Causes and Prevention of Digital Intellectual Property Theft in the Entertainment Industry

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SUBMITTED IN THE PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER IN BUSINESS ADMINISTRATION, INTERNATIONAL PROGRAM, GRADUATE SCHOOL OF BUSINESS, SIAM UNIVERSITY, BANGKOK, THAILAND

2019

Title of Research	: Causes and Prevention of Intellectual Property Theft in the Entertainment Industry
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Degree	: Master in Business Administration (International Program)
Academic	: 2019

This is Independent study has been apporved to be partial fulfillment of the requirement for Degree of Master in Business Administration in Marketing Management

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Abstract

Research Title : Causes and Prevention of Intellectual Property Theft in the Entertainment Industry

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..... 14 ... / ..... May ..... / ..... 2019 .....

The origin of internet piracy sites can be traced back to the early 2000s with the emergence of Napster, an online distribution platform which allowed users to download music for free. While Napster was taken down quickly and due to the popularity of the concept, new sites rose to take its place. With the implementation of peer-to-peer file sharing technology, downloading became easier and faster, and piracy has to this day become the largest threat to the entirety of the entertainment industry online. The objectives of the documentary study were to assess the prevalence and economic effects of internet piracy, explore its causes, and to find and evaluate anti-piracy measures used by stakeholders. Due to the broadness of areas in which the term internet piracy is used, the study focused on key industries of entertainment, specifically the film, TV series, music, and game industries. This study referenced academic articles from EBSCO Host, published between 2012 and 2018 regarding internet piracy and contemporary news sources for up-to-date and supplementary information. The conceptual framework presented for the study listed

causes of piracy and preventive measures for the entertainment industries: TV shows, movies, music, and games. Causes included are: (1) Unavailable content; (2) Legal content too expensive; (3) Content availability differs between regions; (4) Convenience and low risk of piracy. Preventive measures included: (1) Warnings through ISPs to individuals suspected of copyright infringement; (2) Removal of websites from search engines and censorship; (3) Shutdown of piracy sites and their operators; (4) Detection of recordings in cinemas; (5) Ambient light technology in cinemas; (6) Bitcoin tracking; (7) Licensed streaming sites; (8) Video games; (9) Multiplayer and server-based games. The study estimated the degree of piracy among internet users and its financial impact on the entertainment industry, identified causes of piracy and measures or trends which have slowed its growth, recommended anti-piracy options for management, and described implications for other, affected industries. Recommendations for affected industries included: (1) Indexing piracy sites lower on search engines; (2) Halting the finances of ad-based piracy sites; (3) Streaming and ad-supported services; (4) Reducing or removing time delays for movie releases between regions; (5) Implement anti-piracy procedures at cinemas; (6) Tracking of digital files; (7) Minimalizing game piracy through various methods; (8) Make use of copyright protection on social media.

Keywords: Internet piracy, digital intellectual property, entertainment industry, internet piracy prevention, anti-piracy

Approved

Acknowledgements

I would first like to thank my advisor Dr. Tanakorn Limsarun of the IMBA at Siam University. The door to Dr. Tanakorn was always open whenever I ran into a trouble spot or had a question about my research or writing. He consistently allowed this paper to be my own work, but steered me in the right direction whenever he thought I needed it. I am indebted to Dean Jomphong Mongkhonvanit of the IMBA at Siam University for his valuable comments on this thesis.

Finally, I would like to express my very profound gratitude to my parents, brother, and special someone for providing me with unyielding support and continuous encouragement throughout my years of study and through the process of researching and writing this Independent Study. This accomplishment would not have been possible without them. Thank you.

Author

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1 Introduction

1.1 Current situation

Internet piracy was estimated to cause $31.8 billion of lost revenue in 2017 for the movie and TV show industries worldwide ("Online TV & movie," 2017). Comparably, the mentioned industries generated $46.5 billion in revenue the same year, which is about 30 percent higher than the amount lost to piracy. Illegal distribution of TV series can reach shocking numbers, such as the fact that seventh season of Game of Thrones has been pirated more than a billion times ("Fighting the pirates," 2017). Despite the booming film industry in India, evidenced by the 1,000 movies produced in 2016, India's film studios lost $2.7 billion to piracy, which is 35 percent higher than the revenue they generated through legitimate means (Gupta, 2016).

The statistics illustrate the extensiveness of internet piracy in the entertainment industry, which results in losses between 30 percent and higher, depending on the industry and country.

1.2 The problem to be investigated

Internet piracy is ubiquitous for certain industries in which its end-products can be fully available digitally, such as the music, film, TV show, and computer game industries. As such, internet piracy is among the largest contemporary threats to their continuality. In addition to estimating the losses occurred by piracy, the author seeks to identify factors affecting the phenomenon, and preventive measures currently implemented or in development by stakeholders.

1.3 The objective of the study

The objectives of the documentary study are to assess the prevalence and economic effects of internet piracy, explore its causes, and to find and evaluate antipiracy measures used by stakeholders.

1.4 The scope of the study

Due to the broadness of areas in which the term internet piracy is used in, the study focuses on a few, key industries of entertainment, specifically the film, TV series, music, and game industries. Other industries which suffer greatly from internet piracy are software and sport, whereas much software is distributed illegally both online and through physical copies, and sport is being viewed on unlicensed streaming sites.

