovation' difficulty measures of the Complexity and Ease of Use constructs.

This work builds on prior research (Gartside et al., 2006) that examines anonymity, knowledge of law, and technological limitations as another group of factors involved in a user's intentions toward music piracy. This research suggests that user behaviour is not affected by the threat of legal action, due to their perceived anonymity and despite users apparently being well aware of the laws and possible punishments for infringements of the laws relating to Music Piracy. Technology Limitations also seemed to play a part in the piracy decision because of complicated digital rights management (DRM) requirements. These previously examined factors are not isolated from those presented in this paper, and further research into the wider group of influences on music piracy is ongoing. This paper examines the age and economic effects on music piracy and compares the relative complexity of the piracy and legal download processes, illustrating the barriers presented to the potential user wishing to pursue the legal alternative.

Propositions

Age Factor

The legal alternative to music piracy is to purchase and download music from a legal online music source. The options in Australia are Telstra's BigPondMusic.com, a joint venture between Channel Nine television and Microsoft known as NineMSN.com, and a variety of generic music stores that use a common music delivery system supplied by DestraMusic.com.

A key common logistical feature of these alternatives is that to obtain music from an online store, the potential music customer must open an account and be able to pay for the purchases, individual sites having varying further conditions. Most sites require the use of a valid credit card or other payment mechanism such as a PayPal account or a telephone account to pay for downloads. Due to this requirement, and the current Australian legal environment that prevents businesses from 'contracting' with minors for anything but 'essentials', this effectively excluded the vast majority of people under the age of 18 (Turner, 2001). Those who make up the under 18 demographic segment are large consumers of music and represent a substantial part of the music market. They are also the heaviest Internet users (Fisher, 2004; Liebowitz, 2002).

These requirements act as a disincentive to some users, and have the effect of pushing individuals to download music in other ways, if they are going to download music at all. The most obvious other way to obtain music is via music piracy through one of the P2P systems. This notion is supported by the findings of Gopal et al. (2004) that identifies age as a key explanatory variable, specifically that piracy activity is carried out by younger users.

Note that more recently Apple's iTunes has become available in Australia. This service does avoid the logistical limitations outlined here; however at the time the survey was carried out, iTunes was not available in Australia.

This leads to the first proposition:

Proposition 1: Failure to meet critical age requirements for legally purchasing music online will positively affect a user's Intent to engage in Music Piracy.

Economic Effects

Bhattacharjee et al. (2003) found that income has a negative effect relative to music piracy intentions. This suggests that low-income individuals are more likely to engage in music piracy rather than purchase music legally at a price. From a practical standpoint, it is reasonable to assume that low-income individuals are less likely to be extended credit by credit card companies, a credit card being required by many of the legal download options. This would suggest a correlation between the critical requirement of a credit card and the economic variables. A negative effect due to the economic factors of price also makes sense when it is considered that high-income individuals would place greater value on their time than would low-income individuals. It is not an economically rational decision for such individuals to spend their high-value time on a low-return pursuit, such as music piracy (Bhattacharjee, 2003b).

It is posited that a low income will positively affect a User's Intent to Engage in Music Piracy. This is not simply because users with low incomes are better able to accomplish music piracy behavior, but rather that the Economic Factors in general will act to exclude the user from the legal music download alternatives, and that higher income individuals will be less price sensitive. This will have the effect of making the music piracy option more relevant to the low-income user.

This leads to the second proposition:

Proposition 2: Economic factors will positively affect a user's Intent to engage in Music Piracy

Complexity

The literature suggests that complexity refers to “the number and interactions of problem variables” (MacMullin & Taylor 1984, p.103). Complexity concerns receptivity, analyzability, prior determinability, the number of alternative paths of performing a task, uncertainties between performance and goals, and the time-varying conditions of task performance (Campbell, 1988; Fisher, 2004). Higher perceived complexity of a task results in a lower user intention to perform the task (Campbell 1988).

The Perceived Ease of Use variable, developed in Davis’ (1989) Technology Acceptance Model (TAM), suggests that the user’s perception of how easy a technology will be to use has a significant bearing on that user’s intention to use the technology. TAM is ordinarily used to assess an individual’s likely use of a single technology, such as instant messaging (Heales, 2005), wireless technology (Heales, 2004), or online stores (Gefen, 2003). Wood (1986), found task complexity is determined by the number of distinct acts and the dynamic changes in the relationships between task inputs and task products. This definition may help users to better differentiate ease of use from task complexity. It is distinguished that ease of use (i.e., the nature of the interface) from task complexity (i.e., the nature of the task) (Fang et al., 2003)).

