

Unauthorized File-Sharing and Pirated CDs without Effective Copyright Enforcement: A Vietnam Case Study¹

Koji Domon

Faculty of Social Sciences, Waseda University

1-6-1 Nishiwaseda, Shinjuku-ku, Tokyo 169-8050, Japan

Tel/Fax: +81 3 5286-1451, E-mail: domon@waseda.jp

January, 2006

Abstract: At present, Vietnam is regarded as the worst country regarding copyright infringement. China, joining WTO in 2001, has since implemented strict copyright measures. Even though Vietnam has laws for intellectual property rights, enforcement is almost non-existent. We investigated how unauthorized P2P file-sharing affects copyright infringement in Vietnam. We assumed, before visiting Vietnam, that P2P file-sharing was more popular than pirated CDs and DVDs. However, few people knew of its existence. Even when they did, they were unwilling to use it. Another astonishing fact was how pirated CDs play a role in promoting singers who had relied on stage performances. Singers were not eager to support copyright enforcement. In this paper we consider these situations and explain how such behaviors are rational in Vietnam.

Keywords: Copyright, File-sharing, P2P, Piracy

JEL Classification: K11, L82, L86, L96

¹ This paper was supported by Grants-in-Aid for Scientific Research for the Promotion of Science ((B) 17402022) in Japan. I appreciate helpful comments by participants in a seminar at InfoCom Research Inc, and by Kiyoshi Nakamura.

1. Introduction

Copyrights of digital content, such as music CDs and DVDs, have been infringed upon by Peer-to-Peer (P2P) file-sharing on the Internet. Coping with this, authorities and copyright holders in developed countries have implemented hard copyright protection, suing in extreme cases.² However, there continue to be many users, suggesting that its usefulness is superior to the risk of apprehension. Meanwhile, major music labels, facing such a situation, have begun a service for downloading music tracks to cope with file-sharing. This has been effective in decreasing the number of P2P file-sharing users, and changing the way of listening to music.

There are many opinions about P2P file-sharing among authorities, content holders, and users. However, these are based on the situation in developed countries where Internet prevails under strict copyright protection. In developing countries, such as Vietnam, few measures for copyright protection have been implemented even though they have copyright laws, resulting in the spread of pirate markets and unauthorized copying. According to a report of Business Software Alliance (2005), the penetration rate of unauthorized copies of business PC software amounted to more than 90%³ in Vietnam in 2004. From this data, people may assume that, due to infrequent apprehension of illegal users, those who can access Internet use P2P file-sharing more often than those in developed countries. We shall examine this hypothesis⁴.

Our conclusion is surprising, that is, Internet users in Vietnam do not use P2P but know of this system. Internet is popular among the younger generation, who use it as those in developed countries. However, P2P does not prevail. There are several reasons explained by economic factors: transaction costs to use Internet and P2P. This paper considers these and shows necessary conditions for P2P file-sharing expansion from an economic perspective. We also note that singers do not always dislike pirated CDs. They believe that pirated CDs play a role of promoting larger audiences to their performances. Since even top singers have to have many performances to earn money in Vietnam, this effect is not lost on newcomers who have less money to promote themselves.

Many economic discussions consider the situation of strict copyright enforcement in

² Authorities of Japan and the US have recently tried to expand illegal areas to software for P2P file-sharing. This is very controversial, since the software can be useful for legal purposes and Internet itself is based on information sharing.

³ International Intellectual Property Alliance in the US reports a satiation of copyright infringements every year. See <http://www.iipa.com>.

⁴ This research was done in June and October, 2005.

developed countries, as summarized by Landes and Posner [2003]. However, the situation in developing countries has not been focused on in such literature. In developed countries, the main focus of copyright issues has been coping with the emergence of new copy technologies, such as photocopy machines, home-video recorders, and P2P file-sharing on the Internet. To determine the appropriate limit of private copies is always controversial. In other words, the problem is to define the realm of “Fair Use” under a new copy technology.