1.5 Significance of the study

The topic of the current study is important to point out due to multiple reasons. Firstly, the paper can bring awareness to its readers of how internet piracy harms the employees and companies of the industries affected. Secondly, by analyzing factors which influence piracy, stakeholders can use that information to increase their legitimate internet sales. Thirdly, the paper will mention contemporary antipiracy measures, which can give alternatives as well as inspiration to the stakeholders of the industries concerned on how to reduce the lost revenue.

1.6 Definitions of terms

Internet piracy refers to the illegal selling or distribution of copyrighted files over the internet (“Internet Piracy,” 2011). Besides from music and movies, the term is used for the illegal distribution of software, computer and video games, business logos and trademarks (“Growth of Internet Piracy,” 2011),

and similar digital content. Additionally, it can be used to describe fraudulent websites that sell low-quality copies of brand's products, which could even be harmful in item categories like cosmetics and supplements.

An ISP, or Internet service provider, offers and sell internet access and bandwidth to private households and other facilities.

P2P, or peer-to-peer file sharing is the process of having files downloaded from multiple seeders and peers simultaneously (Hayes, 2018). Seeders have already completed the download process, and will from that point only "seed", or share the files with other peers.

Torrents are index files, which allow computers to download content from one another ("Torrent file," 2018). They function as a medium for P2P file sharing.

SOPA, or Stop Online Piracy Act, was a law enacted in the U.S., which could prevent websites that host infringing material from being accessed from the states ("Stop Online Piracy," 2018).

PIPA, which stands for Protect Intellectual Property Act, was another law in the United States that gave "the Department of Justice the authority to take court action against a domain name used by an Internet site that is 'dedicated to infringing activities'" ("Internet Piracy," 2011).

2 Literature Review

2.1 Current estimations of the breadth of internet piracy

There is a plethora of ways to measure the scale of internet piracy, such as user visits to websites sharing infringing files, estimates of revenue lost to freely shared files or streaming, and the total percentages of files or videos being purchased or watched legitimately or illegitimately.

2.1.1 Visits to internet piracy sites

According to Muso, an antipiracy consulting firm, internet users made around 300 billion visits to piracy sites in 2017 (Spangler, 2018), whereas 106.9 billion hits were to TV infringing content, followed by 73.9 billion for music, and 53.2 billion for movies . Compared to 2016, TV piracy rose by 3.4%, music piracy increased by 14.7%, and movie piracy decreased by 2.3%. Country-wise, the U.S. accounted for the highest number of visits to piracy sites with 27.9 billion visits, followed by Russia (20.6 billion), India (17 billion), Brazil (12.7 billion), and Turkey (11.9 billion).

On a global basis, 53% of total piracy occurred on unlicensed streaming sites, whereas 94% of TV and 77% of movie piracy occurred on such streaming sites in the U.S. About 5% of all TV piracy and 20% of film piracy occurred on torrent-based piracy sites. 87% of all visits to piracy sites were via mobile devices, while the remaining 13% were accessed via desktop computers and other devices.

2.1.2 Percentages of internet users

According to a survey conducted by Irdeto, a provider of digital security technologies, of 1,190 U.S. adults, found that 32% watched pirated content, and 39% did not consider the harmful effects that piracy has on the content creators and providers (Spangler, 2017). The survey was conducted between

29th of December 2016 and 3rd of January 2017. Another survey of 1,000 U.K. adults conducted by a British anti-piracy firm, Muso, found that 60% illegally download or stream music, film, and TV programs (Sanchez, 2018). The International Federation of the Phonographic Industry has estimated that 28% of internet users participate in illegal file sharing (Storch, 2013). Yves Guillemont, the CEO of game publisher and developer Ubisoft, stated that 93–95% of players do not pay for the games they play (Holm, 2014). Due to the lenient enforcement of copyright laws in China, it is estimated that about 99% of music accessible online in China is pirated (Civilini, 2012). The Institute for Policy Innovation (IFPI), which represents the worldwide music recording industry, reported that "more than one in four Internet users globally regularly access unlicensed sites that contain copyrighted music" (Hachman, 2012).

2.1.3 Lost revenue to piracy

In the TV and movie industries, revenue from legitimate sources was estimated to be $37 billion in 2016 and $46.5 billion in 2017, whereas revenue lost to piracy reached $26.7 billion in 2016 and $31.8 billion ("Online TV & movie," 2017). In 2017, the revenue from legal sources was about 30 percent higher than the amount lost to piracy. By country, the U.S. suffered the greatest losses in 2016 with $8.9 billion taken up by piracy, followed by China ($4.2 billion), Brazil ($1.4 billion), U.K. ($1.1 billion), and South Korea ($0.9 billion). The French branch of global consultancy and accountancy group EY assessed the losses occurred by the French TV and film industry in 2016 to be approximately $1.6 billion ("Fighting the pirates," 2017). NAGRA, a TV technology firm, estimates that pay TV providers lose up to $7 billion per year due to piracy and content sharing. In 2016, the Indian film industry lost $2.7 billion to piracy, which is 35 percent higher than the revenue of $2 billion they generated through legitimate means (Gupta, 2016). According to the Entertainment Software Association of Canada, computer game piracy results in $3.5 billion of lost revenue per year for the gaming industry in the U.S. and Canada (Holm, 2014). The software industry, which shares their exposure to piracy, suffered in 2010 nearly $59 billion in lost revenue according to Business Software Alliance (BSA: Woolley, 2015).

