The perceived impact of digital video piracy on the growth of Over-The-Top services in South Africa

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ABSTRACT

Digital video content piracy, like tv-series, movies and sporting content is a growing trend in South Africa. This dissertation aims to understand that impact that digital video content piracy has on streaming service subscriptions and the impact on these service providers, thus further contributing to the research on digital piracy. The key questions examined in the dissertation aimed to answer whether the increased availability of digital video content has an impact on digital piracy and whether the increase in piracy is driven by OTT services in South Africa.

The dissertation thus examines the literature around digital piracy, anti-piracy tools and deployment, consumption , growth habits of Over-the-top (OTT) services in South Africa as well as content distribution.

A quantitative research approach is used to collect original data through a structured survey containing a combination of Likert scale and close-ended questions.

The research demonstrates that piracy is driven by digital video content availability and that OTT service providers provide significant input into the efforts regarding utilising anti-piracy tools to stop piracy. The availability of digital video content can be therefore manipulated and adjusted to suit the entertainment industry and can halt revenue loss through piracy.

DECLARATION

I, **Sharon Lynne Knowles**, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Management in the field of Digital Business at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Name: Sharon Knowles Signature: 

Signed at **Johannesburg** on the **15th day of April 2021**

DEDICATION

Thank you to my partner Ceryllene and children, Robyn, Robert and Jean for allowing me the long nights and weekends to do the research, the collaboration and the endless writing.

Thank you to my fellow classmates for the knowledge sharing, debates and heated discussions. With conformity there is no learning.

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CHAPTER 1. INTRODUCTION

1.1 Purpose of the Study

At the beginning of the internet there was nothing, and the internet had no rules and no boundaries because people created and stole digital content for the love of it (Rogers, 2017). Literature uses the terms *content*, *digital content* and *digital video content* when referring to motion pictures, also known as movies, books and music. In this dissertation, these terms are treated as synonyms related to movies or television series. As time rolled on, the small technological advances allowed people to compress and share various and more significant types of digital files.

As the internet continues to evolve, digital content distribution models adapt to these changes so that the onslaught of illegal content sharing increases (Williams, Nicholas & Rowlands, 2010). Alongside these changes, digital video content pirates adjust their strategies and the ways in which they distribute pirated digital content to match or even better that of their competitors, notwithstanding that these competitors are legal distributors of content (Jindal, 2019). Thus, with the rapid spread of digitalisation, piracy is on the increase.

Technological adaptation poses new challenges for the digital content industry, seeking to protect itself and its digital material. When content is downloaded and copied illegally, this is known as ‘digital piracy’ and ‘copyright infringement’ (Belleville, 2012). The most common definition of digital piracy is referred to as “digital infringement of copyright” (Stryszowski & Scorpecci, 2009, p. 7). The lack of a standard digital piracy definition further reflects that various parts of the world approach and handle copyright infringement differently. The digital video content

industry's different perspectives on understanding digital piracy and copyright infringement contribute to the other thoughts on digital piracy management.

The movie industry seems to be losing the battle with high demand for content linked with new, complex software amongst users' multiple devices. The Washington Post (2017) reported that the seventh season of "Game of Thrones" by HBO was pirated 1.03 billion times. The breakdown in views, when analysed, showed that more people watched the show illegally than through a paid service. The Washington Post further reported that the season was "illegally downloaded and streamed more than 90 million times within three days of its airing". This particular example reflects how digital video content piracy has a financial impact on the industry and economy.

Digital Video Content Piracy has evolved in the digital age; since the distinctive characteristics of digital piracy and methods of exchange, conventional regulation and legislative approaches are futile. Piracy is not a new idea; it is the reproduction of the content that has changed as technology and innovation have evolved. The challenge is the identification and prosecution of individuals who carry out piracy and breach copyright laws. South Africa's copyright legislation, governed by the Copyright Act (2011), declares that their original works may not be reproduced unless the copyright owner provides consent. South Africa has not implemented the World Intellectual Property Organisation Copyright Treaty (WCT) in its copyright law; thus, the South African Copyright Act does not regulate digital technology's effects in respect of copyright law.

Digital video content sold to content providers, such as over-the-top (OTT) media services, allows customers to stream legal digital video content directly off the internet and onto a device of their choice. OTT services like Showmax, Netflix, YouTube Premium and Amazon Prime contribute to the large and growing digital video content industry and the economy in various ways (Blackburn & Eisenach, 2019). Therefore, the assumption is that digital piracy must impact the digital video industry.

The purpose of this research was to understand the impact of digital video content piracy on streaming service subscriptions, known as OTT (Over-the-top) in South Africa, the subsequent altering of consumer viewing habits which, in turn, have affected the value chain of the business which is ultimately the growth of the subscription model. The research further explored the cycle in which content is distributed from the studio to various platforms. This study has allowed the researcher to empirically verify whether altering this distribution cycle will affect the level of digital piracy.

6.2 Context of the Study

As internet adoption grew and digital platforms evolved, so did digital piracy and the pirates' ability to steal and monetise the stolen digital content (Weber, 2015b; Xanthidis & Aleisa, 2012). People love their video entertainment, and as access to high speed broadband increases, so does the appetite for up-to-date and current movies and television series. In 2020, the online digital report compiled by Data Reportal confirmed that internet users for South Africa are at 36.54 million people

and internet penetration stood at 62 percent in January 2020. The digital video content industry faces a severe threat of piracy, contributing to revenue loss for digital content creators, providers and distributors (Blackburn & Eisenach, 2019). Piracy affects the taxes that the government can collect and, ultimately, subscribers' growth to the digital platform (Blackburn & Eisenach, 2019; Choi & Perez, 2007).

OTT services distribute online content through an Internet Protocol (IP) – based transmission path, these services then stream online content to viewers. These video content services are recognised as subscription-video-on-demand (SVoD) and allow subscribers to view their content via a compatible hardware device and internet connection.

A subscription-based business model bills customers a recurrent fee, either monthly or yearly, to utilise the service offered. A subscription model typically helps the OTT business take advantage of customer relationships' continuous value (Aversa, Hervas-Drane, & Evenou, 2019). Interpreted, this means that if the business customers continually saw its value, they would continue to pay for it. OTT services like Showmax, Netflix, YouTube Premium and Amazon Prime use the subscription model as their core income generator and brand loyalty strategy.

6.3 Research Problem

In March 2019, South Africa had the highest tracked piracy events in Africa and was ranked eighth globally (Irdeto, 2020a). More than half (54 percent) of the total South African video piracy industry is a serious concern. This percentage places South

Africa 9 percent higher than the worldwide average (Irdeto, 2020a). These statistics reflect that digital content piracy is flourishing in South Africa.

The ever-increasing adverse effects of digital content piracy on the digital video entertainment industry is a concerning issue that requires more research. Digital piracy refers to the illegal distribution of digital content with the understanding that a digital pirate is a person who distributes and streams digital content illegally (Belleville, 2012).

The purpose of the research was to understand the impact of digital video content piracy on OTT streaming services in South Africa. Digital video content piracy is a complex issue with industry experts and literature citing various reasons why piracy occurs, with minimal consensus on an effective long-term solution or researching the relationship between professional film distribution and piracy (Castro, Bennett, & Andes, 2009; Crisp, 2015; Hill, 2007; Quintais, 2018).

6.4 Research Questions

The dissertation aimed to answer whether digital video content's increased availability impacts digital piracy and whether OTT drive the increase in piracy.

6.5 Significance of the Study

Despite the entertainment industry's best efforts to thwart piracy, which include digital content creators and distributors, the impact of digital content video piracy is increasing, costing the movie and entertainment industry millions (Orme, 2014). The result reflects a reduction in revenue and a drop in subscriber growth figures (Hill,

2007; Rodriguez Ovejero, Stammati, & Torres Figueroa, 2019; Yar, 2005). To prevent the illegal viewing of content, the digital video industry uses various methods to prevent digital content piracy. Tools such as forensic watermarking, encryption (where an embedded file is inserted into the video content for tracking) and stricter copyright infringement laws have had limited success in preventing piracy (Asikuzzaman & Pickering, 2018; Belleflamme & Peitz, 2010; Danaher, Dhanasobhon, Smith & Telang 2010; Danaher, Smith, M. & Telang 2104; Smith, M. & Telang 2009; Sudler, 2013).

Digital content piracy evolves as a legitimate business would, with innovative technology and methodology, while employing new strategies to ensure that business is profitable (Slive & Bernhardt, 1998). While the academic debate has produced a plethora of definitions of business models, Teece (2010) defines one of the most popular as "the design of value creation, value delivery, and value capture mechanisms used by businesses as a means of getting customers to pay for value and converting those payments into profits. Thus, any organisation with a business purpose, including those engaged in digital piracy, benefit from a business model concept. Digital content piracy sharing is a business with a well-defined value chain that includes a subscription model (Choi & Perez, 2007).

For OTT and digital piracy subscription models are underpinned by the basic economic principle of economies of scale, namely as a company scales up, revenues should grow faster than cost. The realities of scaling up reflect that

innovation does not always follow this principle (Choi & Perez, 2007; J. McKenzie, 2012). Understanding and catering to subscribers' known consumption habits are critical to retention, as acquisition remains costly (J. McKenzie, 2012; Sudler, 2013)

Furthermore, with digital video content piracy and illegal copying or sharing, the burden of enforcement rests heavily with the entertainment industry. This unlawful behaviour leads to economic pressure, as well as the cost of implementing various tools to prohibit or to slow down digital content video piracy (Blackburn & Eisenach, 2019; Poort, Quintais, Van der Ende, Yagafarova, & Hageraats, 2018; Van der Ende et al., 2015).

6.6 Delimitations of the Study

Although this study focuses on digital content piracy, it did not dwell on technical information security aspects such as confidentiality, integrity and availability (CIA). This study focused on the elements of digital piracy that could impact the subscription model growth of Over-the-top (OTT) digital video content providers such as Showmax, Netflix, YouTube Premium and Amazon Prime in South Africa.

6.7 Definition of Terms

Table 1: Definition of Terms

TERM	DEFINITION

BitTorrent	"BitTorrent" is a communication network for peer-to-peer (P2P) file sharing and is used to distribute data over the internet (BitTorrent, 2021).
Copyright	Copyright is the only way to safeguard an artist's work. It is any intellectual property that grants the artist exclusive publishing, distribution, and use rights.
Cryptography	Cryptography is a method of encrypting information and any communication with cyphers so that only those who are supposed to read and process the data can do so. (Anderson, 2020).
Cyberlocker	A cyberlocker is an internet hosting service that is specially designed to host specific user files. These files are accessed over the internet after verification by the user.
Chromecast	Chromecast is a device that plugs into a television HDMI port, connects to the home internet and play content on a television.
Dark Web	Standard search engines cannot access the Dark Web, as it requires specific protocols to access it. The Dark Web is the area that is often associated with illegal activity.
Deep Web	The Deep Web holds the content that is invisible to search engines like Google and Bing, e.g., the content of personal social media accounts.
Digital Millennium Act of 1998 (USA)	“The Digital Millennium Copyright Act (DMCA) was signed into law by President Clinton on October 28, 1998. The legislation implements two 1996 World Intellectual Property Organization (WIPO) treaties: the WIPO Copyright Treaty and the WIPO

	Performances and Phonograms Treaty" (The Digital Millennium Copyright Act, 2006).
Digital Piracy	In most countries, digital piracy is described as the "illegal act of duplicating, copying, or sharing digital work without the permission of the copyright holder."(Ingram, 2013, p. 1).
Digital Platforms	Various components make up a digital platform or ecosystem which allow the platform to talk to other software and tools.
Digital Watermarking	Digital watermarking is a technique used to protect intellectual property (IP) rights by embedding information in digital multimedia data (Chaudhry, Stumpf, & Sudler, 2011).
Digital Rights Management (DRM)	Digital rights management (DRM) is a systematic approach to digital media copyright protection. DRM's sole purpose is to prevent unauthorized posting of digital content media and to limit how consumers copy content they have purchased. (Gaber, 2013).
Firestick	The Firestick is a media streaming device that lets a user stream video, install apps, play music on television. The Firestick connects to the home internet. The Firestick does not support Google Play and is predominantly an Amazon media device used for Amazon Prime.
Geo-blocking	Geo-blocking is a technology which restricts access to content based on the internet user's geographical location.

Intellectual Property (IP)	Intellectual property (IP), which is an intangible right, protects the products of human intelligence and creation. It covers the rights of original works of content creators.
IP Address	The “IP" part of the IP address stands for “internet protocol”. The “address” part refers to a unique number linked to all online activity by an internet user (Parker, 2020).
ISP	Internet Service Provider provides services for accessing the internet. E.g. Mweb, Cool Ideas and Afrihost.
Leechers	Users who download and upload content at the same time. A leecher could also be a user on a network that downloads more than they upload. The opposite of a leecher is a seeder.
Over-the-top (OTT)	Over-the-top refers to any content service that allows a person to stream videos via the internet and not via satellite or cable.
OTT Streaming Service	OTT is a digital platform that provides access to streaming videos for a monthly fee, utilising a subscription model.
Peer-to-peer (P2P)	Techterms defines P2P as “peer-to-peer”. In a P2P online network, the “peers” are computer systems which connect via the internet. Computer files can be shared “directly between systems on the network without the need of a central server” (Christensson, 2006)
Release (Distribution) Window	With the release window or distribution business model, contents (movies) are first released through movie theatres; then, after a certain period (anything from 4 to up 12 months), they are released to Blu-Ray, DVD and AVOD services.
Set-top Box	This device enables access to digital videos and view; e.g., a Multichoice decoder.

Seeder	Seeding is where a user uploads already downloaded content, or is a user that leaves the upload task active when the download is complete to keep the file being shared in circulation. The opposite of a seeder is a leecher.
Streaming on Demand	It enables a person to view on-demand videos without downloading them. The service requires internet access.
Streaming video on demand (SVOD)	Video on demand service allows consumers to consume as much content as they want for a rate per month. E.g. Showmax, Netflix, YouTube Premium and Amazon Prime, etc.
Torrent	Torrenting is a peer-to-peer (P2P) file-sharing technology where several users will “connect and distribute their online files (including movies) rather than being dependent on a single website and at random times” or “source for downloading a file or files (Buttler, 2020)
Tracker	A tracker is the shortened name for a BitTorrent Tracker. It is a particular type of server that assists in the communication between peers using the BitTorrent protocol. The peers can be both public and private (if it requires registration).
µTorrent	Freeware supported and proprietary BitTorrent clients for Microsoft Windows, Android, Linux and Mac OS X.
Virtual Private Network (VPN)	A virtual private network works by routing the internet connection of the chosen device through a VPN's private server rather than an internet service provider (ISP). When data is transferred to the internet, it is routed via the VPN rather than a person's computer.

6.8 Assumptions

The study is critical because digital content providers are an integral part of the South African socio-economic culture. Broadcasters like Multichoice (Pty) Ltd. invest heavily in local content, sport and the broadcast industry, thus creating various opportunities for talented South Africans. Their Corporate Social Investment (CSI) and empowerment initiatives have a significant, long-lasting impact on multiple communities, which has a positive effect on the local economy (Multichoice, 2019; MultiChoice Investor Relations, 2019).

CHAPTER 2. LITERATURE REVIEW

Chapter 1 introduced the general context regarding the digital piracy research problem concerning the OTT industry. The purpose of this chapter was to explore the literature pertaining to the issues of digital content piracy that have influenced OTT services to reinforce the research problem context. The literature review also considers the argument for digital piracy and whether the literature provides a reasonable argument to strengthen the research empirically. The chapter looks at anti-piracy tools used by the OTT business to counteract piracy and reduce the negative impact on the industry. It then reviews how piracy shapes and alters consumer viewing habits, contributing to the loss of potential subscribers for the OTT service provider.

2.1 Introduction

There is an adage that declares content is king, and this is true for the many entertainment industries and content creators, content drives consumption (Müller & Christandl, 2019). The Global internet Phenomena Report (Sandvine, 2019) stated that with the rise of broadband in many countries, speeds connecting to the internet have increased, data storage is cheaper than ever before, and internet usage has increased. While this benefits the content industry, digital pirates are afforded the same opportunity to share, monetise and distribute stolen content which constitutes digital piracy (Sandvine, 2018).