A paper by Ordover and Willig (1978) provides a theoretical analysis relating to the fair use of copyrighted goods. Although their consideration relates to photocopying of journals in a library, we can observe the same critical factor, transaction costs, by Gordon (1982) in the Betamax case. Users of journals decide whether to subscribe to them or photocopy them in the library, taking into account their transaction costs, that is, the inconvenience when using a library. Because users of a library⁵ are restricted to the members of an institution, they indirectly pay a fee to copyright holders. In such a case, the problem for copyright holders is that users share content in a library.⁶ As a common feature of information goods, there is a large initial (sunk) cost for production compared to a marginal one causing a decreasing average cost. In a static situation, Ordover and Willig (1978) considered a benchmark for the Ramsey pricing for a social optimum.

Liebowitz (1985) also considered copying in a library. Insisting that copying in a library is not harmful to copyright holders because benefits stemming from copying can be charged. He pointed out two kinds of appropriability of revenue: direct and indirect. A direct one takes place when a copyright holder charges purchasers for using content only for themselves. In this case, the charges depend on the purchaser's benefits. The second one occurs when purchasers permit others to copy their content. In this case a copyright holder can charge extra fees to purchasers due to the benefits from copying by others. As a result, Liebowitz concluded that copying in a library was not a problem.

In a static situation an incentive for copyright holders is profit from existing copyrighted goods. However, the incentive dynamically affects the future creation of content. Johnson (1985) focused on this issue and concluded that whether copying is harmful for society as a whole is unclear. He used the product differentiation model in which the producer's number, representing a variety of products, was variable. In the long-run, profit losses from copying cause an exit of producers from the market and a

⁵ Although public libraries are free to use, the users indirectly pay a charge since they are funded by tax payers.

⁶ This type of shared goods is analyzed in a simple model by Varian (2000).

decrease in variety, while consumers' surpluses increase from copying.⁷ Effects of copying on the social welfare depend on parameters of the model.

Besides these theoretical considerations, there are empirical ones which discuss the effects of P2P file-sharing on market sales of music CDs. Liebowitz (2003) considered a historical trend of sales in the US, and concluded that the effects of P2P file-sharing on revenues were negligible although sales of single CDs drastically decreased. Interestingly, he indicated that, with media developments, a demand curve for music content has shifted outward because the benefit of users has increased with them. That is apparent when we consider a media shift from vinyl records to CDs, and finally the emergence of portable players. This phenomenon suggests that, in spite of illegal copying, an incentive to create content may continue since profits are barely affected. Oberholzer and Strumpf (2004) also statistically support the minor impact of P2P on market sales.

These considerations are based on situations in developed countries. In Vietnam, these are not applicable due to ineffective copyright enforcement. From an economic perspective, we will consider what happens in Vietnam. In Section 2, we explain important factors of P2P file-sharing in developed countries. In Section 3, we show facts, investigated in Vietnam, regarding illegal copies and the Internet situation for users. In Section 4, we consider the reason why P2P file-sharing is not attractive to Internet users in Vietnam, compared to users in developed countries. In Section 5, we consider incentives for Vietnamese singers, under ineffective copyright enforcement, and show how pirated CDs indirectly contribute to their earnings. Finally, in Section 6, we conclude our considerations.

2. Factors of P2P File-Sharing Expansion in Developed Countries

Before comparing unauthorized file-sharing between developed and developing countries, we consider factors which make it beneficial in developed countries. There exist the following costs to use P2P file-sharing:

1) Time to search and download

This opportunity cost is a major factor affecting the efficiency of P2P file-sharing, since Internet drastically reduces such a cost. Before online download services of music tracks were available, we had to purchase CDs at a store or on the street. The

⁷ There are papers concerning the effects of a copyright protection on the social welfare. See Novos and Wildman (1984) and Conner and Rumelt (1991).

transportation costs and time spent were not negligible. If consumers did not mind a lack of jacket and text, P2P file-sharing saved time as well as money.

2) Risk of apprehension

There is a risk of being apprehended. The probability is extremely low, compared to other illegal situations. However, recent indictments against P2P users have been effective in reducing such users, although there are still a large number of users. Each user considers expected damages if he is apprehended, and decides whether to use it or not.