On the other hand, some are questioning the creditworthiness of such calculations, since the value of the pirated content may not actually translate to lost purchases in cases where the consumer was not intending to buy it in the first place (Muchmore, 2012).

2.1.4 Illegal downloads of popular entertainment products

Among TV shows, *Game of Thrones* is the most pirated series with season seven alone reaching over a billion downloads ("Fighting the pirates," 2017). Among popular computer games, *Call of Duty: Modern Warfare* 3 reached 3.65 million downloads and *Battlefield* 3.51 million in 2011, whereas legitimate PC sales accounted for only 1.067 million and 1.56 million (Holm, 2014). The amounts of downloads were calculated by monitoring the downloads of pirated copies online.

2.2 Causes for internet piracy

In order to reduce internet piracy, it is imperative to gain insight into the reasoning behind their behavior.

2.2.1 Content unavailable on legitimate platforms

According to a study by Muso, a British anti-piracy firm, of 1,000 U.K. adults, found that 83% of the people who admitted to pirating had tried to find the content on existing streaming services before downloading or streaming (Sanchez, 2018). 34.9% of the respondents claimed that they couldn't find what they were looking for on existing subscription services or channels.

According to Moyer (2012) and Suderman (2014), movies that are unavailable are most likely to be downloaded online or streamed illegitimately. In this context, unavailable means movies that can't be rented, are not available on streams, unavailable for online purchase, and delayed for viewing in cinemas

(Moyer 2012, Pogue 2012). American economists noticed that Hollywood studios often wait weeks after the U.S. premier before releasing a movie overseas. During that time, movie fans in foreign countries can find the film on torrent sites or unlicensed streaming sites, but not in their local theaters. Based on the economists' research, the longer the release delay for movies, the higher the losses for the overseas box-offices were. Based on findings by Suderman (2014), only 44 percent of the most pirated movies on TorrentFreak were legally available in a digital format, and only 18 percent were offered for rental or streaming.

2.2.2 Legal copies are too expensive

In a study of U.K. adults, 35.2% admitting to piracy stated that they downloaded or streamed content illegally due to cost barriers (Sanchez, 2018). Researchers have found that the purchase of legitimate copies are highly dependent on the consumers' income level (Ćwiakowski, Giergiczny & Krawczk, 2016), meaning that frequent purchases of legally obtained content is not sustainable or possible for low income consumers.

2.2.3 Time lags of content availability between regions

Lavin Hirani, Head of Legal Affairs for Red Chillies Entertainment, stated that some areas, such as the UAE, air movies a day before the Indian release date, which results in the movies being leaked online prior to its release in cinemas through (Gupta, 2016). These pirated versions are filmed with a camrecorder or high-quality mobile camera in the cinemas, which often result in poor picture and sound quality, and features people blocking the view as they stand up and walk by.

2.2.4 Convenience, ease, and low risk of pirating content

Another important cause and driving force to the growth of piracy is the acceleration of access for the average household to faster connection speeds, which in turn mean faster download speeds (Ngamsiriudom, 2012). As the middle class broadens in developing countries, internet piracy of large files, such as movies and TV shows, and illegitimate streaming is likely to increase. However, even in poor communities, piracy can have a large presence through low-cost internet cafes and shops selling movies and CDs for a fraction of their original prices.

One of the main causes to China's vast piracy problem is search engine deep linking through popular search engines such as Baidu (Civilini, 2012). While piracy in the U.S. was previously conducted through P2P torrent sites and now through unlicensed streaming sites, piracy in China allows the user to download files without even leaving the search engine website. The user can simply type in an artist or song name, and download links will appear, thereby avoiding detection through accessing third party websites. Similar websites are appearing in the U.S., such as SeeqPod and MP3Tunes, as its consumers realize the benefits of search engine deep links (Civilini, 2012). Furthermore, music is often in the format mp3, in which a song is only a few megabytes in size and can be played by every type of audio speaker. These characteristics make music easy to copy, but difficult to protect from illegal distribution.

With the standardization of internet access, the development of intellectual property laws became imperative for the prevention of internet piracy. Intellectual property laws are meant to guard the ownership and rights of the person or company that has claimed to be the creator of an invention or creation ("Internet Piracy," 2011). However, these laws often fall short regarding copyrighted digital files, partly due to the fact that laws are restricted to either a specific region or country, and would have no power overseas. As such, P2P file sharing websites and other sites providing infringing content may continue to operate due to the fact that their servers are located in countries with lenient copyright law enforcement.

In terms of TV content, Internet Protocol Television (IPTV) is devices that deliver television content over internet protocol networks (IPTV, n.d.). They can stream TV content almost immediately, and are among the greatest threats to the industry's content providers – especially those involved in live sports and entertainment ("Protect What Matters," 2018). This technology, combined with high internet bandwidth, makes the content easy to distribute and share. The users access streams illegitimately through IPTV devices, such as Apple TV and Amazon Fire TV, by using Kodi add-ons on the Kodi application. Recent reports estimate that 9% of U.S. and 15% of all U.K. households had a Kodi box ("Fighting the pirates," 2017).