Viewing online content such as movies and television (tv) series has become more streamlined and convenient due to increased broadband availability worldwide. OTT and SVOD video content services have grown in popularity, with a large catalogue of titles available to subscribers. The popularity of these services is driven by the quality and quantity of video content catalogues that OTT services provide to their subscribers. (Netflix Research & Analytics Team, 2019).

2.1.1 Overview of OTT services in South Africa

OTT stands for 'over the top' and is the practice of streaming content directly across the Internet. As long as a person has access to the Internet, either locally or through a mobile network provider, the content catalogue allows access at any time. OTT service providers operational in South Africa are Showmax, Amazon Prime, YouTube Premium and Netflix (Multichoice (Pty) Ltd., 2019). As OTT service providers increase more services will become available to the South African market.

Table 2: Summarised view of OTT Service Providers

OTT Service Providers	Description
Netflix	Netflix is a global leader in online streaming services, with over 204 million subscribers across 190 countries (2020). Netflix has approximately 400,000 subscribers (2020) since the launch in South Africa in 2016, and the service continues to grow. SimilarWeb (2020), ranks Netflix number two for streaming services in South Africa.
Showmax	Showmax is an OTT provider owned by the MultiChoice Group that was launched in 2015 as a separate service from the main DStv offering in order to compete with global OTT services. Initially launched as a startup, Showmax operated as a

	standalone entity. In 2017 Multichoice decided to bring the brand back into the stable and merge with the Multichoice Digital business unit. Showmax reports a subscriber base of 595,000 which is growing monthly. Its services, like those of most OTT service providers, are available on a smart TV, laptop, smartphone, tablet, and some media boxes. Showmax provides international content and has begun to create local content. Showmax is a free value-added service provided by MultiChoice to its DStv Premium subscribers. MultiChoice launched ShowmaxPro, an alternative service, in August 2020. This new service enabled customers to stream movies, including sport and some sporting highlights on its platform as a standalone subscription on higher or standard definition quality. Showmax Mobile, priced at R49 is a limited offering for subscribers and only available on mobile. Showmax reported an increase in online streaming through its platform when the national lockdown was put in place due to the COVID-19 pandemic. Showmax indicated a positive adjustment in customer viewership and the increase in consumption of digital content by customers using OTT services (Showmax, 2021; Thomson, 2020).
YouTube Premium	YouTube is a video platform owned by Google that is ranked as one of the top websites in South Africa for movie viewing and streaming. Because local television service providers such as eTV and the SABC use YouTube's platform for streaming services, it has a larger reach and is a competitive OTT player in South Africa. YouTube has over 20 million subscribers worldwide, thanks to its music and educational offerings. In South Africa, YouTube has not publicly released subscriber numbers. Similarweb ranks it first in the OTT charts in South Africa. (2020).
Amazon Prime	Amazon Prime is an OTT service owned by Amazon, with a library of over 1500 TV titles. Amazon Prime subscribers can download content for offline viewing on their device and watch it later. This feature reduces data costs, which is especially important in South Africa, where broadband data is still prohibitively expensive for the majority of the population. Amazon Prime has over 100 million subscribers

	and is available in over 200 countries around the world. In December 2016, a basic version of Prime Video was launched in South Africa. It charges its subscribers ZAR 79.99 per month for online streaming video content. This is the average subscription fee in South Africa when compared to other OTT operators. (Thomson, 2020; Udoakpan & Tengeh, 2020).

The cost of streaming services in South Africa are varied and are tied into the definition of content streamed e.g. standard or high definition, tied into the number of devices that the account holder has (Udoakpan & Tengeh, 2020).

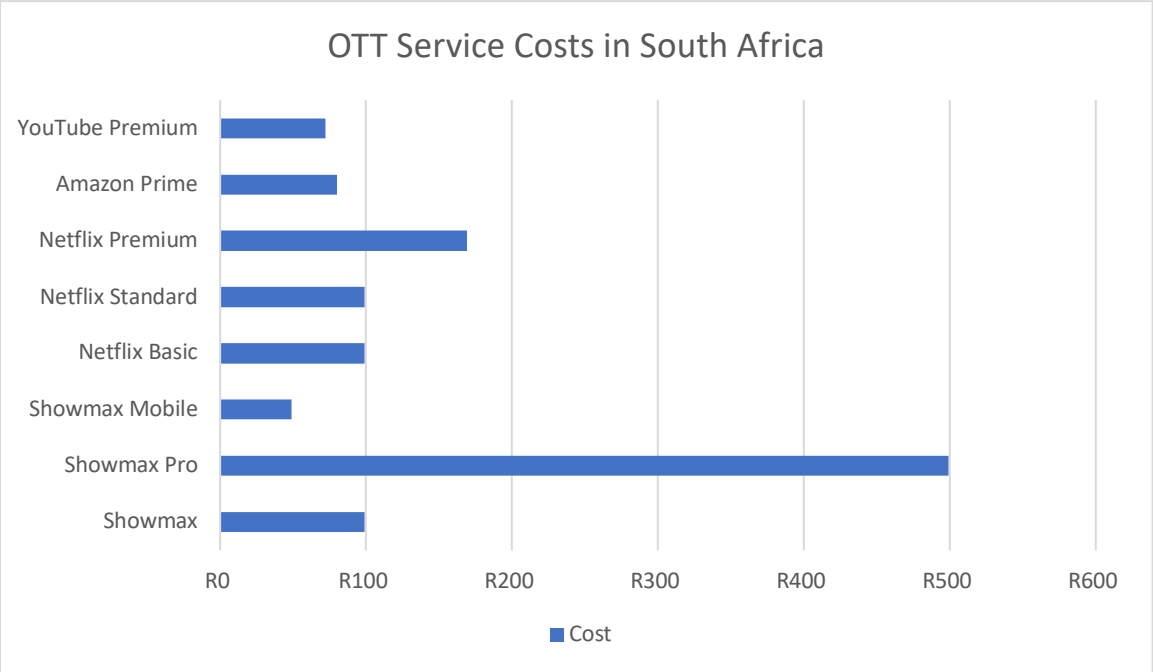

Figure 1: OTT Service Costs in South Africa

2.1.2 Definition of Digital Piracy

In their ground-breaking paper of 1998, Gopal and Sanders (1998) referred to digital piracy as illegal copying, downloading or purchasing copyrighted files without the copyright holder's explicit permission.

Later literature evolved the concept of digital piracy as technology evolved. Bellville (2012) refined the definition to reflect that digital piracy refers to the illegal distribution of digital content to understand that a digital pirate is a person who distributes and streams digital content illegally. In 2013, Tunca and Wu (2013) reasoned further by stating that digital piracy included a wider range of digital goods, from music to movies, software to books. It was the methodology and understanding of how piracy occurred that differed in today's digital world.

A considerable amount of literature has been published studying the economic harm of digital piracy and debate continues around why people pirate. In their research, Danaher, Smith and Dhanasobhon (B. Danaher et al., 2010), J. McKenzie (J. McKenzie, 2012), J. Cox, A Collins and S. Drinkwater (Cox et al., 2010), highlight these findings.

This literature review focuses specifically on digital video content: TV series and movies distributed to a paying customer base by an OTT service provider.

The consequences of digital piracy can be far-reaching. As an artist, an amount of money is invested in producing and distributing that content. Financial payment is received for copies that get sold, and if successful, more content can be created,

employ more people and ultimately, put money back into the economy. If the content is distributed for free and shared without consent, consequences are extensive. Accordingly, digital video content piracy has always been a significant issue for the entertainment industry and content creators.

2.1.3 Legalities

The advancement of technology innovation established a new frontline of intellectual property and a new, more sophisticated type of criminal, the digital pirate. Copyright law, unprepared for the onslaught of digital piracy, struggled to adapt. South African courts wrestled with and adjusted the physical perceptions of copyright with the digital information being shared between billions of users instantaneously. The misconception that anything accessible online can be shared can lead to prosecution and constitutes a criminal offence in the South African Copyright Act (Copyright Act No. 98 of 1978, 2011). In his critique of South African Copyright Law, Riby-Smith (2017) outlines the “legislative neglect” of the 1978 Act by describing how definitions are outdated and unsuitable for a modern South Africa, rendering them difficult to apply to the technological advances of the past two decades.

South Africa has several laws that can accompany the Copyright Act and provide for the protection of rights related to copyright, including:

- **Registration of Copyright in Cinematograph Films Act.** Under South African copyright law, registration of copyright in a cinematographic film has no bearing on the continuation of copyright in that film. (Riby-Smith, 2017). The goal of copyright registration in cinematographic films is to allow the

existence of copyright in a film and the rights under copyright in that film vesting in a specific person to be quickly and efficiently proven in court proceedings. (Registration of Copyright in Cinematograph Films ACT NO.62 of 1977, 1977).

- **Performers' Protection Act (No 11 of 1967).** The Performers' Protection Act provides some protection to performers for "neighbouring rights" or "related rights" related to their renditions of literary, musical, dramatic, dramatic-musical, and artistic works.

Although the regulation for downloading digital goods is years old, it is the identification of the people who download and redistribute that remains a challenge. Detecting illegal copies necessitates capturing the downloader (File receiver) or uploader or source (provider of the file) in the act of transferring the file. There are two primary transfer methods: synchronous download from uploaders on a peer-to-peer (P2P) network or asynchronous download from a cyberlocker. (Walter, 2019). Without access to a user's digital files after the file transfer is complete, detecting and possessing illegitimate copies becomes difficult.

Cyberlockers enable files to be uploaded directly and can be accessed by the uploader and other users, Cyberlockers are usually hosted offshore outside the jurisdiction of Berne signatories. Cyberlockers make available online storage space for users, a link is then given to each file which can be shared with others to facilitate downloads across a broader community (Joaquim, 2016). An example of a cyberlocker is megapload.com and filestube.com, they are known as a direct

download hosting services (Moshirnia et al., 2012; The Berne Convention for the Protection of Literary and Artistic Works, 1979).

Effective digital piracy prosecution necessitates apprehending downloaders/uploaders "in the act," while also acknowledging the difficulties associated with pirated digital media transfer. South African law is only now catching up in terms of piracy and copyright theft prosecution and identification. (Riby-Smith, 2017). To Identify the transfer of illegal digital content would require online monitoring traffic, this notion could be likened to the example of the South African government declaring it will monitor and read every letter sent through local post offices (Walter, 2019).

Torrenting sites like The Pirate Bay, Limetorrents and Tamil Rockers continue to grow. Using a BitTorrent client like µTorrent, coupled with a Virtual Private Network (VPN), the ability to distribute and watch digital content anonymously increases tenfold (Moshirnia et al., 2012). Due to BitTorrent's decentralised nature, it is exceedingly difficult to shut off the dissemination of any single file. Rather than being located on a single server, the file is spread among numerous computers. BitTorrent is a pretty easy-to-use protocol. A user merely needs to install a BitTorrent client," search for and load a torrent file into the client. Both general purpose search engines such as Google and torrent-specific search engines return torrent results (Moshirnia et al., 2012).

OTT services have established a business model and the technological infrastructure that caters for socially connected Millennials, those who binge and

need immediate gratification. Researchers have found evidence to further suggest that there is a direct relationship between the availability of legal digital video content and the unauthorised downloading (Danaher et al., 2020; Nhan et al., 2020; Pham, Quoc Trung. et al., 2020).

2.1.4 The Cost of Piracy

Researchers believe that it is an intricate and complex to estimate the scale of economic loss due to piracy for affected parties (Sandvine, 2019; Tomczyk, 2019).

However, several reports forecast digital content piracy and how it costs the entertainment industry billions of US dollars (YouGov, 2019). The attempt to stop digital content piracy by imposing various controls like implementing digital rights management (DRM) software into the digital video content, encryption, watermarking, and focused effort on prohibiting sharing of credential rights appears to be inefficient (Sudler, 2013).

The complexity of measuring digital piracy's actual cost is highlighted with the varying amounts of industry reports with inconsistent measurement metrics.

With the constant progression of technology and the emergence of torrenting sites, digital piracy is increasing; hence, the following section focuses on digital video content piracy.

2.2 Digital Video Content Piracy and Pirating

OTT streaming services are consistently plagued by digital video piracy. However, digital piracy occurs in many forms like recording the screen during the playing of

content using a software application, altering the video playback software, breaching the secure video channel in the device hardware and even stealing a legitimate user's credentials.

However, it was the widespread adoption of the BitTorrent protocol in 2004 that highlighted the link between an increase in internet piracy and a drop in revenue from media sales. (B. Danaher et al., 2014; De Matos et al., 2018; Granados & Mooney, 2018; Ma et al., 2014). "BitTorrent" is a peer-to-peer (P2P) file-sharing communication network that is used to distribute data over the internet.

Growing academic literature around the topic of digital piracy in all formats provides an insight into the digital pirated content ecosystem where people create unauthorised content by uploading and sharing through BitTorrents (B. Danaher et al., 2010; De Matos et al., 2018; Loh, 2019; Qureshi, Amna. et al., 2015; Rossi et al., 2014). In 2018, BitTorrent "protocols moved as much as 40 percent of the world's traffic daily" (BitTorrent, 2021). The marketing and advertising of infringing content entice the average consumer to cut costs from Pay-tv and legitimate OTT service providers under the pretence that the content is legal (Jones, 2018).

It is up to the OTT service provider to identify these instances and put a stop to piracy. Digital content distributors such as Multichoice Africa (Pty) Ltd, Netflix, YouTube Premium, Amazon Prime and others, use various tools and mechanisms to protect digital video content. These tools range from sophisticated technical tools such as digital watermarking, encryption, geo-blocking, VPN blocking and artificial intelligence, and manual intervention methods such as account and usage

monitoring, monitoring of P2P networks which attempt to slow down and prevent copyrighted material from being illegally shared (Jin & Lotspiech, 2011). These tools and supporting mechanisms are consistently deployed across the content platforms and within the content itself. It must be noted that these tools and resources cost digital content creators and distributors large sums of money traditionally allocated to the bottom line (YouGov, 2019).

2.2.1 Username and Password sharing

Username and password sharing are known as Credential Sharing. Credential sharing was initially accepted by Pay-tv and OTT businesses and was seen to be forming part of the customer acquisition strategy. The company allowing password sharing could be the way to attract unauthorised viewers to become potential subscribers.

However, digital pirates sell compromised credentials online that have been acquired illegally, through the dark web and other online channels and, therefore, inadvertently give access to the digital video content to many people illegally. Credential theft is an issue that is seen to be growing in the digital piracy space (Biddle et al., 2003).

Credential sharing becomes exponentially risky because it not only compromises the safety of customer data; it increases infrastructure costs. Pay-tv and OTT services have implemented algorithms that detect anomalies in subscribers sharing behaviours (Minnock, 2015).

These algorithms pick up the number of devices connected, changing viewing behaviour with identified devices or watching the same content in different locations and even content consumed at multiple IP addresses. The algorithms assign confidence scores to each result which evaluated against propriety benchmarks (Jones, 2018).

Netflix has updated their terms and conditions (Netflix Legal, 2021, p. 1) to state that an account may only be shared with members of the household: *"The Netflix service and any content viewed through our service are for your personal and non-commercial use only and may not be shared with individuals beyond your household."*

In the prompt as shown in Figure 2 below, customers are told that *"If you don't live with the owner of this account, you need your own account to keep watching."* To continue, they need to verify the account with a E-mail or Text Code, or create a new account with a 30-Day Free Trial. With the industry figures showing how high the statistics are for credential sharing, the OTT industry will become more aggressive in cutting down on this behaviour.