3) Low quality

To share files efficiently on the Internet, these are compressed to, for example, about 1/10 by the MP3 format. However, the sound of compressed files is degraded. The extent of the degradation is dependent on the method of compression.

How these factors affect users depends on the characteristics of an individual user. Since college students, for example, have relatively lots of free time, their opportunity costs are low. Their damage from apprehension is also lower than those of workers. Comparing these costs with prices in stores, users decide whether or not to use P2P file-sharing.⁸

To compete with P2P file-sharing, major labels have begun to sell music files online with a lower price than in stores. Price is another important factor to analyze as an advantage of P2P file-sharing. In addition, a portable hard disk player, as i-Pod, is accelerating online sales and quickly making CDs an old-fashioned medium.

In developed countries, the spread of P2P file-sharing depends upon both transaction costs and online prices.⁹ If online stores become common, the number of P2P file-sharing users will decrease due to a low online price and no transportation costs to purchase a CD.

⁸ In such a situation, Domon and Yamazaki (2004) considered the pricing of digital content.

⁹ Major labels are introducing Digital Right Management (DRM), which controls how to use content purchased in the market. Its typical case is a copy control CD which cannot physically copy content. In Japan it failed, since many consumers did not accept such a system. Meanwhile, online stores devise flexible menus of DRM which do not restrict private copying as a copy control CD. When we consider merits from purchased content, DRM is an important factor.

Cost for P2P file-sharing (Unlimited copying)		Online and CD prices (Digital Right Management)
Time to search and download	VS.	
Risk of apprehension		
Low quality		

Figure 1. Competition in Developed Countries

In the following sections, we will examine whether this relationship holds in developing countries where copyright protection is lax. It is important to recognize the situation they face in terms of telecommunication services and infrastructures as well as copyright protection. These significantly influence transaction costs for P2P file-sharing.

3. Circumstances for P2P File-Sharing in Vietnam

3-1. Stores of CDs and DVDs

There are two ways to purchase CDs and DVDs¹⁰ in Vietnam. The popular one is to purchase pirated CDs. Stores selling such CDs are all over Hochiminh City (HCMC) where we did our research. This fact suggests that authorities implement few measures to protect copyrights.¹¹

Prices of a pirated CD and DVD are respectively 12,000 Vietnam Dong (US\$.80) or 17,000 Vietnam Dong (US\$ 1.13)¹² at most stores. An interesting phenomenon is that a large pirate store also sells copyrighted content. When pirated CDs, as listed in a recent hit-chart, are sold out, people must purchase the copyrighted ones.

Fact 1: Pirated and legal content coexist in the market and are differentiated from each other.

This fact indicates that copyright enforcement does not work well in Vietnam. In fact, authorities rarely protect the copyright of both domestic and foreign content.

¹⁰ There remains another media, a VCD, in Vietnam. It is a movie whose screen quality is worse than that of a DVD. Due to its low price, it is familiar in Vietnam.

¹¹ The authorities have made an effort to get rid of piracy, but it has had little impact on the pirate markets. See reports in <http://www.phamassociates.com.vn/English/Index.htm>.

¹² The price level in HCMC is about one tenth as high as that in Tokyo.

However, a price system works under such a situation. The first difference between a pirated and a copyrighted CD is in the package. The jacket of a pirated CD is a thin color copy of the original and there is no lyrics written. The second difference is in quality. There are imperfectly copied pirated CDs. The price of a copyrighted CD is 32,000 Vietnam Dong (US\$ 2.13), which is about three times as high as that of a pirated one. Vietnamese sometimes purchase a copyrighted CD when it is a favorite, or as a gift.

Without copyright protection, pirated content is differentiated from legal ones in both terms of quality and packaging. Also various kinds of domestic music have been supplied for the market in spite of almost non-existent copyright protections. This suggests that musicians earn their main incomes from concert performances. CD sales, including pirated ones, contribute to promotion for live concerts. This relationship is contrary to that in developed countries with their strict copyright protections.