2.3 Antipiracy measures presently in use or under development

2.3.1 Sending warnings of piracy through internet service providers

The government of the UK approved in 2010 the Digital Economy Act (DEA), which called for internet service providers with more than 400,000 subscribers to send piracy warnings to end users that they believed had been downloading copyrighted material illegally (Albanesius, 2012a). If they received three warnings within a year, they would be placed on a list, in which they could be trialed in court and judged for legal action.

The graduated response approach, implemented in France, South Korea, and New Zealand, requires the cooperation of internet service providers to give a series of sanctions which increase in severity with consecutive online infringement (Storch, 2013). The sanctions usually begin with mere warnings, but multiple warnings can lead to a reduction of bandwidth speed, and ultimately a termination of services.

A similar warning system, the Copyright Alert System, was developed in the United States by Center for Copyright Information (CCI) (Koebler, 2012).

2.3.2 Removing piracy sites from search engines or blocking their access

A recent legislative action is the US Digital Millennium Copyright Act, which can remove offending rogue sites from search engines like Google and Yahoo! (Lipton, 2014).

In 2013, the U.K. conducted a massive censorship affecting 28 infringing websites, which lead to a significant decrease in piracy and a 12% increase in visits to sites featuring legitimate content (Danaher, Smith & Telang, 2017).

2.3.3 Targeting the operators or functioning of piracy sites

Another method governments use to fight piracy is by suing the owners of piracy sites. The federal authority of Virginia eventually succeeded in imprisoning the operator of *RockDizMusic.com*, Rocky P. Ouprasith, for music piracy in 2015, after having shut down the website in 2014 ("Operator of Music Piracy," 2016). *RockDizMusic.com* used direct hyperlinks to music files from its sister site, *RockDizFile.com*, which shared the same fate in 2014. These websites had servers in France, Canada, Russia, and Netherlands, and were in the end suspended by the authorities in France and the Netherlands. The final court documents estimated that the websites contained pirated music of more than $6 million in value.

In January 2012, *Megaupload.com*, one of the largest online file-sharing platforms with 50 million daily visitors at its peak ("Stop Online Shoplifters," 2012), was shut down by the U.S. department of Justice (Danaher, Smith & Telang, 2017). The owners were arrested and charged with conspiring to commit copyright infringement, two substantive counts of criminal copyright infringement, and more (Albanesius, 2012c). Though the enforcement appeared as a victory for copyright protection, piracy was mildly affected, due to the availability of *Megaupload*'s content on other piracy sites, and the creation of

new file-sharing sites taking its place. In terms of revenues, Danaher, Smith, and Telang (2017) estimated a 6.5% to 8.5% increase in global digital movie sales and rentals 18 weeks after its shutdown.

2.3.4 Detect illegal recording in cinemas

The Federation Against Copyright Theft (FACT) reports that around 90% of pirated films are sourced from cinemas. Staff in the U.K. received training in detecting illegal recordings in the movie theaters, and reported to have prevented 17 incidents of recording during the last few months ("FDA and FACT,"2016). FACT and the Film Distributors' Association (FDA) believe that the preventive measures have been successful, and rewarded the staff members with money prices and certificates.

2.3.5 Ambient light technology in cinemas

Despite the poor image quality of cam copies, downloading and sharing remains popular. However the conglomerate technology company, Philips, hopes that a new solution will prevent recording in the first place. Philips has made a patent application for a new technology using liquid crystals to obscure the frames, objects, and shading of a movie (Osborne, 2017). This forces the viewers to wear synchronized polarized active shutter glasses, similar to those worn during 3D movies, to actually see what is on the screen. Recording through the glasses would be a major challenge, and the recording person would not be able to see the movie himself, thereby creating new barriers and drawbacks to the movie pirate. Furthermore, it would allow the staff to easily pinpoint a person recording by seeing as he is holding a pair of glasses in which he records through.

2.3.6 Using bitcoins to track and expose downloads and uploaders

Screener Copy, An anti-piracy technology firm, which has been present in Hollywood since 2014, has developed an innovative approach to monitor the contents of filmmakers (Malherbe, 2017). Screener Copy uses the Bitcoin blockchain, which can detect the piracy of digital files within minutes after it has been illegitimately shared. The system turns the downloaders against the provider of the pirated content by offering them embedded Bitcoin rewards, which upon completion exposes the leak and the identity of the uploader. Bitcoin bounties are present within every video file, thus allowing filmmakers to monitor their content. Within two years, the technology has greatly diminished pre-release piracy in South Africa.

2.3.7 Licensed streaming sites

Iflix, a digital hosting and distribution platform for over 150 content providers, now boasts more than 6.5 million subscribers worldwide ("Using Localization," 2018). Iflix has used a localization strategy to combat piracy and to win the loyalty of its users by hosting local movies and original programming, supporting domestic talents and projects, and facilitating for dubbing and subtitles. As such, iflix appears to respect the local culture and religious standards, and proves to offer safer, better, and more convenient services than piracy.

Netflix, a licensed streaming site offering TV, movie, and other video content, boasts over 22.8 million paid subscribers in the U.S., and Netflix and Spotify has reduced piracy in Canada by 50% (Barkachi, 2014).

2.3.8 Video games are significantly less pirated than PC games

Regarding computer and video game piracy, piracy of computer games seem to have a much greater impact on its developers compared to the piracy impact for video game developers (Depoorter, 2014), which could explain why popular games, such as the Battlefield and Call of Duty series, are

available on a multitude of platforms. A significant reason to why video game piracy has remained at fairly low levels is the fact that video games are on separate console platforms from personal computers. There is a risk of damaging the console or the game and voiding the warranty by modifying them. Moreover, there is the chance that pirated games might not work properly or will not have functional online gameplay. Given that the Battlefield series are primarily multiplayer games, online access is essential to play them.

