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# MUSIC SHARING IN CHINA: THEORETICAL FOUNDATIONS

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## ABSTRACT

In this paper we propose a research model, set of constructs, and instrument for collecting data in China to investigate online behavior in the usage of file sharing technologies by music consumers. As a pilot study to test the constructs in our model and its suitability for use in China, we surveyed 152 people in the United States. We found the constructs robust for further investigation. The instrument was revised based upon the results of factor analysis and reliability testing and translated into Chinese. Data was further collected from 439 people in China. Results show that the constructs satisfy the reliability testing as well as structural equation modeling for the Chinese sample.

## Keywords:

Chinese consumers, peer-to-peer, music sharing, music piracy, technology acceptance

## PURPOSE OF THIS RESEARCH

In this paper we propose a research model, set of constructs, and instrument for collecting data in China in order to investigate online behavior in the usage of file sharing technologies by music consumers. The need for the research of consumers in global music sharing networks is stated in the previous work by Amoroso and Guo (2006) and Amoroso and Koster (2003). Researchers surveyed the dependencies of music sales by age of consumer and type of music as reported by RIAA in 2005 and showed respondent demographics in the areas of retail buying, expected downloading patterns, and lost income to music record companies in the United States (IFPI, 2005). Given the radical changes of how the key players in the music industry are jockeying for position, this industry is a good field for studying the different orientations of users toward the consumption of digitized media through digital platforms. Although previous studies were conducted only within developed countries, we are testing the applicability of the TAM framework for the developing technological society of China. We differentiate downloading from file sharing. *Downloading* is defined as copying digital files from a server, network or other media to a local file repository. We define *file sharing* as the movement of digital files from and to file repositories, where centralized “servers” may or may not be present. This research focuses on the music file sharing among computers.

The recording industry seems to be one of the areas in which the new digital technologies are bringing about the most tangible changes in distribution processes. Low cost and global availability of digitalized copies of artists’ intellectual property make file sharing or peer-to-peer (P2P) networks very appealing. According to Liang et al. (2005), on a typical day, KaZaA – one of the most popular files sharing application – has more than three million users logged in and sharing 5,000 terabytes of content. Forrester research estimated \$700 million loss in CD sales for the music industry in 2003 due to sharing copyrighted songs via file sharing applications (Amoroso, 2003).

What has been the impact of file sharing on music sales? An interesting study by Oberholzer and Strumpf (2004) showed that music file sharing has no statistically significant effect on purchases of CDs in their sample. File sharing may have, however, encouraged competition and therefore lowered prices for each item of recorded music. This, in turn, has allowed an apparently large pool of individuals to enjoy music.

Piracy seems to be one of the greatest threats facing the music industry today (Chiou, Huang, and Lee 2005). Some studies have found that file sharing technologies – broadband Internet connectivity, digital compression, file quality, and peer-to-peer applications – have dramatically increased the online sharing of digitized products and therefore promoted the piracy of copyrighted music. The phenomenon of sharing music files online has been dramatically accelerated by various software packages, lower data storage costs, higher bandwidths, and the ability to send large collections of music via email. Inclination to pirate music increases dramatically as Internet bandwidth improves, with similar trends for all music categories (Bhattacharjee, et al. 2003). China is the world’s second-largest Internet market after the United States and in terms of music sales China is the 20th ranked music market in the world and the fifth in Asia (COMTEX, 2006). The Chinese digital music market reached \$324 million in 2005, a 64% jump compared to previous year, and it was estimated that it would be as high as

\$528 million by the beginning of 2007 (MP3.com, 2006). China boasts that 87% of its population is made up of broadband users watching or downloading music videos ([www.earthtimes.com](http://www.earthtimes.com), 2003).