3-2. Internet Access Fees and Prices of PCs

Fees for Internet access are important to consider in the extent of P2P file-sharing. Even if Internet is available, people do not use it if there is a high fee. There are three services available at home to use Internet: dial-up, ISDN, and DSL.¹³ They also use Internet cafes in Vietnam to access the Internet. The rate is about 20 cents per hour. The cheapest access is at an Internet cafe, since a dial-up access service at home costs about 60 cents per hour. The average cost to use ADSL at home is about US\$ 20 per month, which is expensive in Vietnam. The other problem in using Internet is the speed (bandwidth) of networks. The average speed is about 100 kbps at an Internet cafe where people can easily have access to the Internet. The speed at home is similar to or less than 100 kbps. Therefore, a real fee per bps is also very high in Vietnam.

There is another problem when people use Internet at home. It is the price of PC sets which are at the same level as those in developed countries. They set up a PC by choosing the necessary parts by themselves. However, the cheapest one college student can purchase costs about US\$ 600. Since GDP per capita in Vietnam is about US\$ 530 according to 2003 statistics, those who can afford to purchase a new PC are few. Students usually purchase a second-hand PC obtainable for about US\$ 150. Most college students have a PC,¹⁴ according to our interview, while the penetration rate of

¹³ In 2001, Internet access service was open to private sectors. There are several major ISPs in Vietnam. See <http://www.vnnic.net.vn>. Regarding regulatory reform of telecommunications industries in Vietnam, see European Union's Asia IT&C Programme (2004) and International Telecommunication Union (2002).

¹⁴ It is noted that they can obtain a portable hard-disc player, popular in developed countries, and have promoted file-sharing based on the MP3 format. However, only the wealthy can afford to buy it due to its relatively high cost.

the Internet in Vietnam including users at Internet cafes was 6.55% in 2004.

Fact 2: The bandwidth of networks is narrow in spite of DSL. In addition, Internet access fees are very high and a PC is expensive compared to Vietnamese income levels.

3-3. Internet Cafes

Internet cafes are popular in Vietnam, because most people cannot afford to purchase PCs and subscribe to ISPs. A typical case is children playing online games. Since the hardware price of computer games is the same as those in developed countries, children cannot afford to buy them. Instead, they play online games at Internet cafes which are found on the main street of every town. Especially, in the rural areas, Internet cafes are haunts for children.

In contrast, Internet cafes in HCMC are used for gathering information, e-mailing, making materials, so on. There are users playing online games, but the percentage is much lower than that in rural areas.¹⁵ According to students we interviewed, there are college students¹⁶ using Internet cafes to save money instead of subscribing to ISPs.

Only a few of the PC sets at an Internet cafe we visited in HCMC had a CD-R driver or a USB. PCs with such functions were set in front of a counter at shops to be watched for what users did. According to a manager of an Internet café, there are few people using P2P file-sharing. Moreover, according to college students, most users do not know about how to use it.

Fact 3: P2P file-sharing is seldom utilized at Internet Cafes and not known to Internet users.

This fact is expected from the speed of a network at an Internet café. Certainly, in spite of a narrow band as a dial-up access, millions of subscribers in the US are using P2P to obtain content. However, that is explained by the fixed rate of subscriptions in the US. If a fee was dependent on the time to gain access, the merit of P2P file-sharing would drastically decrease. This is taking place in Vietnam.

¹⁵ At resorts, as in HCMC, many tourists use an Internet café.

¹⁶ College students also can make access to the Internet at a computer laboratory in the university. A large university has such a laboratory, but small ones do not. Moreover, they must pay for the use as they do at Internet cafes.

4. Effects of Almost Non-Existent Copyright Protection on P2P File-Sharing

In developed countries a copyright has been strictly protected, and infringers have been apprehended by authorities. Since developed countries have never experienced a situation in which copyright enforcement does not work, due to ineffective measures by the authorities, it is very difficult for us to consider what would take place in such a situation.