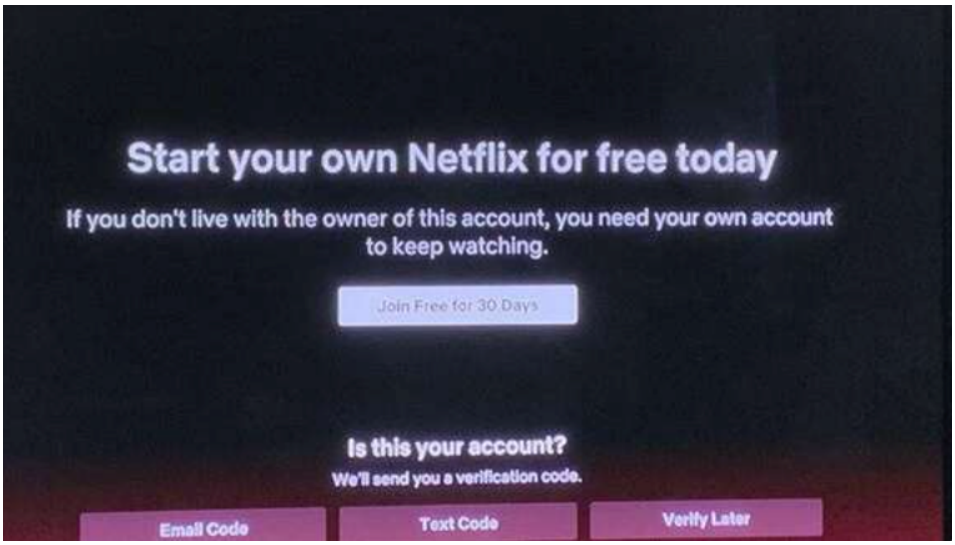

Figure 2: Netflix Screen limiting credential sharing

2.2.2 BitTorrent Networks

BitTorrent was developed in 2002 by Bram Cohen, and the main advantage of using BitTorrent was the speed that users could download content. It was exceptionally fast, which appealed to users who had limited bandwidth availability. The concept around BitTorrent was one of co-operation; the more a user uploads, the more content the user could download. The BitTorrent network did not enable the function to search content, and users had to obtain links to content via an outside source like websites or other P2P networks. The link allowed the user to connect to a predefined server, known as a tracker, managed by that content provider (Casadesus-Masanell & Hervas-Drane, 2010).

Hoffman (2018), in his article, explains how users stream through torrent sites like BitTorrent. Figure 3 below demonstrates how computers in a "BitTorrent swarm" (a

group of computers downloading and uploading the same torrent) convey data between each other without the need for a central server.

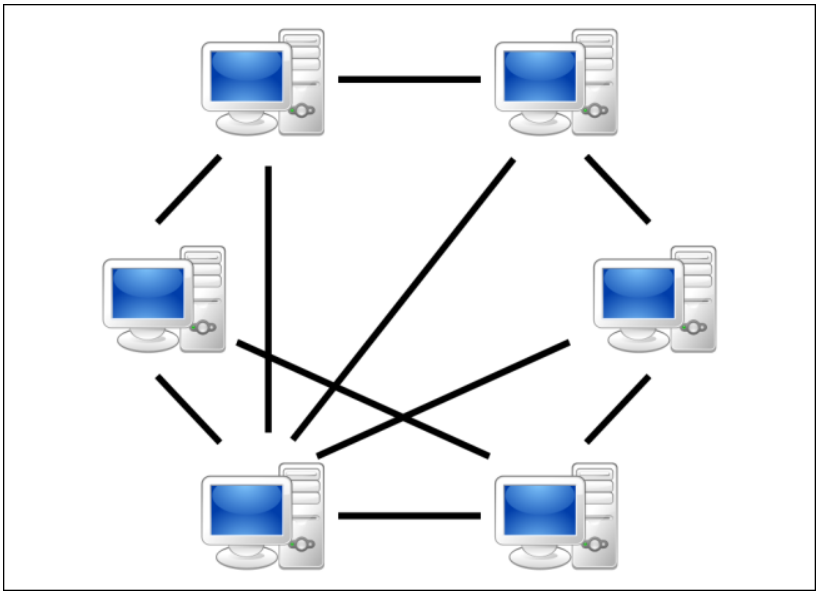

Figure 3: Seeders and Leechers on Torrent Sites (Hoffman, 2018)

According to Irdeto (2019), an anti-piracy organization, 52 percent of consumers worldwide watch pirated content. The most common type of offender is "casual pirates," who are seeders who upload and share content and leechers who download and consume it via torrent sites.

South African digital attorneys, Michelson's, state the following regarding piracy and BitTorrent "*It is worth noting that downloading content over BitTorrent usually results in some portion of the files being uploaded as well due to the nature of the protocol. Even if only part of a file was uploaded, this feature of BitTorrent could be considered distribution under South African law. This interpretation means that South Africans could use BitTorrent to download copyrighted material without a licence,*

and they could very well be charged criminally, not just under civil law. " The attorneys further emphasised that *"BitTorrent as technology was not wrong or illegal to use, and that it is the content being downloaded or distributed that determines whether its use is legal or not"* (Jan Vermeulen, 2014).

OTT services' core business is offering digital video content to consumers for a set amount via a subscription-based business model, either monthly or yearly (Moshirnia et al., 2012). This digital video content is released from studios, like HBO and Disney, following an approved set of protocols and distribution models to ensure that some profit is released per stage of the movie release and distribution (Granados & Mooney, 2018). The respective protocols include staggered movie releases while distribution models span across studios to Pay-tv to OTT services which all contribute million to support effective anti-piracy methods, as discussed in the following section.

2.2.3 Virtual Private Networks

How Stuff Works, a specialist network website, describes "a virtual private network (VPN) as a private, closed network that uses a public network, (the Internet) to connect remote sites or users". Combined, the VPN will utilise a virtual connection routed through the Internet from the business' own private network or a third-party VPN service to a remote site, or personal VPN to help ensure security (Minnock, 2015) so that any person intercepting the encrypted data are unable to read it (Almasalha et al., 2018). Digital video content that is streamed through encrypted pathways using VPNs is challenging to monitor and track (Weber, 2015a).

2.3 The Argument for Digital Video Content Piracy

The Motion Picture Association of America encourages “essential rights of content creators, a strong global creative economy, and a thriving digital marketplace that encourages the production of new creative content and protects against piracy and illegal distribution”(MPAA, 2021, p. 1). They are vehement in their conviction that all “piracy” in every shape and form is theft.

The Recording Industry Association of America closely echoes these sentiments around digital piracy and works hard to protect artists and the music industry from music piracy (RIAA, 2021).

In South Africa, the organisation, Southern African Federation Against Copyright Theft (SAFACT) was registered and established in 2001. The primary objective to protect the intellectual rights of its members against the exploitation of such rights through monitoring and effecting the takedown of piracy-centric websites and services. The MPAA granted SAFACT power of attorney over member studios directly to enforce copyright and IP of members. The power allowed SAFACT to bring action against local infringing parties and websites. However, in 2018, SAFACT closed down operations due to a lack of sufficient funding.

The media industry has cited how digital losses have an impact on revenue, however this is based on the assumption that everyone who watches content illegally would have purchased an authorised copy of the media (Butland & Sullivan, 2018; Keen, 2013; Siegfried, 2004; Siwek, 2006; Smith, & Telang, 2009; Wolk, 2015; YouGov,

2019). Siegfried (2004) was among the first to pose this viewpoint around piracy. However not everyone at that time agreed. In his controversial book, *Free Culture*, Lessig (2004, p. 71) argues

> *"If I steal a CD, then there is one less CD to sell. Every taking is a lost sale. But on the basis of the numbers the RIAA provides, it is absolutely clear that the same is not true of downloads. If every download were a lost sale—if every use of Kazaa* "*rob[bed] the author of [his] profit*"*—then the industry would have suffered a 100 percent drop in sales last year, not a 7 percent drop. If 2.6 times the number of CDs sold were downloaded for free, and yet sales revenue dropped by just 6.7 percent, then there is a huge difference between "downloading a song and stealing a CD."*

Lessig is making a point that a free download does not necessarily imply a lost sale as the industry would have one believe (Gayer & Shy, 2006), as people who download digital content would not have bought the content were it not available on peer-to-peer networks (Chang & Walter, 2015; Cox et al., 2010; Krishnan et al., 2009; Phau et al., 2016). Andersen and Frenz (2010) discovered no statistical relationship between P2P file downloads and Compact Disc (CD) album sales in their early work in this field. Smith and Telang (2009) demonstrated that the availability of pirated video content at television broadcasters had no effect on post-broadcast DVD sales using primary data from Amazon DVD sales rankings and BitTorrent movie file downloads.

Lessig (2004, pp. 10, 76) further considers the background of the statement that content piracy will kill Hollywood. He discusses how Jack Valentini, former president of the MPAA, likened piracy to theft and terrorism. Valentini successfully lobbied politicians and the creative industry by spreading the idea that unauthorised copying of films, and thus all recorded media, will lead to the creative industry's demise. The notion of collapse scenarios because of piracy was further extrapolated to the academic sector where Stuart Lawson theorises that the publishing industry would collapse because of pirate sites, such as Sci-Hub, a shadow library website, that allows the downloading of academic publications for free (Lawson, 2017, p. 2).

2.3.1 Academic viewpoints

In 2003, audio archivist Samuel Brylawski contributed to piracy research by stating that the ability to build complete digital culture archives had collapsed, preventing and hindering archivists from safeguarding digital or digitised works, putting these products at risk of disappearing (Brylawski, 2003). Mary Ide et al. describe how the complexity of digital rights management (DRM) makes legal digital archiving of television difficult for archival institutions in the same report (Ide et al., 2002). The Digital Millennium Copyright Act (DMCA) of 1998 is a piece of American legislation that puts into effect two World Intellectual Property Organization treaties. Jerome McDonough et al. based his research on this legislation, claiming that the prohibition on circumventing technological protection measures makes it impossible to create preservation copies of video games using DRM and anti-copying measures (McDonough et al., 2010).

2.3.2 File Sharing

The challenging problem is that BitTorrent can operate over a decentralised network with no single shutdown point; this improved efficiency facilitates the exchange of any content. The maturity of this technology has allowed the platform to become the primary driver of digital piracy. The torrent network has become accessible to the average internet user (Aversa et al., 2019; Harris, 2018; McKenzie, 2017).

However, even pirate communities on the BitTorrent network rely on individual contributions for the network to function. Harris (2018) categorises the rules used in these pirate communities to solve collective action problems and the applicability of self-governance in his review of Ostrom's Framework (1992), where her work outlines eight design principles found across thriving self-governing communities and categorizes the seven rule types used to implement these principles. He goes on to say that pirate communities overcome these obstacles by defining group boundaries and enforcing them with sanctions.

Lessig (2004, p. 63) argues that this type of piracy, especially when it comes to file sharing, hardly deserves the name of piracy; however, there is no argument that the business of piracy, where pirates obtain other people’s copyrighted content to download and share for the sole reason of selling it, without permission, is wrong. These pirates are sharing content and not selling content.

According to John (2009, Chapter 4), the idea that authors have moral and legal rights of ownership of their words was invented to react to piracy in the early 17th century. So the invention of proprietary ownership was a political and economic

response to piracy. He concludes, in his research, that a more progressive thinking about piracy is needed while working within an ethical framework.

2.4 Anti-piracy Methods Deployed by OTT Services

OTT services worldwide understand that a digital piracy problem exists. These digital pirates will continue to use various methods to copy and distribute content illegally and that anti-piracy prevention needs to be in place (Castro, 2011; Jindal, 2019; Pizzatto, 2019). To address these advanced forms of piracy, a combination of operational solutions is necessary, from digital rights management, breach detection, watermarking and evolved cybersecurity procedures to monitoring social media platforms. Despite these safeguards, the research reflects that digital pirates continue to breach these services, steal content and redistribute illegally (Blackburn & Eisenach, 2019; Hutchins Li, & Rowe, 2019; Pizzatto, 2019; Sandvine, 2019). These costly antipiracy tools, albeit slowing digital video piracy down, do not eliminate or prevent digital piracy.

To stop digital video content piracy, content owners, creators, and distributors have implemented specific controls to prohibit the practice of illegally copying and sharing digital files. DRM is a framework used to secure digital content using cryptographic techniques (securing information use of codes) by enforcing user rights.

2.5 Anti-piracy tools (Methodology)

2.5.1 Digital Rights Management

Anti-piracy controls are implemented by OTT services to help reduce digital piracy, reinforced by digital rights management (DRM) (Sudler, 2013). DRM is the most common digital video security control utilised since it is used by popular digital streaming providers such as Spotify, Apple and Netflix (Granados & Mooney, 2018; Moshirnia et al., 2012). DRM is where video content is encrypted with a secret key, and this secret key is packed with a set of defined rules into a digital licence. When the set-top box or device such as a cable box or decoder plays a movie, the DRM software in the particular device looks at the defined rules in the digital licence to see if they match (Gaber, 2013). If they match, the system will access the key and decrypt the video content, allowing it to play (Dingledy & Matamoros, 2019; Gaber, 2013; Ogren, 2009).

However, digital content providers using the DRM systems have the added cost to measure as these DRM measures come at a fee which can quickly erode profits and threaten the subscription business model (Ogren, 2009). With digital content piracy growing at an exponential rate, spurred on by the digital revolution and the fact that it is difficult to control, the pay-tv and OTT entertainment industry need to relook their methodology to limit and restrict this growth (Biddle, England, Peinado, & Willman, 2003; Chaudhry et al., 2011).

2.5.2 Digital watermarking

Digital Watermarking is where a message is hidden related to the digital signal within that signal, such as a video, with a visible or invisible watermarking distortion; a watermark reader can then identify this distortion (Chaudhry et al., 2011). While real-time watermarking could potentially be limiting the pirating of digital video content, watermarking can also identify original content, trace illegal content copies and then disable that content (Chaudhry et al., 2011; Kumar, Ghrera & Tyagi, 2017).

2.5.3 Credential Sharing and User Account Monitoring

Username and password sharing are known as Credential Sharing. Credential sharing was initially accepted by OTT services and was originally understood to form part of the customer acquisition strategy. However, credential sharing has become exponentially risky because it not only compromises the safety of customer data; it increases infrastructure cost (Nikas, Alepis & Patsakis, 2018; Siukkola, 2016; Siwek, 2006).

OTT services surmised that allowing password sharing could be the way to attract unauthorised viewers to become potential subscribers (Aversa et al., 2019; Siukkola, 2016; Wolk, 2015). However, digital pirates sell compromised credentials online, that have been acquired illegally, through the dark web and other online channels and therefore, inadvertently give access to the digital video content to many people illegally (Kumar et al., 2017). Credential theft is an issue that is seen to be growing in the digital piracy space, compromising both pay-tv and OTT services (Biddle et al., 2003; Jones, 2018; Minnock, 2015; Nikas et al., 2018).

Pay-tv and OTT services have implemented algorithms that detect anomalies in subscribers sharing behaviours (Minnock, 2015). These algorithms pick up the number of devices connected, changing viewing behaviour with identified devices or watching the same content in different locations and even content consumed at multiple internet protocol (IP) addresses. The algorithms assign confidence scores to each result which is evaluated against propriety benchmarks defined by Artificial Intelligence and machine learning to identify suspicious user behaviours (Jones, 2018).

It is crucial for any Pay-tv and OTT business to monitor subscriber behaviour. The monitoring of usage and viewing behaviour allows the company to improve the content and ensure its growth. By understanding subscriber behaviour, both marketing and content divisions can purchase content that appeals to their subscriber base. While user monitoring is studied, it also allows the business to identify any unusual behaviour by subscribers.

2.5.4 Geo-blocking & Geolocation

Digital content creators, like Netflix, HBO and Amazon Prime, use geo-blocking and geotargeting tools to deny access to content to countries or consumers in countries that have not purchased access rights (Netflix Research & Analytics Team, 2019). Geolocation is the mechanism to determine the physical location and is based on information like IP addresses, GPS and WIFI signal. Geo-blocking restricts access to digital content based on both the viewer's IP and the distributors' location (Siukkola, 2016). Siukkola (2016) explains how geo-blocking is used as a technical measure to

disable access to content outside the geographical area where the licenced content is distributed. Production houses do this as part of the licencing rights to protect the content from exploitation, or as part of the video content distribution cycle and the time-release allocated to video content access. In conjunction with a virtual private network (VPN), geographic locations block the content from being shared outside the licenced region (Siukkola, 2016).

2.6 Hypothesis 1

H1a: Ease of content availability does not increase increases levels of digital piracy.

H1b: Ease of content availability does increase levels of digital piracy.

