OSLOMET

Le, Tri Tue

Cloud Gaming Platforms: Their impact on the future of the video game industry

Master's thesis spring 2020

Oslo Business School

Oslo Metropolitan University

Master's program in business administration

Acknowledgements

Abstract

How will cloud gaming platforms affect the future progression of the video game industry? In this thesis, I analyze how the implementation and further progression of cloud gaming platforms will affect the video game industry in the future, through exploratory research. By using desk research and historical data, this thesis aims to express the reshaping that the video game industry has been through from its invention to its current state, as well as its future prospects. Based on the framework of Porter's five forces and Suarez' battle for technological dominance, I have used a combination of both frameworks firstly to analyze the current state of the video game industry, as well as, the changes that will occur with the implementation of cloud gaming platforms. Secondly, the framework is then used to analyze how the different cloud technology, and the companies behind them, compete throughout its lifecycle to gain dominance in the industry. Porter's five forces gives me the indication that the threat level in the industry will remain the same after the implementation of cloud gaming platforms. While Suarez' battle for technological dominance shows that cloud gaming platforms are still in a too early phase to accurately gauge where it is headed. Aside from these two frameworks, there have also been conducted semi-structured expert interviews with software developers to get a better grasp of how the industry is reaction to cloud gaming platforms. By using the results of these frameworks and the expert interviews, I will then discuss three possible scenarios that could be the future outcome of cloud gaming platforms. A key finding in the study indicates that cloud gaming platforms have a promising future ahead where more companies are investing into them. This thesis contributes to existing literature by providing an overview of the current state and an outline of future prospect for cloud gaming platforms.

Table of Contents

1. Introduction

The video game industry has seen rapid growth over the past decades, and it has been impacted by a variety of technologies. These technologies have characterized the video game industry's development and represent an impacting factor influencing the industry's future progression (Egenfeldt-Nielsen, Smith, & Tosca, 2016). This competitive industry requires companies to be able to evolve by following or predicting technological trends, or by creating a unique product or service which increases their chances of being acquired by a larger company in order to prevent the company from becoming irrelevant (Lowensohn, 2015). Various reasons have been identified in previous research for why companies fail to adapt to the new technological flows that shape the industry's development (Reinganum, 1981). Jensen (1981) identified a potential reason as companies not having the capabilities or do not identify a necessity for adapting, which long-term presses many of these companies out of the industry.

Cloud technology is a technological advancement that has seen an increase in popularity, also within the video game industry, with a potential for becoming deeply rooted in the industry's future progression. The companies in the video game industry use this cloud-based technology to create what is now known as cloud gaming platforms (Arkenberg, 2020). Cloud gaming has previously been the subject of much study in recent years. Most of the earlier research that has been conducted on cloud gaming platforms has an increased focus on the technology used, where mainly the focus is on its limitations and possible improvements. There is also some early research that has researched the potential future of cloud gaming with a focus on the technological aspects of cloud gaming. These studies indicate that cloud gaming platforms potentially has a bright future if the companies producing them can figure out a way to solve the downsides of them. (Wang et al., 2017; Cai et al., 2016; Shea et al., 2016). However, cloud gaming platforms impact on the video game industry's future development have, to my knowledge, not undergone much research. The purpose of this thesis is therefore to achieve a better understanding of what will happen when cloud gaming platforms become more predominant and building a larger network in the video game industry. More precisely this thesis aims to identify *how cloud gaming platforms affect the future progression of the video game industry.*

The descriptive research method is applied to facilitate the research analysis and an external industry analysis methodology is used to evaluate the cloud gaming platforms effect on the industry. There is also a focus on qualitative research which is done through the usage of expert interviews to acquire a greater depth of the industry. The video game industry envelops a large variety of aspects with products and consumers within software, hardware, consoles, computers, and cellphones amongst others. Evaluating cloud gaming platforms effect on each of these aspects would be a sizable task which could not be sufficiently covered within the bounds of this thesis. To reduce the extensiveness of this thesis, the video game industry is delineated to the focus of consoles and how cloud gaming platforms will affect the video game industry in terms of consoles.

This thesis starts with a historical overview of the industry starting from 1970s to get a better understanding of the industry's past developments. The current situation in the video game industry follows the historical overview before introducing the major leading actors in the industry at present. The subsequent section presents the thesis methodology and empirical analysis using Porter's five forces to analyze and Suarez' framework on battles for technological dominance. Porter's five forces aim to analyze the pre- and post-cloud gaming platforms introduction period in the video game industry. The Suarez framework aims to analyze how the cloud gaming platforms compete against one another to gain dominance in the video game industry. A brief discussion of the empirical findings through the basis of the literary review is presented before summarizing the findings and concluding.

2. Industry overview

This chapter will be used to get a better grasp of how the video game industry is built up. There will firstly be a section with the historical overview of the industry. This section will start with the industry from the 1970s and then slowly go through all the decades leading up to the 2020s. This is done to get a better view of all the technological developments that the video game industry has been through throughout its existence. After the historical overview of the industry, a section with the current situation in the industry and its major companies will follow. This section will go more in depth about how to major companies are positioned in the industry and

what their main consoles are, as well as which product lines their consoles are most known for. After this section, there will be a short part where the different categories of cloud gaming platforms will be introduced. After that, there will be a short introduction of each major cloud gaming platforms in the industry and which category they belong to.

2.1 Video game history

The 1970s

The video game industry, established around 50 years ago, is still considered to be very young, becoming a phenomenon first in the 1970s. It all started with the small company Atari. In the early 1970s, they produced games such as *Spacewar!* and *Computer Space*, however, it was not until the production of *Pong* that the industry skyrocketed. With this success, Atari marked the birth of the video game industry while simultaneously paving the way for other gaming consoles (Egenfeldt-Nielsen et al., 2016). With the introduction of video games, another subculture would soon be created among the world population. That subculture came to light as gamers, who typically were young men that gathered together to play these new inventions (Egenfeldt-Nielsen et al., 2016).

Towards the end of the decade, two other events occurred that later would have a substantial effect on the video game industry. The first event was the new technology of microprocessors. This technology would affect not only gaming and consoles, but also computers, which eventually would become an important aspect of the video game industry. The second event was the introduction of *Dungeons & Dragons*, also known as *D&D*. This game introduced gamers to a whole new industry genre that was very appealing to them (Egenfeldt-Nielsen et al., 2016).

The 1980s

By the beginning of the 1980s, introduction of personal computers (PC) had contributed to a rapid industry wide growth. Nonetheless, the 1980s would be the decade that experienced, what would later be called, the Great Videogame Crash of 1984 (Egenfeldt-Nielsen et al., 2016). The industry had been moving towards a crash for the first three years of the 1980s, although the crash of 1984 was perceived as sudden. The industry was thriving at the beginning of 1984, and

warning signs indicating a potential crash was overlooked. However, Atari's first two games in the 1980s were so poorly designed and rushed through production that they became a considerable failure for the company (Egenfeldt-Nielsen et al., 2016). Atari, who now controlled two-thirds of the industry, tried to impede their competitors by taking them to court, arguing the illegality of independently made games for the Atari system. Atari's loss in court led to a flood of new games where quality varied. The final action that spurred the Great Videogame Crash of 1984 was the introduction of personal computers. The PC's allowed people to play the games without the use of consoles, which in turn led to the console industry becoming obsolete (Egenfeldt-Nielsen et al., 2016).

It would take a whole two years before anyone dared to take another shot at the console industry. The company that took that leap was the Japanese company, Nintendo. They released their console called NES simultaneously with the release of their Famicom, which was a computer, into the United States. Nintendo immediately became popular and by the end of the decade, they had already cemented themselves as the most successful console manufacturer, taking the metaphorical crown away from Atari (Egenfeldt-Nielsen et al., 2016). Seeing the success of Nintendo, Sega decide to enter the console market too with their Sega Genesis. Sega became the rival of Nintendo for almost a decade, but it all ended when Sony entered the market (Egenfeldt-Nielsen et al., 2016).

The 1990s

The initial growth that the video game industry had experienced, increased with the development of CD technology and became more rapid with the establishment of trends in online games around 1993 (OECD 2005). As mentioned above, video games would mostly be played on consoles, but in the early 1990s, the personal computer had cemented itself as a frontrunner for gaming platforms. This was usually due to the computer's advantages in sound and graphics (Egenfeldt-Nielsen et al., 2016). There were now two main mediums for playing video games, personal computers and consoles. In addition, a potential third medium was on the rise through the use of portable devices.

With the arrival of the CD-ROM and the shift of genre from classical adventure games towards action games, Sony felt that it was their turn to enter the console market. Sony took the console

market by storm, with their PlayStation, outclassing both Sega and Nintendo. Simultaneously as Sony's PlayStation gained market popularity, the emergence of the World Wide Web shifted the focus of games towards multiplayer games. This also paved the way for people to play with one another on different consoles and computers (Egenfeldt-Nielsen et al., 2016).

The 2000s

Console games became increasingly popular in the early 2000s with the introduction of Sony's PlayStation 2 and Microsoft's Xbox. Three companies were now competing for the annual market revenues, Microsoft with their Xbox, Sony with their PlayStation, and Nintendo with their GameCube. While consoles were becoming increasingly more popular for video gameplay. Computer-based games were still the most frequently used medium to play video games (OECD, 2005). The technology was now rapidly developing, leading to the introduction of the PlayStation 3, the Xbox 360 and Nintendo's Wii, which were all announced in the middle of the 2000s (Egenfeldt-Nielsen et al., 2016).

During this decade there was a revolution within the video game industry which came in three stages. The first change was the massive development of internet bandwidth and connectivity. This led to the rise of Massive Multiplayer Online games (MMOs) and at the same time the rise of downloadable games which decreased the popularity of cartridge and CDs. The second change was the unexpected rise of casual games. Web-based games such as *Bejewelled* became mesmerizing for web users. This happened in 2001 but it was not until Nintendo's release of the Wii that it really became popular (Egenfeldt-Nielsen et al., 2016). The last part of the revolution that happened in the 2000s came with the mobile phone. Apple's introduction of the iPhone quickly became a phenomenon and it rapidly became the phone every mobile game was played on (Egenfeldt-Nielsen et al., 2016).

With the video game industry on the rise, the United States and Japan took the role of industry frontrunners. As industry frontrunners, the leading console manufactures, placed two out of the three headquarters in Japan while the last one was placed in the United States. By 2002, The United States represented 37% of the video game market with a market value of USD 7 billion and by 2008 the market value was expected to rise to USD 15 billion. During the same period

Japan obtained 27% of the video game market, with a market value of USD 8 billion in 2003 and with expectations of it rising to the same amount as the United States by 2008 (OECD, 2005).

The 2010s

Three trends where, by the 2010s, present in the video game industry. The first trend was the distribution revolution. This trend was all about how games were distributed to the consumers. With the introduction of Apple's iPhone, many developers saw the possibilities of downloadable games which shifted the need away from physicals CDs. The second trend was the rise of social games. These social games used the increasing popularity in social media to distribute their games primarily done through Facebook. This saw the rise of many new companies were perhaps the most notable was Zynga with their game *Farmville*. The third and final trend that appeared during this decade was the use of the body, which threatened the need for controllers and its buttons. This saw the rise of Microsoft Kinect and Sony's Eye both with the main focus of using your own body to play the games (Egenfeldt-Nielsen et al., 2016).

Moving into the new decade, the development and soon the release of the eighth generation of consoles would also take place. The first console of the eighth generation was the Nintendo Wii U released in 2012. A year after that both Sony and Microsoft released their consoles in the form of the PlayStation 4 and the Xbox One, who would later on become the eight generations of consoles. However, the Wii U did not have a large enough impact on consumers as Nintendo would have liked and it got replaced by the Nintendo Switch in 2017. Even though these consoles were new, a majority of the consumers were not new to console gaming as nine out of ten already owned a console (Pike, 2015).

Now in 2019, a decade after the United States was forecasted to have a market value of USD 15 billion, it has risen to USD 25,5 billion, while in Japan, forecasted to have to same market value as the United States, the market value is only at USD 14 billion. One of the main reasons for this might be the increasing use of mobile games and portable devices within the industry (WePC, 2020). Mobile games in 2015 accounted for 34% of the video games market shares and they are expected to increase another 17% by 2020. However, even though it was expected to reach 50% of the video games market shares by 2020, the mobile games managed to do that in half the time.

This illustrates how rapid the mobile games segment is growing in the video game industry (WePC, 2020).

The 2020s and beyond

With the beginning of a new decade, we can take a sneak peek into how the video game industry will shape itself in the coming years. The technological development that might affect the video game industry the most is probably cloud gaming platforms and the ability to stream games. Microsoft and Google want to make video games as easy to stream as songs and movies. They have therefore started the projects xCloud which is Microsoft's project and Stadia which is Google's project (Mohamed, 2019). However, Microsoft and Google are not the only companies that want to bet on the cloud gaming platforms. Sony and Nvidia have also launched their own cloud gaming platforms, named the PlayStation Now and the Nvidia GeForce Now (Hollister 2020).

Cloud gaming platforms like the xCloud, PlayStation Now, Nvidia GeForce Now and Stadia will make it possible to stream games and play games without the use of a computer or console. The main requirement would be a strong internet connection. This is expected to reduce the cost for the consumers, making it possible for more people to play video games. If Microsoft and Google follow a style similar to Netflix where consumers can pay for a variety of games, then the consumers do not have to worry about the time used to download and install a game (Mohamed, 2019). According to Zion Market Research, the global video game streaming market is predicted to grown up to USD 6.9 billion in 2026 (Mohamed, 2019). Another factor that will affect the video game industry is the removal of the CDs and the DVDs. Most video game publishers save money on manufacturing, shipping, and storage cost if they distribute the games digitally. This also makes it possible for them to cut out the middleman such as GameStop and sell the games directly to the consumers through their own digital sites (Mohamed, 2019).

The last factor that might affect the video game industry going forward is the new revenue models that most publishers' have started to use. In the past, most publishers had a onetime earning which came in each time they sold a game. However, now revenue models such as paying for downloadable content and subscribing monthly to gain access to multiplayer gaming are becoming more and more popular (Mohamed, 2019). By using this revenue model, most

publishers are able to earn money on their games long after they are first released, improving their revenues and cash flows (Mohamed, 2019).

2.2 Major Actors

The video game industry can be divided into a software and hardware side. There are many major actors when it comes to the software side of the video game industry, but here the focus is on the major actors on the hardware side of the industry, due to the cloud gaming platforms being regarded as threats to consoles. The major actors on the hardware side of the industry are Nintendo, Sony, Microsoft, with Nintendo being the oldest company in this industry and Microsoft being the youngest. Every major actor has one console each that is dominant in the video game industry and has been dominant for over many decades.

Nintendo

Nintendo entered the video game industry back in 1986 just a few years after the great videogame crash and quickly became a dominant company in this industry. The reason for this is because they entered the industry when it was "new" and there were therefore no competitors in the industry at that time (Egenfeldt-Nielsen et al., 2016). However, Nintendo is now the smallest of the three dominating companies on the hardware side even though they are the oldest company. The main reason for Nintendo's loss in advantage in the video game industry is due to the size of the companies that entered the industry after Nintendo. Sony and Microsoft were already behemoths in their own industries prior to entering the video game industry. The branding of Sony and Microsoft were already so huge that it was only a matter of time before Nintendo started to fall behind. Thus, to differentiate themselves from Sony and Microsoft, Nintendo started to create consoles that gave the gamers new ways of playing video games. This made it so that Nintendo were focusing on the user experience of playing games rather than the pure raw power of the consoles (Wardyga, 2019).

Sony

Sony entered the video game industry almost a decade after Nintendo, giving Nintendo an almost ten-year head-start in shaping the industry. Despite this, Sony managed to grow past Nintendo at a rapid pace. One of the main reasons for this was the fact that Sony were a bigger company than Nintendo. This gave them a technological advantage over Nintendo, while at the same time giving them advantages in promoting their brand (Faber, 2020). The PlayStation and the PlayStation 2 were superior in every way with their CD-ROM and graphics, thus, opening up for Sony to take advantages of the network effects in the industry. They also reduced the switching cost for the consumers by making the PlayStation 2 backwards compatible. By doing this they achieved a cost advantages over their competitors, Nintendo and Microsoft. All of these factors together made Sony the leaders in the video game industry, while at the same time making the two bestselling consoles in the form of the PlayStation and the PlayStation 2 (GA, 2015).

Microsoft

Microsoft were the last of the three big companies to enter the video game industry. However, Microsoft quickly rose to prominence in the industry, largely due to their already well-known brand and reputation. A clear example of how Microsoft used their reputation and brand to get ahead of Nintendo and arguably Sony, is their console, the Xbox. The Xbox were manufactured in such a way that it had the tools necessary to support third party software developers. Microsoft were also quick in using their connections to allow other large companies like Netflix, Comcast, HBO, and Hulu onto their platforms (Mintz, 2011). Today, both Sony and Nintendo also offer video streaming on their platforms. However, it was the early strategic maneuvering of Microsoft that made them able to reap the early benefits of differentiating themselves and climb past Nintendo and become on par with Sony in the video game industry.

2.3 Video game platforms

There have been many different video game platforms in the video game industry throughout the lifetime of the industry. It all started with Atari, as mentioned above, and has since then grown exponentially together with the technological advances that has been happening in the video

game industry. This has led us to the point where there is an oligopoly in the video game industry on the hardware side with three companies competing against each other.

Nintendo Switch

Nintendo's consoles, the Nintendo Switch, is the weakest of the three consoles in the market when it comes to raw power and technological progress. Sony's console, the PlayStation 4, and Microsoft's console, the Xbox One, are on par with each other and their product lines of consoles have been competing against each other for a long time. However, even though the Nintendo Switch is inferior to both the PlayStation 4 and the Xbox One in terms of processing power and graphics, Nintendo has still managed to compete against Sony and Microsoft. The main reason for this is the Nintendo Switch's uniqueness and its exclusive game titles. While every console line has their own set of exclusive titles, Nintendo's are arguably more well-known with product lines such as Pokémon, Zelda and Mario. The Nintendo Switch is unique in the way that it is a hybrid between a handheld system and a home console (Wardyga, 2019). This combination has given Nintendo great success and the ability to compete with greater consoles in the video game industry.