Our research in Vietnam shows us that two of the three factors mentioned in Section 2, risk of apprehension and low quality, do not seriously influence Vietnamese use of P2P file-sharing. The first factor does not exist, since the authorities do not implement effective measures to prevent pirated CDs. Under such a situation Internet users do not mind an infringement. The second factor apparently does not seriously affect users, since most of them usually purchase pirated CDs. These facts have positive effects on the spread of P2P file-sharing. Nevertheless, in our interviews, we found that most people do not even know of the existence of P2P file-sharing. This indicates there is no merit for them to use it. There are two reasons to explain this fact, technical and institutional ones.

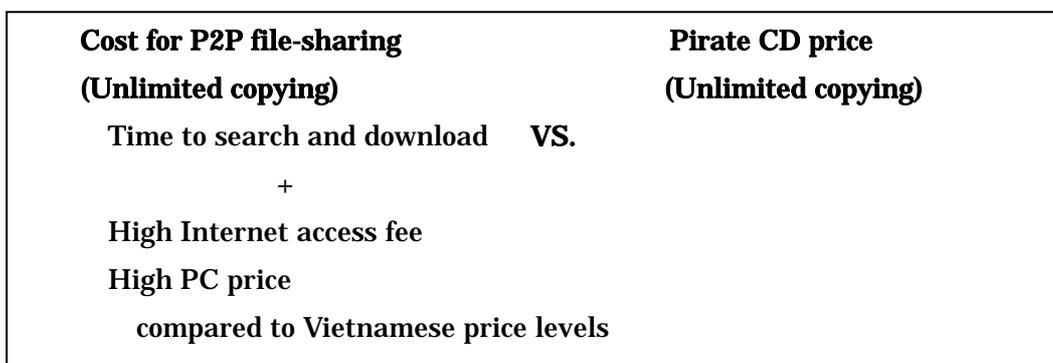


Figure 2. Competition between P2P and a piracy in Vietnam

The first of the technical reasons is an Internet network speed. As mentioned in Section 2, downloading time, dependent on speed, is very important for P2P file-sharing due to its opportunity costs. Even though content is free, people are not willing to download when such time is lengthy. Therefore, a broadband network or a fixed usage fee is necessary. The second technical reason is the PC price level compared to income. If a PC price is several times as high as monthly incomes, most people cannot afford to buy

one. The third technical reason is a subscriber's fee of ISPs which is as prohibitive as PC costs. As a result, even if people could freely obtain content by P2P file-sharing, its transaction costs are relatively higher than its merits.

The institutional reason is the pirated content market which widely penetrates Vietnamese life. In developed countries, P2P file-sharing competes with a legal content market, whereas it competes with a pirated one in Vietnam. Therefore, the advantages of P2P file-sharing in Vietnam are fewer than those in developed countries.