2.7 Consumption Habits of Consumers utilising OTT Services

This study's crucial research questions were to answer whether digital video contents' increased availability impacts digital piracy and whether OTT Services drive the increase in piracy. Martínez et al.(2017) differentiate between three models for OTT business models that drive consumption: fixed payments, pay-per-view, and subscription. Showmax, a South African OTT service provider owned by the Multichoice Group, utilises a business subscription model with various options. Month-by-month tiered subscription, as a free benefit to DSTV premium customers, through vouchers purchased in local retail stores and a mobile-only offer. The subscription fee allows the subscriber access to the relevant content catalogue based on the tier paid (Showmax, 2021).

Research reflects that digital video content piracy numbers are increasing (Bartkus & Akulavicius, 2015; Doyle, 2015; Jacobs, Heuvelman, Tan & Peters, 2012; Yar, 2005). With the insatiable viewing habits of consumers looking for new digital video content, Parks Associate Research (an American research company) forecasts that legal OTT services will lose approximately $9.1 Billion to piracy and account sharing as investigated and reported in their Account Sharing and Digital Piracy Research (Sappington, 2019).

The shifts in OTT technology and digital convergence has altered consumption habits. Further technological innovation and research will be the key to understanding the relationship between digital pirates and legitimate subscribers (Aversa et al., 2019; Oberholzer-Gee, Felix. & Strumpf, 2009).

Sappington (2019) further states that a different opinion could beg whether these consumers are pirates or digital video enthusiasts looking for content wherever they may find it. The Global Online Piracy Report, a research project of the University of Amsterdam's Institute for Information Law, acknowledges that illegal consumption of digital video content affects consumer habits, affecting content providers' revenue streams (Poort et al., 2018). Smith and Telang (2012) further maintain that people will pirate content because it appears safe and easy to do.

2.7.1 The OTT Subscription Model

Traditionally, a business model is used as a tool for strategy, displaying how the business creates value, delivers it to its ideal consumer market and then takes that value in return (Zott, Amit & Massa, 2011). Digital disruptors of the subscription

business model in the OTT space, like Netflix and Hulu, knew that to build subscriber growth and increase revenues, they needed to give the consumer what they wanted. It thereby entices more consumers to become continuing, paying subscribers of the service (Rogers, 2016).

A subscription business model is where a subscription fee, either monthly or yearly, is charged to consumers, allowing the content distributor to predict some level of predictability in terms of recurring revenue streams (Afuah, 2019). As time has seen, there has been flexibility required to initially begin and develop the OTT subscription business model through the years (Aversa et al., 2019).

Wolk (2015) describes OTT as the most prominent and advanced distribution services for viewing video content. The rise of OTT services in the modern world has corresponded to consumers altering their viewing habits once realising that they do not need to own physical copies of digital content (Wolk, 2015). The growth and trends in OTT services focus on profitably delivering digital video content to their customers (Hutchins et al., 2019).

With contracts traditionally fixed annually, the rise of new OTT services, plus the improvement of bandwidth, consumers have demanded a level of flexibility to improve the competitiveness of services and in turn, allowed providers to increase their subscriber growth numbers by adapting their business model (Aversa et al., 2019; Joaquim, 2016). A subscription business model is a model where customers choose to pay the service provider and will do so if their service is easy to use, the

amount is reasonable, and it is findable (Kelly, 2008). Kevin Kelly, digital visionary, writes that anything can be copied in digital networks and is thus “abundant”.

OTT services today are driven by exponential growth; their success is reflected through an increase in paying subscribers and successful delivery of content (Aversa et al., 2019). Technology is key to delivering content; subscribers must be able to watch content effortlessly on their devices on-demand, so anywhere and at any time. With the delivery of digital video content, subscribers have expectations around the value of what they receive for their subscription fee and that the content is accessible on any of their allocated devices (Wood, 2019).

With user base growth, the need for strong anti-piracy measures follows suit.

2.7.2 Content Distribution

Pre-Covid era, movies were released using a series of staggered release windows, strategically timed across the different products and geographical markets. Most commonly, the United States first and then later in other markets, including South Africa. Studios were utilising delayed releases for a variety of operational, financial and regulatory reasons.

Studios have had to adjust to a new digital era of digital transformation as post covid revolutionises how content is consumed. Smith and Telang (2012), in early research, concluded that this window impacted legitimate sales of content and suggested releases should be done earlier. Another argument for an earlier release model, based on the idea that movie content is perishable, suggested that studios should

further optimise additional revenue channels by releasing earlier and increasing the movie's total life cycle revenues. Bai and Waldfogel (2012), Bounie et al.(2011), Danaher et al. (2010), DeVany and Walls (2007), Hennig-Thurau et al. (2007), Herz and Kiljanski (2018), Ma et al. (2014), McKenzie and Walls (2016), Rob and Waldfogel (2007), Smith and Telang (2009), and Zentner (2010) have all published studies on the relationship between piracy and video content sales (2012). Most of the literature finds evidence of sales shifts caused by video piracy.

However, internet distribution threatens the viability of movie theatres' and, to a lesser extent, pay-tv services. With faster internet releases, studios and content providers are now forced to choose between embracing internet distribution and increasing piracy (Ma et al., 2014).

Danaher et al. (2010) provides an example of NBC television removing content from the iTunes platform, which resulted in an increase in demand for NBC pirated content. When the NBC titles were restored to iTunes a year later, there was no statistically significant decrease in piracy. Danaher et al. (2013b) discovered that when ABC content was added to the Hulu platform, piracy decreased.

Digitalisation has changed the way the consumers view digital video content; with improved infrastructure and technological developments, anyone can watch movies on the go and pretty much wherever they are (De Jager, Jensen, Myburgh, Liebenberg & Stuart, 2015; Poort et al., 2018).

Global distribution is a significant revenue stream for studios, and piracy poses a threat to studios and independent content creators (Crisp, 2015). The distribution of digital video content by significant studios is based on the business distribution model of inflexible window systems and exclusivity (Hennig-Thurau, Henning, Sattler, Eggers, & Housten Thorsten, 2007). The traditional release model followed a theatrical release followed by a delayed-release to other platforms (Hennig-Thurau, et al., 2007). Furthermore, there is a lack of research directly assessing the connection between professional film distribution and piracy.

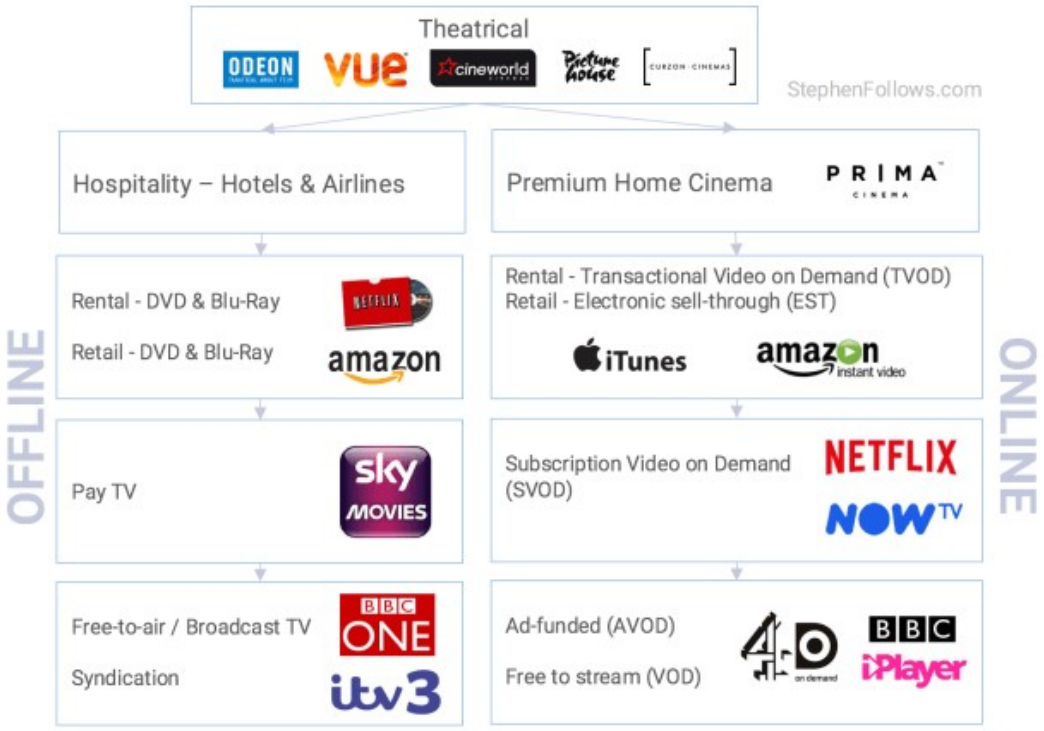

Figure 4: Traditional Content (Distribution Window)

Literature suggests that this delay could potentially be a reason for digital piracy (Castro et al., 2009; Lai, Chow, Fan & Chan, 2013). Pre-release piracy has an

impact on the content creator and distributor, as it affects the revenue stream (Ma et al., 2014).

This distribution cycle included a requirement from distributors that their movies run in theatres for a minimum time before being released to the next platform (Wozniak, 2012). Continued literature review further indicates that theatres would ideally not opt to run movies for longer than a week to stem costs (Follows, 2017; Hennig-Thurau et al., 2007; Wozniak, 2012).

These loyal consumers will readily pay for subscription services as the convenience, simplicity, and value, appeals to them, and Aversa (2019) states that to capture these consumers, OTT services should attempt to secure broad geographical access to distribute video content quickly. However, even with all this in place, consumers do experience desired video content, missing notably in some geographical locations due to licencing rights imposed by publishers. (Castro, 2010; Castro et al., 2009; Lai et al., 2013; Slive & Bernhardt, 1998). Smith and Telang (2009) suggest that releasing titles earlier, and in more geographic regions, can keep more consumers using legal channels.

A content distribution model, known as a Freemium service, offers a free subscription service mostly financed by advertising. Showmax established a free/freemium tier in order to grow its paying base and further capture the South African market (Showmax, 2021). Halmenschalerger and Waelbrock (2014) argue that freemium models have created an opportunity for OTT service providers to

reduce piracy. OTT free and paying customer segments form part of the same customer market, and the segmentation of the customers is defined by price point. As customer acquisition costs start to increase and exceed the customer lifetime value, it breaks the traditional growth model (Miric & Jeppesen, 2020; Nan et al., 2016). Free has become the number one model employed to drive more cost-effective growth (Nan et al., 2016). OTT services have low marginal costs, and with a rapidly growing digital advertising market in South Africa, Showmax is well-positioned to capture this market by offering this tier (Showmax, 2021). Halmenschaleger et al. (2014) concluded that some customers will use the free version, some customers will upgrade to the paid version and some will continue to pirate content.

2.8 Hypothesis 2

H2a: The anti-piracy tools used by OTT services have an impact on the level of digital piracy.

H2b: The anti-piracy tools used by OTT services have no impact on the level of digital piracy.

2.9 Conclusion

Literature seems to suggest that there is an expected relationship between digital video content piracy and the adverse impact that it has on OTT subscription services. An expected consequence is an anticipated change of potential customer viewing habits, negatively influenced and altered through digital piracy. The most commonly used attributes of an OTT service, as reviewed in the literature, are

identified as the organisational model (content originators, aggregators, redistributors), distribution channels (platforms), and revenue models (freemium, subscription, hybrid) (Slávik & Bednár, 2014).

Digital piracy is not a new phenomenon and will continually evolve as technology evolves.

As the entertainment industry expresses concerns over growing piracy and its cost, OTT services and their media stakeholders need to review the distribution model and examine digital pirates as competitors.

Leveraging business models in the digital space need to be resilient. They can change the piracy game by offering new consumption paradigms and striking up new content service agreements with stakeholders across the digital content spectrum. The literature reflects that the technical tools deployed by OTT services are costly to implement and affect the bottom line, notwithstanding that digital pirates are just as tech-savvy and even more resilient in counteracting these tools.

Ampere Analysis (2020), a market-leading data analysis company, states that Netflix posted the lowest piracy rates than other premium SVoD and OTT service providers because of the widespread accessibility of their service.

CHAPTER 3 RESEARCH METHODOLOGY

The previous chapter, covering the literature review, gave a contemporary perspective regarding various mechanisms being exploited to sustain digital video content piracy. The chapter further established that digital video content piracy has been around since the internet started, which reinforces the phenomenon that digital video content piracy is generally understood and thrives through OTT. The available literature around digital video content piracy in OTT streaming services is limited; the constraints are mainly focused on behaviour and the classification of an audience that consumes pirated content. The purpose of this chapter is to provide the rationale for a plausible research methodology to generalise the findings about digital video content piracy and the impact on OTT services.

3.1 Research Approach

A quantitative research approach has been used to collect original data as well as primary data sources. A structured survey, containing a combination of Likert scale and closed-ended questions, has been used to gather the information that has contributed to answering the research questions. The anonymous survey was done online through the Qualtrics survey platform, an online tool supplied by the university. The generated link was shared on various social media platforms with no distinct preference of platform. The respondents were asked to complete two preliminary questions to meet the research criteria to answer the survey, namely, whether they resided in South Africa and watched digital video content, a definition of the phrase "digital video content" was provided.

3.2 Research Design

Almeida et al. (Almeida et al., 2017) highlights that a research methodology is a tool of importance for using scientific methods when completing research. The research format used in an investigation should be viewed as a tool for answering the research question—this paper sought to explore and comprehend the variables described. The following research questions guided this study:

- Does the increased availability of digital video content have an impact on digital piracy?
- Is the increase in piracy driven by OTT services?

Quantitative research was applied as the methodology because it reinforces, quantifies and analyses the variables to get results.

The research was conducted over a time frame of three months and demonstrated multiple regression methodology. The evidence obtained allowed the effective addressing of the research problem as logically and unambiguously as possible. Data was collected using an online survey and the next paragraph highlights the justification for using quantitative research.

3.2.1 Justification of using Quantitative Research

Surveys allow information to be gathered about a given topic through the formulation of specific questions organised in a particular order. Surveys are one of the most used quantitative techniques for this reason (Almeida et al., 2017). The benefit of using a survey for the research was the high representativeness of the entire

population. Allowing the participants to remain anonymous would bring about more honesty in answering questions around digital piracy, which is illegal.

Rahman (2016) identifies several advantages of quantitative research methodology:

- Because a larger sample was chosen at random, the findings are more likely to be generalizable to a whole population or subpopulation.
- Statistical software used for data analysis is less time consuming.
- Quantitative research is based on a positivist measurement paradigm.

Quantitative research often uses deductive reasoning to seek uniformities in human lives by separating the “social world” into empirical factors called variables (Rasinger, 2013). The research method attempts to investigate the answers to questions starting with how many, how much and to what extent. Therefore, the methodology measures variables in the social world (Payne & Payne, 2004, p. 180). Positivism, which underpins quantitative research, means that person and reality are held as separate.

Weber (2004) uses a colleague, Jorgen Sandberg, to further characterise positivism by stating that objective reality exists beyond the mind; research methods are statistics and content analysis. He goes on to say that validity data accurately measures reality and that results can be reproduced; thus, the research object possesses inherent qualities that exist independently of the researcher. Bryman (2012) identifies positivism as synodical research, and knowledge is obtained from empirical testing.

In Appendix A, the online survey is provided to give the context to the questions that were posed to the respondents.

3.2.2 Conceptual framework

A conceptual diagram was developed with the research questions and the aim was to understand the different variables and their relationship. Digital Content, the independent variable, is the variable responsible for bringing about a shift in anti-piracy, identified as the dependent variable. The control variable, OTT services, demonstrates a relationship with the dependent variable.