This research differs in that it examines behavior in terms of a user’s behavior that involves a choice between two technologies. It is proposed to develop the counterfactual to Perceived Ease of Use: that the user presented with two choices with different complexity levels of task of music downloading.

As can be seen in Figures 1 & 2, the added steps involved in legally downloading music, as well as the more onerous conditions imposed on music once it is obtained, and the limitations on how and where such music may be played, work to create a lot of barriers to users wishing to download music legally. Thus, the legitimate music downloading alternatives actually seem to penalize the user for choosing the legal option over music piracy.

This suggests that legal music download options involving Digital Rights Management (DRM) systems, although establishing the security of music downloaded legally, are part of the problem. This is due to the added barriers they present to legal music downloading operating to increase the probability of music piracy.

This leads to the third proposition:

Proposition 3: Complexity in the process and use of legal music downloading systems will positively affect a user’s Intent to Engage in Music Piracy.

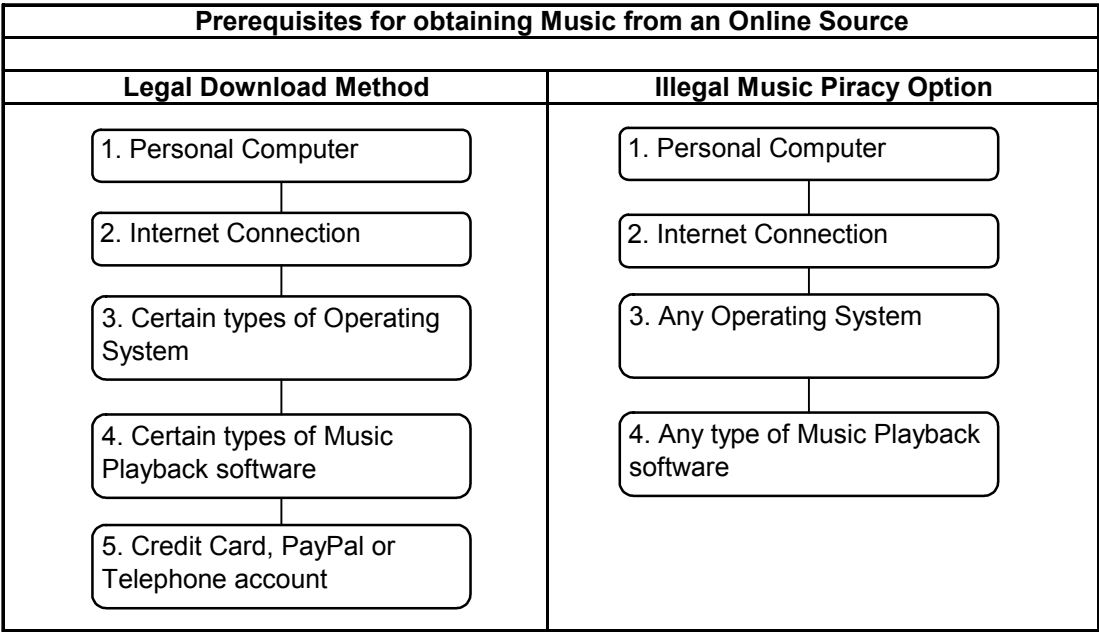


Figure 1. Prerequisites for Obtaining Music from an Online Source

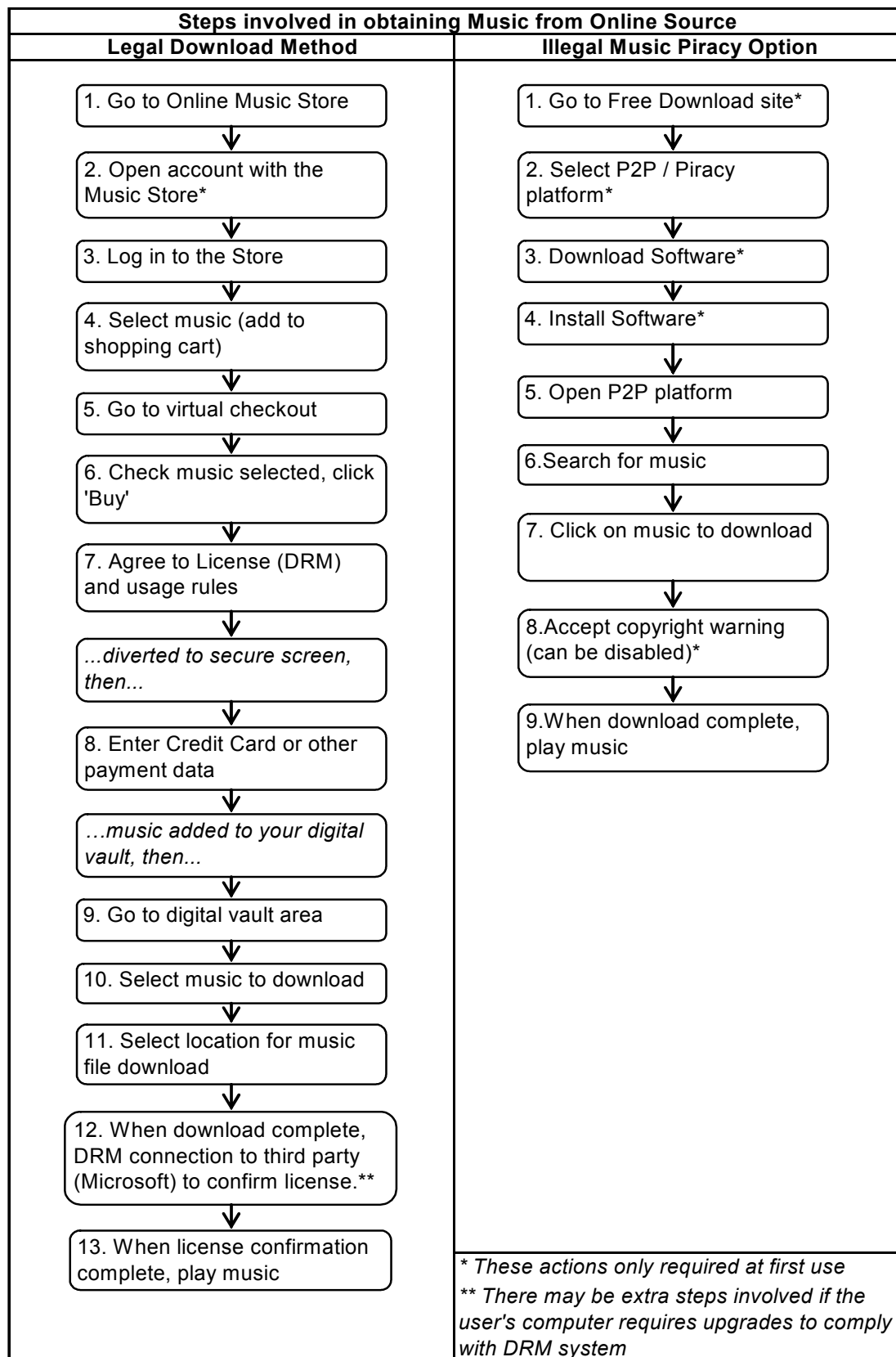


Figure 2. Steps Involved in Obtaining Music from an Online Source

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.

Measurements