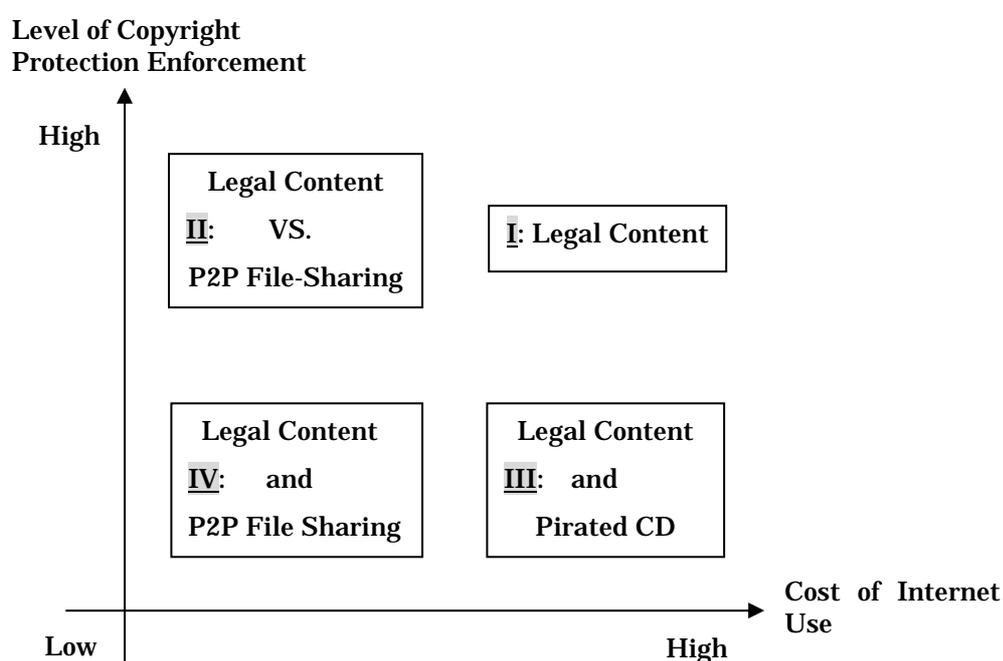


Figure 3. Four Situations of Copyright Infringement

How infringement on digital content takes place significantly depends on the level of copyright protection and Internet access fees. We consider four general patterns of their combinations in Figure 3.

Area I indicates a situation which developed countries faced before the 90s. Then, people purchased CDs in a store, or borrowed from friends to privately copy. Even though pirated CDs existed, the percentage was very small since authorities could easily detect and apprehend infringers who were selling a number of CDs to the public.

Area II is a situation after P2P software was developed and became familiar with Internet users under the spread of broadband access services. Due to a drastic reduction of an access fee per bps as well as an increase of costs to detect and apprehend

infringers on the Internet, transaction costs for P2P file-sharing are reduced to a level at which a considerable number of users can obtain benefit from it. Coping with it, major labels have started online download services, but there still remain millions of P2P users. This is the current situation in developed countries.

Area III is a situation in developing countries, as Vietnam, where authorities actually do not effectively protect a copyright. Since Internet access and a PC are relatively expensive in such countries, P2P file-sharing is uncommon. Pirated CDs have been produced for a long while and coexisted with legal ones. This situation will not change until people can use a broadband access service or afford to buy a PC.

Finally, Area IV is a situation which we have not experienced¹⁷. This situation is ideal for P2P file-sharing, since it becomes more convenient than pirated CDs. Most people may think that, in such a situation, there are not merits for singers to release CDs, resulting in no market. However, as we will consider in the next section, they release CDs without profit. Vietnamese singers release CDs without profit due to the promotional effects resultant from pirated CDs. These effects increase earnings for live performances. Therefore, in this area, legal CDs may coexist not with pirated CDs, but with P2P file-sharing.

5. Meanings of CD Sales for Singers

Finally, we consider the influence of ineffective copyright enforcement on incentives for musicians to produce CDs. In our research, it turned out that, under ineffective copyright enforcement, most singers cannot recover expenses¹⁸ by releasing CDs. The reason for releases is promotion of their songs through pirated CDs.

According to a manager, there are three groups in professional singers: a top class earns about US\$ 1,000 per 30 minute performance of 6 songs. There are about 20 singers in this group. The second class earns about US\$ 600 per 30 minute performance of 6 songs. About 100 singers belong to this class. The third class earns about US\$ 200

¹⁷ It turned out, by the first research of Beijing in Oct. 2005, that Chinese college students in dormitories were sharing their private CD and DVD files within campus high-speed LANs by using FTP. This situation is similar to that of Area IV. The monthly fee is about only US\$ 4. According to an interview, they enjoy the latest movies on their PCs. Furthermore, music files are easily obtainable on the Internet by using the famous search engine, Baidu, in China. They seldom purchase CDs and DVDs. They also use P2P software called MAZE.

¹⁸ According to an interview, the expenses of the first release of 1,000 CDs are at least US\$ 5,000. Thus, a CD price must be US\$ 5 to recover them. However, the price is about US\$ 2.13. If pirated CDs are 90% of total sales, then the first release supplies 90,000 pirated CDs for the marketplace at a lesser price.

per 15 minute performance of 3 songs.¹⁹ There is a considerable number of singers of this class.

Vietnamese singers earn money basically from live performances. Their fees reflect on how large an audience they can gather. In such a situation, they want to advertise their songs, using any method. Due to lack of experience with strict copyright enforcement, most of them do not realize that they could earn enough royalties from CD sales, while they use pirated CDs as promotional tools. There is a huge gap in the role of CD sales between strictly copyright-protected countries and Vietnam.