PlayStation 4

The PlayStation 4 is the most powerful console in the video game industry, both when it comes to the GPU and the CPU. The PlayStation 4 also has a bandwidth advantage over the Xbox One so the games run better on the PlayStation 4 while also being cheaper than the Xbox One (Wardyga, 2019). However, it isn't just the technology that has made the PlayStation 4 popular in the video game industry. Sony also has exclusive titles to their console with names such as; Ratchet & Clank, Uncharted, The Last of Us, and many more. Together with this, Sony has opened up for backward compatibility through their cloud gaming platform, the PlayStation Now. All this combined has made the PlayStation 4 the most popular console in the video game industry, which is illustrated in the graph below.
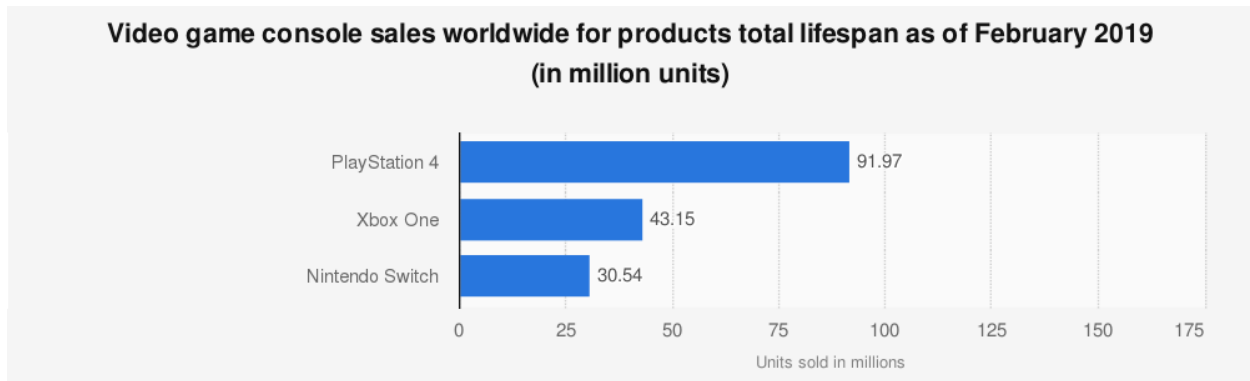
Fig. 1: Video game console sales worldwide as of February 2019 (Source: Statista, 2020)

However, even though the PlayStation 4 has such high sales numbers, it was still in fierce competition with the Xbox One.

Xbox One

The Xbox One has, despite its lower sales numbers, managed to compete with the PlayStation 4 for many years. One of the reasons that the Xbox One could still compete in the video game industry were its highly technological advances where it was programmed to monitor itself to prevent the console from overheating. This, together with Microsoft's already well-known brand and loyal customers made it possible for Microsoft to have their biggest and best launch of their console, with sales reaching over one million units in just the first 24 hours (Wardyga, 2019). The thing that separated the Xbox One from the PlayStation was its focus on being an all-in-one entertainment system. The Xbox One was therefore able to stream tv shows, social media, and streaming games through cloud computing which made it possible to play games on any PC that had windows 10 (Wardyga, 2019).

The next consoles after the Xbox One and the PlayStation 4 are rumored to be the Xbox series X and the PlayStation 5. Both of these consoles are rumored to be as powerful as a normal everyday computer, which supports the statement of Wardyga (2019). He states that there might come a point in time in the video game industry where the consoles are as powerful as a

computer. Hence, making it so that they cannot be classified as a console anymore. Together with the new consoles, Sony and Microsoft has also opened for backwards compatibility and the possibility to stream their games to other platforms, which has paved the way for cloud gaming platforms in the video game industry.

2.3.1 Cloud gaming platforms

After Sony and Microsoft started to open up for the possibility to stream games through cloud servers, many other companies have started to create their own cloud gaming platform to try to take part in this industry too. Some of the companies that wants to enter the industry with a cloud gaming platform are already a part of the video game industry in some way, while other companies are completely fresh and new to the video game industry, but still wants to enter with a cloud gaming platform.

Most of the cloud gaming platforms that has started to appear in the video game industry follows either one of two models. The first model is a subscription service where you play to game remotely through the company's servers and on any platforms. The second model is also a subscription service but here you can download the game to partly play it through the company's servers and it is usually just targeted in on one platform. All the cloud gaming platforms that have entered or wants to enter the video game industry can be separated into four categories.

The first category are the cloud gaming platforms that are still in an early development phase. Thus, indicating that not much is known about these cloud gaming platforms. Cloud gaming platforms like EA's Project Atlas, Valve Steam Cloud Gaming, and Verizon Gaming all fall under this group. All these cloud gaming platforms are still in a closed beta where the companies are testing it out. Therefore, very little is known about these cloud gaming platforms other than the fact that they are aiming to launch them one day. Companies like Nintendo, Apple, and Walmart have also shown interest in entering the market with a cloud gaming platform and therefore also fall into this group.

The second category consist of the cloud gaming platform where the consumers play the games remotely through the company's servers. There is only one cloud gaming platform that falls

under this category out of all the cloud gaming platforms in the market right now. That cloud gaming platform is the Stadia that is being produced by Google. Even though the Stadia is the only cloud gaming platform with this business form as of right now, it isn't hard to imagine that some of the cloud gaming platforms that are in an early phase might adapt this business model as well.

The third category is made up of cloud gaming platforms where the consumer could either play the games through the company's servers, download the games and play it locally or a mix of these two. There are two cloud gaming platforms that falls under this category, these two are the PlayStation Now, produced by Sony, and the Nvidia GeForce Now, produced by Nvidia. Even though both cloud gaming platforms can be grouped together, there are still one large distinction that separates them from one another. The PlayStation Now is mainly focusing on cloud gaming on the PlayStation 4, while still allowing cloud gaming on computers. The Nvidia GeForce Now is mainly focusing on cloud gaming on computers, but you can only play games you already own on the Nvidia GeForce Now. Thus, making the business model a bit suboptimal with payment for both the monthly subscription and the game costs.

Lastly, the fourth category consist of cloud gaming platforms that have been in the video game industry for quite some time but is run by small companies. This group consist of cloud gaming platforms like Shadow and Vortex who run a subscription-based cloud gaming service, much like the other larger companies that are entering the video game industry. However, even though these cloud gaming platforms are present in the market, there will be no focus on these small platforms. The reason for this is because branding and consumer loyalty is a huge factor in the models that follows which makes it unnecessary to analyze them due to the high likelihood of them being acquired by the larger companies. This has already been observed with the case of OnLive and Gaikai (Lowensohn, 2015). Another reason for why it is unnecessary to focus on the smaller platforms is their technology. The technology of companies like Shadow and Vortex are the same ones that are used by the larger companies. Thus, indicating that there is nothing unique to their technology and that their technology is not superior to the others. Therefore, it is hard to see Shadow and Vortex surviving in an industry that is heavily relying on branding and installed user base.

3. Empirical analyses

The Porter's five forces model, together with Suarez' model of technological dominance battles will be used to analyze how cloud gaming platforms will affect the future of the video game industry. In addition, semi-structured expert interviews are conducted to obtain a better comprehension of the video game industry and the effects that cloud gaming platforms might have on this industry.

The semi-structured expert interviews that have been conducted were restricted to software developers based in Norway. All the software developers that where interviewed are part of software companies in Norway that are relatively new to the industry. The interview is done in a semi-structured manner to leave it more open for discussion around cloud gaming platforms during the interview. The interviews were conducted to gain a deeper insight into how the software companies were reacting to cloud gaming platforms. Even though the companies interviewed are small companies based in Norway, it is still possible to gain a perspective of how the industry as a whole is reacting to cloud gaming.

There are four companies interviewed and the first one is a company that has existed for 10 years. They mainly focus on story telling indie games and the software developer has been a part of the industry for over two decades. The second company interview is a small company that has only existed for two year, but the developer has worked in the industry for almost a decade and focus mostly on horror games. The third company have existed for almost two decades and the software developer have worked there since the beginning of the company. The company focuses largely on mobile games but are branching into console and computer games. The last company has existed for just under a decade and are focusing mostly on card games. The software developers working there have been a part of the industry for almost three decades and have been working with cloud gaming platforms before in the form of OnLive. These four companies will hereafter be referred to as interview object A, B, C, & D, in the order of presentation.

Porter's five forces is normally used to measure both the rivalry and profitability within an industry, for new and existing firms to further influence the dynamics of the industry (Roos et al., 2014). In this case however, Porter's five forces is used to both measure the current state of the video game industry, while simultaneously trying to analyze the industry's reaction to the entry of cloud gaming platforms and how the video game industry will develop moving forward.

Cloud gaming platforms produced by large companies have existed in the video game industry for quite some time. However, for the purpose of this thesis an initial Porter's five forces analysis of the video game industry will be performed without considering the cloud gaming platforms to identify the state the video game industry is in before cloud gaming platforms. The initial Porter's analysis will provide information on the rivalry situation within the industry, and the behavior of the industry's typical suppliers and consumers. This information will then be used to achieve a better understanding of how the video game industry will react to the implementation of cloud gaming platforms. From this, an analysis of how cloud gaming platforms will affect the industry and some forecasting on cloud gaming platforms future survival potential in the industry is performed. This thesis will not elaborate in excess the theoretical aspects of the Porter's five forces analysis as the model's framework is assumed to be well-established and known by most individuals.

Conversely, Suarez (2004) framework for technological dominance battles is lesser known. It is, therefore, reasonable to go more in-depth about the theory behind the Suarez framework and its functions. The 3.2 section on Suarez (2004) and his framework will, therefore, start with a theoretical section. The theoretical portion gives an in-depth presentation on the different aspects of the Suarez framework and further explains how the different models in Suarez' framework is connected and how they are used to detect when technological dominance is achieved in an industry or market. After explaining the theory and functions of the Suarez (2004) framework, it will be applied to analyze all the cloud gaming platforms that are entering into the market and their technologies. The focus will be exclusively on cloud gaming platform that are from well-known companies. The reason for this focus is that the Suarez frameworks emphasis on branding and loyalty amongst former customer bases being important factors for winning the technological dominance battle.

Following the analysis of both Porter's five forces and Suarez' technological dominance battle, there will be a discussion section where the goal is forecasting i.e. trying to predict how the video game industry will further progress after the implementation of cloud gaming platforms in the industry. The forecasting of the video game industry will be based on both Porter's five forces and Suarez' technological dominance battle, as well as, semi-structured expert interviews that have been conducted with software producers in the video game industry to get a better

insight into how the industry is currently reacting to cloud gaming platforms. Together these analyses and interviews are used to obtain a better understanding on the video game industry, which will be useful when trying to predict the further progress of the industry.

3.1. Porter's five forces

The Porter's five forces analysis is used to measure the rivalry and profitability within an industry, both for new and existing firms. The method is based on Michael Porter's theory of five factors that influence the dynamics of an industry (Roos et al., 2014). Porter's five forces framework is therefore used to carry out an industry analysis. The forces, as presented in Figure 2, consist of five main elements: the threat of substitutes, threats of new entrants, bargaining power of suppliers, bargaining power of buyers and rivalry among existing competitors. Through the analysis of the industry, a company's position in the market is evaluated. Furthermore, the effects from various industry factors on growth and profitability are explored.

Figure 2: *A representation model of Porter's five forces (Source: Roos et al., 2014. Made by: Le, Tri T.)*

Threat of substitutes

Within most industries, there exists the potential for product substitution, where the use of products or services from different industries are considered a threat. However, the potential for substitutions varies between industries (Chappelow, 2020). For industries where no or few close substitutes are present, a higher degree of company influence exists. Conversely, when close substitutes are present, consumer flexibility to choose between products and services increases, which in turn might adversely affect the industry (Chappelow, 2020).

The video game industry faces the threat of several substitutes in the form of different entertainment, where the substitutes with the highest threat towards video games are considered to be the other media entertainment platforms such as films and tv-series. Easily accessible streaming platforms are available from a range of devices and has become increasingly more successful, as the propensity to utilize paid streaming services, which allows user access to both films and series within a single platform, has grown over the last couple of years (Watson, 2019). The array of platforms that allow for streaming such as Chromecast, Apple TV, HBO, Netflix, Roku Streaming Player and Smart TV's to name a few, indicate a high potential for substitutions and suggests that switching costs are relatively low (Roetting et al., 2010; Salmose & Elleström, 2019; Straubhaar, LaRose, & Davenport, 2018). To illustrate the size of the streaming platforms, three streaming services are presented in Table 1, sorted after their respective subscriber number and market earnings.

Substitute	Users/subscribers/accounts	Market cap/Earnings
Netflix	167.1 million (Dec 2019) (Iqbal, 2020)	$163 billion (March 2020) (Iqbal, 2020)
HBO	146 million (2019) (Smith, 2020)	$ 5.81 billion (2019) (Watson, 2020)
Ruko Streaming	36.9 million (2019) (Delgado, 2020)	$1.13 billion (2019) (Feiner, 2020)

Table 1: Subscription and earnings for popular streaming services.

However, in spite of the streaming services being a highly profitable industry which can be seen as a threat to the video game industry, it could also be seen as a complement towards gaming and cloud gaming platforms. The reason for this is the consumers need for a good bandwidth connection in order to fully utilize the streaming services (Gonzalez, 2020). This bandwidth is considered a complement to the video game industry because a good bandwidth is also needed to fully utilize the games (Chen et al., 2011). Bandwidth is especially important with the implementation of the cloud gaming platforms in the industry (Manzano, Hernandez, Uruena & Calle, 2012). Thus, implying that bandwidth is an important complement to both the streaming services, as well as, the video game industry. The bandwidth will, therefore, be a more important complement in the video game industry after the implementation of cloud gaming platforms than before because games will be running through cloud servers which require stronger bandwidth (Manzano et al., 2020).

Although streaming services are substitutes for video games, it is believed that their threat level towards the video game industry is low. The reason for this is that gamers, on average, do not spend that much time playing video games. The only gamers that actually spend a significant amount of time on games are hardcore gamers and professional gamers. All other gamers, who will fall under the category of casual gamers, spends on average seven hours on video games a week. This is illustrated by the graphs in Figure 3.

Average Hours Each week

Female 6.3
Male 7.9

Gaming device usage per gender

	Female	Male
Gaming console	1.12	1.38
Computer (laptop or desktop)	1.45	1.71
Tablet	1.08	1.00
Mobile phone	2.11	1.92

■ Female ■ Male

Game Type

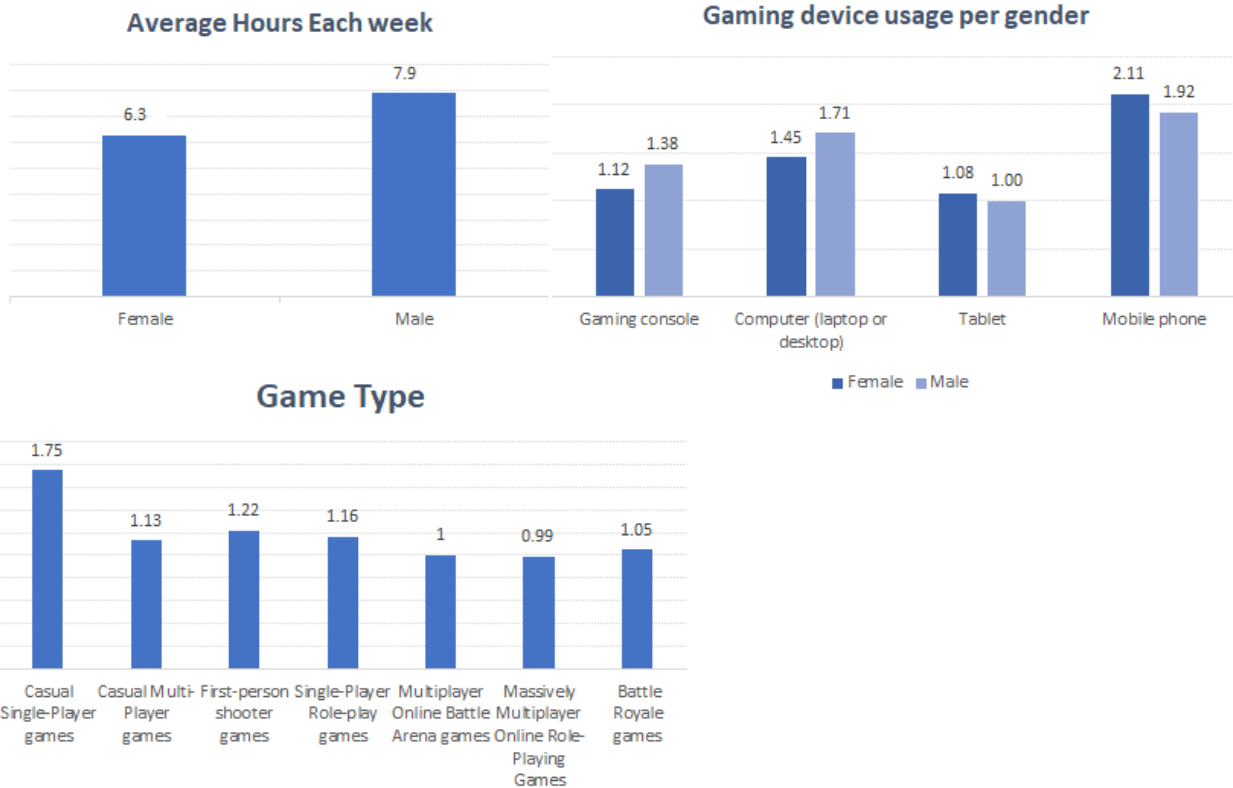|	
Casual Single-Player games	1.75
Casual Multi-Player games	1.13
First-person shooter games	1.22
Single-Player Role-play games	1.16
Multiplayer Online Battle Arena games	1
Massively Multiplayer Online Role-Playing Games	0.99
Battle Royale games	1.05

Fig. 3: Hours spent playing video games per week (Source: Anderton, 2019)

Since casual gamers do not spend as much time per week on video games, they presumably also need other things to do when they are not playing video games (Anderton, 2019). One of these things could be streaming services, as mentioned above, which is considered easy to switch to because of the non-existing switching costs of going from video games to streaming services (Roetting et al., 2010; Salmose & Elleström, 2019; Straubhaar, LaRose, & Davenport, 2018). The low threat of substitution represented by the streaming services towards the video game industry will in all likelihood be kept at the same level with the introduction of cloud gaming platforms into the industry. The reason for this is that cloud gaming platforms most likely will not increase the amount of game time per gamer but rather the number of gamers in the video game industry (Zeloof, 2019). Thus, suggesting that there will be more gamers in the industry who plays around the same average of game time as is already present in the industry. Based on this assessment the threat level of substitutes in the video game industry will be low both before and after the implementation of cloud gaming platforms.