Survey items were adapted from 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. The questionnaire was first examined by a diverse group selected from the population: 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 Limewire¹ and Kazaa² 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.

Table 1 lists the measures used in this research. *Age* was measured by *Age1* and *Age2*. *Age1* was a variable used to indicate whether the respondent was under or over 18, using values of 7 and 1 respectively. *Age2* was measured as an interval value broken up as follows; under 18 (7), 18-25 (5), 25-40 (3), and over 40 (1). *Income* was composed of three measures, *Econ1*, *Econ3*, and *Econ4*. We asked participants to provide their income by category (*Econ1*) as per Table 1, and also to evaluate their music downloading decisions from a cost perspective (*Econ3* and *Econ4*). We initially included another measure, *Econ2*, as a measure of Income; this was later dropped from the analysis due to poor loading in the Lisrel CFA. Further analysis of the item supports this action. Complexity was measured using three factors, *Complx1*, *Complx2*, and *Complx3*. The complexity items examine the users’ perceptions of the relative ease that each method offers to accomplish the same task, that of obtaining the music that the user desires. *Intent* was measured using four factors, *Intent1*, *Intent2*, *Intent3*, and *Intent4*. The Lisrel CFA suggested dropping *Intent2* because of poor loading (<0.50) on *Intent*. The measurement instruments for Income, Complexity, and Intent were designed in a 7-point Likert scale, and participants rated their perception on a scale of 1 to 7, where 1 represents Strongly Disagree, 4 is the neutral point, and 7 represents Strongly Agree.