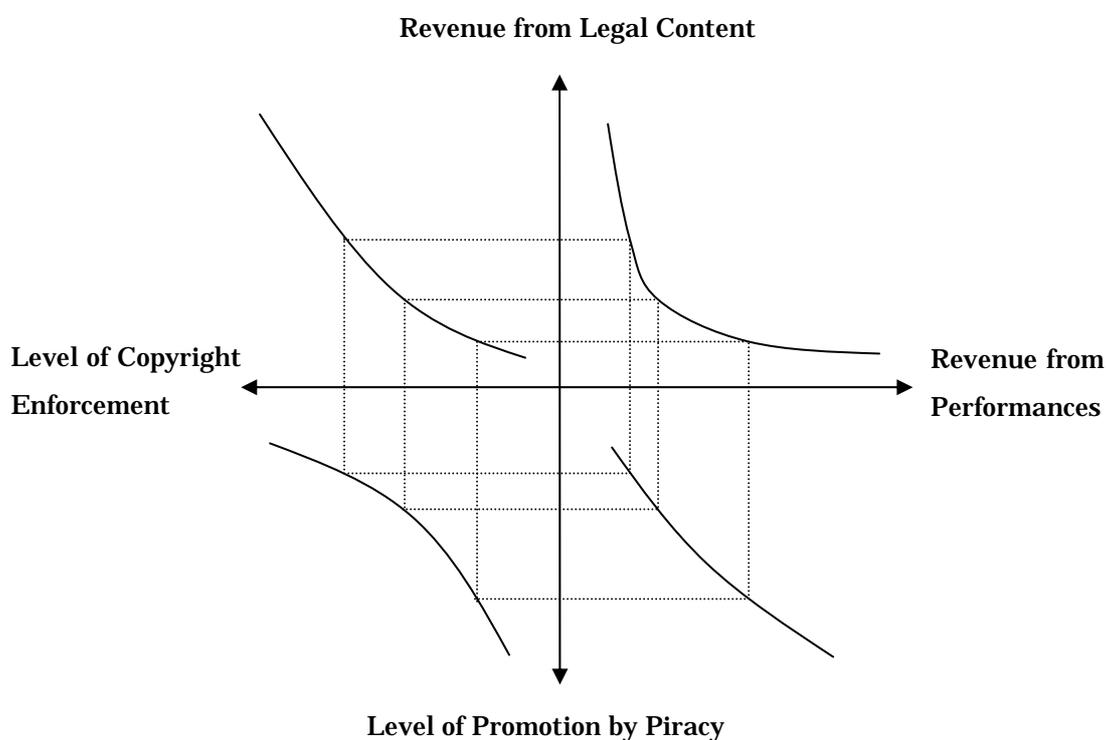


Figure 4. A Dilemma of Singers

Considering such an effect of pirated CDs, Vietnamese singers believe they face a dilemma between revenues from legal CDs and performance fees. This is explained in Figure 4. The second quadrant shows the relationship between revenues from CD sales and the level of copyright enforcement. Moreover, since pirated CDs play a role in promotion, strict copyright enforcement results in a decrease of promotion. This phenomenon is indicated in the third quadrant. The popularity, partly influenced by pirated CDs, determines performance fees on the stage. This relationship is indicated in

¹⁹ Most performances are done by a few singers in Vietnam.

the fourth quadrant. Finally, we can see the dilemma, which singers face, in the first quadrant. Strict copyright enforcement does not assure a beneficial situation for them.²⁰

8. Concluding Remarks

Prior to this research, we thought that P2P file-sharing might be more popular in Vietnam than in developed countries, since we found that more than 90% of PC software in Vietnam is a piracy. Yet, the reality was more complicated than we anticipated. Most people do not use P2P file-sharing in spite of the fact that copyright protection is almost non-existent. We found two main reasons: expensive Internet usage fees and cheap pirated CDs. Facing such a situation, Vietnamese Internet users cannot derive merits from P2P file-sharing. This suggests that not only copyright enforcement but also expenses to use copy technology determine the extent of both a piracy market and P2P file-sharing. In addition, during research, we found that there are singers who do not complain of their pirated CDs. They think that their earnings for live performance increase due to pirated CDs.