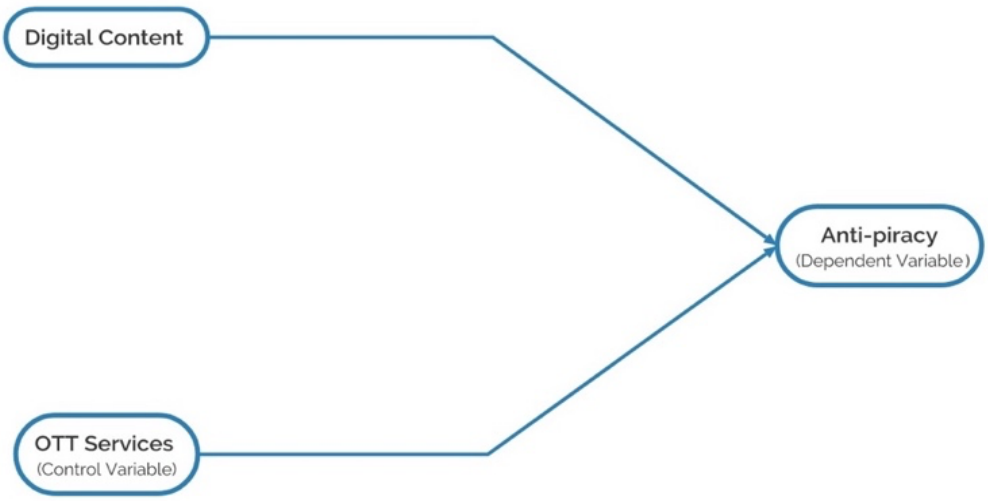

Figure 5: Conceptual Model Depicting Variables

The online survey was sent out to a sample of internet literate people, meaning those who understand and can navigate independently around the internet, via email and social media platforms, comprising the various demographics.

The survey was broken up into various sections and various digital content piracy areas to address the research areas. The research design was supported by a robust data collection methodology, as discussed in the following section.

3.3 Data Collection Methodology

This research around digital video piracy used social media platforms such as LinkedIn, Facebook, Twitter and WhatsApp groups. Social media platforms are favourable due to the current COVID-19 pandemic with strict social distancing rules that might be challenging to observe. Data collection methods remained constant in the degree of structure, significance, obtrusiveness, and objectivity of the research connected with digital piracy. However, the questionnaire was structured to preserve the participants' privacy and not be intrusive. The research instrument for collecting data was a questionnaire sent out to several recipients to allow the collection of responses that assisted in the research. The research data was analysed using mathematical and statistical methods.

3.4 Population and Sample

3.4.1 Population

Ponto (2015, p. 2) refers to the population as the total of all members that match a specific set of provisions. In this research, the target population was South Africans who are internet literate and comfortable with navigating through the internet with confidence. This prerequisite determined the value measured in this identified

sample of South Africans that demonstrate characteristics similar to the population of interest. What was proposed was to generalise the findings from a limited sample of 200 (or more) and use that to deduce South Africans' behaviour in general.

3.4.2 Sample and sampling method

The sample used a random range of anonymous participants from the identified population of internet literate South Africans. The characteristics of the sample requested in the survey covered age, gender, job status, education and household income defined over a range of values. These values ruled out any pre-defined perception of a person who watched illegal content on pirate platforms or through illicit means.

Considering the various angles, the feasibility of using this type of random sampling allowed the researcher to uncover certain population features. The independent variable of content directly influences digital piracy, the dependant variable, in that it either increases or decreases piracy. The control variable was the OTT service, which remained constant and was an unchanging standard of comparison in this research.

3.5 The Research Instrument

The research instrument was used to collect and analyse the data to reinforce the conceptual framework and how the research variables connect. The research instrument used in this research was an online survey administered through a survey platform known as Qualtrics, which allowed the questions to be composed in a

format conducive to the study. The survey consisted of 25 questions and was separated into sections as follows:

- Demographics
- OTT Services used

It continued with the following question sets that were constructed as a six-point Likert scaled set from strongly agree to strongly disagree.

- Digital video content distribution models
- Subscriber growth and distribution models
- Anti-piracy tools used by OTT service providers.

The research instrument deliberately gathered data to test the following hypotheses :

- Hypothesis 1
    - H1a: Content availability does not increase the levels of digital piracy.
    - H1b: Content availability does increase the levels of digital piracy.
- Hypothesis 2
    - H2a: The anti-piracy tools used by OTT services have an impact on the level of digital piracy.
    - H2b: The anti-piracy tools used by OTT services have no impact on the level of digital piracy.

These hypotheses allowed the research to answer the research questions, namely:

- Does the availability of digital video content have an impact on digital piracy?
- Is the increase in piracy driven by OTT services?

3.6 Procedure for Data Collection

The survey was published online and offered to internet literate respondents who could navigate the internet and social media platforms with ease. The survey was compiled in Qualtrics, a survey tool supplied by the University. The survey link was shared through various platforms, as described above. The survey included an introduction describing who the researcher was, guaranteeing anonymity and the process as to how the survey was to be completed. There were minimal to no risks to completing the survey as no personal, identifying questions were asked other than age, gender, job status, education and household income. The data was confidential and was not shared with any third party. There was no compensation offered for completing the survey. The researcher's details were listed at the bottom of the introductory page for any clarification that was required concerning the survey.

3.7 Data Analysis and Interpretation

Data analysis was started by scanning the questions and then reviewing the survey responses, with the individual variables assessed first. Muijas (2019) points out that there are various benefits to looking at individual variables before looking for the relationships between variables, such as looking for any data input errors or values that could be out of the prescribed range.

The shared online survey received two hundred and sixty responses; only 217 were used as the base for computing the results. Forty-two surveys were discarded from the analysis because of missing data or not completed. Two qualifying questions were asked to ensure that participants were based in South Africa and watched digital video content in some format. The two qualifying questions were stated as:

- Do you watch Digital Video Content? (Movies/TV Series)?
- Do you live in South Africa?

The two qualifying questions were asked of the respondents as the research was to understand the impact that digital video content piracy has on OTT service providers in South Africa.

The data analysis was used to summarise, describe, and characterise the sample data used in the research. The graphics analysis explained what the data had shown. The statistical significance demonstrated the likelihood that the relationship between the independent and dependent variables was not caused by chance.

3.8 Limitations of the Study

The main limitation of this study was seen to be that quantitative questionnaires were rigid which left no room for participants to explain the reasoning behind their answers. However, this was compensated for by including one qualitative question giving respondents time to reflect on their choices. Respondents were encouraged to answer this particular question and this did not show any impact on the research validity and reliability as discussed in the following section. The other significant limitation was that of the time allocated to the research. Availability and economic

factors can impact content availability and would have to be researched more systematically to provide more insights.

3.9 Reliability and Validity of the Constructs

In research, reliability and validity address matters relating to the error and measurement of the research instruments (Clow & James, 2014). Reliability and validity refer to the respondents' perception and comprehension of questions as intended by the researcher as well as the researcher's understanding of the answers provided by the respondent as intended by the respondent (Saunders et al., 2019).

3.9.1 Reliability

The reliability test was performed to test the internal consistency of measures. The degree to which an instrument measures the same way each time it is used under the same conditions with the same subjects is referred to as its reliability. (Rochford & Borchert, 2011). Cronbach's alpha is the most used test to determine the internal consistency of an instrument. The cut-off value for Cronbach's alpha is 0.7(Malhotra, & Birks, 2017). According to the results in Table 11, the Cronbach's alpha above 0.7 for digital content (0.825), OTT (0.766), and anti-piracy (0.819) and indicate that all the selected items measuring these constructs, respectively, are internally consistent in their measurement.

3.9.2 Validity

Validity is defined as the extent to which a concept is correctly measured (Heale & Twycross, 2015); this means that all items used to measure a concept (construct)

must be measured in the same direction. In the column ‘'Corrected Item-Total Correlation," the convergent validity is assessed. The value of items in this column was expected to be greater than 0.3 (Pallant, 2010), indicating an appropriate contribution of at least 30 percent. Looking at the results, all items have at least 30percent contribution to the formation of the constructs respectively.

Table 3: Reliability and Validity Assessment

Constructs	Items	Corrected Item-Total Correlation	Cronbach's Alpha	Number of Items
Digital content	DC1	0.582	0.825	5
	DC2	0.561		
	DC3	0.657		
	DC4	0.648		
	DC5	0.644		
OTT Services	OTT1	0.470	0.766	5
	OTT2	0.457		
	OTT3	0.559		
	OTT4	0.622		
	OTT5	0.561		
Anti-piracy	AP1	0.504	0.819	5
	AP2	0.698		
	AP3	0.713		
	AP4	0.705		
	AP5	0.465		

The relationship between the dependent and independent variables was demonstrated through standard linear regression analysis. The test was conducted to evaluate the impact of the predictor (digital content and OTT services) on the dependent (anti-piracy) variable considering the effect of the control variable, OTT services. The test was conducted because the dependent variable (anti-piracy) of

the model was continuous (Pallant, 2010). Two assumptions were considered before conducting the test, namely, using the normality assessment and multicollinearity.

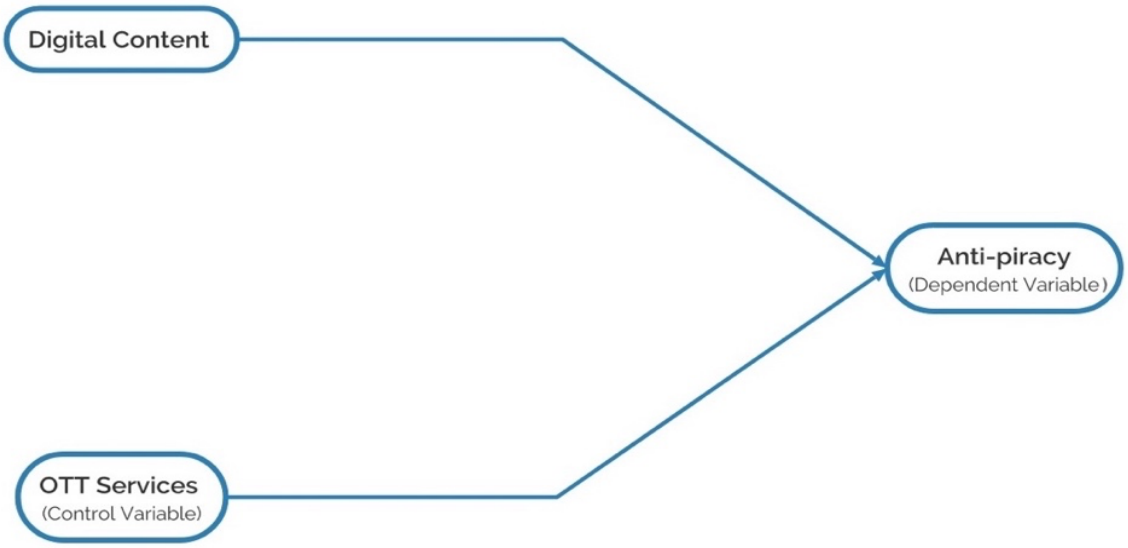

Figure 6: Conceptual Model Used to Demonstrate the Relationship Between the Independent, Dependent and Control Variables

A normality test was conducted to appraise the normal distribution of the data while a multicollinearity assessment was undertaken to assess the discriminant validity of the independent variables (OTT services and digital content).

The model was assessed in two parts. These were to determine the impact of digital content availability on piracy and the impact of OTT services as a control variable. The validity of the model was assessed through a model summary (R squared) and the ANOVA test.

The R-squared is used as a statistical measure of how close the data is to the fitted regression line. It is also known as the coefficient of determination, or the coefficient

of multiple determination for multiple regression. To calculate the total variance, the average actual value was subtracted from each of the actual values, results squared and summed. The first sum of errors was divided (explained variance) by the second sum (total variance), then the result from the first value were subtracted, which gives R-squared.

3.10 Demographic Profile of Respondents

The survey allowed the respondents to remain anonymous, and there was minimal to no risks to completing the survey. The survey requested no personal or identifying questions, and only the following details were requested: age, gender and household income. The data is confidential and was not shared with any third party.

3.11 Ethics

Quantitative research includes formalised principles that form the basis for the research process, from the formulation of the research questions to analysing the data. Ethics tell us how people ought to act in situations in which they find themselves, and being ethical does not translate to a particular religion or following the law (Markkula Center for Applied Ethics, 2021). Kaiser (2019) suggests that those who are entrusted with research are *"obliged to act with academic, methodological and ethical credibility"*.

The research methodology utilised in this research applied the ethical research requirements for digital video content piracy from a conceptual framework. No commercial or recognised digital video content pirates were interviewed or

considered in the research. The research requirements and research methodology on this topic required an in-depth understanding of the ethical boundaries and constraints of digital video content piracy. Piracy is often equated to theft; however, the difference between standard theft and digital piracy is a little more nuanced. The main difference with stealing and piracy is that the pirate is actually replicating the product instead of acquiring it from a third party.

The ethical considerations were reviewed regarding the researchers' previous employment with an OTT service, ensuring confidentiality at all times. The research has adhered to those conditions of confidentiality, and all sourced and utilised data had been granted permission to be used or published. The researchers' company provided a letter of authorisation in this regard.

Ethical approval was obtained from the University of the Witwatersrand to conduct the research. The research aimed to avoid any bias, always respected intellectual property, and has acknowledged the contributions to the research provided by others.

CHAPTER 4 RESULTS PRESENTATION

4.1 Introduction

Chapter 3 gave a comprehensive overview of the research methodology chosen to determine the correlation between two hypothesises and their corresponding null hypotheses. This chapter aims to present the results, as they are used to support the statistical analysis discussed in Chapter 5. The next section introduces the findings pertaining to the hypothesises under scrutiny.

The total number of respondents who completed the Qualtrics Survey was 259. The data was first screened on Microsoft Excel to identify respondents with many missing answers. The data was imported into SPSS version 26 to screen it by running the descriptive analysis to identify missing values further. The results identified respondents who did not live in South Africa and who did not watch digital videos. These respondents (both for missing answers and those who do not meet the screening questions) counted to 42 and were deleted. Therefore, the remaining number of respondents was 217.

The screening questions were presented in the table to ensure that the respondents were based in South Africa and made use of OTT services.

Table 4: Qualifying Questions to complete Survey

Do you watch digital video content (movies / TV- series)		
	Frequency	Valid percent
Yes	216	99.54
Missing value	1	0.46
Total	**217**	100
Do you live in South Africa?		
	Frequency	Valid percent
Yes	214	98.6
Missing value	3	1.4
Total	**217**	100

4.2 Digital Piracy Perspective

The aim of the study was to unpack the nature of digital video content piracy in the South African context. Two hundred and seventeen respondents fully answered the set of questions below in order to determine inherent digital piracy, Table 5 shows the digital video content question matrix and the corresponding number of respondents.

Table 5: Digital Piracy Perspective Matrix

	DSTV Now	Show-max	Netflix	Amazon Prime	You-tube	Other	No Sub-scription	**TOTAL**
1. For which OTT service provider do you have a paid subscription?	95	95	174	31	28	15	14	**266**

	Smart TV	Social Media	Media Box Player	Mobile Device	Personal Computer	**TOTAL**
2. How do you stream or watch digital video content?	132	61	55	129	152	**529**

Question 1 in Table 5 above reflects that respondents have a paid subscription for more than one service, and the majority of respondents have a Netflix subscription, with a small number of respondents having no paid subscription to any OTT service provider and therefore removed.

Question 2 reflects that respondents view digital video content through various devices and are not limited to viewing it through one device only.

To stream OTT, customers need to have a compatible hardware device and internet connection. Devices would include smartphones, tablets, desktops and laptops. Gaming devices, such as PlayStation and Xbox, allow content to be streamed

through OTT apps loaded on the consoles. Media sticks like Chromecast, Firestick and media boxes have the capability to load OTT apps to allow streaming. Technology has evolved and televisions are called smart when they allow an internet connection and host the OTT apps in which content can be streamed. So while you can stream OTT content through mobile and desktop devices, they are not considered true OTT devices.

The questions were asked to establish whether the respondents had access to digital video content and whether they could view digital video content through a paid subscription.

4.3 Central Tendency Measure

Central tendency measures were used to analyse each concept involved in the study (digital video content, OTT, and piracy). A six-point Likert scale was used where the value 1 corresponded to “Strongly disagree” and the value 6 corresponded to “Strongly agree” were applied. The mean point of a six-point Likert scale is 3 (6/2), mean scores below 3.4 indicate that most respondents tend to disagree with statements, while mean scores equal and above 3.5 suggest that most respondents agree with the construct.