2.3.9 Multiplayer-only and server-based games

Some games are exclusively played online with numerous other players, commonly known as massive multiplayer online games (MMOs: Holm, 2014). The users need to sign in and are dependent on the company's servers to play, making DRM an integrated component of the gaming experience. This dependency on private servers has resulted in a very low degree of piracy for MMOs. Though piracy exists, the pirated versions cannot be used for playing on the company's servers. Moreover, the servers created for these versions may contain malware, which effectively discourages users from pirating in the first place. In addition, by placing the servers in single known location, the game owners have a better foundation for legal action.

Single-player only games have taken inspiration from MMOs by adding game components to their servers, i.e. making content available online only, social features, and converting single-player games to multiplayer.

A new type of business strategy for games, referred to as "free-to-play", has emerged, in which the base game is free, but additional content for enhancing their game experience or gaining an advantage requires extra purchases.

2.3.10 Making game purchases legal, convenient, and cheap

Similarly to the business strategies of music providers, such as iTunes Apple store, and movie and TV providers, like iflix, the gaming industry has given rise to global game providers, e.g. Steam and Good Old Games (GOG: Holm, 2014). Steam distributes games for hundreds of gaming studios, and displays discounts frequently on its front page. Steam has to be installed on the user's computer, and then acts as a platform in which the user can keep track of his games, and buy and install new ones with a few clicks. GOG offers games which are about a decade year old or more in a non-DRM format for low prices. However, this strategy is not suitable for studios of high budget games, and the strategy is still challenged by the convenience of piracy.

2.4 Barriers to copyright law enforcement and protection

2.4.1 Limitations and drawbacks of copyright laws

ISP liability loophole. Cumbersome procedures for addressing direct infringement actions have made it difficult for law enforcers to hold individual internet users liable for copyright violations (Storch, 2013). Secondary liability lawsuits against internet service providers are prevented by a loophole in section 512 of the Digital Millennium Copyright Act (DMCA). Internet service providers are obliged to provide IP addresses for potential infringers according to ISP subpoena provided for in section 512(h) of the DMCA, but this law only applies for an ISP that is storing infringing contents on their servers. The modern P2P file sharing sites do not store content on their servers, but only transfer files between its users, effectively allowing internet service providers to avoid secondary copyright liability.

Drawbacks of piracy warning programs. The Copyright Alert system in the U.S., known as the "six strikes" program, has some inconvenient features which affects its integrity (Storch, 2013). The early warnings are meant to inform the accused violator of copyright infringement, but do not give the accused a chance to challenge the accusations. Furthermore, in the mitigation step, the accused is considered

guilty, and is required to pay $35 to prove otherwise. In retaliation, internet activists have demanded that the copyright owners reimburse their losses from unfounded Copyright Alert sanctions. Furthermore, the sanctions are imposed without the involvement of a legal party, thereby raising concerns of the program's legitimacy and competency.

The Copyright Alert system, as well as similar programs implemented in other countries, such as New Zealand and Australia, are further limited by the users' ability to hide their IP addresses with virtual private networks (VPNs), enabling them to avoid identification and detection by internet service providers (Barkachi, 2014).

Negative PR from pursuing copyright law enforcement. Direct lawsuits against private users are perceived negatively by the public, who view them as giant corporations targeting vulnerable victims for easy settlements (Storch, 2013). Furthermore, as piracy is viewed by some as an expression of free speech, industry-wide law enforcement has often received negative press and public outrage.

By looking only a few years back, two controversial laws targeting internet piracy and copyright infringement, Stop Online Piracy Act (SOPA: Anthony, 2013), and Preventing Real Online Threats to Economic Creativity and Theft of Intellectual Property Act (Protect IP Act, or PIPA: "Dot-com Revolt," 2012), were swiftly put down before making any significant effects on the online environment.

SOPA could empower the Attorney General of the US to block websites from providing access to infringing work made by US citizens ("Can Online Piracy," 2012). However, It stated that it could target sites that were "dedicated to the theft of U.S. property", which was seen by many as an ambiguous definition that lacked clarity. Even Wikipedia, Facebook, Twitter and Google fought against these proposed laws. Mark Zuckerberg, the founder of Facebook, posted a message that directly expressed his opposition: "(…) Facebook opposes SOPA and PIPA and we will continue to oppose any laws that will hurt the internet." ("Dot-com Revolt," 2012)

Chinese search engines bypasses copyright laws. Chinese search engines, e.g. Baidu, features both infringing and non-infringing content in their search queries. Infringing content often appears in the form of search engine deep links (Civilini, 2012), which are direct download links to digital files, such as songs. This process allows users to obtain files with lower risk, as their IP addresses remain unknown. Since these search engines are not specifically made for featuring infringing content, standard copyright laws which are eligible for P2P websites do not apply for them, making these search engines difficult to prosecute.