In developed countries, we do not know what happens in modern music industries under almost non-existent copyright enforcement. Most people may fear that the number of and the quality of songs decreases with less incentives to create them. However, in Vietnam, we saw many kinds of domestic CDs in shops and their quality was at the same level as those in developed countries. Varieties of domestic songs were not as numerous as those in developed countries, but this may reflect upon the Vietnamese economic and cultural situation. One apparent fact is that there are no millionaires among their top singers.

In order to consider economic welfare, we must take into account both consumers' and producers' surpluses. It is apparent that the level of copyright absolutely influences them. In the modern era, we think that copyright is necessary to create content. However, the thinking is not always right in terms of music content. Without copyrights some musicians lose earnings, but there is the possibility to increase economic welfare due to increased listeners. This case study of Vietnam clearly shows us that.

²⁰ A similar phenomenon is pointed out in terms of P2P file-sharing. That is, illegal content exchanged by P2P file-sharing is contributing to sales of legal CDs.

References

- Business Software Alliance, 2005, *Piracy Study*.
- Conner, K. E. and Rumelt, R. P., 1991. Software Piracy: An Analysis of Protection Strategies, *Management Science*, 37(2), 125-139.
- Depoorter B. and Parisi F., 2002. "Fair Use and Copyright Protection: A Price Theory Explanation," *International Review of Law and Economics*, 21, 453-473.
- Domon, K. and Yamazaki, N., 2004. "Unauthorized File-Sharing and the Pricing of Digital Content," *Economics Letters*, 85(2), 179-184.
- Domon, K. and Joo, E., 2005, Copy Control of Digital Broadcasting Content: An Economic Perspective, *Toward Digital Television: America, Europe and Japan*, edited by Cave, M. and Nakamura K., Edward Elgar (forthcoming).
- European Union's Asia IT&C Programme, 2004, *Promoting Internet Policy and Regulatory Reform in Vietnam: Status of Telecommunications Development in Vietnam*.
- Gordon W. J., 1982. "Fair Use as Market Failure: A Structural and Economic Analysis of the Betamax Case and its Predecessors," *Columbia Law Review*, 82, 1600-1657.
- International Telecommunication Union, 2002, *Vietnam Internet Case Study*.
- Johnson, W. R., 1985. "The Economics of Copying," *Journal of Political Economy*, 93(1), 158-174.
- Landes, W. N. and Posner, R. A., 2003. *The Economic Structure of Intellectual Property Law*, Harvard Univ. Press.
- Liebowitz, S. J., 1985. "Copying and Indirect Appropriability: Photocopying of Journal," *Journal of Political Economy*, 93(5), 945-957.
- Liebowitz, S. J., 2003. "Will MP3 Downloads Annihilate the Record Industry? : The Evidence So Far," *In Advances in the Study of Entrepreneurship, Innovation, and Economic Growth*, edited by Gary Libecap, JAI Press.
- Novos, I. E. and Waldman, M., 1984. "The Effects of Increased Copyright Protection: An Analytic Approach," *Journal of Political Economy*, 92(2), 236-246.
- Oberholzer F. and Strumpf, K., 2004. "The Effect of File Sharing on Record Sales: An Empirical Analysis," mimeo.
- Ordover, J. A. and Willig, R., 1978. "On the Optimal Provision of Journals qua Sometimes Shared Goods," *American Economic Review*, 68(3), 324-338.
- Takeyama, L. N., 1994. "The Welfare Implications of Unauthorized Reproduction of Intellectual Property in the Presence of Demand Network Externalities," *Journal of Industrial Economics*, 62(2), 155-166.

Unauthorized File-Sharing and Pirated CDs without Effective Copyright Enforcement

Varian H. R., 2000. "Buying, Sharing and Renting Information Goods," *Journal of Industrial Economics*, 48(4), 473-488.