Threat of new entrants:

A company's power in the market is affected by the threats of new entrants to the industry. The threats of new entrants are high when the new companies have low entry costs and do not need to use any time to become a competitor in the industry. For existing companies, the ideal situation would be strong barriers to entry because they then can charge the price they want and negotiate better terms with suppliers and buyers in the industry (Chappelow, 2020). One approach that could be used to measure threats of new entrants is Bain's typology. Bain's concept of condition of entry is defined as a percentage that the firms, already existing in the industry, can raise their price above the competitive level without attracting new entrants. This percentage may vary from everything between zero and towards a high number (Bain, 1956).

The barriers to entry in the video game industry could be said to be either a blockaded entry or an accommodated entry. Blockaded entry is defined as structural barriers being so high that the companies in the industry do not have to do anything to stop new entrants, while accommodated entry is defined as structural barriers being so low that either the entry deterring strategies will be ineffective or the cost of stopping new entrants will overshadow the benefits, they would receive from keeping the new entrants out (Besanko et al., 2012).

On the hardware side of the video game industry there is a blockaded entry due to the high cost that the new companies would have to endure to be successful. There are currently three dominant companies on the hardware side of the industry which have a large installed user base. These three companies have already invested a lot into their consoles and built up their brand in the industry, which leads to a belief that the brand loyalty amongst the users is high (Bayless, 2019). If a company still want to establish themselves on the hardware side of the industry it would have to be a preexisting large and dominant company in another industry due to the large capital requirements that are needed to enter the hardware side of the industry, and that the three companies already established in the industry, have an extensive experience in the gaming field, as well as a large installed user base (Mochizuki, 2020; Warren, 2019). An illustration of this can be observed with the implementation of the cloud gaming platforms. Large companies like Amazon, Google, Valve, EA and potentially companies like Apple and Walmart have announced

that they are developing or are thinking of developing a cloud gaming platform to compete in this industry (Peters, 2019).

The common thing for these new entry companies is that they are already huge companies in their respective industries, which is the reason why these companies can try to create their own cloud gaming platforms. Since they already are successful companies, they have the capital that is needed to break through the entry barriers on the hardware side of the industry and establish themselves in the industry (Peters, 2019). The capital requirements will decrease a bit with the implementation of cloud gaming platform. However, there will still be a large capital requirement needed to make successful cloud gaming platforms (Walton, 2019; Mocheva, 2019). This is due to the large amount of cloud servers required to be spread out in the world. Therefore, even if these companies are on pair or maybe even larger than the existing companies in the industry, it does not indicate that these companies have a higher chance of succeeding with cloud gaming platforms (Hollister, 2019). This statement is supported by one of the companies interviewed, stating that companies like Google and Apple do not have any precedence to be better than the already established companies. This indicates that the threats of new entrants are low to moderate on the hardware side of the industry.

While there is a blockaded entry in the hardware side of the industry, there is however, an accommodated entry on the software side of the industry. There are a large number of game developers in the world and Figure 4 indicates how many there are by showing the countries with the highest number of game developers.
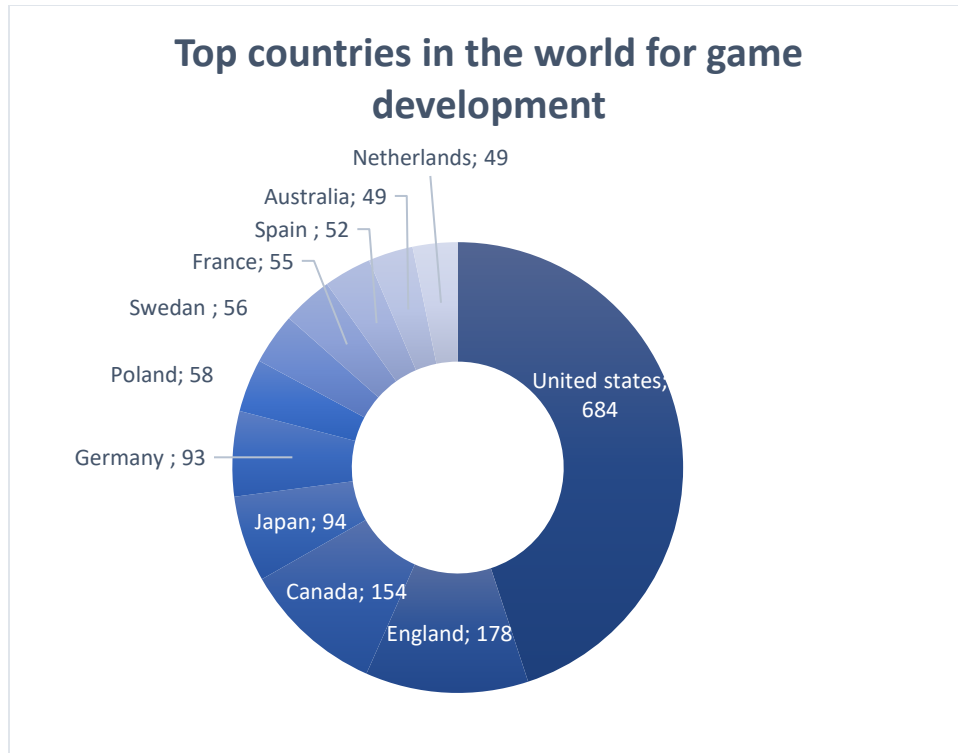
Fig. 4: Top game developing countries. (Source: Bay, 2015)

The large number of game developers could be seen in connection with the accommodated entry in the software side of the video game industry. Anyone who desires to become a game developer can chose to do so and each year there are more and more individuals that become game developers (Beck, 2019). There are also very low capital requirements to make video games, thus making it even more attractive to enter the industry (Beck, 2019). But even though it is easy to enter into the software side of the industry due to the low entry barriers, it is still hard to be successful in the video game industry (Kelly, Mishra, & Jequinto, 2014). This is further supported by one of the interviews, stating that a game would need to be exceedingly unique for it to be successful on the software side. This is because the mass production of games in some genres have led to the fact that new games need to be unique and, in another genre, to be successful. The threats of new entrants on the software side of the industry is considered high since it is so easy for new software developers to enter into the industry.

With the entry of cloud gaming platforms, the threat assessment that has been analyzed might be raised for software developers that want to make a name for themselves. With the cloud gaming

platforms in the industry, there will be an increase in the variety of different platforms games can be played on, thus making it so that there are more companies that the software developers could sell their product to (Kolakowski, 2019). Since it might potentially be easier for software developers to strike a deal with a company, it could result in a higher number of game developers appearing in the video game industry. Thus, the implementation of the cloud gaming platforms will make the threats of new entrants even higher, because of the low capital requirements and the increasing chance of getting known on the software side of the video game industry (Arkenberg, 2020).

Bargaining power of suppliers:

The bargaining power of suppliers refers to how suppliers can affect the cost of inputs in the industry. The power of the suppliers is determined by their individual uniqueness in the market, the numbers of suppliers in the industry, as well as, the switching cost that companies have to endure when switching suppliers (Chappelow, 2020). The bargaining power of a supplier is high if there are few suppliers in the industry. If there are few suppliers in the industry, then they can push for advantages in trade talks. In contrast, when there are many suppliers in an industry and low switching cost, then the bargaining power of the suppliers falls (Chappelow, 2020).

There are two kinds of suppliers in the video game industry. The first suppliers are the manufacturers who produce the parts for the consoles and delivers them to the companies who sells the consoles. The other suppliers are the companies who develop the games and then enters into agreements with the hardware companies and sell their games on their platforms. These companies are the software developers who also are a huge part of the video game industry (Aleem, Capretz, & Ahmed, 2016).

There are many suppliers to choose from within the video game industry, both on the hardware side and the software side of the industry. On the hardware side of the video game industry there are three main companies that want suppliers for their consoles. These three companies are, as mentioned above, Sony, Microsoft, and Nintendo (Zackariasson & Wilson, 2012). Even though there are many companies that could supply consoles for these three companies, they still stick with almost the same companies when it comes to the technical components inside their consoles

(PlayStation, 2020; Xbox, 2020; Nintendo, 2020). Sony and Microsoft both use an 8 core CPU delivered from AMD in their consoles. The only difference is that Microsoft uses an AMD Custom while Sony uses an AMD Jaguar (PlayStation, 2020; Xbox, 2020). Even though Nintendo does not use an AMD CPU in their console, they still got their CPU delivered from one of the large companies in the field, namely Nvidia. The CPU that is in the Nintendo Switch is a Nvidia Custom Tegra 4 core processor (Nintendo, 2020). All the consoles also have a good GPU which enables high quality gaming which they also get delivered from major companies within this field, like AMD (PlayStation, 2020; Xbox, 2020; Nintendo, 2020).

From this it is observed that all three major companies that produce consoles use just a few companies to get the components needed in the assembly of their consoles. This implies that the supplier in this regard have some kind of power in the video game industry on the hardware side, even though there are many suppliers available in the industry. However, since there are so many potential suppliers for Sony, Microsoft and Nintendo to use, it makes it harder for the suppliers used by these companies to control the price in the industry. The reason for this is that large companies like Sony, Microsoft and Nintendo are, presumably, sought after by many suppliers which then again decreases the power that the suppliers have in the video game industry (Roetting et al., 2010).

On the other side of the video game industry are the software suppliers which is that part of the industry with a vast number of suppliers. Figure 5 shows how many million copies of games that are sold worldwide. These games are produces by several software producers and these charts are used to illustrate how important the games are for the hardware producers.

Worldwide unit sale of the best selling pc games of all times in millions unit (January 2018)

Game	Units sold in millions
The sims 3	7.95
World of warcraft	6.33
Diablo III	5.23
Microsoft Flight Simulator	5.12
StarCraft II	4.86
Warcraft II	4.21
Half-Life	4.12
World of Warcraft: The...	4.09
The Elder Scrolls V: Skygrim	3.95
The Sims: Unleashed	3.76
The sims 4	3.74
Doom II	3.61
The Sims: Vacation	3.07
The Sims: Livin Large	2.99
Star Wars: The Old...	2.97

All-time Best-selling Console Games Worldwide as of March 2018 (based on unit sales, in million units)

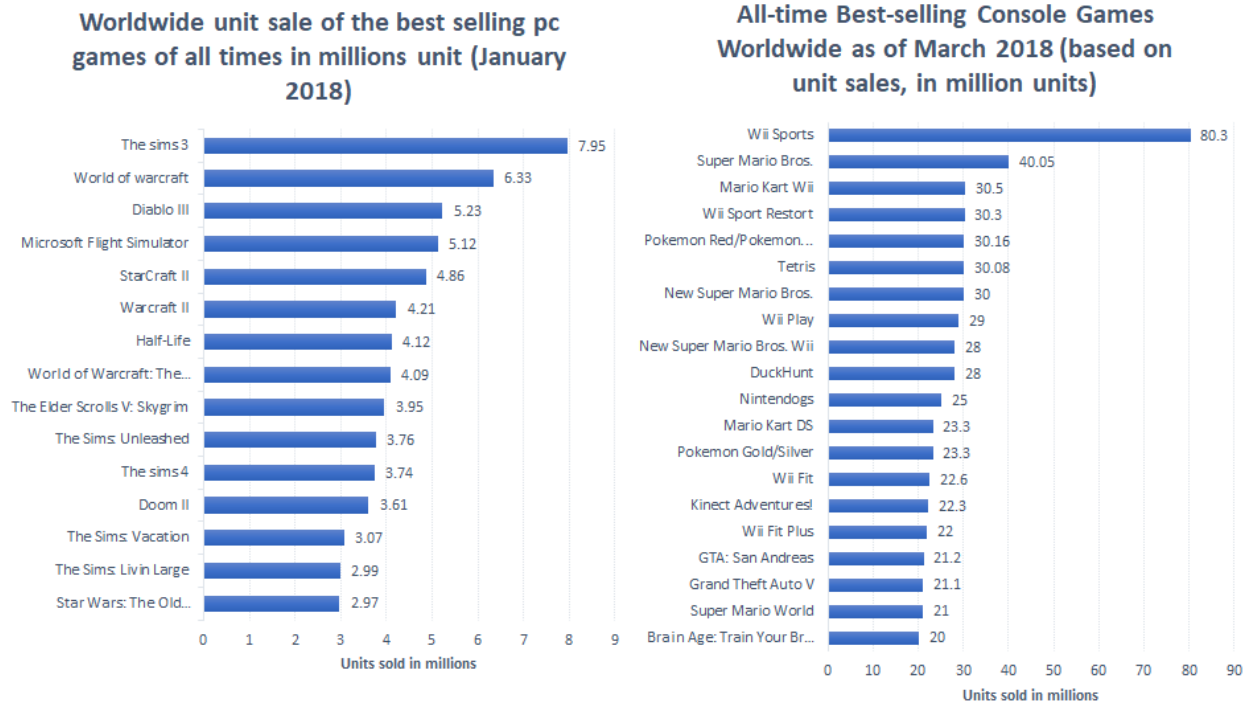| Game	Units sold in millions
Wii Sports	80.3
Super Mario Bros.	40.05
Mario Kart Wii	30.5
Wii Sport Restort	30.3
Pokemon Red/Pokemon...	30.16
Tetris	30.08
New Super Mario Bros.	30
Wii Play	29
New Super Mario Bros. Wii	28
DuckHunt	28
Nintendogs	25
Mario Kart DS	23.3
Pokemon Gold/Silver	23.3
Wii Fit	22.6
Kinect Adventures!	22.3
Wii Fit Plus	22
GTA: San Andreas	21.2
Grand Theft Auto V	21.1
Super Mario World	21
Brain Age: Train Your Br...	20

Fig. 5: Worldwide sales of bestselling PC games and console games (Source: VGChartz. Created by: WePC.com)

The two graphs in Figure 5 show us that the software suppliers in the video game industry are an important factor for the hardware manufacturers to create revenue. This is due to the fact that the consoles will lose value without the software that is played on it. A presumption can therefore be that the software suppliers have a large bargaining power in the video game industry, however, that is not the case. Interview object D talks about how the companies that mostly focus on hardware in the video game industry rarely seek software from the software companies. The reason for this is that hardware is a more important factor for software than software is for hardware. They therefore wait until the software companies come to them with finished games and then strikes a deal with them to get these games on their consoles (Interview object D). This indicates that the software developers have almost no bargaining power in the video game industry.

With the emergence of the cloud gaming platforms in the video game industry, more platforms to play video games on will be available and software developers could therefore have more companies to reach out to with their games (Kolakowski, 2019). More companies to reach out to could indicate that there will be an even fiercer competition amongst the software developers to

28

secure a platform for their games since more consoles would indicate more software developers in the industry. This suggest that the bargaining power of the suppliers will decrease with the introduction of cloud gaming platforms in the video game industry.

Bargaining power of buyers:

The bargaining power of buyers is associated with the consumer's ability to push down the prices in the industry. What determines the power of the buyers is the number of customers in the industry, the significant meaning of each customer and the company's ability to replace customers. The smaller the customer group is the lower the bargaining power and the greater role the customer group plays, the higher the bargaining power is (Chappelow, 2020).

The buyers in the video game industry can be divided into three groups. The casual gamers, regular gamers, and hardcore gamers, where the hardcore gamers will have more bargaining power than the others because of their time investment into the games. The group of hardcore gamers can also be divided into a subcategory called pro gamers (Techni Sport, 2020). The casual gamers are the gamers that occasionally play and usually on either their smartphones or tablets. Even though casual gamers only play games rarely, they are still arguably the largest group of the three definitions of gamers (Andre, 2020). The buyers that are classified as regular gamers are those who play a fair amount of games but not enough to build a long-lasting commitment with the games. These gamers usually play on consoles or computers and usually have a large number of different games that they play (Techopedia, 2018). The last group of buyers in this industry is the hardcore gamers. These gamers are those who invest as much of their time as possible into video games and they are usually invested into a few games at one time. A sub-category of the hardcore gamers will be pro gamers who have managed to get good enough at the game to play it professionally (Techni Sport, 2020).

The casual gamers and regular gamers will not have a huge amount of bargaining power in the video game industry. The reason for this is that there are roughly 2.5 billion gamers all over the world and a fair amount of these gamers are classified as casual gamers or regular gamers (WePC, 2020; Arkenberg, 2020). The number of gamers split by region is illustrated in Figure 6. Given that there are so many casual gamers and gamers in the world, a single gamer will not

have much of a bargaining power in the video game industry. However, if enough casual gamers and gamers rally together it could potentially increase their bargaining power. The reason for this is because the video game industry cannot ignore it when a large number of gamers gather together in order to change something (Tassi, 2019; Bhagat, 2019; Woodcock & Johnson, 2018)

2016 Recorded Number of Video Games in Millions (by Region)

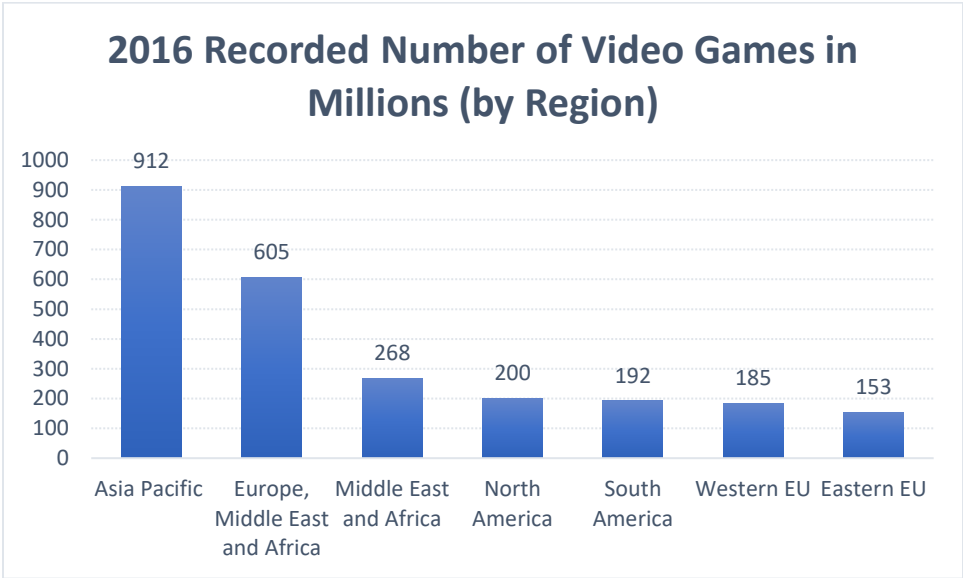| Region	Value
Asia Pacific	912
Europe, Middle East and Africa	605
Middle East and Africa	268
North America	200
South America	192
Western EU	185
Eastern EU	153

Fig. 6: Number of gamers per million worldwide (Source: Newzoo, Created by WePC.com)

The hardcore gamers might have a larger bargaining power than casual gamers and regular gamers. The reason for this is that hardcore gamers are usually more well-known in the gaming community because they are dedicated to very few games at a time (Techni Sport, 2020). Since hardcore gamers are more well-known in the market it would be easier for them to rally up a large group of gamers if they want to see changes within a game (Techni Sport, 2020). It would also be easier for them to influence other gamers into taking action against companies when they want changes in a game (Tassi, 2019; Biswas, 2020; Dey, 2020). However, even if hardcore gamers are considered to have a higher bargaining power than other gamers, it is still small because of the number of gamers that exist in the world, but the sub-category of hardcore gamers, the pro gamers, is a different story (Coale, 2016).