Drawbacks of website censorship. The Australian government proposed a new amendment, referred to as the Copyright Act, which would allow copyright owners, through internet service providers, to ban users' access to websites operating outside Australia that have a "dominant purpose" of infringing copyright (Barkachi, 2014). However, due to the vagueness of the description, Australian Securities and Investments Commission (ASIC), an independent Australian government body, may have blocked up to 1,200 non-infringing websites in 2012 and 2013. Such indiscriminate use of law enforcement has raised public concern for threats to freedom of speech and digital liberty.

Virtual private networks (VPNs), which can protect the user's personal identity and location, are a threat to censorships as they allow users to access the blocked sites (Danaher, Smith & Telang, 2017).

2.4.2 Limitations of legitimate streaming services

A study of U.K. adults reported that 91% already subscribed to a streaming service, such as Netflix and Amazon Prime for TV shows and movies, and Apple Music or Spotify for music (Sanchez, 2018). Despite this large number, 60% admitted to participating in internet piracy.

Furthermore, there is a widespread concern among content creators of Spotify and other streaming services that their revenue could be negatively affected to compensate for the affordable

subscriptions of the streaming sites (Barkachi, 2014). However, on the plus side, the streaming sites provide extensive exposure and availability of their creations, and do pay royalty for popular content.

Another drawback of multiple streaming services is that some, such as Netflix and Amazon Prime, tend to develop exclusive content rather than featuring other studios' movies and TV shows, which turns them into new competitors rather than channels of revenue for many content creators (Segan, 2015).

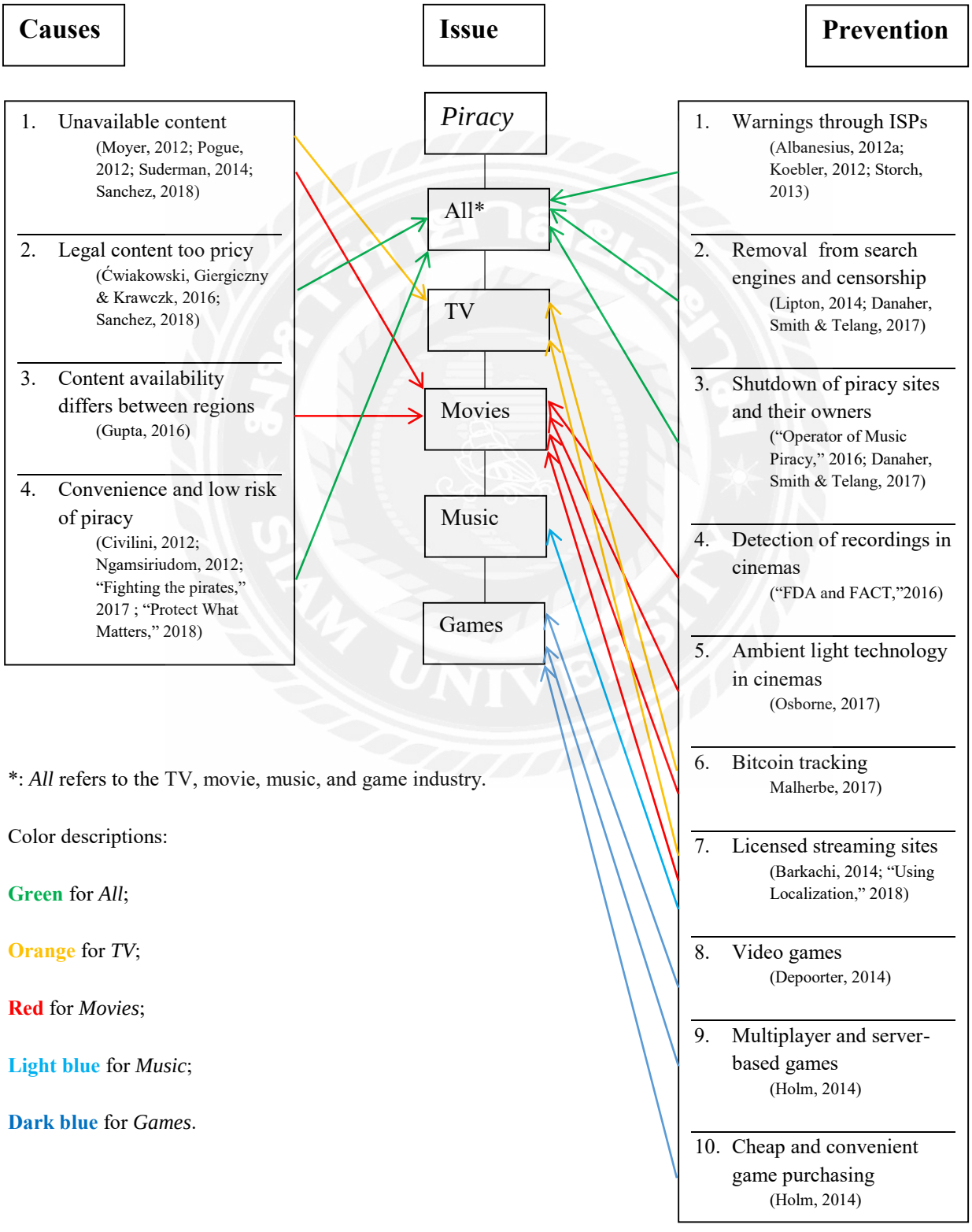
2.4.3 Limitations of DRM

Digital Rights Management (DRM) is one of the earliest forms of copyright protection for computer games (Holm, 2014). DRM is an embedded piece of code integrated with that of the game, and usually appears for the consumer as the requirement of online activation before being able to play. Despite its intentions, piracy of games has continued to prosper. Since games require code to run on computers, hackers always have access to the underlying code, in which they modify to create cracked versions. Once the cracked version is released online, DRM is of no use. Furthermore, DRM can disrupt the user's ability to play single player games, which inherently can be played offline, in cases where online connection is required and the publisher's servers are down. This was the case with Blizzard studio's *Diablo III*, which experienced heavy traffic after its release, leading to the servers crashing.