Chinese music downloading is continuing to grow and we are beginning to see a growth of investment in the Chinese music market. Most sources have stated seeing an annual growth rate of over 60% in China since 2004. The price of some music downloaded legally is considerably low. For example, a legal Chinese service top100.cn charges just one yuan per song (allofmp3.com, 2006). Top100.cn has entered into licensing agreements with major music labels such as EMI, SonyBMG, Sanctuary Record Group, China Record Corporation, and many others. In addition to this, Google and News Corp. have planned investments in Chinese companies (The Toronto Star 2006, MP3.com, 2006) while China Unicom and Warner Music signed an agreement for selling music to mobile phone users in China. Statistics from IFPI shows that 90% of CDs in China are plagiarized (ChinaTechNews, 2006). Illegal sales of music in China are valued by the International Federation of the Phonographic Industry (IFPI) at about \$400m (£216m). Currently, Chinese laws do not apply to digital media but are limited to physical media only. Chinese music sharing services not only supply cheaper alternatives for music downloading but provide music in various formats, ranging from WAV-rips (highest quality), to MP3 (typical P2P quality) and even in formats like OGG, which is considered a high-quality compression, much better than MP3 (ChinaTechNews, 2006). In general, the Internet is regulated to a much greater extent in China than here in the United States. China's Ministry of Culture have released a new measure called "Several Opinions on Network Music Development and Management of the Ministry of Culture" which states that it must approve all music downloading companies before they run imported music online (ChinaTechNews, 2006). In China, the government blocks Internet content making companies such as Google China to release "China friendly" versions of its search engines ([www.searchenginejournal.com](http://www.searchenginejournal.com), 2006).

## RESEARCH MODEL

In this paper, we present a research model and an instrument for studying consumer behavior of music down loaders in China. The model examines the propensity of music consumers to adopt file sharing technologies in a rapidly developing country - China. According to our review of the literature, music downloading was not tested in China using technology acceptance models, neither were aptitudes for music sharing software. Based upon the empirical research of music downloading constructs, the proposed model was adopted originally from the Amoroso and Guo study (2006). The model presented in Figure 1 extends the Amoroso and Guo model (2006) by including five added constructs: risk, trust, facilitating condition, enjoyment, and image. Each of the constructs is discussed below.

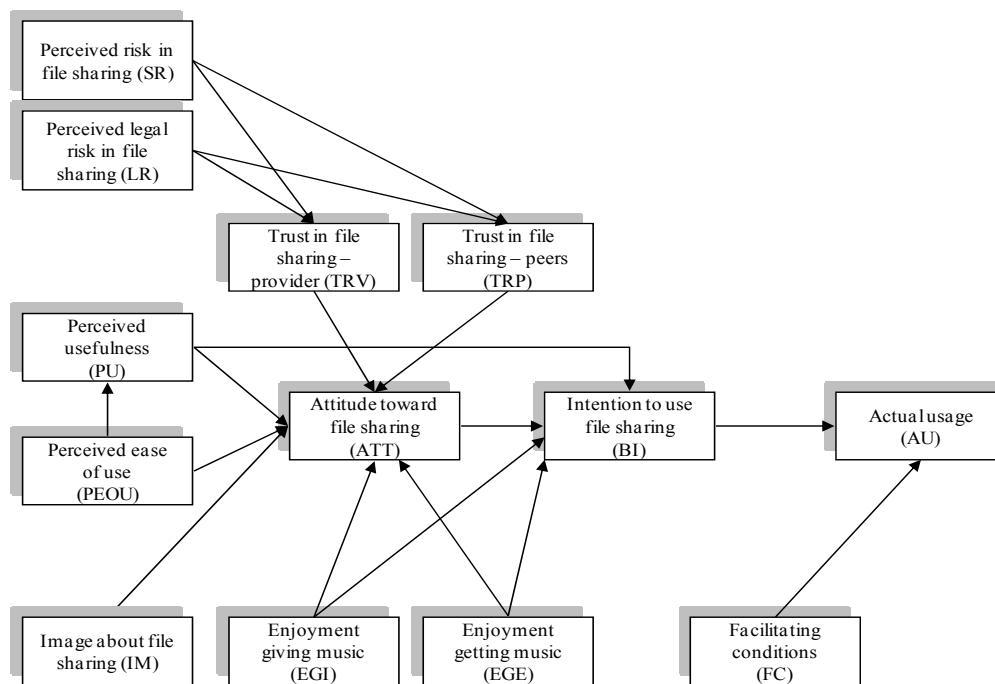


Figure 1. Exploratory Research Model

Perceived ease of use of file sharing technology has been found to influence usefulness, attitude, intention, and actual use, in many studies. Perceived ease of use is the degree to which an individual believes that using a particular system would be free of physical and mental effort. Davis et al. (1989) and Venkatesh and Davis (2000) found that perceived ease of use directly and indirectly affects usage through its impact on perceived usefulness through the attitude toward using the Internet. *Perceived ease of use for file sharing* in our study measured the easiness of learning to download music on the Internet, easiness to obtain the desired music file, whether the processes for downloading music are clear and understandable, ease of file sharing, ease of becoming skillful at using music downloading programs, and overall ease of downloading technologies in general.