The pro gamers are gamers who play just one game at the time on a professional level but can also at times play a few other games when they have time for it (Techni Sport, 2020). Out of all the types of gamers the pro gamers have the highest bargaining power in the video game industry. The reason for this is that pro gamers usually are a part of a pro team which makes them more well-known, not just in the video game industry, but also to other related industries (Townley & Townley, 2018). This leads to gamers in this category getting companies wanting to sponsor them and the better they are at their respective games the more sponsors they get (Weber, 2020). Pro gamers also usually stream themselves playing video games which creates another platform where they can talk about and discuss video games with their fellow gamers. This, in turn, gives the pro gamers more bargaining power because when they stream there is frequently a large number of viewers that watch them stream (Gough, 2020; Gough, 2020). In Figure 7 two charts are provided to show the average viewer count and monthly viewer count on twitch, which is a popular streaming website for gamers and games.
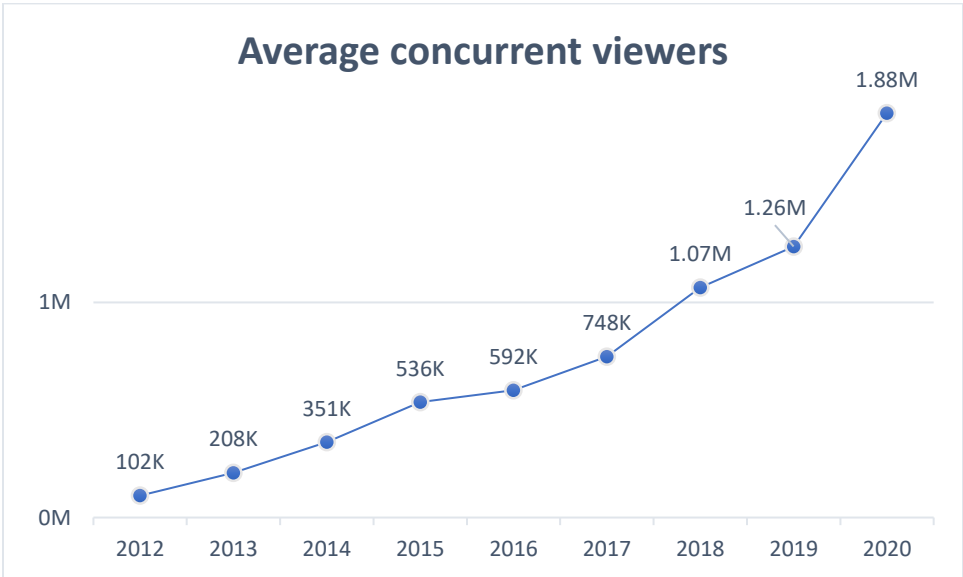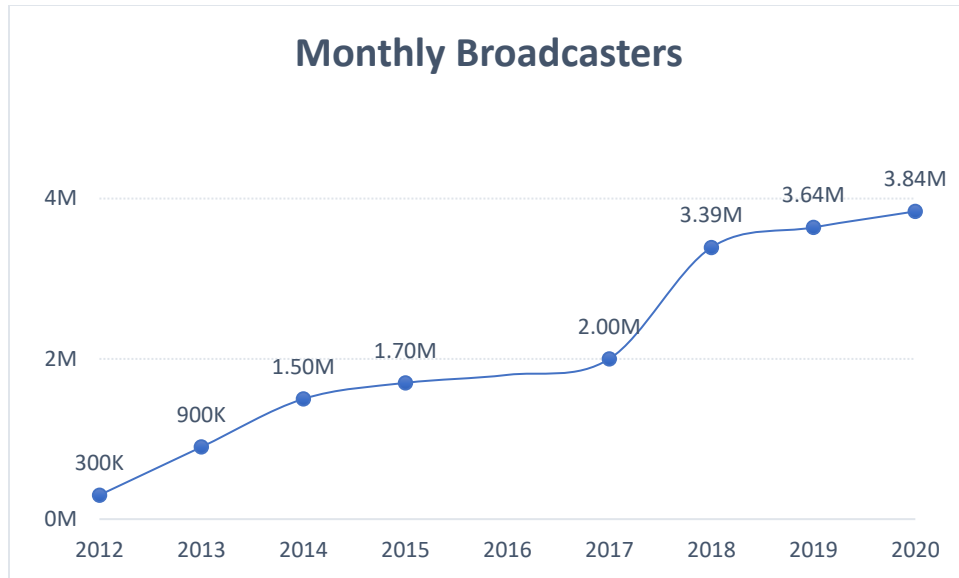
Fig. 7: Average and monthly viewer count on twitch (Source: Twitchtracker)

Figure 7 indicates that gamers do have a large bargaining power in the video game industry. However, it is only the hardcore gamers that have a bargaining power of some degree, with the pro gamers having the highest bargaining power in the industry. This could potentially change with the cloud gaming platforms slowly making its way into the video game industry. The reason for why the average gamer does not have much bargaining power in the video game industry, is due to large number of gamers in the industry (Arkenberg, 2020; WePC, 2020). There are not many differences between the competitors so there is no reason to switch consoles, and if the average gamers do decide to switch then the switching cost is usually very high because of the price of the consoles (Dornbush, 2017). All this combined gives the average gamer low bargaining power.

However, with the implementation of cloud gaming platforms, gamers will not have to endure such high switching costs. Switching from one platform to another will almost be the same as going from one website to another (Ball & Navok, 2020). This will reduce the gamers' switching cost to almost zero, because if they want to switch, they will only have to pay the monthly fee of the platform they switch to. The effect of this will be a higher bargaining power to the gamers since it then will be harder for the companies to keep hold of the gamers (Ball & Navok, 2020).

The decrease in switching cost is not the only contributing effect cloud gaming platforms could have on the bargaining power of the buyers. The implementation of cloud gaming platforms could also bring additional new gamers because cloud gaming platforms opens for more casual playing (Zeloof, 2019). Cloud gaming platforms make it possible to play more games and games of higher quality on mobile devices which in turn could result in more people starting to play video games (Zeloof, 2019). The increase in numbers of gamers in the industry will have the opposite effect from the reduction of switching costs and will decrease the bargaining powers of the buyers. The reason for this is that the more gamers there are in the video game industry, the harder it is for a single gamer to have enough bargaining power to make changes in the industry (Arkenberg, 2020; WePC, 2020). Given all the aforementioned considerations the accumulated bargaining power of the buyers is considered to have a moderate threat level to the video game industry.

Rivalry among existing competitors:

Rivalry amongst existing competitors assesses the number of competitors in the industry and how they are able to dominate another company. The larger the number of companies present in the industry and the more alternatives that exist in the industry, the lower the rivarly power of a company is. Contrarily, if there is low rivalry among existing competitors then a company can decide what to charge in the market and run the industry by themselves (Chappelow, 2020).

There are many competitors in the video game industry and several of them have different business models (Zhang, 2020; Dillon, 2013). As previously stated, the video game industry is split into two parts: the hardware developers and the software developers i.e. the hardware side and software side. The most well-known companies in the video game industry on the hardware side are Microsoft, Sony, and Nintendo. All three of these companies sell video game consoles that are required by gamers to connect to a television (PlayStation, 2020; Xbox, 2020; Nintendo, 2020). However, Nintendo differentiate themselves from the others by also selling handheld video game consoles (Wardyga, 2019).

On the software side of the industry, the most well-known companies are Tencent, Sony Computer Entertainment (SCE), Nintendo, Mojang, EA, Activision Blizzard, Rockstar Games, and Epic Games (Game Designing, 2020). Most software companies rely on hardware companies as there otherwise would not be a platform where gamers could play their games. While most companies rely on the hardware companies, there is a minority that have built their own platform for the games they produce. These companies are Mojang and Epic Games. The games sold by these companies can be directly installed on your computer making it unnecessary to get a video game console from the hardware producers (Epic Games, 2020). Among the most successful software developers are two abnormalities. These two are SCE and Nintendo and they are abnormalities in the form that they are the only two companies who have managed to do it well in both the hardware and software side of the industry.

There also exists a large number of smaller companies that develop games which are lesser known in the industry, but they still compete for the market shares in the industry (Game Designing, 2020). Some of these companies are Square Enix, BioWare, Naughty Dog, CD Projekt Red e.g.
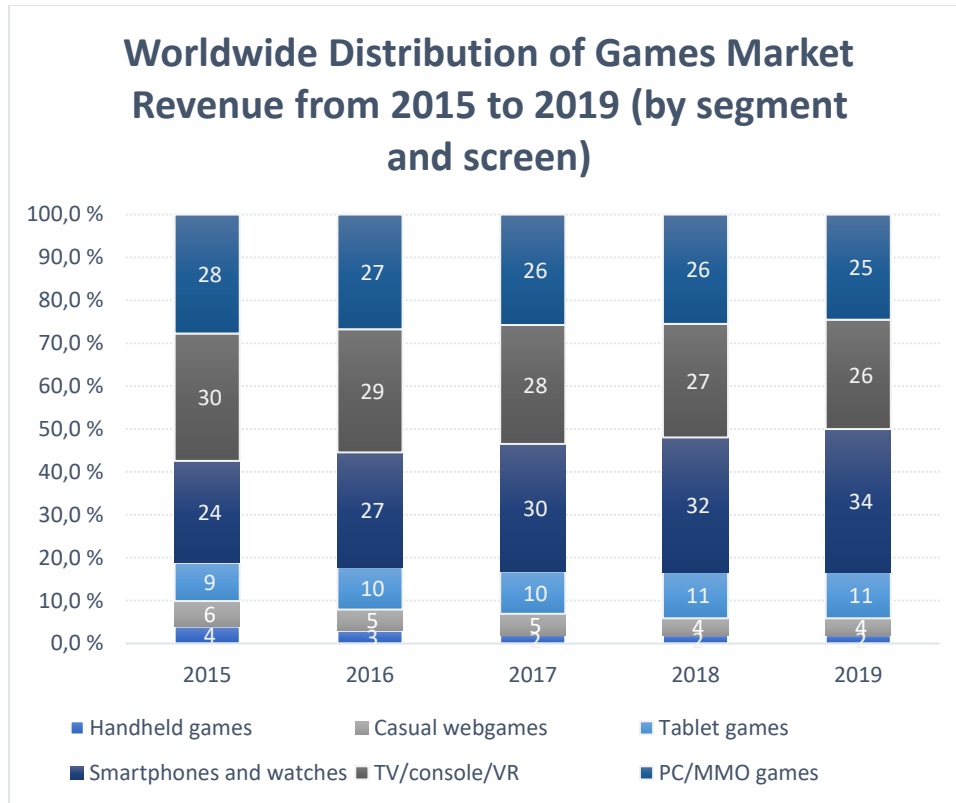
Fig. 8: Worldwide distribution of Games Market Revenue by Segment and Screen (Source: Newzoo, Created by: Le, Tri T.)

The graphical representation on the global games market revenue by segment and screen in Figure 8 shows a gradually increasing proportion of gamers who play on cellphones and tablets from 2015 to 2019, which could be why companies like Google and Apple are starting to take more of the market share in the video game industry, as indicated in Figure 9. This trend indicates that the rivalry among the existing companies will be fiercer in the years to come. Companies who have dominated this industry for a long time, like Microsoft, Sony, and Nintendo, now must expect competition from larger companies like Google and Apple (Webb, 2019).
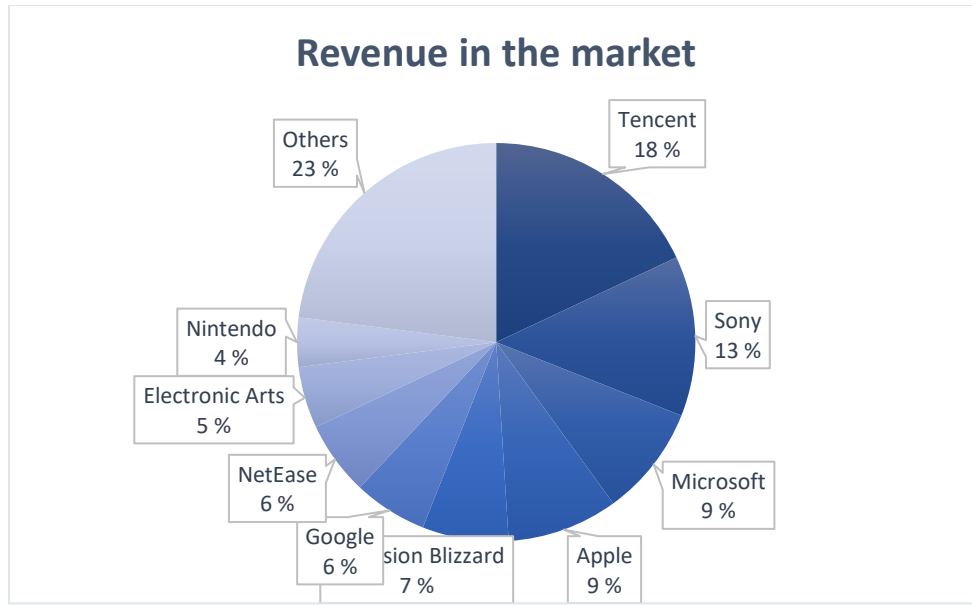
Fig. 9: Game company's revenue in the market in 2019 (Source: Newzoo, Created by: Le, Tri T.)

Even though Google and Apple have started to take a bit of the revenue in the video game industry, the consoles of Sony, Microsoft and Nintendo have become a standard in the video game industry, and it is therefore not necessary to expect fiercer competition on the hardware side but rather on the software side of the video game industry. The reason for this is that Apple and Google earn their revenue from mobile phones which is a different platform form what Microsoft, Sony, and Nintendo uses (Gough, 2020). The rivalry will, therefore, be toughest on the software side of the video game industry because that is where most of the revenue from the industry comes from, as presented in Figure 10 showing the revenue in the video game industry between hardware and software.
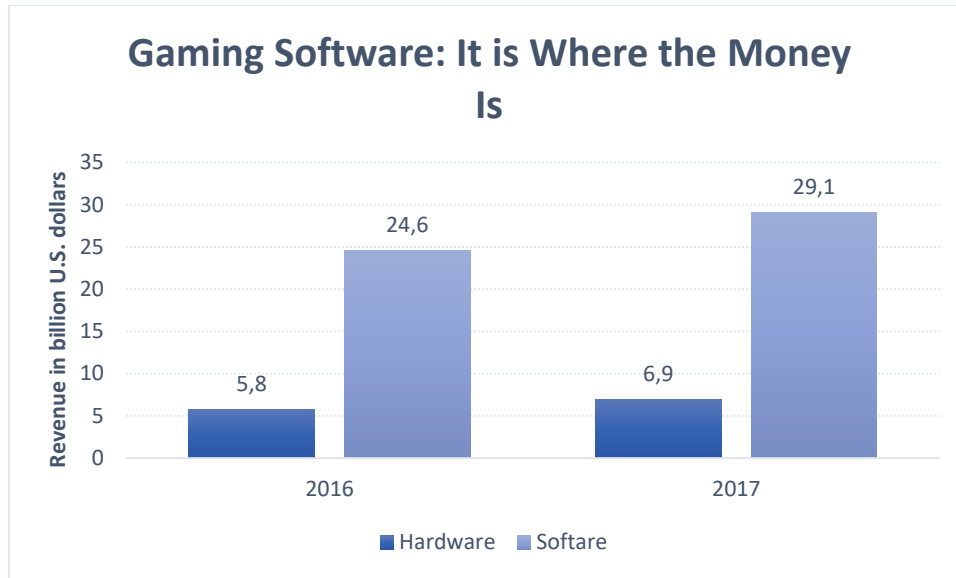
Fig. 10: The revenue split between hardware and software (Source: Entertainment Software Association, NPD Group. Created by: WePC.com)

With cloud gaming platforms coming to the video game industry, it can be surmised that the rivalry between the big and small companies will become even fiercer on the software side of the industry. The reason for this is that cloud gaming platforms could potentially remove the need for hardware in the video game industry, thus indicating that companies must compete on the software side of the industry (Arkenberg, 2020; Zeloof, 2019; Kolakowski, 2019). Cloud gaming platforms will also, as mentioned before, make it easier for smaller software companies to enter the market through the different cloud gaming platforms. This, in turn, could further contribute in making the rivalry stronger in the industry.

The switching cost in the video game industry will also almost become zero because cloud gaming platforms could, as mentioned above, potentially remove the need for hardware. If the need for hardware in the video game industry disappears because everything has been moved into the cloud system, then gamers will not have to buy a new console every time they want to switch from one console type to another. It will, because of this, be harder for companies to retain their customers because it is easier for them to switch between consoles (Kolakowski, 2019; Ball & Navok, 2020). However, it can be postulated (based on theory on consumer loyalty) that the gamers with a high brand loyalty towards the companies that have established

themselves with the consoles in the market, Microsoft, Sony, and Nintendo, would want to keep using the cloud gaming platforms that these companies develop.

With the implementation of cloud gaming platforms, the existing companies also have to expect some rivalry from companies that are not directly attributed to the video game industry but want to take part in it (Schiesel, 2020; Etienne, 2019; Welch, 2019). Companies like Nvidia, Verizon and Amazon want to implement their own cloud gaming platforms in the video game industry to reap the benefits from this fast-growing industry. These companies are not directly in the business of selling hardware and software but are still a part of the video game industry in the form of selling graphic card (Nvidia and Verizon) and in the form of streaming games (Amazon) (Peters, 2019).

There are also companies that are well-known in the video game industry that now want to implement their own cloud gaming platforms to compete with the cloud gaming platforms of Microsoft and Google who have had a head-start in the production of their own platforms. These companies are Nintendo, EA, and Valve who have all been beta testing their own cloud gaming platforms (Peters, 2019). Since there are so many large companies that are already competing directly and indirectly in the video game industry, it is believed that the rivalry amongst existing competitors will be very high.