3 Findings

3.1 Conceptual framework

Figure 1. The model connects the causes and preventive measures for piracy of various industries.



*: *All* refers to the TV, movie, music, and game industry.

Color descriptions:

Green for *All*;

Orange for *TV*;

Red for *Movies*;

Light blue for *Music*;

Dark blue for *Games*.

Figure 1 shows the causes and prevention of piracy reported in the reviewed literature.

Causes for TV piracy are primarily unavailable content, high prices, and the convenience and low risk of piracy. The differences in content availability between regions for TV series were not mentioned, but may exist to a lower extent, such as the variances in time zones. Piracy of movies is affected by all four causes, while music and games are influenced by price and the convenience and safety of piracy.

Preventive measures for TV piracy include warnings through internet service providers, the removal of piracy sites from search engines and censorship, the arrest of piracy owners and the suspension of their websites, licensed streaming sites, and bitcoin tracking. Prevention of movie piracy includes those for TV piracy as well as detection of recordings in cinemas, and ambient light technology in the film theaters which is still in the early stages of testing. Music is typically protected via warnings through ISPs, censorship or suspension of infringing sites, and licensed streaming services. The gaming industry is safeguarded through ISP warnings, censorship or closure of piracy sites, sales and operations of video games, the creation of multiplayer and server-based games, and by using large online sales platforms to offer their products conveniently and cheaply to consumers.

3.2 Assessment of internet piracy's threat to the entertainment industry

While the numbers of visits to piracy sites and users participating in internet piracy are staggering, the content creators' biggest concern is piracy's impact on their finances. Estimations made by associations or consultancy firms may report losses of billions of dollars for the respective industries, but the figures may be deceiving as users download content in which they did not intend to purchase to begin with (Muchmore, 2012). Surprisingly, global box office revenues rose from $31.6 billion in 2010 to $36.4 billion in 2014, which does not illustrate the grim situation that the movie industry tends to describe

(Segan, 2015). Furthermore, the Online TV Piracy Forecasts estimate a constant growth for legitimate online revenues for the TV and movie industry, reaching up to $83.4 billion in 2022 ("Online TV & movie," 2017). Spotify had 15 million users, of which 4 million were paid subscribers, in 2011, which was a positive development for the legal distribution of music (Dyer, 2012). Its growth the last few years has been massive, evidenced by its 180 million active users worldwide in April 2018, of which 83 million were paid subscribers (Gartenberg, 2018). Netflix reached over 125 million subscribers the same month (Fiegerman, 2018), and over 15 million subscribed to iflix in July (Frater, 2018). This considerable growth in presence on legitimate streaming sites may indicate a promising turn for the online entertainment business, though piracy is still a widespread issue without an absolute solution.

4 Conclusion and Recommendation

4.1 Limitations

Several factors affect the credibility of the study.

Firstly, while some data merely states facts, such as the current number of active subscribers of streaming sites, other estimations, e.g. Industry-wide revenue losses to piracy, which often are made by stakeholders, may be biased and overstated. Other findings made by third party consultancy or technology firms, e.g. results from surveys, may not be globally representable due to their geographical and procedural limitations. This makes independent findings questionable, unless substantially backed up by similar research.

Secondly, there are data gaps for key indicators for assessing both the severity of piracy and viability of anti-piracy measures. The presence of piracy has to be constantly monitored, and can change rapidly in terms of preferred platform, e.g. from P2P file-sharing to unlicensed streaming sites, device used to access infringing files, and other properties. Additionally, it is difficult to prove the exact link between legitimate online sales trends and piracy, as the internet is a global and ubiquitous network made up of billions of users. With over 1,900 piracy sites as of 2015 (Stassen, 2016), it requires dedicated effort to grasp the entirety of its extent, and anti-piracy action is generally concentrated on the largest perpetrating sites.

Thirdly, some of the sources used in the current study, i.e. dated between 2011 and 2013, may give an outdated perspective of the digital environment.

Fourthly, the study may not have covered the full extent of causes and preventive procedures for internet piracy. It is likely that some anti-piracy procedures have avoided public documentation in order to strengthen their protective effects.

4.2 Recommendations

4.2.1 Copyright protection through law enforcement

Various warning systems through ISPs to individual users do not offer effective protection against piracy. Due to their low efficiency and downsides, they are often more cumbersome than they are worth. Censorship of piracy sites and the prosecution of their owners may cause a temporary reduction in piracy, but do not prevent new sites from appearing and taking over. However, these methods can be intimidating for normal users, and can encourage them to convert to legitimate sources for entertainment. Ultimately, the most effective ways of combating piracy is on the corporate level.