The measures used for Age and Economic Factors (*Econ1*) have been validated by prior research (Gefen, 2000). The remaining measures for Economic Factors, *Econ3* and *Econ4*, were developed for this research but were based on prior work of Bhattacharjee et al. (2003b). There are three Complexity instruments; *Complx1* is a modification of an instrument used in (Kwong et al., 2002). *Complx2* and *Complx3* have been developed for this work, in keeping with the comparison style instruments validated in the Music Piracy ethics work of d’Astous et al. [2005]. The measures used for Intent are also adapted from Kwong and Lee (2002) and modified to better suit this research

¹ <http://www.limewire.com>

² <http://www.kazaa.com>

Table 1. Psychometric Properties of Measures

Construct	Measures	Loading	t-value
AGE CR=.934 AVE=.876	<i>Age</i> : These measures were adapted from the specific age of the respondent Age1: Whether the respondent was under 18 (7) or over 18 (1) Age2: Split into age brackets: under 18 (7); 18-25 (5); 25-40 (3); and over 40 (1)	.948 .924	34.701 39.584
Economic Factors CR=.843, AVE=.729	<i>Economic Factors</i> Econ1: Please indicate your income range : (in AUD\$) 0-15'000 (1) ; 15'001 – 30'000 (3) ; 30'001 – 50'000 (5) ; and over 50'001 (7) Econ3: Access costs for Pay-per-Download systems are the main reason I use a free music download system instead Econ4 : On a cost comparison, I would choose the music sharing option despite the risk	.563 .821 .885	4.133 13.791 15.326
Complexity CR=.835 AVE=.656	<i>Comparative Ease of using the two download methods</i> Complex1: Using a Pay-per-Download music site is easier than using a file sharing system (like Limewire ³ or KaZaA ⁴) Complex2: On comparison of complexity (no. of steps) I would choose the music sharing option despite the risk Complex3: On comparison of the conditions imposed on the music, I would choose the music sharing option despite the risk	0.382 0.954 0.955	2.256 48.350 51.450
Intent CR=.849 AVE=.653	<i>Intent to engage in Music Piracy</i> Intent1: : Have you ever downloaded music from an online source of some description Intent3: : I use other technology, such as CD players or MP3 players, which involves copying music Intent4: : I sometimes make copies from my friends' music collections	0.734 0.843 0.842	11.463 15.719 12.858

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%), has a range of education levels from early high school through to post doctoral, and are located in United Kingdom, Australia, United States, Canada, Germany, New Zealand, Taiwan, and Japan. 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 et al., 2000; Tenenhaus et al., 2005).

Data Analysis

The Partial Least Squares (PLS) Structural Equation Modeling (SEM) technique has been used for data analysis in this research. Confirmatory factor analysis was undertaken using Lisrel. Validity checks for content validity,

³ <http://www.limewire.com>

⁴ <http://www.kazaa.com>

convergent validity, discriminant validity, and unidimensionality; and overall fit were performed for the original model, and two items were removed

The PLS technique demands minimum sample sizes of 10 times the number of items in the most complex construct; 30 observations in this research. The 112-observation sample size obtained in this research satisfies this requirement. PLS analysis was carried out using the SmartPLS version 2 computer program. The online survey was promoted via email, with a request to pass the link on to others. This has resulted in a broad range of backgrounds and ages in respondents, but does not allow a response rate assessment.

Two accepted PLS analysis measures were chosen to test the model in this research. The first is the assessment of path-specific validity using t-statistics from a bootstrap technique. The 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 is loading higher on its assigned construct than on other constructs (Tenenhaus, 2005). All tests were satisfactory, with all paths being found significant at the .05 level and being further confirmed by AVE checks.

To establish the accuracy of the path estimates, we used the composite reliability score as suggested by Werts, Linn, and Jöreskog (1974). With composite reliability scores ranging from 0.835 to 0.934, it may be assumed that these are accurate estimates of the structural paths.