Perceived usefulness of file sharing is concerned with an individual's beliefs in the decision making process. Perceived usefulness is the degree to which an individual believes that using a particular system would enhance his or her performance. It has been found that the relationship between perceived usefulness and usage of the system is strong and consistent (Davis, et al. 1989) *Perceived usefulness of file sharing* for our study included measuring the ability to accomplish the downloading of music easier, improved the efficiency of downloading music, increased the likelihood of success in downloading music, and provided alternatives to purchasing music CD's at retail.

Attitude toward using is the user's evaluation of the desirability of his or her using the system (Madden and Rainie, 2005). The attitude toward using is an individual's positive or negative feelings about performing the target behavior. Davis et al. (1989) found that user's attitudes had a significant effect on behavioral intention. Taylor and Todd (1995) found that attitude is not a significant determinant of behavioral intention although the relationship between attitude and behavioral intention is more significant for experienced users. These findings show that users are likely to have a positive attitude if they believe that usage of a technology will increase their performance and productivity.

Behavioral intention to use files sharing is a measure of the strength of one's intention to perform a specified behavior. Venkatesh and Davis (2000) reported that behavioral intention is a good predictor of actual usage of a technology which has received numerous empirical supports from prior studies. One of the conclusions of the study by Davis et al. (1989) was that people's computer use can be predicted reasonably well from their intentions. *Intention to download music* in our study was measured as a combination of carrying out the downloading task and planned use of the downloaded music files (Agarwal and Karahana, 2000).

Actual use is defined as the perceived amount of time spent interacting with a technology and the frequency of use. Actual usage, as originally conceptualized in the Davis, et al. (1989) study is measured by the frequency of use and the length of time of use. The *actual usage* construct was measured as a perceived level of use of file sharing downloading technologies, knowing that there are conflicting opinions on the reliability of such self-reported measures (Taylor and Todd, 1995).

Enjoyment is an intrinsic motivation that is found to be an important driver of behavior. Enjoyment is defined as the perception of pleasure and satisfaction from performing particular behavior. In the context of music downloads, the link between enjoyment and download behavior is natural, as the utility of music per se is for enjoyment for most music consumers. The nature of the technology that we investigate, file sharing, opens another aspect of enjoyment – the enjoyment originated in altruism acts. In the music file sharing context, we expect that being able to provide music that are needed by peers on the network will bring joy to the music provider. Hence, we tap into both sides of enjoyment, namely, the enjoyment from getting music and the enjoyment from giving music.

Image represents the degree to which an individual believes that the adoption of an innovation will bring them prestige in their relevant community. This prestige influence affects an individual's belief structure through an identification mechanism (Venkatesh, et al. 2003). Image has been incorporated as an extrinsic motivation and a precursor to perceived usefulness (Venkatesh and Davis, 2000) and behavior intentions (Kankanhalli, et al. 2005) in the extended TAM model. The adoption of innovations are generally associated with positive images in prior innovation diffusion research. In the situation involving music piracy, music download behavior may be associated with both negative and positive images. It is important to know whether a positive or a negative social image is associated with the use of P2P applications in music download and how important it is in the formation of users' attitudes.

Trust is an important element in online exchanges especially those that are conducted under uncertainty and risk (Ba and Pavlou, 2002). Trust facilitates exchanges where uncertainties and dependencies are present and increases the willingness to take risks (Mayer, et al. 1995). The two main sources of uncertainties important in the file sharing context are based on the difficulty to adequately monitor the behavior of the *file sharing providers* on the one side and the *peers* (i.e., the users) in the file sharing network on the other side (Xu, et al. 2005). For example, file sharing applications may install malware or spyware which potentially give others a chance to access the user's personal information (i.e. hacking) or gain control over the user's computer system.