Summary:

After analyzing the video game industry, a radar chart is used to visualize the multivariate data obtained from the porter five forces model and give a more collected view of the whole analysis. The radar chart of the analysis of the video game industry in Figure 11 highlights the important parts. In this radar chart, zero signalize that the given factor analyzed has no impact on the industry and the level of impact increases at each point where five signifies the factor(s) that have the highest level of impact on the industry.
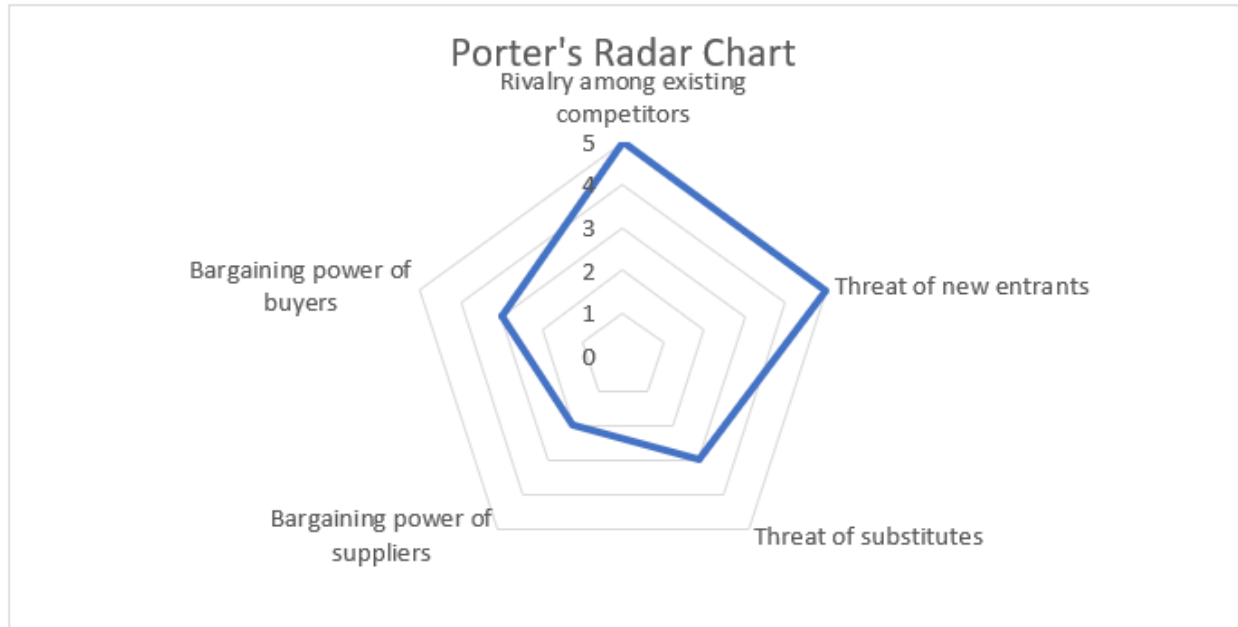
Fig. 11: Radar chart of Porter's five forces (Created by: Le, Tri T.)

Based on the Porter's five forces analysis, rivalry amongst existing competitors and the threat of new entrants are determined as most significant for shaping the video game industry both before and after the implementation of cloud gaming platforms. Following that, threat of substitutes and bargaining power of buyers are assessed to have a moderate level of impact on the progression of the industry. The factor with the least potential to impact the dynamics of the video game industry, is the bargaining power of supplier due to the availability of gaming platforms and the position of hardware actors in the industry.

3.2. Suarez battle for technological dominance

Based on the previous work of other authors in this field, Suarez (2004) has proposed an integrative framework that describes the different stages of a dominance battle and proposes five battle milestones that in turn define five key phases in the process. The outcome of each technology battle depends on the key firm- and environment-level factors that may affect the outcome of the battle (Suarez, 2004). The following work is based on Suarez' (2004) work unless it is stated otherwise.

Over the last decades there have been several battles for dominance that have occurred, and the battles have always been between two or more rivaling technologies that are backed by well-known firms. The outcome of these battles would often determine more than the fate of the new technologies. It would also determine the type of complementary goods and services offered around these technologies and it could sometimes determine the fate of the near future of the industry as well.

The majority of previous research has focused on identifying the different factors affecting the final outcome of the technology battle e.g. technological superiority, firm resources, institutions' role, etc., but these studies have provided insufficient insight as to how these factors play out in different situations and how they affect the industry over time. By focusing on the process of dominance, Suarez (2004) proposed five milestones and five key phases, which in turn leads to the different stages a technology must go through to achieve dominance. The importance of the different factors needed to achieve dominance will vary depending on which stage the technology is in.

Suarez' (2004) framework complements and expands the existing literature that exist in this field. By using the various literature, it is then possible to integrate the different perspectives of each literature, into a more consistent and comprehensive approach. This framework created by Suarez (2004), applies mostly to technological battles that develop within the broad set of industries typically defined as information and telecommunication technologies.

Technology is defined as a package of knowledge incorporated into devices and equipment and become dominant when they compete with several other alternatives and versions of this technology (Clark, 1985). However, studies show that a technological trajectory is reversible if the firms figure out that they have entered the industry with the "wrong" technology, thus making it so that the firms still have a chance when entering with a "wrong" technology (Tegarden et al., 1999).

Suarez (2004) states that in most models that discuss the battles of technologies, two firms are always considered. One represents the old technology and network and the other represent the new technology and network. However, Suarez (2004) also states that there is no model that puts

together all the findings of the different models. Nonetheless, these theoretical differences provide future researchers with a better understanding of the battle for technological dominance by focusing on three issues:

1. "The role of firms' installed base and "excess inertia" (Suarez 2004, pp. 274).
2. "The role of consumer expectations, shaped by brand image, pre-announcements and information availability" (Suarez 2004, pp. 274).
3. "The importance of dynamic elements of firms' strategies, such as pricing and licensing policies" (Suarez 2004, pp. 274).

Suarez (2004) argues that the technology used in the products could be divided into simple products and complex products. Furthermore, he divides these two categories into non-assembled products, assembled products, and complex systems. Non-assembled products are the products that do not have components that can be separated. Assembled products are products with a few components put together, and the complex system has a whole array of technological subsystems put together. Furthermore, these products have either a quality standard or a compatibility standard, whereas the compatibility standard is divided into non-sponsored and sponsored. The following model will take into account the sponsored technology that is used in all three kinds of products mentioned above. By doing this, the model will allow us to view the dominance battles where multiple companies compete against each other.

```
┌─────────────────────────────────┐          ┌─────────────────────────────────┐
│ FIRM-LEVEL FACTORS              │          │ ENVIRONMENTAL FACTORS           │
│                                 │          │                                 │
│ • Firm's technological superiority│        │ • Regulation                    │
│                                 │          │                                 │
│ • Firm's complementary assets   │          │ • Network effects & switching   │
│   and credibility               │          │   costs                         │
│                                 │          │                                 │
│ • Firm's installed base         │          │ • Regime of Appropriability     │
│                                 │          │                                 │
│ • Firm's strategic manoeuvering │          │ • Characteristics of the        │
│                                 │          │   technological field           │
│     o  entry timing             │          │                                 │
│     o  pricing                  │          │       o  number of actors       │
│     o  licensing and            │          │       o  level of cooperation v.s│
│        relationships with       │          │          competition            │
│        complementors            │          │                                 │
│     o  marketing & PR to        │          │                                 │
│        manage expectations      │          │                                 │
└─────────────────────────────────┘          └─────────────────────────────────┘

                      ┌──────────────────────────┐
                      │   TECHNOLOGICAL          │
                      │   DOMINANCE              │
                      └──────────────────────────┘
```
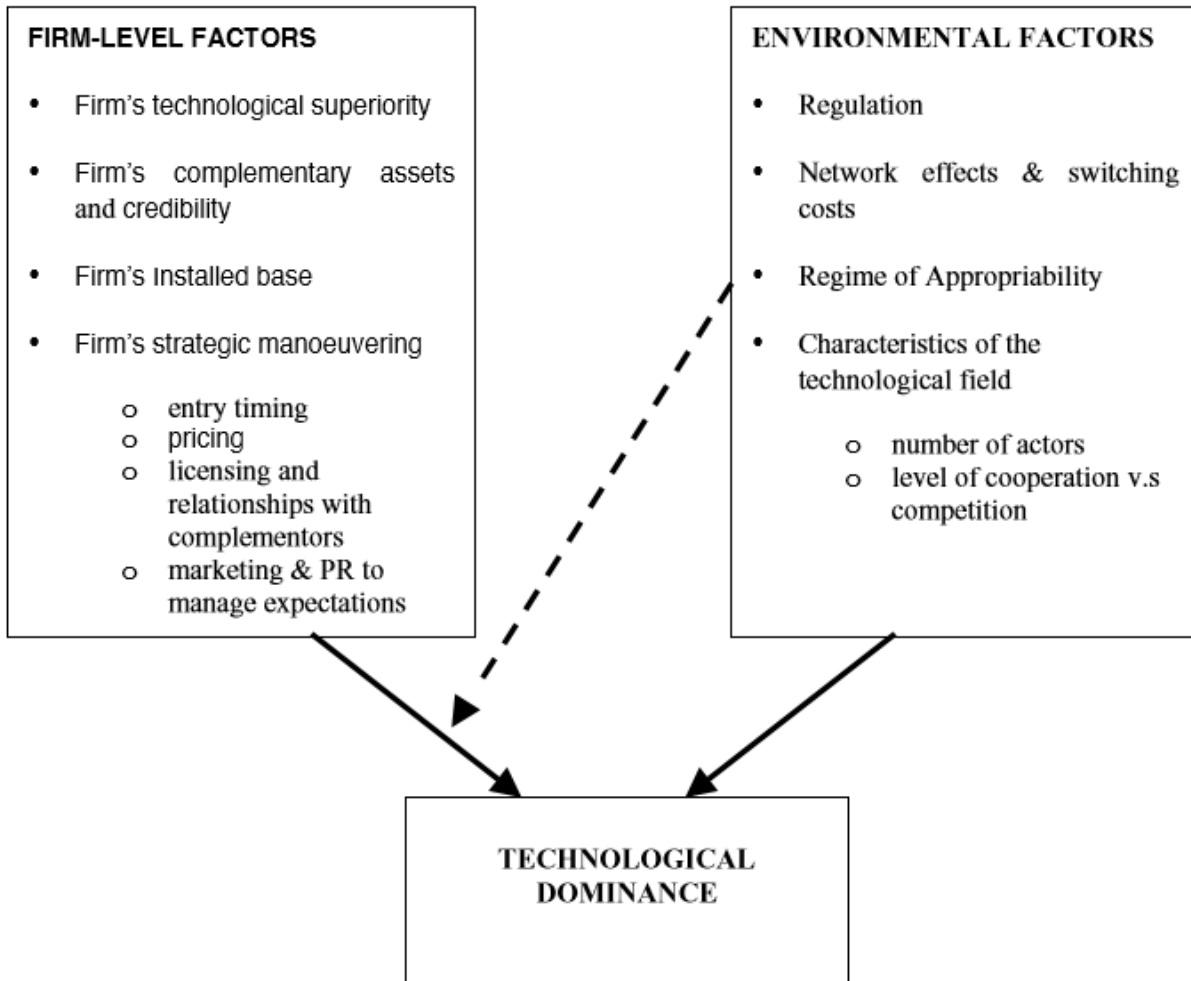
Fig. 12: Firm- and environment-level factors influencing the outcome of technology battles (Suarez 2004, pp. 275).

The model, as presented in Figure 12, shows a process where the different companies compete for technological dominance where the firm-level- and environmental factors are intertwined and play a role in the outcome of the technology battle.

Suarez (2004) states that no technology works alone. At some point they will need to be compatible and coordinated with other technological systems and the higher the complexity of the products, the more resources are needed for the companies to achieve technological dominance in the battle. The sponsoring part of the battles will, as a result of this, also become more complicated. The reason for the complications is because the more complex the system is the more components requires attention at the same time.

42

However, the technological field can be in all kinds of sizes and there will still be two broad groups of factors that affects the outcome of the technological battle. Those two groups of factors are firm-level factors and environmental factors as presented in Fig. 12. Suarez (2004) argues that it is important to specify the different factors that plays a role in a technological battle because the battle in itself has a very special dynamic. Suarez (2004) also argues that environmental factors cannot only influence the outcome of a technological battle, but also influence certain firm-level factors through the use of regulation.

In a typical technological battle, there are no single factor powerful enough to tip the balance in favor of a certain company. The outcome of a technological battle is always the results of how all the firm-level factors and the environmental factors together affect the technology in favor of one another.

The first firm-level factor, technological superiority, captures the pure effect of the technology and how it competes against the alternatives of technologies. Suarez (2004) argues that if all is equal, then the technology that performs the best out of the competing technologies has a higher chance of becoming dominant. However, research on this subject shows that being technologically superior to your competitors is not always synonymous with dominance. Rosenbloom & Cusumano (1987) demonstrate this in their studies on the VCR industry. It is therefore believed that technological superiority only plays a huge role if there are large differences between competing technologies.

The second firm-level factor that plays a role in whether a firm gets technological dominance or not is the credibility of the technology and its complementary assets. An example of this is shown in Teece's (1986) work about technological innovation. Here he shows how complementary assets played a crucial role when IBM and Apple were battling for dominance. Another example of this firm-level factor is presented in the research by Gallagher and Park (2002). They demonstrate how Sony's credibility in the market were an important factor when they overcame Nintendo as the leader in the video game industry back in 1995. Suarez (2004) pulls all of these points together stating that a better complementary asset and credibility will increase the chance for dominance given that everything else is equal.

43

The third and arguably the most important firm-level factor is the firm's strategic maneuvering. This firm-level factor discusses the key elements of strategy available to firms in technological dominance battles. Suarez (2004) argues that there are four elements that are more important than others. These four elements are: "the timing of entry to the industry, the specific pricing strategy, the way a firm manages the relationship with complementary goods and services, and the form and intensity of a firm's marketing and public relations efforts aimed at managing customers' expectations" (Suarez 2004, pp. 276).

Entry timing relates to both when a firm enters a market and with the pioneering of R&D activities in the circumstances of technological battles. Rosenbloom and Cusumano (1987) found the entry timing of a firm was important for whether their technology would be dominant in the market or not. Carpenter and Nakamoto (1990) states that an early entry helps to build reputation and a customer base that will help throughout the technological dominance battle. Even though early entry is mostly associated with success, it could also have some negative consequences. Dosi (1982) argues that early entry in a market could lead to a firm getting locked into a technological trajectory that isn't necessarily the one that will win the technological dominance battle. Suarez (2004) also mentions that a firm's survival chance is low when entering early in fast-paced industries, which the video game industry is. A firm therefore need to enter a few years just prior to the arrival of a dominant technology to maximize their survival chances.

Pricing has always been important for any product, but it is highly important in the case of technological dominance battles. If there are networks effect present, then early aggressive pricing could lead to a large customer base, which in turn, makes the firm's technology dominant. Suarez (2004) mentions that this kind of pricing is often observed in cases with alternative competing technologies. An example of this is when Microsoft launched their Xbox back in 2001 at a price 30% lower than that of Sony's. This resulted in a price decrease from Sony to prevent potential loss of market shares to Microsoft.

A firm's licensing policy is also important when it comes to maintaining the relationship with the producers of complementary products. Firms can choose to have an open standard licensing which is making the product free for consumers or they could choose a liberal licensing policy. A liberal licensing policy does, however, come with some backlashes. It comes with increased competition and the firm might lose control of the development path of their technology.

The last firm-level element that falls under strategic maneuvering is a firm's use of marketing and public relations resources. The reason for its importance is that customers' expectations have always played an important role on the final outcome. Since customer expectation is so important, firms usually pre-announce their product to create buzz around their upcoming products, simultaneously creating a customer hold-up. This is a normal tactic to use in the video game industry and it has been done many times by the large industry leaders. Sony did this when they pre-announced their PlayStation 2 a whole year in advance of the actual launch and Microsoft has also done this on several occasions. This tactic is also used on the software side of the video game industry where companies usually announce their games half a year in advance of the release date.

The final firm-level factor that can affect the technological dominance battle is the firm's installed base of users. The base of users can be seen as an outcome of the other firm-level factors that affect dominance, but the base of users in itself can affect customers' demand, if there are network effects present in the video game industry. A large customer base can either give the firm the last extra push they need to win a technological dominance battle, or the firm can design their products to be compatible with their customers base based on previous technology. An example of this strategy is when Atari made their new console Atari 7800 compatible with games from their old console, the Atari VCS. They did this to try to stop Nintendo's rapid surge in the video game industry, but the quality of the old videogames of Atari were too poor for people to want to play them on the new console.

However, there are not only firm-level factors that can affect the outcome of a technological dominance battle. There are also environmental factors that comes into play when firms are battling for dominance in an industry. This is illustrated in Fig 12. The first environmental factor is regulation and institutional intervention. This factor discusses how governments might at times intervene in an industry to make them use a particular technology. It can either be through regulations that make a technology dominant in the industry, or through purchasing a product that is in an early stage which will give the technology an edge over the other technologies that are competing.

The second environmental factor that can affect the outcome of a technological dominance battle are network effects and switching costs. Network effects shows up in an industry when the number of consumers increase, thus pushing the demand curve upwards. Katz & Shapiro (1985) argues that network effects can be spilt into a direct and an indirect effect. Direct network effects occur when a nth consumer joins a network which creates a new network connection for all existing consumers. Whereas, indirect network effects occur when the demand for complementary products or services is increasing. The fact that network effects is present in a firm's environment will imply that the value of the consumers is an important tool in the battle for technological dominance. However, network effects will not only affect the result of a technological dominance battle directly, they may also affect some of the firm-level factors on the left side of the model. Weak networks effects might for example make the effect of early entry less critical to the outcome of the technological dominance battle.

Apart from networks effects, we also have switching costs that affects a firm's ability to attract consumers and keep a hold on to the consumers. Suarez (2004) argues that switching costs can occur out from network effects, but they can also occur with the lack of network effects. When consumers have become attached to a network, they may find themselves unwilling to switch to a different one if the switching costs are considered too high. Therefore, the higher the switching cost is, the more strenuous is it for another firm to steal those consumers. Thus, making consumers more loyal if the switching costs are high. Switching costs, like network effects, might affect the firm-level factors in the way that it might encourage firms to an early entry in the industry and then apply penetration prices.