4.4 The Impact the Availability of Content has on Piracy

Table 6 shows the matrix of the actual questions for digital video content and the number of respondents (217) who completed the question set. According to the overall Mean (M=3.97) and Standard Deviation (std. Dev. = 1.23) results indicated in

Table 3, the majority of the respondents tend to agree with the statements measuring digital content.

Table 6: Digital Video Content Perspective

Digital Video Content				Number of Respondents					
Construct	**Mean**	**Median**	**Standard Deviation**	**1(SD)**	**2(D)**	**3(SD)**	**49SA)**	**5(A)**	**6(SA)**
Overall results	3.97	4.00	1.23						
If legitimate versions of movies/tv series are not available in my country, I am more likely to stream pirated digital video content (DC1)	4.24	4.23	1.64	29	8	17	58	47	58
				13.4%	3.7%	7.8%	26.7%	21.7%	26.7%
Content I am interested in watching is usually not available in my geographical location (DC2)	3.36	3.36	1.69	46	28	37	46	31	29
				21.2%	12.9%	17.1%	21.2%	14.3%	13.4%
New content takes too long to appear on an OTT service	4.12	5.00	1.52	19	18	30	41	69	40
				8.8%	8.3%	13.8%	18.9%	31.8%	18.4%

platform (DC3)									
If the content is not available in my country, I am more likely to pirate it (DC4)	3.95	4.00	1.69	37	12	13	57	57	41
				17.1%	5.5%	6.0%	26.3%	26.3%	18.9%
The waiting time for content to be distributed via legal channels is too long (DC5)	4.16	4.00	1.47	13	21	34	44	61	44
				6.0%	9.7%	15.7%	20.3%	28.1%	20.3%

This set of questions directly accentuated the null hypothesis that content availability does not increase digital piracy levels and its alternate hypothesis that content availability increases digital video content piracy levels.

The following section discusses the questions pertaining to the secondary hypothesis.

4.5 OTT and the Impact of Piracy through Anti-piracy Tools

As the study has stated previously, OTT services, like Showmax, Netflix, YouTube Premium and Amazon Prime contribute to the large and growing digital video content industry and the economy in various ways. To stop digital piracy, content owners, creators, and distributors have implemented specific controls to prohibit the practice of illegally copying and sharing digital files.

These controls all fall under the category of anti-piracy and for the context of this research applied by OTT service providers. The questions for the construct of OTT services, as the control variable, were to determine how the respondents responded to the availability of digital video content offered by OTT services and whether this would impact piracy. As the majority respondents indicated that they had a paid subscription to an OTT service and some respondents more than one subscription, the availability of content was presumed to be there. The results (mean =4.26) in Table 7 below indicate that the majority of the respondents tend to agree with the questions around OTT service providers.

Table 7: OTT Services with a Number of Respondents Reflected as Frequency and Percentage

OTT Services				**Number of Respondents**					
Construct	Mean	Median	Standard Deviation	1(SD)	2(D)	3(SD)	4(SA)	5(A)	6(SA)
Overall results	4.26	4.26	1.04						
Content is to spread out across different OTT services (OTT1)	4.27	5.00	1.37	12	9	40	45	70	41
				5.5%	4.1%	18.4%	20.7%	32.3%	18.9%
It is too expensive to legally consume all the content I desire through OTT services (OTT2)	3.96	4.00	1.61	24	24	25	49	53	42
				11.1%	11.1%	11.5%	22.6%	24.4%	19.4%
I would rather watch content instantly than wait for it to appear on an OTT service provider (OTT3)	3.90	4.00	1.63	26	25	27	46	52	41
				12.0%	11.5%	12.4%	21.2%	24.0%	18.9%
I would subscribe to an OTT service if new release	4.55	5.00	1.37	7	14	28	35	70	63

digital video content was made available were immediately **(OTT4)**				3.2%	6.5%	12.9%	16.1%	32.3%	29.0%
I would pay for a subscription to an OTT service provider if new digital video content was immediately available (OTT5)	4.63	5.00	1.30	8	8	23	41	74	63
				3.7%	3.7%	10.6%	18.9%	34.1%	29.0%

The construct on anti-piracy encompasses the efforts made by OTT service providers to stop piracy and to increase their subscriber numbers; therefore, increasing their turnover. The respondents were asked five questions to reveal their understanding of piracy and, in turn, whether OTT services impacted the levels of piracy utilising anti-piracy tools. The mean score of 3.83 shows that the majority of the respondents tend to agree with the statements measuring anti-piracy tools and piracy.

Table 8: Piracy Number of Respondents Reflected as Frequency and Percentage

Anti-piracy / Piracy				**Number of Respondents**					
Construct	**Mean**	**Median**	**Standard Deviation**	**1(SD)**	**2(D)**	**3(SD)**	**4(SA)**	**5(A)**	**6(SA)**
Overall results	3.83	4.00	1.22						
It is easy to pirate digital video content (AP1)	4.02	4.00	1.55	20	19	39	39	59	41
				9.2%	8.8%	18.0%	18.0%	27.2%	18.9%
If I wanted, I could easily bypass anti-piracy tools to stream pirated digital video content (AP2)	3.69	4.00	1.68	37	17	42	34	54	33
				17.1%	7.8%	19.4%	15.7%	24.9%	15.2%

Downloading movies from the internet free is easy (AP3).	4.29	5.00	1.59	19	15	30	33	59	61
				8.8%	6.9%	13.8%	15.2%	27.2%	28.1%
Using tools like uTorrent and LimeWire is easy for me (AP4)	3.89	4.00	1.72	32	19	36	33	48	49
				14.7%	8.8%	16.6%	15.2%	22.1%	22.6%
It is easy to screen grab digital content while watching on an OTT service provider platform (AP5)	3.25	3.00	1.44	33	29	66	44	30	15
				15.2%	13.4%	30.4%	20.3%	13.8%	6.9%

Both sets of questions in Tables 7 and 8 directly accentuate the null hypothesis that anti-piracy tools used by OTT services impact the levels of digital piracy and its alternate hypothesis that anti-piracy tools have no impact on the levels of digital piracy.

4.6 Standard Linear Regression Analysis

The standard linear regression is used to describe data and to explain the relationship between one dependent variable and two or more independent variables (Schinka et al., 2013). The test was conducted to evaluate the impact of predictor (digital content and OTT) variable on the dependent (Anti-piracy) variable, considering the effect of the control variable OTT. The test was conducted because the dependent variable (Anti-piracy) of the model is continuous (Pallant, 2010). Two assumptions were considered before conducting the test; these are normality (Table 9), and multicollinearity (Table 10). Both of these assumptions is discussed fully.

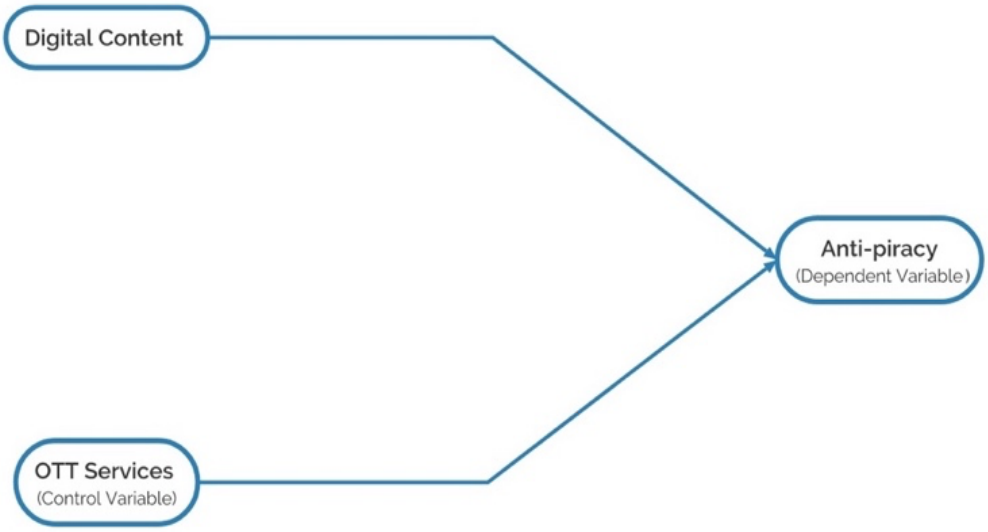

Figure 7: Conceptual Model

4.7 Normality Assessment

To assess the data's normal distribution, a normality test was performed. According to Kline (2015), the “skewness and kurtosis values of the indicators should be less than 3 and 10, respectively.” The results in Table 9 show that the assumption of univariate normality was met because the skewness and kurtosis values are within the range recommended by Kline (2015).

Table 9: Normality Assessment

	Skewness	**Kurtosis**
Digital content	-0.241	-0.635
OTT	-0.393	0.026
Anti-piracy /piracy	-0.237	-0.749

4.8 Assumption of Multicollinearity

To assess the discriminant validity of the independent variables, multicollinearity was assessed (OTT and digital content). The Tolerance and Variance Inflation Factor are examined in the test (VIF). The Tolerance value is expected to be greater than 0.1, and the VIF value is expected to be less than 10. (Pallant, 2010). The results in Table 10 show that there is no multicollinearity in the data because the Tolerance and VIF are both above the required thresholds.

Table 10: Collinearity Statistics

	Tolerance	**VIF**
OTT	0.597	1.675
Digital content	0.597	1.675

4.9 Model Evaluation

The model was assessed in two parts, (1) to assess the impact of digital content on anti-piracy, (2) the impact of OTT as a control variable. The validity of the model is assessed through model summary (R squared) and Anova (Table 8).

The results on Table 11 and Table 12 below show that the model predicting anti-piracy is statistically significant (F = 73.835; $P < 0.001$: 0.000) and explains 25.6 percent (R^2= 0.256) of the variance of antipiracy.

Table 11: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.506[a]	0.256	0.252	1.05651
a. Predictors: (Constant), Digital Content b. Dependent Variable: Anti-piracy/piracy				

Table 12: ANOVA

Model		Sum of Squares	df	Mean Square	F	P value
1	Regression	82.416	1	82.416	73.835	.000[b]
	Residual	239.985	215	1.116		
	Total	322.401	216			
a. Dependent Variable: Anti-piracy/piracy						
b. Predictors: (Constant), Digital Content						

The results indicate that both digital content and OTT explains up to 28.7 percent of the variance of anti-piracy (Table 13).

4.10 Model Summary

Table 13: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
OTT, and Digital content 2	.535	0.287	0.280	1.03670
a. Predictors: (Constant), OTT, Digital Content c. Dependent Variable: Anti-piracy				

Table 14: ANOVA

Model		Sum of Squares	df	Mean Square	F	P value
OTT, and Digital content 2	Regression	92.406	2	46.203	42.990	.000
	Residual	229.994	214	1.075		
	Total	322.401	216			
a. Predictors: (Constant), OTT, Digital Content						

4.11 Conclusion

The conceptual model demonstrates that the impact of digital video content availability on piracy is more (β= 0.506) than the interference of OTT services (β= 0.228).

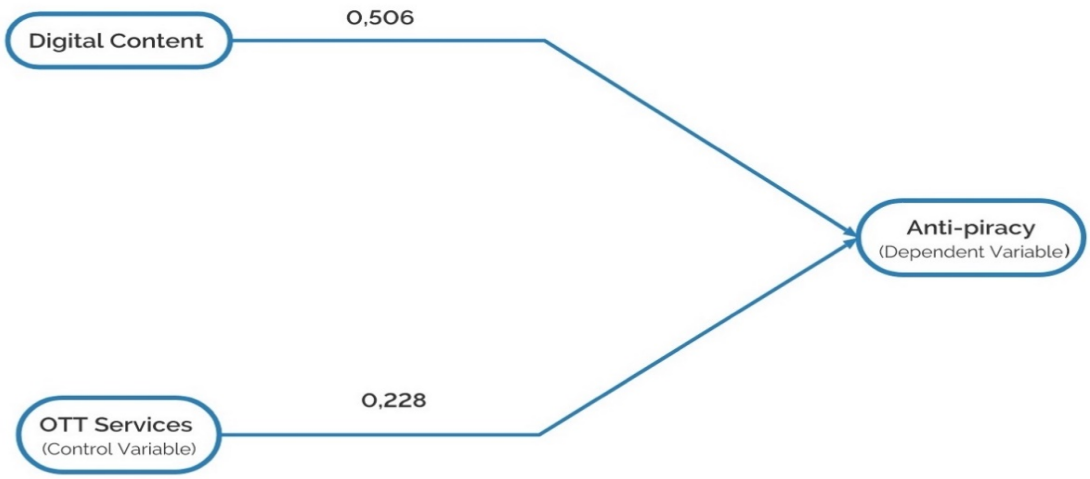

Figure 8: Conceptual Model Reflecting the Impact of Digital Video Content Availability on Piracy

The conceptual model demonstrates that the impact of digital video content availability on piracy is more (β= 0.506) than the interference of OTT services (β= 0.228).

The dependent variable of antipiracy was significantly influenced by the independent variable, digital video content and the control variable of OTT services. Therefore, it is assumed that one might vary the change in piracy by changing the two variables significantly or influencing them indirectly.

Using a standardised beta coefficient to compare the strength of the independent variable's effect on the dependent variable demonstrates that the high absolute value of the beta coefficient reflects the more significant impact.

Table 15: Standardised Coefficients

Model		Beta	t	P-value
1	(Constant)		7.513	0.000
	Content	0.506	8.593	0.000
a. Dependent Variable: Anti-piracy /Piracy				

Table 16 further demonstrates that the strength of digital content available on piracy drops in the presence of OTT services, as digital content has more (β= 0.506) impact on antipiracy when OTT is excluded. Still, when OTT is included, the impact decreased to (β= 0.361), shown in Table 16.

Therefore, it is concluded that 20.5 percent of the variance accounted for by OTT overlaps (controls) with the variance accounted for digital content. Hence the necessity to control the influence of OTT when testing the impact of digital content on anti-piracy.

Table 16: Standardised Coefficients

Model		**Beta**	**T value**	**P-value**
2	(Constant)		4.182	0.000
	OTT	0.228	3.049	0.003
	Digital content	0.361	4.832	0.000
a. Dependent Variable: anti-piracy				

Based on the above results, it can be established that the availability of digital video content drives piracy, and that OTT services do have an influence on digital piracy and anti-piracy implementation.

CHAPTER 5 DISCUSSION OF THE FINDINGS

The previous chapter outlined the study findings. In this chapter, a discussion around the findings is presented. The results are discussed with reference to theory and existing literature around digital video content piracy and OTT services. The discussion is based on quantitative findings based on the research questions below:

- Does the availability of digital video content have an impact on digital piracy?
- Is the increase in piracy driven by OTT services?

A hypothesis is a specific restatement and clarification of the research question, an explanation that accounts for a set of facts and is tested by additional research. A hypothesis is a statement conveying the relationship between variables, usually two or more (Mourougan & Sethuraman, 2017). The hypotheses were tested using the p Value. To assess the statistically significant impacts, we looked at the p value below 0.05; any p value above 0.05 shows a non-statistically significant impact. The Beta value is used to identify the strength of the impact. The chapter contains further discussion and reaffirms the conclusions regarding the hypotheses.

- Hypothesis 1

  - H1a: Content availability does not increase the levels of digital piracy.
  - H1b: Content availability does increase the levels of digital piracy.

- Hypothesis 2

- H2a: The anti-piracy tools used by OTT services have an impact on the level of digital piracy.
- H2b: The anti-piracy tools used by OTT services have no impact on the level of digital piracy.

The analysis presents the following outputs: descriptive statistics (demographics of the respondents) and central tendency measures, reliability, normality, and multicollinearity test. Standard multiple regression was the main statistical method used to test the direction and the strength of relationships between the variables of interest.

5.1 Demographic Profile of the Respondents

This section provides information about the respondents' demographics. The demographic profile of the respondents was primarily described using frequency tables.

Table 17 and Figure 9 indicate that most respondents (35.9 percent) were between the ages of 35 and 45 years.