In the file sharing context we differentiate between trust in the *file sharing provider* and *file sharing peer network* and define *trust as a set of specific beliefs referring to the competence, integrity, benevolence, and predictability of a trustee*. Trust between the trustor and trustee is able to reduce the risk associated with an exchange (Jarvenpaa and Tractinsky, 2000).

File sharing is typically associated with various risks and uncertainties. This risk can impede people to engage in file sharing behavior. In the literature, risk is defined as *the subjective belief of an individual to suffer a loss in pursuit of a desired outcome* (Pavlou, 2003). Important is that it is the user's perception or the belief that a loss is possible not the actual probability of a loss. We believe that two types of risks are important in the file sharing context: computer security risk and legal risk. Computer security risk can originate from both, the file sharing vendor and the peers on the file sharing network. For example, some file sharing applications may install harmful software such as malware or spyware on the user's computer system that give external parties access to the computer or may negatively affect the performance of other software (Xu, et al. 2005) or share harmful files carrying viruses or worms. The perceived legal security risk is the legal liability for user actions in the file sharing context (Xu, et al. 2005). The user may face lawsuits and punishments when sharing music with other peers.

Facilitating conditions are defined as the extent to which an individual believes that factors in the environment exist that makes a behavior easy to accomplish (Venketash, et al. 2003). In the context of file sharing, users need to have the access to a computer or similar device to download music as well as a stable and fast enough Internet connection. Especially in less developed countries, the insufficient telecommunications infrastructure and lack of adequate devices to download music can be a significant factor preventing music file sharing. Facilitating conditions are supposed to directly and positively influence actual behavior, i.e., the usage of file sharing technology (Venketash, et al. 2003).

## METHOD AND ANALYSIS

From the research model, we created an instrument based upon the scales found in the studies presented earlier. We administered the survey online through an online tool, Survey Monkey. In order to develop and test the initial instrument for reliability and validity prior to collecting actual data from the Chinese sample, a pilot study was performed with US undergraduate students. Pilot data were collected via a survey of United States university students concerning their habits with respect to music downloading and their future music buying behavior. The survey was offered to 185 undergraduate students with over 168 undergraduate students in the United States completing the online survey, for a response rate of 90.8%. The majority of students were eighteen- to twenty-two- year old business majors taking a standard academic workload in terms of classes. After eliminating cases that had missing values, we ended up with 152 responses for analysis or 90.5% usable response rate.

To collect final data from students in China, the original survey was translated into Chinese. The survey was offered to 777 undergraduate students with over 439 undergraduate students in China completing the online survey, for a response rate of 56%. The majority of students were eighteen- to twenty-five year old students. To assess the reliability of the questionnaire, Cronbach alpha coefficients for the various subscales were calculated. An alpha coefficient of .70 or greater for an existing instrument is considered an acceptable measure of reliability. In the current study, Table 1 shows that the Cronbach's alpha for all subscales met or exceeded the required lower limit with the exception of perceived computer security risk (0.689) and perceived legal risk of file sharing (0.639) which was slightly below .70.

We subdivided the trust construct into trust in the file sharing provider and trust in file sharing peers for purposes of analyzing the reliability of the scales, both showing strong Cronbach alpha coefficients. We used factor analysis as an assessment of construct validity. Moore and Benbasat (1991) state that, where possible, data analysis ought to be grounded in a strong a priori theory set. We conducted principal components analysis with varimax rotation yielding a seventeen-factor solution with eigenvalues greater than 1.0, explaining 79.2% of the variance in the data set. We examined the rotated factor matrix for items that did not load strongly on any factor ( $<0.60$ ), that loaded on another factor greater than the intended component, or that loaded relatively equally on more than one factor. Most of the items for the constructs loaded cleanly on separate factors with a few exceptions of Perceived Usefulness, Actual Usage, Enjoyment, Facilitating conditions and Risk. The items that did not load properly or loaded on other factors were deleted from the pilot data to provide new reliabilities as shown in Table 2.