The third environmental factor that might affect the outcome of a technological dominance battle is regime of appropriability, which Teece (1986) has defined with aspects of the commercial environment and mentions that its main point is how a firm is able to capture the rent associated with innovation. Suarez (2004) argues that a business environment will decide the degrees of appropriability that a firm can achieve and that this degree may have a strong connection with the technologies that are competing for technological dominance in an industry. Suarez (2004) also mentions that a high appropriability regime in an industry will work out better for those firms who have a superior technology, because it will prevent competitors with a poorer technology to get consumers to their firm.

The final environmental factor is the characteristics of the technological field, which discusses the structure and dynamics in the market. Suarez (2004) talks about how technological trajectories compete for dominance in new technological fields, where he mentions that a firm's ability to reach agreements with firms who produces complementary goods or consumers will depend on the structure and dynamics in the technological field. Suarez (2004) mentions that there are two factors who play a role in the technological field and that are the number of actors present and the level of cooperation versus competition. Technological fields are as Suarez (2004) describes them, "populated by communities of researchers in particular disciplines and also by firms that operate along the whole value system into which new product is to be inserted" (Suarez 2004, pp. 279). The research communities have preferences of how technology should be, i.e. that there is more support for in the community. For instance, in the software developer community there is more support for an "open standard" type of technology. An "open standard" is a standard where companies build industrial knowledge to produce their products.

Suarez (2004) mentions that the technological dominance process can be outlined into five milestones, where each milestone marks the start of a new stage in the technological dominance battle. Each stage has different characteristics which make some of the factors who can determine the outcome of a technological dominance battle more relevant than others.

The first milestone, which is also the beginning of a technological field is when researchers are doing R&D which is directed towards the creating of a new product or service. The pioneer who started doing R&D first will then be joined by other researchers and actors who wants to research the same thing and then technological field will be filled with different actors who compete with alternative technologies.

The second milestone is, as mentioned by Suarez (2004), marked by the emergence of the first working prototype in the industry. The first working prototype sends a message to all the other firms in the technological dominance battle that one of the technological trajectories is doable and that there soon is a working product in the industry. Suarez (2004) argues that a working prototype often act as a signal for the other firms to review their own technological trajectory to see whether it is still doable or not.

The third milestone in the technological dominances battle is marked by the launch of the first product in the industry, which for the first time since the technological dominance battle has started, connects the technology with the consumers. Suarez (2004) argues that the first product in the industry usually target high-end of the market because they are too expensive for the whole market. He also mentions that the first product acts as a "last-minute call" to the firm still developing their own product, because if they dwindle too much with the production of their own products then they are going to be left behind in the market.

The early market is essential for a firm to become a frontrunner in the technological dominance battle, and Suarez (2004) mentions that the fourth milestone is marked when there is a frontrunner in the technological dominance battle. The frontrunner has usually a higher chance of winning the technological dominance battle because of a large consumers base which creates excess inertia. However, the outcome of the technological dominance battle will depend on how quickly the competing firms can improve their own technology and catch up to the frontrunners and how fast the industry itself is growing. Katz & Shapiro (1985) argues that excess inertia can be overcome by the competition if they find enough room to grow their own technology and its even easier if their technology is superior to the frontrunners and the industry is rapidly growing.

At some stage during the technological dominance battle, a firm's technology will achieve dominance in the industry, and this marks the last milestone in the technological dominance battle. The early research argues that a technology has achieved dominance in the technological dominance battle when they have achieved 50% of the market shares, thus making the market share the measurement of dominance (Anderson & Tushman, 1990, Christensen et al., 1998, Katz & Shapiro, 1985). However, Suarez (2004) argues that these kinds of measurements ignores the dynamics of the competitive part of the technological dominance battles. Therefore, a technology will only achieve dominance when, during phase four of the model shown below, one or both of these situations occurs:

1. "There is a clear sign that the most closely competing alternative design has abandoned the active battle, thus acknowledging defeat directly or indirectly" (Suarez 2004, pp. 281)
2. "A design has achieved a clear market share advantage over alternative designs and recent market trends unanimously suggest that this advantage is increasing" (Suarez 2004, pp. 281)

Once a technology becomes dominant in the industry, it stays unchallenged until a new technology shakes up the industry and opens up for a new technological dominance battle. Fig. 13, which is shown below, displays the timeline suggestion for the milestones in the technological dominance battle where:
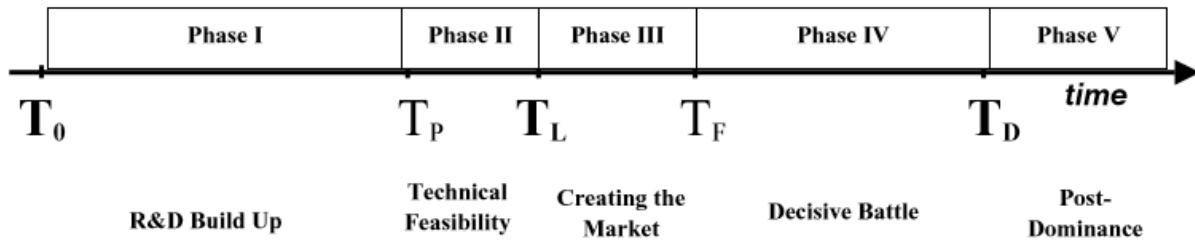

Fig. 13: Five milestones in the process of technological dominance (Suarez 2004, pp. 281).

- " T_0 denotes the beginning of a technological field with an organization pioneering applied R&D" (Suarez 2004, pp. 281)
- "T_P denotes the time when the first working prototype emerges" (Suarez 2004, pp. 281)
- "T_L denotes the time of the first launching of a commercial product" (Suarez 2004, pp. 281)
- "T_F denotes the time when a clear early front-runner appears" (Suarez 2004, pp. 281)
- "T_D denotes the time when one of the alternative designs becomes dominant" (Suarez 2004, pp. 281)

These milestones show us how the technological dominance battle unfolds in an industry and it was mentioned earlier that different firm-level and environmental factors have a stronger effect during some of the phases. This does not however point towards the fact that some of the factors are irrelevant during some of the phases. All factors are present during all the phases, but some play a larger role than others.

The first phase, R&D build up, decides the attributes that the technological field will have. A technological field is typically built up with, firms with high knowledge, new entrants and researchers from various research fields, and the size and power of those firms that enters into

49

the technological field will decide how hard of a technological dominance battle that it is going to be. In this phase the most important part is the technology, because it is here in this phase that the path of each technology is laid out. Suarez (2004) argues that the firm-level factors of credibility and complementary assets plays an important role to attract people with high technological talent. The key element in this phase is for competing firms to develop their technology faster than their competitors. Alongside the firm-level factors, there are also one environmental factor that plays a large role during this phase. That factor is the regime of appropriability because it dictates which firms that must deal with imitators and which firms that do not.

One of the competing firms can set of a new dynamic in the technological dominance battle during phase two, technical feasibility, if they manage to produce a working prototype. The moment a working prototype emerge in a technological dominance battle, all other firms who are taking part in this battle needs to decide whether or not they are in a position to continue on with this technological dominance battle. In this phase, the firm-level factor of technological superiority has a huge effect on the outcome. Its effect is so large that it sometimes could lead to the appearance of a winning technology in the technological dominance battle. The environmental factor that has the biggest effect in this phase is an active regulator role. Suarez (2004) argues that firms normally hasn't reached a point in the industry where regulators can intervene when they just have made a working prototype. When a regulator comes into play it can directly alter the course of the technological dominance battle by either supporting one type of technology or minimizing the alternative technologies in the technological dominance battle.

The third phase in the model shown above consist of creating the market. This is marked by the launch of the first product which changes the feel of the technological dominance battle from technology to market. Thus, making it so that the difference in technology does not matter as much as before. The firm-level factor of strategic maneuvering has the highest impact on the outcome of a technological dominance battle in this phase. Lieberman & Montgomery (1998) argues that when a firm is the first one in the market, they are able to secure reputational advantages and at the same time hinder later entrants in getting access to key resources that they might need. Another firm-level factor that has a strong effect during this phase is penetration pricing. This is due to competing firms not having achieved a large consumer base, making it

more likely to sway customer decisions through pricing. The same goes for a firm's ability with marketing to shape consumers view of the technology because they have little to no information on it. Suarez (2004) also mentions that it is in this phase that they competitors have to secure support to their technology in the form of complementary goods.

Suarez (2004) argues that a firm's large customer base will start to have an impact on the customers decision in phase four of the model. It has also been shown in early research that the benefit of technology can only be seen when there are a certain number of users (Roller & Waverman, 2001). The firm-level factor, installed base, will increase in strength and effect when there are more networks effects in the environment. The firm-level factor of complementary assets and credibility also has an important role in this phase. Suarez (2004) argues that phase four of a technological dominance battle consist of mainstream market consumers, who aren't as impressed by technological performance as technological enthusiasts and visionaries are. Mainstream market consumers are more into products who are produced by established firms and trustworthy firms.

In the last phase of the model, phase five post-dominance, there will be a technology that has won the technological dominance battle and its huge consumers base will act as a shield against future competitors. Especially in environments with strong networks effect and high switching costs. The competition that is left in the industry after the technological dominance battle is often called a within-standard competition (Gallagher & Park, 2002). In these kinds of competition there are usually firms that have established themselves with different products of the dominant technology that are competing against each other. Suarez (2004) mentions that this within-standard competition last until another new technology start a new technological dominance battle in the industry.

The five milestone and phases, that are mentioned earlier, and their reaction to the different firm-level factors and environmental factors gives us this model that is illustrated in Fig. 14. This model presents the phases and factors shown to have a strong effect together.

Factor Type	Dominance Factor	Phase I	Phase II	Phase III	Phase IV	Phase V
Firm-level	Technological superiority		★★★			
	Credibility/complementary Assets	★★★			★★★	
	Installed base				★★★	★★★
	Strategic manoeuvering			★★★		
Environ-mental level	Regulation		★★★			
	Network effects and switching costs				★★★	★★★
	Regime of Appropriability	★★★				
	Characteristics of the technological field	★★★				

Fig. 14: Key factors of success at each stage of the dominance process (Suarez 2004, pp. 283)

3.2.1. Utilization of Suarez' battle for technological dominance

In the video game industry, there are many cloud gaming platforms that have started to emerge and compete with one another. The most known cloud gaming platforms that exist right now are Google Stadia, Nvidia GeForce Now, PlayStation Now, and Microsoft xCloud. There are also some cloud gaming platforms that are being made by companies like Apple, Walmart, Nintendo and EA. However, very little is known about these cloud gaming platforms because they are still in an early research and development state.

PlayStation Now and Google Stadia were two of the first cloud gaming platforms that were launched. They were followed shortly after by Nvidia GeForce Now who released their cloud gaming platform just a few months later, and Microsoft who released their closed beta cloud gaming platform at the same time as Nvidia. The graph illustrates where in the different phases that the companies are in right now and it is made by using the information above.
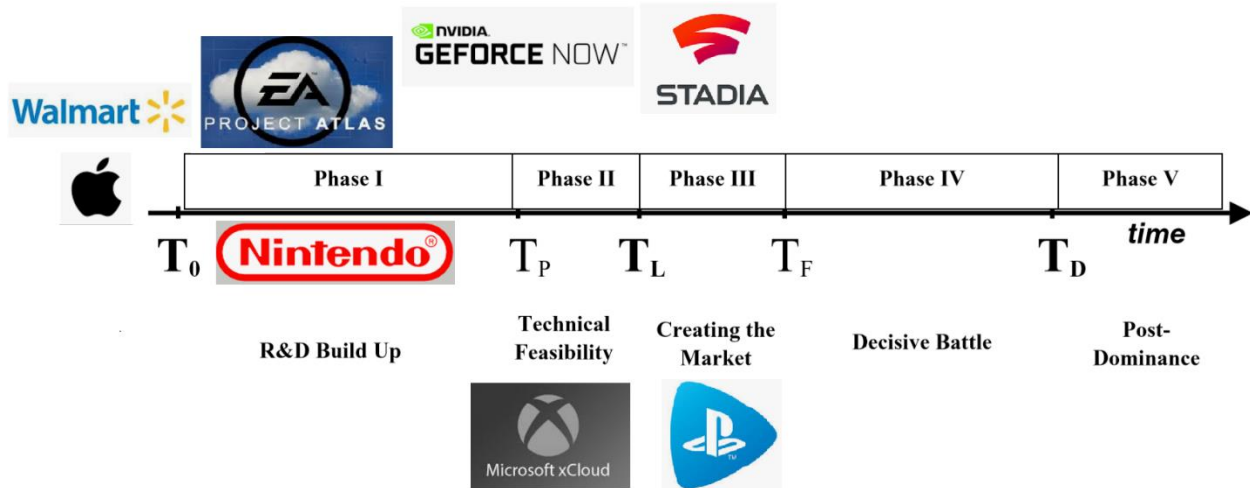
Fig. 15: Five milestones in the process of technological dominance with companies (Suarez 2004, pp. 281).

Here it is observed that none of the cloud gaming platforms has passed phase three of the model. The reason for this is that all of them are fairly new projects that are still being worked on to see what's the best fit for the industry.

How fierce the technological dominance battle will be is dependent on the size of the companies that decide to take part in the battle, which happens in phase one of the model. Here it is noted that there are only large and already powerful companies that has entered into this technological dominance battle. This indicates that the firm level factor, credibility, is strong for all the companies that have entered into this battle. A strong credibility helps the companies to gather key technological researchers for the buildup of the technology, which helps the companies to move faster from phase one to phase two. Here it is observed that there are four companies that are still in phase one even though they have a strong credibility. The reason for this is because these companies; Walmart, Apple, EA, and Nintendo, are either still considering an entry into this technological dominance battle or have just entered into the technological dominance battle. Thus, giving the other companies a head-start in this battle.

There are also two environmental factors that will affect the technological dominance battle that has the strongest effect in phase one. The first one is regime of appropriability which can be said to be low. The reason for this is because cloud technology in itself is a very known technology and therefore making it harder for companies to gain traction in the technological dominance

battle. However, it is possible that the firms like, Google and Sony, who have moved on to the later phases have a stronger regime of appropriability than the regular competing firms because they might have put their personal touch on cloud technology. The characteristics of the technological field do also affect the competition in the technological dominance battle. The technological field can either have an open or closed standard but it is common to have an open standard in this type of field thus making it easy for companies like, Nintendo and EA, who is still in phase one, to build on the technology of companies who have moved on to the later stages.

Nvidia, Google, Sony, and Microsoft have moved on to phase two of the model with their cloud gaming platforms. It is in this phase that they beta test their cloud gaming platforms to get insight into what they can improve on their platforms before launching it into the market. However, it is after the first emerging prototype that all the other firms must decide whether they are in a position to take part in the technological dominance battle or not. In this case, the first prototype came from Google and Sony seeing as they both are in phase three and thus, Nvidia and Microsoft have decided that they are in a position to fight in this battle. This also applies to the companies that are in phase one of model.

It is in this phase that technological superiority is at its utmost importance and in some cases could lead to early emergence of a winning technology. However, that is not the case in this battle. For technological superiority to make a case of early winners, their technology has to be above and beyond their competitors. With the case of cloud gaming platforms most of the platforms are identical when it comes to the technology. Most cloud gaming platforms uses the technology of streaming games through the cloud servers that are located in different parts of the world. However, Nvidia and Sony separate themselves from the other cloud gaming platforms by also allowing consumers to download the game and then playing it through their cloud gaming platforms. This difference in technology does not however give any of the companies a large enough of a lead in the technological dominance battle for an early winner to emerge.

The environmental factor, regulation, have the strongest effect in this phase. It is here that the government or industrial associations could go in and intervene when the companies are slowly creating the market. However, there is no indication that the government or the industrial

associations is going to intervene in this technological dominance battle, thus indicating that the environmental factor regulation will not give any companies an edge over the others in this battle.

It is in phase three of the model that the first product is launched, and it can be said that both Google and Sony were the first companies to launch a product into the market. There are two companies that launched the first product in this technological dominance battle because even though both are cloud gaming platforms, they utilize the technology in different ways, thus, suggesting that it can be seen as two different products. Google's cloud gaming platform is a fully cloud gaming platform where every game is streamed through Google's own cloud servers. Sony's cloud gaming platform, however, is a partially cloud gaming platform where Sony allows the gamer to either stream the game through their cloud servers or download the games and play it through your own console.

However, the technological dominance battle main point will switch from technology to market with the launch of the first product. Thus, implying that the technological differences between the companies competing will become increasingly less significant as time pass by. This indicates that it does not matter if the companies that are in the early phases enter with a product that is similar to either Google's or Sony's since it is how you approach the market now that will have the highest impact on which company that will win the technological dominance battle. A firm's strategic maneuvering will therefore be a key factor to winning this technological dominance battle.

One of the key factors in strategic maneuvering is the entry timing of a company. An early entry into the market will give the companies time to build a large installed base and reputation. This indicates that Google, Nvidia, and Sony should be able to build a larger installed base than the companies that are still in the earlier phases. However, this is not necessarily the case in this technological dominance battle. All the companies that are in the earlier phases already have an installed user base that is quite large and a well-known reputation in their own industries. The same goes for both the companies that are in phase three. Thus, implying that the entry timing into the technological dominance battle is not so important towards who will win the battle.

Early entry can also give companies the time they need to experiment with different technologies to see what works best. However, no company in the technological dominance battle has done that so far since they all are going down the same technological path that they intended to go down. This is, however, a downside of early entrants since it could potentially lock firms into technological trajectories that aren't necessarily the best one. This can be seen in the criticism that Google are receiving and the harsh times that Nvidia are going through. Game developers are removing their games from Nvidia's cloud gaming platform (Statt, 2020) and Google are in dire need of more players to their cloud gaming platform, thus, taking some measures to ensure that more people are using their services (Hollister, 2019, Warren, 2020, Gartenberg, 2020, Statt, 2020). This indicates that the companies in the earlier phases who will enter the market in a later time might have a good chance to win the technological dominance battle.

Other ways that these companies can strategically maneuver themselves to win this technological dominance battle are through pricing. One alternative are penetration pricing and a very aggressive pricing strategy. This is common when there are two alternative technologies competing, which is sort of the case here where the companies competing either has a cloud gaming platform that follows Sony's style or Google's style. This type of pricing combined with networks effects that are present in this competition could give one of the companies an edge over the other companies in this technological dominance battle. This can be observed in the technological dominance battle when Nvidia entered the market with their cloud gaming platform. They had set their prices at a half of what Google's prices are to try to build a larger installed base than Google and to compete with them (Hollister, 2020).