Table 17: Age of the Respondents

	Frequency	**Per cent**
18 ≤ 25. i.e. up to 24 years 11 months	7	3.2
25 ≤ 35. i.e. up to 34 years 11 months	46	21.2

35 ≤ 45. i.e. up to 44 years 11 months	78	35,9
45 < 55. i.e. up to 55 years 11 months	63	29
55 and upwards	23	10.6
Total	**217**	**100**

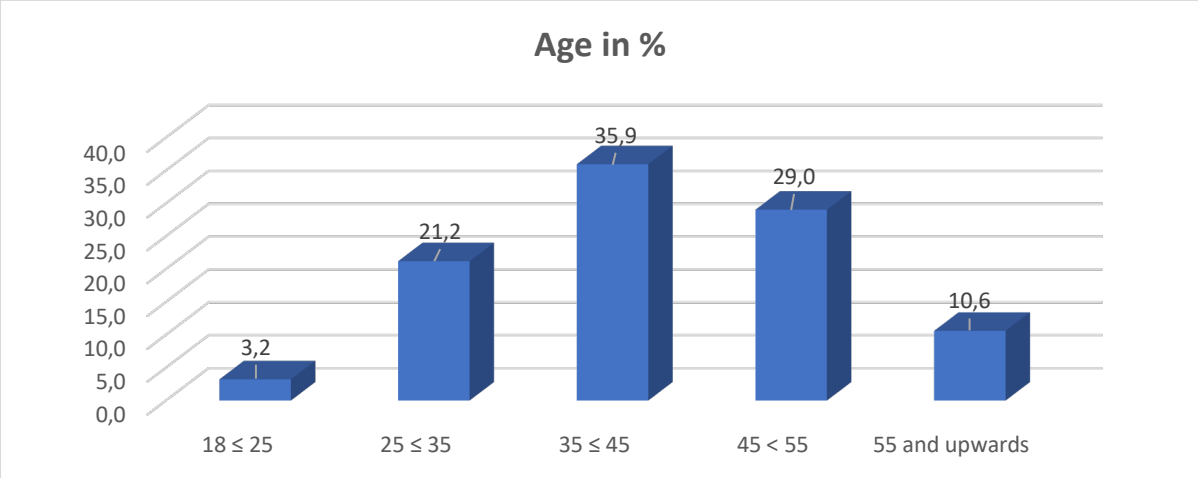

Figure 9: Age of the Respondents in Percentage

Even when gender is considered, research suggests that it is not conclusive that gender alone determines levels of piracy. Morris, Johnson and Higgins' (2009) study that examined gender and predictability of willingness to participate in digital piracy, found that other factors like an association with pirating peers, gender was not significant. Table 18 and Figure 10 show that the majority of the respondents (60,3) who participated in the study are female.

Table 18: Gender of the Respondents

	Frequency	**Per cent**

Male	86	39.6
Female	131	60.3
Total	**217**	**100**

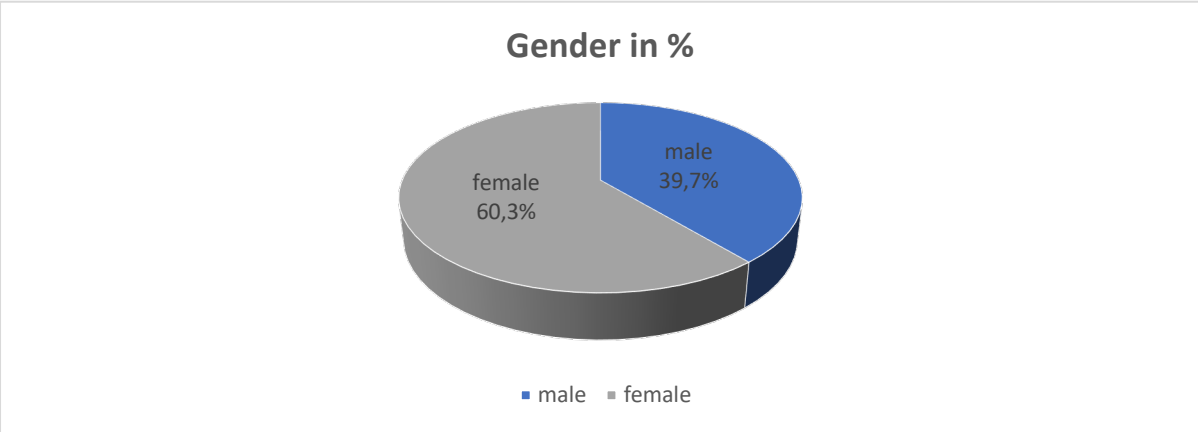

Figure 10: Gender of the Respondents in Percentage

According to the results in Table 19 and Figure 11, most of the respondents (79,3) were employed full-time.

Table 19: Job Status of Respondents

	Frequency	**Per-cent**
Employed full-time	172	79.3
Employed part-time	16	7.4
Unemployed	13	6
Student	5	2.3
Retired	11	5.1
Total	**217**	**100**

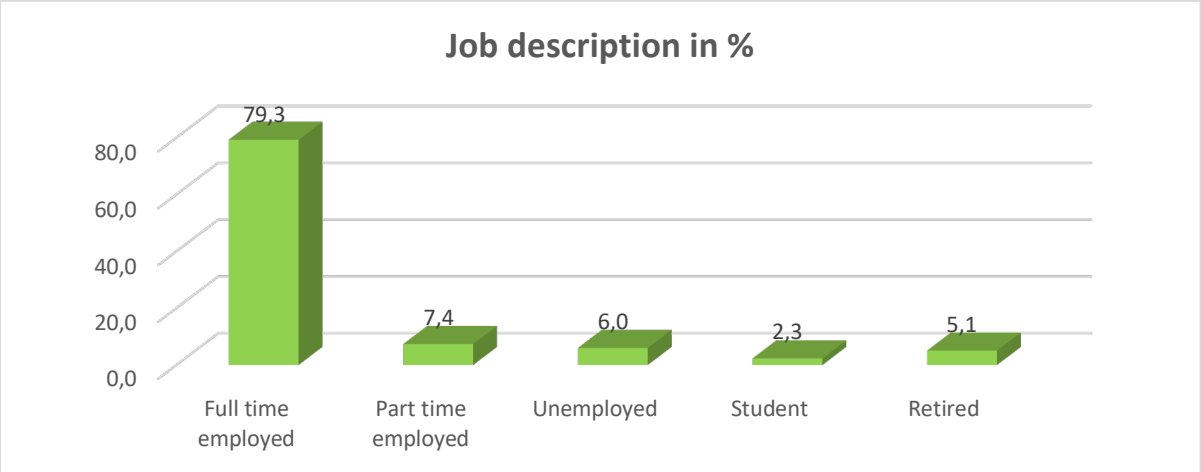

Figure 11: Job Status of Respondents in Percentage

5.2 Content Availability and the Impact on Digital Piracy

One of the study's aims was to research if the availability of digital video content impacted piracy levels. The first hypothesis was that there was a positive, significant association between digital piracy and content availability. In this study, the literature defines a digital pirate as a person who distributes and streams digital content illegally and digital piracy is defined as the illegal copying, downloading or purchasing of copyrighted files without the copyright holder's explicit permission (Belleville, 2012; Gopal & Sanders, 1998; Tunca & Wu, 2013).

The study identifies themes associated with content availability and the impact on digital piracy and correlates the themes identified with the research question and hypotheses.

Watson et al. (2015) explored the underlining determinates for a person's decision to acquire content legally or illegally, while Fleming (2016) further explored this

question through laboratory experiments. However, Smith et al. (2017) explore the effectiveness of strategies used by rightsholders for content availability.

The effect of piracy because of content availability looks at the distribution or windowing model; pre-Covid movies were released to the various media distributors over several months, strategically timed across the geographical markets. Smith and Telang (2012) concluded that this window impacted legitimate sales of content and suggested that movies and tv series be released earlier, simultaneously. Prior studies noted the importance of the studio business model where contacts highlight theatrical distribution first. Castro et al. (2009) highlight the studio release business model's issue and the limited release rights attached to the movie, suggesting that consumers are driven to piracy because the licencing rights are only available in certain countries. The studios secure these content rights to tv series. Castro (2009) draws the same conclusion and argues that if content producers and distributors provided legal and affordable digital video content access, piracy levels could be lowered.

One interesting finding is that, specifically, American and British television series are popular globally. Still, with the licencing and distribution rights restricted for broader distribution, these series are not available immediately for fans, this is frustrating, and they are then driven to consume pirated versions (Castro et al., 2009). Another important finding by Smith and Telang (2017) is that release rights are attributed across all media types, and a delayed-release model correlates to piracy levels.

The research recognises that strategies of rightsholders from the media industry influence the supply side of content. Danaher (2020) proposes that the coinciding blocking of sites and the shutdown of large piracy sites can reduce piracy levels and increase consumption. Sudler (2013) has a similar argument where he proposes that supply chain ecosystems can evolve, maximising revenues in the presence of measured piracy.

However, the world is changing, and release windows are under pressure from interconnected global markets, and behaviour changes will reshape the customer journey and the entertainment industry business models. The Covid pandemic has accelerated digital transformation, and the impact has forced the entertainment industry to adjust while experiencing crippling revenue loss (Hantrais et al., 2021; Soto-Acosta, 2020).

OTT service providers adjust their localisation strategy with current limited content availability, by ensuring they launch in new markets as quickly as possible. Streaming is slowly replacing linear television, pushing pay-tv services like Multichoice to adapt and rethink content distribution. Using their streaming service, Showmax, they strengthened their OTT catalogue by capitalising on the partnerships Multichoice has with studios globally and securing rights to more international content (Moyo, 2019; MultiChoice Investor Relations, 2019). This reaffirms Sudler's (2013) viewpoint that supply chain systems evolve to minimise the impact of piracy. The findings indicate that the entertainment industry has had to move into the era of digital transformation faster than anticipated.

The literature reflects a distinct ideology that availability of content, pricing structures and co-operation within the entertainment industry can limit piracy. As the industry evolves and the dynamics of consumption change, piracy's economic harm can be reduced by prioritising the availability of content (Cunningham & Scarlata, 2020; Moyo, 2019; Netflix Research & Analytics Team, 2019; Thomson, 2020).

Danaher and Waldfogel (2012) and Smith et al. (2017) validate that improving the availability of content as well as shortening release schedules will have an impact and decrease piracy levels. According to Table 20 below, this study found that digital content availability had a positive (β= 0.506) and statistically significant (P= 0.000) impact on piracy, thus contributing to the research reflecting that the availability of content impacts piracy. Using standardised beta coefficient compared the strength of the independent variable's effect to the dependent variable, demonstrating that the high absolute value of the beta coefficient reflects the stronger effect.

Therefore, H1 is accepted.

Table 20: Standardised Coefficient

Model		Beta	t	P value
1	(Constant)		7.513	0.000
	Content	0.506	8.593	0.000
a. Dependent Variable: Anti-Piracy / Piracy				

5.3 Anti-piracy, Digital Video Content and the control by OTT services

Various anti-piracy interventions are employed by OTT services to prevent piracy; these tools and methodologies come at a cost and impact revenue streams. Offering digital content in a convenient manner through accessible means can convert a number of digital pirates to legal consumption while still utilising anti-piracy tools. (Cunningham & Scarlata, 2020; Brett Danaher et al., 2013, pp. 385–406; Granados & Mooney, 2018).

The study looks at some of the tools and methodologies implemented by the media industry to curb digital piracy, according to this study's results, OTT services has a positive (β= 0.228) and significant (P= 0.003) impact on anti-piracy.

Digital rights management or DRM protection are tools and processes outlined by Dingledy et al. (2019), Gaber (2013) and Ogren (2009) as copy protection implemented through encryption. Encryption encodes digital content so that it can only be read by devices or software that have a specific key to unlock it. Control limits are a type of permission management. Software licenses and keys are examples, as are user authentication, IP authentication protocols, geo-blocking, and designing products to work on specialised hardware or software. Zhang (2018) examined the removal of digital rights management (DRM) protection from one of a major music label's catalogues and discovered some controversy surrounding the use of DRM management. According to the findings of the study, the increased appeal of DRM-free content persuaded some pirates to purchase legally. According

to Lipton (2005), if DRM was regulated, it is possible to balance the industry (content owners) and fair use for end-users. However, this does pose a dilemma as the industry is profit-motivated and would impact revenue generation.

Digital watermarking is when identifiable data is embedded in content; although invisible and inaudible to humans, it is quickly recognised by content systems. Castro et al. (2009) list several reasons for the use of watermarks by the industry. Watermarks are embedded in theatrical releases of movies by studios so that if a person records the video with a camcorder and distributes it, the studio can still recognize the watermark and identify the source of the recording. The digital capture of digital video content by pirates streaming illegally, using screen grabbing software or attempting to capture the content from an HDMI signal allows watermarking to be detected as the content is close to the state in which it was watermarked. Watermarking is used in conjunction with DRM on optical media to prevent unauthorised copying (Lotspiech, 2006). Watermarks are challenging to remove, even when content is altered by pirate sites, and is an essential feature of anti-piracy methodologies.

OTT service providers offer subscribers the opportunity to connect and stream digital content through more than one device. Showmax, for example, will issue the primary account holder with credentials to access the service and then allow users in the same household to connect and stream simultaneously with these same credentials. The users then can create user profiles for themselves and watch the content that they choose. Unauthorised credential sharing is when a subscriber shares these

credentials with a person outside of the household, or the subscriber account is compromised. While password sharing was initially seen as an opportunity to entice illegal viewers to sign up for the OTT service, service providers like Showmax, Netflix, Amazon Prime, and others have come to realise that credential sharing is an issue (Fink, 2018; Irdeto, 2020b; Multichoice PTY LTD, 2019). OTT services lead to revenue loss when subscribers share their credentials. OTT service providers monitor subscriber accounts to combat piracy through determining above threshold credential sharing, credential theft scraping on the dark web and remove compromised accounts (Baumgartner, 2019; Loh, 2019; Lovely, 2021; Netflix Legal, 2021).

Geo-blocking is the technical way that the copyright owners and their licensees permit access to digital content to online users gaining access from a designated country and blocking any other user who is not present in that country. Geo-blocking complies with licensing obligations. Online users, therefore, resort to piracy to access content not available in their country through the use of VPN networks as a means of circumventing geo-blocking measures(B. Danaher et al., 2014; Brett Danaher et al., 2017; Roy & Marsoof, 2017).

As a distributor of content, OTT service providers look to block VPN usage to minimise licenced content access. Geo-blocking and VPN blocking can be effective in preventing access to copyrighted content. However, OTT service providers will use the copyright law to compel VPN service providers to identify and hand over their user IP details (Roy & Marsoof, 2017; Van der Sar, 2015, 2021).

Danaher et Al. (2020) found that enforcing anti-piracy can be effective in turning users of illegal piracy channels towards legal consumption which reinforces the research results that OTT services positively (β= 0.228) and significantly (P= 0.003) have an impact on piracy.

Table 21 further demonstrates that the strength of digital content available on piracy drops at the presence of OTT services, as digital content has more (β= 0.506) impact on antipiracy when OTT is excluded, but when OTT is included, the impact decreased to (β= 0.361), shown in Table 21.

Therefore, it is concluded that 20.5 percent of the variance accounted by OTT overlaps (controls) with the variance accounted for digital content. Hence the necessity to control the influence of OTT when testing the impact of digital content on anti-piracy. Therefore, H2 is accepted.

Table 21: Standardised Coefficients

Model		Beta	T value	P-value
2	(Constant)		4.182	0.000
	OTT	0.228	3.049	0.003
	Digital content	0.361	4.832	0.000
a. Dependent Variable: anti-piracy				

As these results demonstrate a conclusion can be reached that anti-piracy is driven by digital content, and OTT influences digital piracy and anti-piracy. However, the impact of digital content on antipiracy is more (β= 0.506) than the interference of OTT (β= 0.228).

5.4 Conclusion

The purpose of this research on digital video piracy was to understand the impact of digital video content piracy on streaming service subscriptions (OTT services) in South Africa. A quantitative method was applied to collect 217 questionnaires and a standard multiple regression was conducted using IBM SPSS version 26. As stated previously, the total number of the respondents who completed the Qualtrics survey was 259. The data was screened, and the qualifying number of respondents who met all of the qualifying criteria numbered 217.