Lisrel analysis gives a χ^2 : df ratio of 2.64 that comes below the acceptable 3:1 level (Gefen, 2000). The Goodness Of Fit Index (GFI) is 0.93, the Adjusted Goodness Of Fit Index (AGFI) is 0.87, and the Normed Fit Index (NFI) is 0.94, all exceeding their respective suggested benchmarks of 0.90, 0.80, and 0.80. The Standardized Root Mean Residual is 0.07, exceeding the benchmark of .05 (Gefen, 2000). However, the Comparative Fit Index (CFI) result of 0.98 comfortably meets the benchmark of 0.80. These results must be interpreted in light of the fact that this is ongoing research within a larger model, other sections of this having also been successfully tested in other work (Gartside et al., 2006). The encouraging results of this research are expected to improve with a larger data set that will be developed and combined with other work as the research continues.

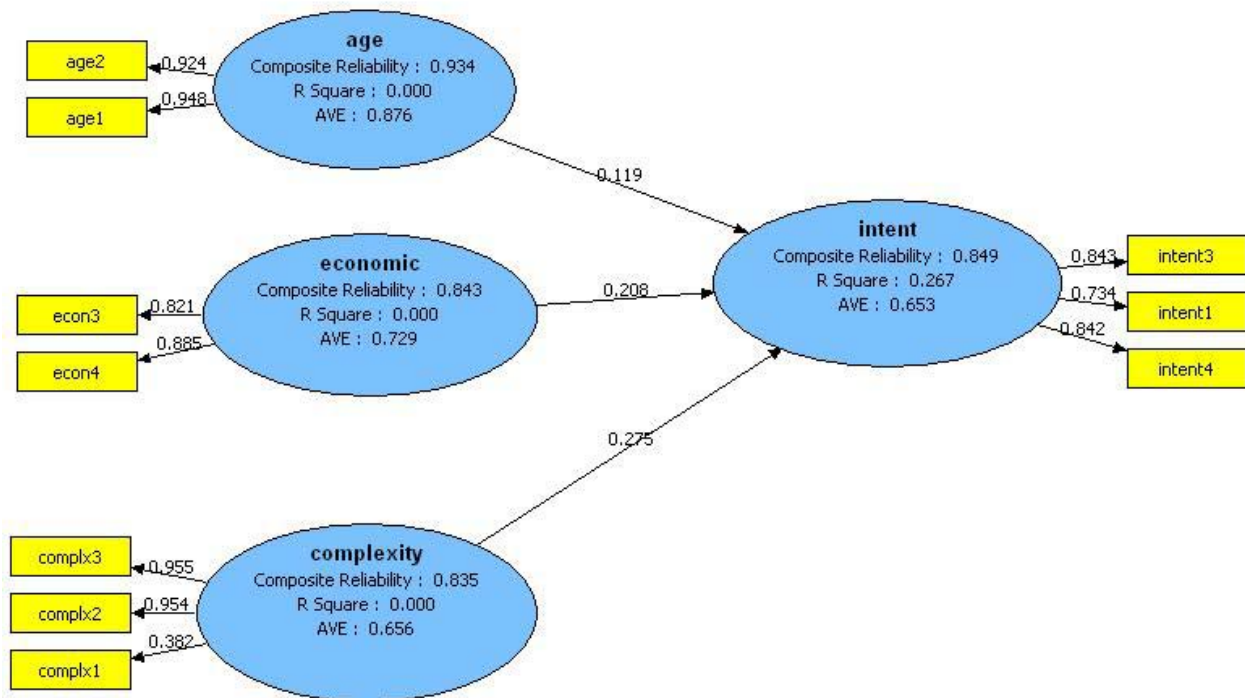


Figure 3. PLS Model as specified

Discussion

Proposition 1: Age

The relationship between the Age and Intent constructs is unexpectedly the weakest of those tested, although it is significant at the $p < 0.05$ level. It passes the AVE test, and enjoys a high composite reliability score of .934.

In order to explain the lower-than-expected loading, further investigation was undertaken. Approximately 20 of the survey respondents were contacted directly, and asked about their attitude toward music piracy. The aim was to determine whether users would in fact begin to pay for music downloads once they turned 18. Their response was uniformly “Why would I pay for something I have been getting free”? The age range of the survey respondents was from 15 to 70 years.