The last strategic maneuvering that the companies can do to get an advantage in the technological dominance battle is through their marketing and public relations resources. There is one marketing strategy that most of the companies who are taking part in this technological dominance battle is using. That strategy is a buzz-creating strategy where they pre-announce their cloud gaming platform months in advance of the launch. This buzz-creating strategy creates positive expectation towards the cloud gaming platforms that the customer is looking forward to. However, a buzz-creating strategy can give the company some backlash when the product does not live up to the hype that it is creating. This is observed with the launch of Google's cloud gaming platform, the Stadia. Google spent the whole of 2019 to create buzz and hype around

their cloud gaming platform, but it couldn't live up to all the hype that it created on its launch. The platform lacked in gaming content and it required a too strong internet connection for the regular user to enjoy it (Franzese, 2020, Gilbert, 2020). Thus, making it a flop upon its launch and making Google miss out on the chance to take a lead during this technological dominance battle.

It is also in this phase that the competing companies must secure their support of goods and service to their cloud gaming platforms. It's observed that Nvidia and Google is working hard on this during this phase where we can detect that they are trying to get a hold of game companies for their cloud gaming platforms. Nvidia has secure Control to their cloud gaming platform and is hoping to get more game from Epic Games onto their GeForce Now (Statt, 2020). While Google has secured a deal with PUBG Corporation to make the game PlayerUnknown's Battlegrounds available on the Stadia and they have also secured a deal with EA to launch several of their games on the Stadia this coming fall (Warren, 2020).

It is in phase three of the model that the companies competing against each other build up their installed user base for their given technology. It is only when the companies competing has built up a sizable user base that they can transition into the fourth phase of the model. However, there are no companies in this technological dominance battle that has managed to build a sizable user base to go from phase three to four. It is stated above that all the companies who are competing already have a large installed user base, but that is however indicating that the companies have a large installed user base and not the cloud gaming platforms. Thus, signaling that there are no companies who have reached phase four and beyond yet in the model.

This indicates that the technological dominance battle is far from over since it is in phase four that the decisive battle takes place. In phase, the large installed user base that the companies manage to accumulate will have an impact on the customers decisions on whether they prefer one technology over another. However, the strength of the installed user base is determined by the network effects in the environment and in this technological dominance battle there are a possibility that at one point the network effects would flatten out. It is also in this phase that the company's credibility plays a huge role. The reason for this is because the market that is created

in phase three that transitioned into phase four considers a firm's credibility more important than the technology alone.

4. Discussion

There exists a consensus amongst researchers that one of the technologies in the dominance battle will emerge victorious. Thus, signalizing that all other competitors within the cloud gaming platform market must follow this leading technology or create a new dominance cycle with another technology, if they wish to remain a competitor in the market (Suarez, 2004).

The winner of the technological dominance battle will have managed to build a large installed consumer base using mechanisms such as the network effects and credibility, as well as the loyalty of their current installed user base to obtain a competitive advantage. It is, therefore, believed that the winner of this battle will be a large, pre-existent and well-known company there amongst Microsoft, Google and Sony. This belief renders small cloud gaming platforms, like Shadow and Vortex, run by small and/or inferior companies, less relevant when looking forward into the video game industry's technological development (Lowensohn, 2015).

The impact from certain mechanisms that contribute to a technology establishing technological dominance might over time diminish. As the effect of one more new user will start to become irrelevant for the pre-existing users, the networks effect could lessen. An existing user of a game will only require a certain number of users to play against. This further supports the supposition that the network effects diminish over time (Choundary, 2014). This could indicate that other mechanisms such as branding and loyalty, might be more important when it comes to the future of cloud gaming platforms. The technological dominance battle has been going on for a short time and there is no telling of when or if it will end. Numerous scenarios on the potential impact from cloud gaming platforms on the video game industry pare present should the technology get the breakthrough that it needs in the industry to become dominant (Arkenberg, 2020; Digital Realty, 2019).

Most actors in the video game industry believes that cloud gaming platforms will become the industry's dominant technological platform and that it is simply a question of time (Freeman, 2019; Fernandes, 2019; Interview object B; Interview object C; Interview object D). A potential scenario resulting from the technological dominance battle is the winning technologies potential to become so dominant that it in effect revolutions the industry as a whole (Schumpeter, 2006). This could also be a case of disruptive technology, where cloud gaming technology could potentially sweep away the old business models and replace them with new models (Arjunwadkar, 2018). If cloud gaming technology becomes the prevailing gaming platform it could result in present day business models and consoles becoming obsolete. This would effectively be an act of creative destruction in the video game industry where pre-established systems must be dismantled to make way for innovation, in this case cloud gaming platforms (Schumpeter, 2006). Evidence in support of the aforementioned scenario comes from the interviews done with experts presently active in the video game industry. Half of the companies interviewed firmly believe this scenario will be the outcome of the technological dominance battle. In the interviews they discussed the current technological trend stating that cloud gaming platforms at some point in the future will become so popular that companies like Microsoft, Sony, and Nintendo stops producing their traditional consoles because their production no longer would be profitable (Orland, 2018; Grimm, 2020; Snider, 2020; Interview object D).

The scenario is further supported by elements in the empirical analysis. The external industry analysis conducted using Porter's five forces indicate that cloud gaming platforms could create a situation where there are no switching costs, more games and gamers, and possibly lower manufacturing costs for the manufacturers of consoles because the consoles would be moved up into the cloud. The analysis also shows that other large companies like Google, Apple, Nvidia, etc. could acquire market shares from already established companies. These empirical findings signify an increased potential for the outcome where cloud gaming platforms become the industry's dominating gaming platform, since parts of the Porter's five forces analysis shows that the industry might react towards this decision. As well as half of the interviewed companies is also leaning towards this future scenario. The uncertainty factor for the given scenario is time. An established time frame for when the video game industry will reach this outcome has not, at the present time, been determined with any degree of certainty.

Another potential scenario for the outcome of the technological dominance battle is a scenario in which the cloud gaming platforms rise in popularity without becoming the predominant technological industry gaming platform. In this scenario cloud gaming platforms become popular enough for companies to invest on the cloud gaming platforms, but not profitable enough to discontinue the production of their initial console lines (Snider, 2020; Grimm, 2020; Interview object B). This scenario is partially supported by both the Porter's five forces analysis and the expert interview. An assessment of the findings in the Porter's five forces analysis indicates that the introduction of cloud gaming platforms will not have a large impact on how most companies in the video game industry operate. The analysis shows that the implementation of cloud gaming platforms will in large part contribute to an increase in the number of gamers, new ways of playing the games, and the possibility for zero manufacturing costs.

These findings support cloud gaming platforms potential for becoming a dominant platform within the industry, although it does not indicate the certainty of its occurrence. Another factor that would most likely lessen the dominance of cloud gaming platforms are the installed base of consoles in the industry. The consoles in the industry and the future consoles that consumers will invest in before cloud gaming platforms gain an influence in the industry will help to slow down the transition from consoles to cloud gaming platforms. The most likely outcome for this scenario, based on the previous Porter's five forces analysis and the expert interviews, would then be that cloud gaming platforms and the traditional consoles coexist in the industry. Thus, indicating that the actors existing in the video game industry must compete and earn market shares mainly on the software side.

A third scenario that stands in contrast of the first two, is an outcome where cloud gaming platforms neither become the dominating gaming platform nor increase in popularity. In this scenario cloud gaming platforms would remain in their current position and potentially be acquired by and integrated into larger companies (Lowensohn, 2015). Similar to the two aforementioned scenarios, this third scenario is also supported by numerous actors in the video game industry and a quarter of the companies interviewed believes that this is the outcome of cloud gaming platforms (Hollister, 2019; Cranz, 2020; Interview object A). One factor that might end up leading the cloud gaming platforms down this third path is hype. A common strategy in the video game industry is a buzz-creating strategy where companies hype up their product

before the launch (Suarez 2004). Conversely, companies producing the cloud gaming platforms might face some backlashes if the hype is in excess of what the product can deliver. One such incident has already occurred with the launch of the Google Stadia where it could not live up to all the expectations that the consumers expected (Hollister, 2019).

The generous promises made by Google created consumer expectations which the product failed to fulfill resulting in the Stadia flopping in the initial months after launch. However, Stadia has started to rise in popularity again after their initial flop, but the Stadia still faces one immense challenge; the lack of gamers on their platform. The low user number is currently constraining the products growth potential within the industry (Warren, 2020). This aligns with what Suarez (2004) states with his framework for the technological dominance battle. He states that an installed user base is a deciding factor for whether a technology succeeds in an industry or not. It is, therefore, important that Google starts to build up their installed user base for the Stadia, otherwise it may end up as a complete product failure for Google. If this does happen then there is an increased possibility that the cloud gaming segment may collapse with the Stadia. Nonetheless, the likelihood of this scenario occurring is considered low by the industry, as it is difficult to imagine that companies such as Google and Microsoft dropping the cloud-based technology this early considering the substantial investments they already put into this technological platform (Arkenberg, 2020).

From an assessment of the empirical analyses, either scenario one or two would be considered the likeliest outcome for the cloud gaming platforms future progression. The reason that these two scenarios are considered to have a higher likelihood of occurring is based upon preexisting research in the field of cloud gaming technologies and the empirical analysis indicating that its progression is moving in this direction. However, this does not necessarily imply that there is a zero possibility for the third scenario to occur, although as previously mentioned its likelihood are considered to be low. Ruling this third scenario out based on its low probability of occurring, leaves the remaining first two scenarios.

The previous research on cloud gaming platforms shows that the technology is changing rapidly and that it is improving over time. However, Suarez' (2004) framework of technological dominance states that technology decreases in value and an installed user base increases in value

as time pass by. But this does not necessarily indicate that the role of technology is unimportant. It will be easier to push cloud gaming platforms in the direction of the first two scenarios as an increased potential in the technological aspects of cloud technology will help to mitigate the potential downsides of the platforms (Parker, 2020; Cai et al., 2016). From the aforementioned it can therefore be stated that Porter's five forces and Suarez's technological dominance battle analyses both indicate the potential occurrence of one of the two first scenarios, as both analyses show cloud gaming platforms to have potential in the industry. It is, however, difficult to predict with any degree of certainty, which of the two scenarios will gain more traction at this early phase in the technology's development.

5. Concluding Remarks

The analyses conducted based on the framework of Porter and Suarez, and the expert interviews conducted, indicate that the video game industry is headed towards new potential heights with cloud gaming platforms. Together with the historical overview, this shows that the trends in the video game industry are moving towards major changes whenever there are new promising technologies introduced in the industry. From an assessment of both the historical overview and the empirical analysis together with industry interviews, an overall indication for the future of the video game industry is that cloud gaming platforms are here to stay.

As with most research it is wise to be caution about generalizing the findings of the empirical analyses into other industries. The analyses that are performed in this thesis is limited to the console segment of the video game industry. This singular segment focus of this thesis can be extended by the inclusion of either or both the mobile and personal computer segment of the video game industry, leaving it open for further study. Furthermore, the applied framework may not have been the optimal methods for analyses due to the fact that Porter's five forces is originally meant to be used as an industrial analysis that do not have the possibility to forecast the future. Furthermore, cloud gaming platforms are in such an early phase that Suarez' framework for technological dominance battle could not be utilized fully. Other frameworks, not initially considered or familiar to me (known by me to an extent to which its application would produce satisfactory results), could potentially be more suitable for the research conducted in this

thesis. An additional aspect that could contribute to the furtherance of this research might be the inclusion of a larger number of interviewees from industry actors, in addition to companies with more market shares.

This thesis also has several limitations that could affect the outcome of the analyses. One such limitation could come from the expert interviews. The results that are presented by the interviewees could be based on their preconceived opinions on cloud gaming technology, thus, making the results biased. Another limitation is the use of second-hand data, which could weaken the results that are achieved as there are no hard data analyze and lead to bias in the results. However, the frameworks that are used are frameworks that traditionally uses second-hand data to analyze and it is therefore believed that even though there might be bias, these biases would have minimal effect on the usage of the frameworks.

The empirical findings that are achieved in this thesis could be important for various actors in the video game industry, as they would obtain a broader visualization of the directions that the industry is moving towards. The findings of this thesis indicate that cloud gaming platforms are heading towards a brighter future where there are more consumers in the industry, as well as, cheaper for them to engage in playing video games on the various platforms. However, the future of cloud gaming platforms could potentially change as technology and the industry progresses forwards. It is, therefore, wise to conduct additional analyses of the industry sometime in the future after the video game industry has had the chance to grow accustomed to cloud gaming platforms, in order, to identify if the trajectory remains similar to the two scenarios presented in this thesis. Additionally, there could also be conducted further research on the profitability of the different models that are used in the industry. Conducting such a research would help the companies to achieve a broader picture of whether the cloud gaming platform model is profitable or not.

6. Bibliography

Aleem, S., Capretz, L. F., & Ahmed, F. (2016). *Game development software engineering process life cycle: a systematic review.* Journal of Software Engineering Research and Development Vol 4; Issue 1.

Anderson, P., & Tushman, M. L. (1990). *Technological discontinuities and dominant designs: a cyclical model of technological change.* Administrative Science Quarterly Vol. 35; Issue 4. Pp. 604 – 635.

Anderton, K. (2019). *Research report shows how much time we spend gaming [infographic].* https://www.forbes.com/sites/kevinanderton/2019/03/21/research-report-shows-how-much-time-we-spend-gaming-infographic/#3d7db4f73e07 – Retrieved: 13.04.20.

Andre, L. (2020). *Number of Gamers Worldwide 2020: Demographics, Statistics, and Predictions.* https://financesonline.com/number-of-gamers-worldwide/ - Retrieved: 08.06.20.

Arjunwadkar, P. Y. (2018). *FinTech: The technology driving disruption in the financial services industry.* Taylor & Francis Group, CRC Press. Boca Raton, Florida.

Arkenberg, C. (2020). *Cloud gaming and the future of social interactive media.* Deolitte Insights. https://www2.deloitte.com/us/en/insights/industry/telecommunications/future-of-cloud-gaming.html - Retrieved: 31.05.20.

Bain, J. S. (1956). *Barriers to new competition (Their character and consequences in manufacturing industries) // 1. The importance of the condition of entry.* University of Arizona.

Ball, M. & Navok, J. (2020). *Cloud Gaming: Why it matters and the games it will create.* https://www.matthewball.vc/all/cloudmiles - Retrieved: 08.06.20.

Bay, J. W. (2015). *Best cities for video game development jobs.* https://www.gameindustrycareerguide.com/best-cities-for-video-game-development-jobs/ - Retrieved: 07.04.20.

Bayless, J. (2019). *Generational Brand Loyalty – Gaming Affiliations.* https://www.bestseocompanies.com/generational-brand-loyalty/#Gaming_Affiliations – Retrieved: 08.06.20.

Beck, K. (2019). *How video game development has changed over the last decade.* https://mashable.com/article/video-game-development-over-the-decade/ - Retrieved: 08.06.20.

Besanko, D., Dranove, D., Shanley, M., & Schaefer, S. (2012). *Economics of Strategy.* John Wiley & Sons.

Bhagat, R. (2019). *Most popular video games streamers and their impact on the gaming industry.* https://www.techgenyz.com/2019/08/15/popular-video-games-streamers/ - Retrieved: 08.06.20.

Biswas, S. (2020). *Controller aim assist buff creates an uproar in the Fortnite community.* https://www.essentiallysports.com/pc-controller-aim-assist-buff-creates-an-uproar-in-the-fortnite-community-epic-games-esports-news-2020/ - Retrieved: 08.06.20.

Cai, W., et al. (2016). *The Future of Cloud Gaming [Point of View].* Proceedings of the IEEE Vol. 104; Issue 4. Pp. 687 – 691.

Carpenter, G. S., & Nakamoto, K. (1990). *Competitive strategies for late entry into a market with a dominant brand.* Management Science Vol. 36; Issue 10. Pp. 1268 – 1278.

Chappelow, J. (2020). *Porter's 5 Forces.* https://www.investopedia.com/terms/p/porter.asp - Retrieved: 16.03.20.

Chen, K-T., Chang, Y-C., Tseng, P-H., Huang, C-Y., & Lei, C-L. (2011). *Measuring the latency of cloud gaming systems.* ACM Press the 19th ACM international conference. Scottsdale, Arizona.

Choudary, S. P. (2014). *Reverse Network Effects: Why today's social networks can fail as they grow larger.* https://www.wired.com/insights/2014/03/reverse-network-effects-todays-social-networks-can-fail-grow-larger/ – Retrieved: 31.05.20.

Christensen, C. M., Suarez, F. F., & Utterback, J. M. (1998). *Strategies for survival in fast-changing industries.* Management Science Vol. 44; Issue 12. Pp. 207 – 220.

Clark, K. B., (1985). *The interaction of design hierarchies and market concepts in technological evolution.* Research Policy Vol. 14; Issue 5. Pp. 235 – 251.

Coale, R. (2016). *If you don't think pro gamers are athletes, consider this.*
https://www.chicagotribune.com/redeye/redeye-esports-athlete-chicago-video-games-20160616-story.html - Retrieved: 08.06.20.

Cranz, A. (2020). *Maybe Microsoft's Xbox chief didn't say the stupidest thing about cloud gaming this week.* https://gizmodo.com/maybe-microsofts-xbox-chief-didnt-say-the-stupidest-thi-1841494677 - Retrieved: 31.05.20.

Delgado, R. (2020). *How to watch UFC 249 on Roku.* https://www.cordcutters.com/how-watch-ufc-249-roku - Retrieved: 16.03.20.

Dey, D. (2020). *"Epic Games need to change attitude" SypherPK on reshaping Fortnite.*
https://www.essentiallysports.com/epic-games-need-to-change-attitude-sypherpk-on-reshaping-fortnite-esports-news-2020/ - Retrieved: 08.06.20.

Digital Realty. (2019). *The transformative impact of cloud computing on the online gaming industry.* https://www.wired.com/insights/2014/03/reverse-network-effects-todays-social-networks-can-fail-grow-larger/ – Retrieved: 31.05.20.

Dillon, R. (2013). *The evolution of business models in the video game industry.*
https://www.researchgate.net/publication/302114853_The_Evolution_of_Business_Models_in_the_Video_Game_Industry - Retrieved: 08.06.20.

Dornbush, J. (2017). *Update: Comparing the price of every game console, with inflation – From the Odyssey to the Nintendo Switch.* https://www.ign.com/articles/2016/10/04/comparing-the-price-of-every-game-console-with-inflation - Retrieved: 08.06.20.