The research has demonstrated that piracy is driven by digital video content availability and that OTT service providers provide significant input into the efforts regarding utilising anti-piracy tools to stop piracy (B. Danaher et al., 2020). Digital video content and the availability thereof can be manipulated and adjusted to suit the entertainment industry, and collaboration can halt the ever-increasing revenue loss attributed to piracy.

As stated previously that, despite the best efforts of the entertainment industry, which includes digital content creators and distributors, the impact of digital content video piracy is increasing, costing the movie and entertainment industries millions

annually (Orme, 2014). It was also stated, with digital video content piracy and illegal copying or sharing, the burden of enforcement rests heavily with the entertainment industry. This unlawful behaviour leads to economic pressure and the cost of implementing various tools to prohibit or slow down digital content video piracy (Blackburn & Eisenach, 2019; Poort et al., 2018; Van der Ende et al., 2015).

CHAPTER 6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This study aimed to understand the impact of digital video content piracy on OTT services in South Africa. As comprehensive and credible literature is absent from a South African context, the study adds to the current literature by offering evidence of the impact of digital piracy on OTT service providers in South Africa.

Currently, there is only one primary South Africa OTT service provider created in South Africa for South Africans, namely Showmax. International offerings like Netflix, Amazon Prime and YouTube Premium are still in the exploratory stage of understanding the South African market complexities. Other local players are attempting to enter the local market, catalogues are limited, and they do not have the audience reach that Showmax and Netflix currently enjoy. South Africa experiences lower levels of internet penetration, slow internet speeds and high data prices, all of which impact OTT services. As the demand for digital content grows, digital piracy has become one of the biggest threats to local content and industry growth.

CHAPTER ONE: This chapter defined and expanded the background to the research problem by stating the problem, specifying the research questions, and approaching the research. The proposed methodology and structure of the research were presented.

CHAPTER TWO provided a literature review relating to digital video content piracy and whether the availability of digital video content and anti-piracy tools had an

impact on levels of digital piracy. This review was undertaken to establish an understanding of and a basis for developing the research instrument used.

CHAPTER THREE discussed and presented the research methodology for this quantitative study. This chapter further discussed the research design and collection methodology, reliability and validity, and the limitations of the research.

CHAPTER FOUR presented the results as they are to support the statistical analysis discussed in Chapter Five.

CHAPTER 5 discussed the results regarding theory and existing literature around digital video content piracy and OTT services.

CHAPTER 6 summarised the research and the conclusions drawn and made recommendations for further research and, where appropriate, future strategies for reducing digital piracy.

6.9 Conclusions around Content Availability and Digital Piracy

Digital Piracy is prevalent amongst viewers based in South Africa; this is because of digital video content from countries like the USA and the UK using a windowed approach to releasing movies and tv series. These study results match those mentioned in earlier studies by Danaher et al.(2017), Castro et al. (2009), Aversa et al. (2019), where it was found that windowed release models contributed to consumers resorting to piracy to avoid this delay.

The study found that anti-piracy as the dependent variable is significantly influenced by the variables of OTT services and digital video content availability. This study's results indicate that the results are interpreted as creators and distributors (rightsholders) have options to protect content and mitigate piracy's impact on sales. While the demographic data revealed that 6.5 percent of the respondents had no subscription to any OTT service provider, it cannot be assumed that these respondents consumed digital video content illegally.

The hypotheses explored the relationship between digital video content availability and piracy, and according to the results, the availability of content has a statistically significant impact on piracy. This accessibility suggests a robust link between the shortage or availability of digital video content and the level of piracy. However, the survey's conclusions are statements posed to the respondents, and no issues around licensing or cost to OTT service providers were considered. Availability and economic factors can impact the level of piracy and would have to be researched more systematically to provide better insights.

6.10 Conclusions around OTT Services and the Impact on Digital Piracy

OTT services provide digital video content to subscribers at a fixed cost. The availability of content that OTT services list on their digital catalogues is supplied by rightsholders and licensed for distribution; this includes legal requirements to protect against digital piracy. OTT service providers make use of technology, and the study discusses three tools viz. DRM, digital watermarking and user account monitoring.

This technology protects the digital video content on the platform, and the account monitoring allows the OTT anti-piracy team's intervention to effect measures to protect the content. There is a collaboration with the content developer and the OTT platform to minimise piracy to some extent.

The second hypothesis explored the relationship between OTT services and whether they impacted piracy levels. The results show that OTT services have a positive (β= 0.228) and significant (P= 0.003) impact on piracy, and this is demonstrated as the levels of piracy decrease when anti-piracy tools are implemented. The prevalence of password sharing among users of subscription services reflects a distinct percentage of the user base.

Although the study has highlighted that the anti-piracy tools effectively prevent piracy, some limitations could be explored in further research as with technological systems, there is the possibility of error. The research suggests that to further reduce digital piracy's economic impact, a combination of methods will be the most effective.

6.11 Recommendations

The evidence from this study points towards the idea that reducing economic harm will be through combined anti-piracy efforts from rightsholders, technology firms and government with legal digital video content being made easily accessible, including synchronised international release dates and education. However, because some consumers are under the impression that digital piracy is a victimless crime and not

theft, stealing can only be attached to a tangible product (Knowles, 2019), therefore an element of public education can be used to educate people around the damaging effects of piracy. The main distinction between stealing and piracy is that the pirate replicates the product rather than stealing it from a third party. The South African government should respond to digital piracy by instituting well-enforced legal penalties for piracy, collaborating with OTT service providers and Internet Service Providers to ensure the protection of digital video content. The benefits of collaboration benefit all.

6.12 Suggestions for Further Research

The research conducted in this study looked at the impact of content availability through OTT services, their usage of anti-piracy tools and the impact on levels of piracy.

Acknowledging the limitations of the data used in this study and the data collection period infer that OTT services are impacted severely by piracy. With a more extended time frame, a richer data set and more sophisticated in-depth research, a deeper understanding of piracy and content availability could provide more robust information for understanding the complexity of digital video content piracy and the impact it has on OTT services. Revenue loss can be a game changer for South African OTT service providers and whether they succeed in the local market. Future work needs to be done on the collaboration of South African Internet Service providers (ISPs) and the part they play in enabling digital piracy. Future studies on the current topic are recommended to order to establish whether OTT subscribers in

South Africa continue to pirate content with new entrants like Amazon Prime, Acorn, HBO Max and Disney+ looking to expand geographically.

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APPENDICES

APPENDIX A: Survey Questions

Viewing baseline

1. Which OTT service provider do you have a paid subscription for?
    - DStv Now
    - Showmax
    - Netflix
    - Amazon Prime
    - YouTube Premium
    - Other
    - No subscription
2. How do you stream or watch digital video content?
    - Smart TV
    - Social Media (Such as Twitch, YouTube etc.)
    - Media Box or Player (Such as MyGica, Roku, Apple TV etc.)
    - Mobile Device (Phone or Tablet)
    - Personal Computer of Laptop
3. How many hours did you stream digital video content a day before lockdown?
    - 2 – 5 hours 59 minutes
    - 6 – 8 hours 59 minutes
    - 9 hours upwards
4. How many hours do you stream digital video content a day during lockdown?
    - 2 - 5 hours 59 minutes
    - 6 – 8 hours 59 minutes
    - 9 hours upwards

Does the distribution model for digital video content have an impact on digital piracy?	Strongly Agree	Agree	Somewhat Agree	Somewhat Disagree	Disagree	Strong Disagree
If legitimate versions of movies/tv series are not available in my country, I am more likely to stream pirated digital video content	☐	☐	☐	☐	☐	☐
Content I am interested in watching is usually not available in my geographical location	☐	☐	☐	☐	☐	☐
New content takes too long to appear on an OTT service platform	☐	☐	☐	☐	☐	☐
If the content is not available in my country, I am more likely to pirate it	☐	☐	☐	☐	☐	☐
The waiting time for content to be distributed via legal channels is too long	☐	☐	☐	☐	☐	☐

Is subscriber growth of OTT services impacted by content distribution models?	Strongly Agree	Agree	Somewhat Agree	Somewhat Disagree	Disagree	Strong Disagree
Content is to spread out across different OTT services	☐	☐	☐	☐	☐	☐
It is too expensive to legally consume all the content I desire through OTT services	☐	☐	☐	☐	☐	☐
I would rather watch content instantly than wait for it to appear on an OTT service provider	☐	☐	☐	☐	☐	☐
I would subscribe to an OTT service if new release digital video content was made available immediately	☐	☐	☐	☐	☐	☐
I would pay for a subscription to an OTT service provider if new digital video content was immediately available	☐	☐	☐	☐	☐	☐

Are anti-piracy tools used by OTT services adequate in protecting content from piracy?	Strongly Agree	Agree	Somewhat Agree	Somewhat Disagree	Disagree	Strong Disagree
It is easy to pirate digital video content	☐	☐	☐	☐	☐	☐
If I wanted, I could easily bypass anti-piracy tools to stream pirated digital video content	☐	☐	☐	☐	☐	☐
Downloading movies from the internet free is easy	☐	☐	☐	☐	☐	☐
Using tools like utorrent and Limeware is easy for me	☐	☐	☐	☐	☐	☐
It is easy to screen grab digital content while watching on an OTT service provider platform	☐	☐	☐	☐	☐	☐

APPENDIX B: Literature Reviewed for Anti-piracy Management

Literature		
	Journal Paper	**Author/s Citation**
Digital Rights Management (DRM)	Digital Rights Management	(Gaber, 2013)
	Understanding the Preservation Challenge of Digital Television	(Ide et al., 2002)
	Preserving Virtual Worlds	(McDonough et al., 2010)
	Effectiveness of anti-piracy technology: Finding appropriate solutions for evolving online piracy	(Sudler, 2013)
	Popcorn or Snack? Empirical analysis of Movie Release Windows	(Granados & Mooney, 2018)
	Fighting Piracy with Novel Digital Rights Management Technology	(Moshirnia et al., 2012)
	Software Piracy pandemic needs government role, better vendor antipiracy plans	(Ogren, 2009)
	Intellectual property strategy and the long tail: Evidence from the recorded music industry	(Zhang, 2018)
	What is Digital Rights Management?	(Dingledy & Matamoros, 2019)
	The DRM Dilemma: Re-Aligning Rights Under the Digital Millennium Copyright Act	(Lipton, 2005)
Digital watermarking	Piracy in cyber space: consumer complicity, pirates and enterprise enforcement	(Chaudhry et al., 2011)
	An ID-based secure and flexible buyer-seller watermarking protocol for copyright protection	(Kumar et al., 2017)

	Steal These Policies: Strategies for Reducing Digital Piracy	(Castro et al., 2009)
	The advanced access content system's use of digital watermarking	(Lotspiech, 2006)
Credential Sharing & user Account Monitoring	I know what you streamed last night: On the security and privacy of streaming	(Nikas et al., 2018)
	Extreme teams: Why Pixar, Netflix, Airbnb, and other cutting-edge companies succeed where most fail.	(Fink, 2018)
	The " Streaming Wars " give pirates the competitive advantage	(Irdeto, 2020b)
	Multichoice Integrated Reports	(Multichoice PTY LTD, 2019)
	Video Streamers Step Up Password-Sharing Crackdown | Light Reading	(Baumgartner, 2019)
	"Do you have a link?": The effects of piracy and online streaming services on the sharing practices of television content	(Loh, 2019)
	Subscription Mooching in 2021	(Lovely, 2021)
	Netflix Terms & Conditions	(Netflix Legal, 2021)

	Netflix Anywhere? Geo-Blocking of Online Copyright Protected Content v. Free Movement of Services within the European Union	(Siukkola, 2016)
	The True Cost of Motion Consumption, Government Piracy to the U. S. Economy	(Siwek, 2006)
	Business model responses to digital piracy	(Aversa et al., 2019)
	Netflix and Spotify's unlimited streams are diminishing digital content's value	(Wolk, 2015)
	An ID-based secure and flexible buyer-seller watermarking protocol for copyright protection	(Kumar et al., 2017)
	The Darknet and the Future of Content Protection	(Biddle et al., 2003)
	Analysing the Modern OTT Piracy Video Ecosystem	(Jones, 2018)
	Should Copyright Laws Be Able To Keep Up With Online Piracy?	(Minnock, 2015)
Geo Blocking	Netflix Research	(Netflix Research & Analytics Team, 2019)
	Netflix Anywhere? Geo-Blocking of Online Copyright Protected Content	(Siukkola, 2016)

	v. Free Movement of Services within the European Union	
	Geo-blocking, VPNs and injunctions	(Roy & Marsoof, 2017)
	Piracy and Copyright Enforcement Mechanisms	(B. Danaher et al., 2014)
	Piracy and Copyright Enforcement Mechanisms	(Brett Danaher et al., 2017)
	Movie Companies Sue VPN Provider for 'Encouraging' and 'Facilitating' Piracy (Updated) *	(Van der Sar, 2021)
	Netflix Cracks Down on VPN and Proxy "Pirates"	(Van der Sar, 2015)
	The effect of piracy website blocking on consumer behaviour	(B. Danaher et al., 2020)

APPENDIX C: Literature Reviewed for Consumption

Literature		
	Journal Paper	**Author/s Citation**
Consumption habits	Analysis of the Change in the Audiovisual Ecosystem	(Martínez et al., 2017)
	Showmax	(Showmax, 2021)
	The Formation of Digital Piracy Management Business Models in the Music Records Industry	(Bartkus & Akulavicius, 2015)
	Parks Associates forecasts $12.5B in lost revenue in 2024 due to Pay-TV and OTT piracy and Account sharing	(Sappington, 2019)
	Digital movie piracy: A perspective on downloading behavior through social cognitive theory	(Jacobs et al., 2012)
	Business model responses to digital piracy	(Aversa et al., 2019)
	File sharing and copyright	(Oberholzer-Gee, Felix. & Strumpf, 2009)
	Global Online Piracy Study	(Poort et al., 2018)
	Why digital media require strategic rethink	(Smith, Michael D. & Telang, 2012)
OTT Subscription Model	The Business Model: Recent Developments and Future Research	(Zott et al., 2011)
	Mastering Disruptive Business Models	(D. L. Rogers, 2016)
	Types of Business Models	(Afuah, 2019)
	Business model responses to digital piracy	(Aversa et al., 2019)
	Netflix and Spotify's unlimited streams are diminishing digital content's value	(Wolk, 2015)
	Over-the-top sport: live streaming services, changing coverage rights	(Hutchins, Li, et al., 2019)

	markets and the growth of media sport portals	
	Better than Free	(Kelly, 2008)
	Can OTT and streaming services replicate the big screen on the small screen ?	(Wood, 2019)
Content Distribution	Why digital media require strategic rethink	(Smith, Michael D. & Telang, 2012)
	An Empirical Analysis of the Impact of Pre-Release Movie Piracy on Box Office Revenue	(Ma et al., 2014)
	Converting Pirates Without Cannibalizing Purchasers: The Impact of Digital Distribution on Physical Sales and Internet Piracy	(B. Danaher et al., 2010)
	Entertainment and media outlook: 2015 – 2019 South Africa – Nigeria – Kenya	(De Jager et al., 2015)
	Global Online Piracy Study	(Poort et al., 2018)
	Film Distribution in the Digital Age	(Crisp, 2015)
	The Last Picture Show? Timing and Order of Movie Distribution Channels	(Hennig-Thurau et al., 2007)
	Steal These Policies: Strategies for Reducing Digital Piracy	(Castro et al., 2009)
	An Empirical Study Profiling Internet Pirates	(Lai et al., 2013)
	Vertical Restraints in the Movie Exhibition Industry	(Wozniak, 2012)
	Three Major Ways Movie Release Patterns are Changing	(Follows, 2017)
	Steal These Policies: Strategies for Reducing Digital Piracy	(Slive & Bernhardt, 1998)
	Showmax	(Showmax, 2021)
	Fighting Free with Free: Freemium vs. Piracy	(Halmenschlager, Christine. & Waelbroeck, 2014)

	Does piracy lead to product abandonment or stimulate new product development?: Evidence from mobile platform-based developer firms	(Miric & Jeppesen, 2020)
	Optimal Pricing of Information Goods under the Freemium Strategy in the Presence of Piracy and Network Effects	(Nan et al., 2016)