Construct	Description	No Items	Reliability	Reference
PU	Perceived Usefulness	8	0.922	Davis, 1989; Lee 2003
PEOU	Perceived Ease of Use	5	0.935	Davis, 1989
EGI	Enjoyment Giving Music	4	0.952	Kankanhalli et al., 2005
EGE	Enjoyment Getting Music	6	0.835	Jarvenpaa et al. 2000
ATT	Attitude toward File Sharing	5	0.957	Fishbein and Ajzen 1975
FC	Facilitating Conditions	6	0.923	Lee 2003
IM	Image	4	0.937	Moore and Benbasat 1991
TRV	Trust in File Sharing - Provider	6	0.902	Xu 2005
TRP	Trust in File Sharing - Peer	4	0.899	Xu 2005
SR	Perceived Risk of File Sharing	5	0.689	Javenpaa et al. 2000; Xu 2005
LR	Perceived Legal Risk in File Sharing	5	0.639	Chiou 2005
BI	Intention to Use File Sharing	4	0.891	Venkatesh et al. 2003
AU	Actual Usage	4	0.726	Amoroso, 2007

Table 1. Constructs and Initial Reliability Analysis

Construct	Description	No Items	Old Rel	New Rel	Improvement
PU	Perceived Usefulness	7	0.922	0.919	-0.003
EGE	Enjoyment Getting Music	6	0.835	0.820	-0.015
FC	Facilitating Conditions	4	0.872	0.930	0.058
SR	Perceived Computer Security Risk of File Sharing	3	0.689	0.915	0.226
LR	Perceived Legal Risk of File Sharing	3	0.639	0.746	0.107

Table 2. Reliability Analysis Revised Scales

As with the pilot data, data from the Chinese sample was analyzed for reliability by calculating Cronbach's alpha coefficients. As shown in Table 3 all the constructs have a reliability of over 0.7. Thus all constructs showed good reliability. Similar to the pilot study we conducted factor analysis as an assessment of construct validity on the Chinese data. We conducted principal components analysis with varimax rotation yielding a thirteen-factor solution with eigenvalues greater than 1.0, explaining 77.12% of the variance in the data set. Most of the items for the constructs loaded cleanly on separate factors with one exception of enjoyment. We removed the two items from the Enjoyment construct to improve reliability.

Construct	Description	No Items	Reliability
PU	Perceived Usefulness	7	0.962
PEOU	Perceived Ease of Use	5	0.941
EGI	Enjoyment Giving Music	4	0.932
EGE	Enjoyment Getting Music	6	0.886
ATT	Attitude toward File Sharing	5	0.957
FC	Facilitating Conditions	4	0.947
IM	Image	4	0.911
TRP	Trust in File Sharing - Provider	6	0.960
TRV	Trust in File Sharing-Peer	4	0.945
SR	Perceived Risk of File Sharing	3	0.864
LR	Perceived Legal Risk in File Sharing	3	0.832
BI	Intention to Use File Sharing	4	0.923
AU	Actual Usage	3	0.783

Table 3: Reliability Analysis Original Scale Chinese Data

The instrument was further tested for psychometric properties using the full set of data. In addition to Cronbach's alpha ( $\alpha$ ) and factor analysis, variance extracted and convergent and discriminant validity were calculated. A value greater than 0.5 for variance-extracted occurs when the indicators or items truly represent the hypothesized latent constructs (Byrne 1998, Hair et

al., 1998). Convergent validity is evidenced when items from the same construct correlate highly. The analysis of convergent validity and variance extracted showed that all proposed constructs satisfy the recommended values. Discriminant validity is “the extent to which an independent assessment method diverges in its measurement of different traits” (Byrne 1998). The variance extracted, composite reliability and discriminant validity are shown in Table 4. All constructs showed a good level of composite and discriminant validity. This discussion concludes that the measurement instrument used in this study has passed important criteria for measurement reliability and validity.