Dosi, G. (1982). *Technological paradigms and technological trajectories: A suggested integration of the determinants and directions of technical change.* Research Policy Vol. 11; Issue 3. Pp. 147 – 162.

Egenfeldt-Nielsen, S., Smith, J. H., and Tosca, S. P. (2016). *Understanding Video Games: The Essential Introduction.* Routledge. New York.

Entertainment Software Association Website. (2020). *2019 essential facts about the computer and video game industry.* https://www.theesa.com/esa-research/2019-essential-facts-about-the-computer-and-video-game-industry/ - Retrieved: 11.03.20.

Epic Games Website. (2020). https://www.epicgames.com/store/en-US/ - Retrieved: 08.06.20.

Etienne, S. (2019). *Walmart is reportedly looking into launching its own cloud gaming service.* https://www.theverge.com/2019/3/21/18276235/walmart-cloud-gaming-service-google-stadia-competitor - Retrieved: 08.06.20.

Faber, T. (2020). *How Sony became a player in the gaming world.* https://www.ft.com/content/d8f66cbc-7e38-11ea-b0fb-13524ae1056b - Retrieved: 11.05.20.

Feiner, L. (2020). *Roku beats Q4 expectations, shares rise.* https://www.cnbc.com/2020/02/13/roku-earnings-q4-2019.html - Retrieved: 16.03.20.

Fernandes, G. (2019). *The Incoming Storm: Cloud gaming is positioned to change the games business as Newzoo releases global cloud gaming report.* https://newzoo.com/insights/articles/the-incoming-storm-cloud-gaming-is-positioned-to-change-the-games-business-as-newzoo-releases-global-cloud-gaming-report/ – Retrieved: 31.05.20.

Franzese, T. (2020). *These are the 2 big reasons developers don't want to be on Google Stadia.* https://www.inverse.com/gaming/google-stadia-games-library-flop-developers - Retrieved: 29.04.20.

Freeman, W. (2019). *Cloud gaming has incredible disruptive potential, and 5G is the key to unlocking it.* https://www.thegamingeconomy.com/2019/10/08/cloud-gaming-has-incredible-disruptive-potential-and-5g-is-the-key-to-unlocking-it/ - Retrieved: 31.05.20.

GA. (2015). *PlayStation: How Sony came to dominate the gaming industry.* HBS Digital Initiative.

Gallagher, S., & Park, S. H. (2002). *Innovation and competition in standard-based industries: a historical analysis of the US home video game market.* IEEE Transactions on Engineering Management Vol. 49; Issue 1. Pp. 67 – 82.

Game Designing Website. (2020). *The 50 top video game design companies.* https://www.gamedesigning.org/game-development-studios/ - Retrieved: 08.06.20.

Gartenberg, C. (2020). *Google is launching a Stadia Makers program to attract more indie developers.* https://www.theverge.com/2020/3/23/21191361/google-stadia-makers-indie-developers-release-games-funding-dev-kits - Retrieved: 28.04.20.

Gough, C. (2020). *Apple app store and Google play gross mobile games revenue worldwide in Q3 2018 and Q3 2019.* Statista. https://www.statista.com/statistics/661521/global-app-stores-mobile-games-revenue/ - Retrieved: 08.06.20.

Gough, C. (2020). *Average viewers of League of Legends on Twitch worldwide from January 2018 to June 2020.* Statista. https://www.statista.com/statistics/1108953/league-of-legends-number-viewers/ - Retrieved: 08.06.20.

Gough, C. (2020). *Number of viewers Counter Strike: Global Offensive Intel Extreme Masters worldwide in 2020.* Statista. https://www.statista.com/statistics/1109989/counter-strike-iem-viewers/ - Retrieved: 08.06.20.

Gilbert, B. (2020). *Google's ambitious push into gaming is floundering, and it's due largely to too few games on its Stadia platform – here's why developers have held back.* https://www.businessinsider.com/why-are-so-few-games-on-google-stadia-2020-2?r=US&IR=T – Retrieved: 29.04.20.

Gonzalez, B. (2020). *Internet Speed Requirements for Video Streaming.* https://www.lifewire.com/internet-speed-requirements-for-movie-viewing-1847401 - Retrieved: 08.06.20.

Grimm, P. (2020). *Nintendo president thinks cloud gaming won't replace consoles for at least another decade.* https://gamerant.com/nintendo-cloud-gaming/ - Retrieved: 31.05.20.

Hollister, S. (2019). *How Sony bought, and squandered the future of gaming.* https://www.theverge.com/2019/12/5/20993828/sony-playstation-now-cloud-gaming-gaikai-onlive-google-stadia-25th-anniversary - Retrieved: 31.05.20.

Hollister, S. (2020). *Nvidia's GeForce Now is finally out of beta, challenges Google Stadia at $5 a month.* The Verge. https://www.theverge.com/2020/2/4/21121996/nvidia-geforce-now-2-0-out-of-beta-rtx - Retrieved: 25.03.20.

Hollister, S. (2019). *The world is waiting for Google Stadia to flop.*
https://www.theverge.com/2019/11/14/20964386/google-stadia-pre-launch-editorial-cloud-gaming - Retrieved: 28.04.20.

Iqbal, A. (2020). *Netflix Revenue and Usage Statistics.*
https://www.businessofapps.com/data/netflix-statistics/ - Retrieved: 16.03.20.

Jensen, R. (1981). *The Adoption and Diffusion of Innovations Under Uncertainty.* Northwestern University, discussion paper.

Katz, M. L., & Shapiro, C. (1985). *Network externalities, competition, and compatibility.*
American Economic Review Vol. 75; Issue 3. Pp. 424 – 440.

Kelly, C., Mishra, B., & Jequinto, J. (2014). Accenture. *The Pulse of Gaming – Gaming Disruption.* https://www.accenture.com/us-en/~/media/accenture/conversion-assets/landingpage/documents/3/accenture-3-lt-10-pulse-gaming-disruption.pdf - Retrieved: 01.06.20.

Kolakowski, N. (2019). *Cloud-based gaming could kick off huge developer race.*
https://insights.dice.com/2019/12/30/cloud-based-gaming-developer-race/ - Retrieved: 08.06.20.

Lieberman, M. B. & Montgomery, D. B. (1998). *First-mover (dis)advantages: retrospective and link with the resource-based view.* Strategic Management Journal Vol. 19; Issue 12. Pp. 1111 – 1125.

Lowensohn, J. (2015). *Sony buys streaming games service OnLive only to shut it down.*
https://www.theverge.com/2015/4/2/8337955/sony-buys-onlive-only-to-shut-it-down - Retrieved: 14.05.20.

Manzano, M., Hernandez, J. A., Uruena, M., & Calle, E. (2012). *An empirical study of Cloud Gaming.* IEEE 11th Annual Workshop on Network and Systems Support for Games (NetGames). Venice, Italy.

Mintz, J. (2011). *Why Microsoft embraced gaming.*
https://www.technologyreview.com/2011/11/03/189898/why-microsoft-embraced-gaming/ - Retrieved: 11.05.20.

Mocheva, Z. (2019). *Seven aspects you should consider before developing or streaming games in the cloud [infographic].* https://www.cloudsigma.com/seven-aspects-you-should-consider-before-developing-or-streaming-games-in-the-cloud/ - Retrieved: 08.06.20.

Mochizuki, T. (2020). *Sony is struggling with PlayStation 5 price due to costly parts.* https://www.bloomberg.com/news/articles/2020-02-14/sony-is-struggling-with-playstation-5-price-due-to-costly-parts - Retrieved: 08.06.20.

Mohamed, T. (2019). *5 ways the video game industry will change in the next decade.* Businessinsider. https://markets.businessinsider.com/news/stocks/5-ways-the-video-game-industry-will-change-in-the-next-decade-2019-7-1028394586#streaming-gameplay1 – Retrieved: 25.03.20.

Newzoo Website. (2020). *General Rankings.* https://platform.newzoo.com/general-rankings – Retrieved: 03.03.20.

Nintendo Website. (2020). *Technical specification.* https://www.nintendo.com/switch/tech-specs/ - Retrieved: 27.03.20.

OECD. (2005). *Digital Broadband content: The online computer and video game industry.* OECD Publishing, Paris.

Orland, K. (2018). *Ubisoft CEO: Cloud gaming will replace consoles after the next generation.* https://arstechnica.com/gaming/2018/06/ubisoft-ceo-cloud-gaming-will-replace-consoles-after-the-next-generation/ - Retrieved: 31.05.20.

Parker, Z. (2020). *4 reasons why cloud gaming is bad.* https://www.sysjolt.com/2019/4-reasons-why-cloud-gaming-is-bad/ - Retrieved: 01.06.20.

Peters, J. (2019). *Amazon's cloud gaming service could arrive next year and offer Twitch integration: 2020 is shaping up to be a big year for cloud gaming.* https://www.theverge.com/2019/11/20/20974324/amazon-cloud-gaming-service-streaming-2020-twitch-google-stadia-microsoft-xcloud - Retrieved: 16.03.20.

Pike, N. (2015). *No stranger to the (Video) game: Most eighth-gen gamers have previously owned consoles.* Nielsen. https://www.nielsen.com/us/en/insights/article/2015/no-stranger-to-

the-video-game-most-eighth-generation-gamers-have-previously-owned-consoles/ - Retrieved: 25.03.20.

PlayStation Website. (2020). *Technical specifications.* https://www.playstation.com/no-no/explore/ps4/tech-specs/ - Retrieved: 27.03.20.

Reinganum, J. F., (1981). *On the Diffusion of New Technology: A Game Theoretic Approach.* The Review of Economic Studies Vol 48; Issue 3. Pp. 395 – 405.

Roetting, M., Huber, N., Lubbers, K., Brames, N., & Heilman, B. (2010). *Video game system industry analysis.* https://www.nku.edu/~fordmw/mgt490projectvideogames.pdf – Retrieved: 08.06.20.

Roller, H. L., & Waverman, L. (2001). *Telecommunications infrastructure and economic development: A simultaneous approach.* American Economic Review Vol. 91; Issue 4. Pp. 909 – 923.

Roos, G., Von Krogh, G., Roos, J., Boldt-Christmas, L. (2014). *Strategi; En Innføring.* 6 Utgave. Fagbokforlaget.

Rosenbloom, R. S., & Cusumano, M. A. (1987). *Technological pioneering and competitive advantage: the birth of the VCR industry.* California Management Review Vol 29; Issue. 4. Pp. 51 – 76.

Salmose, N. & Elleström, L. (2019). *Transmediations: Communication across media borders.* Routledge.

Schiesel, S. (2020). *Amazon pushes into making video games, not just streaming their play.* https://www.nytimes.com/2020/04/02/technology/amazon-making-video-games.html - Retrieved: 08.06.20.

Schumpeter, J. (2006). *Capitalism, Socialism and Democracy.* 6th edition. Routledge.

Shea, R. et al. (2016). *A Survey on Cloud Gaming: Future of Computer Games.* IEEE Access Vol 4. Pp. 7605 – 7620.

Smith, C. (2020). *20 Interesting HBO Statistics and Facts (2020) | By the Numbers.* https://expandedramblings.com/index.php/hbo-statistics-facts/ - Retrieved: 16.03.20.

71

Snider, M. (2020). *Video games in 2030: Will I still need a console game system? That depends.* https://eu.usatoday.com/story/tech/gaming/2019/12/22/video-games-2030-move-cloud-obscure-console-systems/4261137002/ - Retrieved: 31.05.20.

Statista website. (2020). *Video game console sales worldwide for products total lifespan as of February 2019 (in million units).* https://www.statista.com/statistics/268966/total-number-of-game-consoles-sold-worldwide-by-console-type/ - Retrieved: 12.05.20.

Statt, N. (2020). *Bethesda follows Activision in pulling games from Nvidia's GeForce Now.* https://www.theverge.com/2020/2/21/21147638/nvidia-geforce-now-bethesda-pulling-games-activision-blizzard-cloud-gaming – Retrieved: 28.04.20.

Statt, N. (2020). *Google now giving away three months of Stadia access to Chromecast owners.* https://www.theverge.com/2020/3/6/21168471/google-stadia-cloud-gaming-chromecast-ultra-giveaway-promotion-subscription - Retrieved: 28.04.20.

Statt, N. (2020). *Nvidia adds Control to GeForce Now and promises new games every week.* https://www.theverge.com/2020/3/27/21197361/nvidia-geforce-now-cloud-gaming-control-new-games-weekly - Retrieved: 29.04.20.

Statt, N. (2020). *Nvidia's GeForce Now will lose access to titles from Xbox Game Studios and Warner Bros.* https://www.theverge.com/2020/4/20/21228792/nvidia-geforce-now-microsoft-xbox-game-studios-warner-bros-remove-games - Retrieved: 28.04.20.

Straubhaar, J., LaRose, R., & Davenport, L. (2018). *Media Now: Understanding media, culture, and technology.* Cengage Learning.

Suarez, F. F., (2004). *Battles for technological dominance: an integrative framework.* Research Policy Vol. 33; Issue 2. Pp. 271 – 286.

Tassi, P. (2019). *"Fortnite" star Ninja leaves twitch for Mixer with new Microsoft deal.* https://www.forbes.com/sites/paultassi/2019/08/01/fortnite-star-ninja-leaves-twitch-for-mixer-with-new-microsoft-deal/#523d6077183a – Retrieved: 08.06.20.

Techni Sport Website. (2020). *How to become a pro gamer in 2020.* https://technisportusa.com/blogs/news/how-to-become-a-pro-gamer - Retrieved: 08.06.20.

Techopedia Website. (2018). *Gamer.* https://www.techopedia.com/definition/1912/gamer - Retrieved: 08.06.20.

Teece, D. J. (1986). *Profiting from technological innovation: implications for integration, collaboration, licensing, and public policy.* Research Policy Vol. 15; Issue 6. Pp. 285 – 305.

Tegarden, L. F., Hatfield, D., & Echols, A., (1999). *Doomed from the start: what is the value of selecting a future dominant design?* Strategic Management Journal Vol. 20; Issue 6. Pp. 495 – 518.

Townley, S., & Townley, A. (2018). *eSport: everything to play for.* https://www.wipo.int/wipo_magazine/en/2018/01/article_0004.html - Retrieved: 08.06.20.

Twitchtracker Website. (2020). *Twitch Statistics & Charts.* https://twitchtracker.com/statistics – Retrieved: 16.03.20.

VGChartz Website. (2020). *Game Search.* https://www.vgchartz.com/gamedb/ - Retrieved: 30.03.20.

Walton, J. (2019). *The first successful cloud gaming platform could make billions.* https://www.pcgamer.com/the-first-successful-cloud-gaming-platform-could-make-billions/ - Retrieved: 08.06.20.

Wang, P., Ellis, A. I., Hart, J. C., & Hsu, C. (2017). *Optimizing next-generation cloud gaming platforms with planar map streaming and distributed rendering.* 2017 15th Annual Workshop on Network and Systems Support for Games (NetGames). Taipei, Taiwan.

Wardyga, B., J. (2019). *The Video Games Textbook [History – Business – Technology].* CRC Press. Boca Raton.

Warren, T. (2020). *Google discounts Stadia for the first time just as Doom Eternal launches.* https://www.theverge.com/2020/3/20/21187919/google-stadia-discount-sale-doom-eternal-launch-pricing - Retrieved: 28.04.20.

Warren, T. (2020). *Google launches free version of Stadia with a two-month pro trial.* https://www.theverge.com/2020/4/8/21213679/google-stadia-free-pro-trial-launch-price-features - Retrieved: 28.04.20.

Warren, T. (2020). *Google Stadia gets PUBG, with Star Wars, Madden, and FIFA arriving later this year.* https://www.theverge.com/2020/4/28/21239809/google-stadia-pubg-launch-ea-games-fifa-star-wars-madden-nfl-release-date - Retrieved: 29.04.20.

Warren, T. (2020). *Google Stadia is a lonely place – Google's virtual stadium doesn't have crowds yet.* https://www.theverge.com/2020/5/12/21252200/google-stadia-cross-play-games-lonely-venue - Retrieved: 31.05.20.

Warren, T. (2019). *Microsoft and Sony are teaming up for the future of gaming.* https://www.theverge.com/2019/5/20/18632374/microsoft-sony-cloud-gaming-partnership-amazon-google - Retrieved: 08.06.20.

Watson, A. (2020). *HBO: Subscription revenue 2011-2019.* https://www.statista.com/statistics/329295/hbo-subscription-revenue/ - Retrieved: 16.03.20.

Watson, A. (2019). *Streaming – Statistics & Facts.* https://www.statista.com/topics/1594/streaming/ - Retrieved: 16.03.20.

Webb, K. (2019). *Apple and Google are going to war over the future of gaming as the entire industry goes through a radical transformation.* https://www.businessinsider.com/apple-google-video-game-transform-industry-2019-9?r=US&IR=T – Retrieved: 08.06.20.

Weber, S. (2020). *The rise of eSports sponsorship.* https://opendorse.com/blog/the-rise-of-esports-sponsorships/ - Retrieved: 08.06.20.

Welch, C. (2019). *Exclusive: Verizon is quietly testing its own Netflix-style cloud gaming service.* https://www.theverge.com/2019/1/11/18179048/verizon-gaming-video-game-streaming-service-vzg-nvidia-shield-android - Retrieved: 08.06.20.

WePC Website. (2020). *2020 Video Game Industry Statistics, Trends, & Data.* https://www.wepc.com/news/video-game-statistics/#gaming-video-content-market – Retrieved: 03.03.20.

WePC Website. (2020). https://www.wepc.com/news/video-game-statistics/ - Retrieved: 25.03.20.

Woodcock, J., & Johnson, M. R. (2018). *The impacts of live streaming and Twitch.tv on the video game industry.* Media, Culture & Society Vol. 12.

Xbox Website. (2020). *Xbox One X.* https://www.xbox.com/en-US/consoles/xbox-one-x - Retrieved: 27.03.20.

Zackariasson, P., & Wilson, T. L. (2012). *The video game industry: formation, present state, and future.* Routledge. New York.

Zeloof, M. (2019). *Cloud gaming won't have the impact many expect, but every cloud has a silver lining.* https://medium.com/ironsource-levelup/cloud-gaming-wont-have-the-impact-many-expect-but-every-cloud-has-a-silver-lining-fe06fd35f91 - Retrieved: 08.06.20.

Zhang, X. (2020). *The evolution of business models in the video game industry.* https://www.edhec.edu/en/news/evolution-business-models-video-game-industry - Retrieved: 08.06.20.