The low loading of age as a factor toward Intent, coupled with the evidence from these small interview groups, suggests that people of all ages engage in Music Piracy, and that it is not limited to younger, more technologically aware individuals. The notion that age creates logistical limitations to using legal downloading variants, thus pushing users under 18 toward music piracy, is supported. However it does not appear to be as relevant as the attitudes expressed, that a user who is used to obtaining music free is disinclined to switch to the legitimate download option as barriers are removed. Further work needs to be undertaken to confirm this notion.

Proposition 2: Economic Effect

The loading of the Economic Factors construct on to the Intent construct is stronger at 0.208, significant at the $p < 0.05$ level, and passes the AVE test, with a composite reliability score of 0.843.

This result offers support for the notion that low income and the price barrier will positively affect user's Intent to engage in Music Piracy. However it is noted that in developing the PLS model, some correlation was observed between the Economic Factors and Complexity variables, which suggests the reverse of the original Proposition 2; that a high income individual may not spend time on a complex pursuit such as music piracy or legal music downloading. This may imply that high-income individuals would tend to buy their music in a traditional 'offline' manner instead of engaging in complex downloading of any form.

Proposition 3 Complexity

The relationship of the variable Complexity to Intent is the strongest at 0.275, passing all other tests, and has a composite reliability score of 0.835, providing strong support for Proposition 3. Accordingly, it is found that greater complexity involved in the process and use of legal music downloading systems will positively affect a user's Intent to Engage in Music Piracy. The questions in the Complexity construct were among those developed specifically for this research, and are validated by this result.

Summary

The pervasiveness and increasing sophistication of computers, Internet, data storage, compression and file sharing application technologies has reached the point that there are now "... millions of users with millions of machines, all of them breaching copyright in some way every day..." (Fisher, 2004; Lessig, 2005).

This research suggests that music piracy has become a normal, accepted practice among users in different age groups and with different economic status. Complexity of legal downloading music as one of the barriers to legal downloading, complicated legal alternatives, easy-to-use piracy avenues, and the rapid spread and evolution of portable music player technology effectively eliminate the barriers that previously limited the piracy problem. Previous work has shown that despite user awareness of copyright law and potential punishment for breaching those laws, the user still opts to engage in music piracy (d'Astous, 2005; Gartside et al., 2006). Therefore, these results point to a situation where Music Piracy is becoming the norm.

This online survey contains respondents from several different countries, and a wide variety of ages and backgrounds; as such these results should be reasonably generalizable to the wider Internet using population. The survey was conducted, online, which naturally precludes those music consumers and potential users who do not have easy Internet access, forming the major limitation of this work. Note that this does not mean that people without such Internet access are not engaging in music piracy. Further, since this work was carried out, Apple's iTunes service has become available in more and more markets worldwide. The availability of this easier-to-use legal alternative is likely to have an effect in reducing music piracy, and this issue will be the focus of future research, to be presented with this paper in December 2006.

Implications for Industry

Technology has the potential to be a tremendous benefit to the music industry, and the potential for tremendous disruption. As technology becomes ubiquitous, and usage patterns become automatic or reflex, it is critical that Music Piracy, or copyright theft of any kind, is not also automatic as the inevitable result would be a "Tragedy of The Commons" (discussed below). The individual may gain in the short term by receiving free music, but at a long-term cost to society, as the music industry may well collapse (van der Heijden, 2004).

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' arena is that all users exercise their own economically

rational strategy and steal music via piracy, which will eventually cause the collapse of the music industry. Consequently there is no music provider, no music to share via piracy, and a cultural loss to the world. This is the danger perceived by the music industry (Browne, 2004; Hardin, 1968; Liebowitz, 2002).

Future Work

The behavioural dynamics behind music piracy are complex, and this research stream considers it desirable to develop and refine a 'unified' model to examine the variables that are likely to explain piracy behaviour. In the future, we will continue to define a unified model, encompassing the variables relating to the age and income level of the user, as well as the relative complexity of the alternatives to music piracy in the current research. , Anonymity, knowledge of law, and technological limitations are another group of factors involved in a user's intentions toward music piracy, which was examined earlier by Gartside and Heales (2006). This stream of research will contribute 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. The framework developed offers a possible platform for future music piracy research.

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