4.2.2 Corporate anti-piracy measures

Indexing piracy sites lower on search engines. Several sources state that one major flaw with search algorithms of sites like Google, is that rogue web sites offering infringing content often rank high up on the first page of searches. When asked about the "most effective ways to convince consumers to use legitimate sources" for obtaining audio and movie files, John McCoskey, executive vice president at the Motion Picture Association of America, responded, "Make sure they know about it" ("Business, Education," 2013). According to April 2011 research conducted by the Publishers Association, about four of the first 10 links were to infringing sites hosting pirated content (Hachman, 2012). The recommendation would be to develop additional lines to the search algorithms, which would index rogue web sites lower, and licensed and trustworthy web sites higher.

Halt the finances of ad-based piracy sites. Google argued that rather than filtering and blocking websites, which could hinder fundamental freedoms, advertisement networks and payment processors should work together to stop the finances of the infringing websites by not displaying advertisements on these sites (Albanesius, 2012b). This is a non-intruding method for discouraging piracy site owners from

operating, and is such recommended by the study's author. On the flip side, simply taking away one source of finances does not necessarily mean that the website will shut down, since the owner could have additional sources of income.

Streaming and ad-supported services. A current measure to reducing digital piracy for firms in the entertainment business is to make the content available on popular streaming sites, e.g. video files on Netflix and audio tracks on Spotify. When ABC added some of their television programs on Hulu, a stream service provider, piracy decreased of those television programs by 20% (Danaher, Smith & Telang, 2017). With Spotify's 180 million active users (Gartenberg, 2018) and Netflix's 125 million subscribers (Fiegerman, 2018), not to mention all the other streaming sites, this new business model may be the most effective measure for increasing legitimate online revenue, and fighting piracy. The convenience and affordability of massive streaming platforms for related content rival those of piracy sites, which take away the advantages for consuming and obtaining content illegitimately. However, *free* is always preferred by users, and streaming sites tend to keep exclusive content.

Reduce or remove time delays for movie releases between regions. Studies have found that the reduction or elimination of time delays between U.S. and international releases of movies and the DVD release of recently featured movies at cinemas, can decrease piracy and boost sales (Danaher, Smith & Telang, 2017). As DVD sales fall with each quarter, it does not make sense that film studios release movies months after it has been featured in the cinemas. Who spends $10 for purchasing one movie, when several films are released every week? A $10 television subscription per month can contain multiple channels, which plays dozens of films daily. However, new movies may not appear on TV until 12 months has passed at the earliest.

The prospect of airing a single movie on the same day globally is an ambitious endeavor. Film theaters may have slight differences in release dates due to the discrepancies in daily schedules and local movies not aired elsewhere. However, a suggested course of action would be to introduce a global

system, which can monitor the release dates of international movies. Further communication between management of the cinemas involved can then lead to the harmonization of release dates, effectively minimizing the time delays.

Anti-piracy procedures at cinemas. Management at cinemas can make a stand against film piracy by placing bags in temporary storage areas, and training staff in detecting live recordings.

Tracking of digital files. Content creators can take advantage of bitcoin technology to monitor their video and audio files, allowing them to detect leaks in a matter of minutes.

Minimalizing game piracy. Piracy of games can be minimized by producing MMOs for gaming consoles, such as Sony's Playstation or Microsoft's Xbox. MMOs for PC games are fairly secure as well, and can be featured on major distribution platforms like Steam. However, many players prefer offline, single-player based PC games, which are most susceptible to game piracy. They may benefit from implementing features which requires internet connection, such as social chats, friendlists, and clans, leaderboards and other competitive statistics describing a player's strength and achievements, updates of content or seasonal events, and an in-game purchase system for obtaining advantageous items or boosts.

Copyright protection on social media. Youtube is making use of a copyright protection feature known as Content ID (Stassen, 2016), which is able to detect when other videos utilize unlicensed audio or video clips in them. However, videos can still be pirated via applications. Despite this downside, Youtube is an important social media site for content creators of entertainment - especially for the music industry. A pro-active measure for the music studios is to apply an introductory or end section to the music videos lasting a few seconds featuring their logo. During the added parts, the logo could appear transparent or fixed over the video to appear less provoking. These video fragments confirm the real copyright owners and acts as a secondary protective layer versus infringers by who want to use the creations without permission.

4.2.3 Implications for other industries

Software. As software programs tend to be downloaded on the same piracy sites as music and movies, the software industry benefits from the censorship of piracy sites and the prosecution of their owners. Creators can track their products by embedding bitcoin bounties into their software. However, beyond these measures, the content creators have few, other options for copyright protection. As far as the author of the study is concerned, a subscription service for a large selection of software on a scale comparable to Spotify or Netflix, has yet to emerge. The reason for this may be due to the huge cut in revenues the creators have to accept. However, if such a software platform would flourish and attract millions of subscribers and provide cutting edge software, revenues could quickly rise to compensate for the initial losses.

E-books. Similarly to software, e-books are exposed on P2P sites, and can be tracked through the bitcoin blockchain. However, the effort and cost involved in tracking hundreds of thousands of e-books may exceed the revenue conserved, meaning that bitcoin tracking is more suitable for large, essential files, e.g. movies, and programs. Opposed to software, several subscription platforms for unlimited e-book reading exist, such as Scribd, Kindle Unlimited, Bookmate, and 24symbols (Lee, 2018). As these subscriptions cost about $10 a month, they would only be worthwhile for active readers. However, in the future, we may be introduced to merged subscription services offering a complete range of digital entertainment content, combining e-books, music, films, and games, which could have a major effect on today's internet piracy.

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