Construct	Abbreviation	AVE	Composite	Square Root of
Attitude Towards File Sharing	ATT	0.8527	0.967	0.923
Actual Use	AU	0.7622	0.906	0.873
Intention Towards File Sharing	BI	0.8654	0.963	0.93
Enjoyment Getting Music	EGE	0.5847	0.913	0.765
Enjoyment Giving Music	EGI	0.8312	0.952	0.912
Facilitating Conditions	FC	0.8623	0.962	0.929
Image About File Sharing	IM	0.7893	0.937	0.888
Perceived Legal Risk	LR	0.7591	0.904	0.871
Perceived Ease of Use	PEOU	0.8102	0.955	0.9
Perceived Usefulness	PU	0.8148	0.969	0.903
Perceived Risk	SR	0.793	0.920	0.891
Trust in File Sharing ( Provider)	TRP	0.7542	0.925	0.868
Trust in File Sharing ( Peer)	TRV	0.7363	0.944	0.858

**Table 4: Composite Reliability and Average Variance Extracted**

As strong theoretical foundations supported the area under study, it was appropriate to evaluate the associations of the constructs with structural equation modeling (SEM) (Joreskog and Sorbom 1993). The model was tested using structural equation modeling techniques using Smart PLS. Anderson and Gerbing (1988) suggested that the measurement model provides an assessment of the convergent and discriminant validity while the structural model provides an assessment of the predictive validity. Seven significant paths exist in the structural model as shown in figure 3. The significant paths are in bold. They are Perceived Ease of Use (PEOU)→Perceived Usefulness (PU), Perceived Risk (SR)→ Trust (Provider), Perceived Risk (SR)→ Trust (Peer), Perceived Legal Risk (LR)→ Trust (Provider), Perceived Legal Risk (LR)→ Trust ( Peer), Attitude toward file sharing (ATT)→ Intention toward file sharing (BI), and Intention toward file sharing ( BI ) → Actual Use (AU).

## DISCUSSION AND CONCLUSION

The goal of this study was to build a research model and instrument for collecting data in China in order to understand the music downloading patterns with relation to technologies and adoption. Overall the study confirms prior studies while showing evidence of several areas of differences. As discussed in many previous studies of the Technology Acceptance Model across cultural dimensions, this study again confirms that perceived ease of use of applications (PEOU) has a significant effect on the perceived usefulness (PU) of the applications. In our study, the perceived ease of understanding how to download desired music, how to install music downloading applications and share music files in general, greatly impacts the ability to perceive its usefulness and become adept at music downloading and sharing these files. In previous literature, there have been some varied results of the interaction of attitude on behavioral intention (Matheison, 1991; Taylor et al 1995). Our results show that attitude has a significant relationship with behavioral intention which in turn has a significant relationship with Actual Usage. These constructs and relationships were significant in the extended Technology Acceptance Model (TAM2) (Davis 1989). Our findings indicate that if a user has a positive attitude towards file sharing, their behavioral intention or plan to use file sharing for downloading music and sharing music with their peers is positive as well. There is high likelihood that they will use file sharing technologies now and in the future if the users have a positive attitude towards file sharing.

Another significant relationship that resulted from our study was the relationship between perceived legal risk and trust with the provider and peers. Many previous studies have shown that trust is essential in online file sharing (Ba and Pavlou, 2002). Trust increasing the willingness to use certain applications inspite of the risks involved. Music downloading is illegal in many countries especially in countries such as the United States and Germany. Although Chinese laws do not currently have

regulations against digital music downloading, one would assume that it is a matter of time before the Chinese government enforces such rules. Under such circumstances, if the user trusts the music provider and can be ensured that the provider has the integrity and competence to manage uncertain situations if they so arise, the user maybe willing to take the risk of downloading music. Similar to perceived legal risk, it was found that perceived security risk has a strong relationship with trust with the provider and peers. If the user trusts the provider and peers enough to be ensured that they will not intentionally or otherwise install malware and spyware on the user's computer to gain access of personal information, or will not hack their system for personal gains, it will most likely reduce the perceived risk of indulging in file sharing. While our research study confirms some previous studies, it shows several areas of differences as well. Our research shows that facilitating conditions, enjoyment getting and giving music as well as image have no effect on the attitude, behavioral intention and actual usage of the application. This research has profound implications for both research and management. Since the sample size was 439, we do not want to make any serious implications with respect to generalizing the analysis of the path model. Even though the sample size is larger than most of the studies from which we derived the initial constructs for this research, we are using the results of this study to solely develop a generalizable model to study music downloading behavior.

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