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Unlocking the Growth Potential of the Online Gaming Industry in South Africa: Challenges and Opportunities

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MEASURING & VALUING SOUTH AFRICA'S CULTURAL & CREATIVE ECONOMY

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Summary

In 2018, the global gaming industry consisted of 2.3 billion consumers, who spent nearly US$ 138 billion on games. Although the South African gaming industry is small, it is growing at an exponential rate. A recent PWC (2018) report identifies the digital video games sector as one of "the biggest success stories" in the South African entertainment and media industries.

The PWC Media and Entertainment Outlook (2017) also makes the point that, in the past, participation in games was restricted to audiences who could afford to buy expensive PC or gaming equipment. Even in this segment, research reported on by Hall et al. (2017) showed that there were more than 11 million gamers in South Africa: 78% black; 8% coloured; 3% Indian/Asian and 11% white. However, the rise of mobile gaming via smartphones has meant that many more South Africans can afford to play.

This research identified 54 gaming or gaming and animation companies in South Africa. Nearly half (48%) are based in the Western Cape. The most commonly used gaming release platform is still PC, which (given the international shift to mobile), may be a future constraining factor (along with high data costs).

There is considerable overlap between gaming and animation with 46% of companies producing games also doing animation work. Given turnover data provided in a detailed online survey, it is estimated that the turnover for the gaming and animation industry in the 2017/8 financial year was R476 million, of which R198 million was attributed to gaming and hybrid companies. This is a considerable increase from the R100 million revenue for the gaming industry in 2015 found in a previous study (IESA, 2016).

The South African gaming and animation sector currently create 1225 direct jobs, of which 457 are in the gaming sector. A challenge for the gaming and animation sector is transformation – the majority of people working in the sector are white men (as also found in previous studies). Part of the reason given for this is that the sector is still perceived to be a risky and unstable sector, so that it is not recognised as a viable career path by many. Support for the technical training required was suggested, as were tax breaks for smaller companies to encourage more start-ups.

Advantages identified by those in the industry included: Unique African stories and cultural diversity; Lower production costs that enable international service work; a significant pool of talent and skills; the high quality of the work produced; and access to advanced production and infrastructure.

Key Findings

- International competition is fierce: 37% of the 800 million games released on Steam have zero downloads
- "Free-to-Play" is the current gaming meta, which has advantages, but means that developers have no income until the game becomes established.
- *e*Sports are driving the popularity of online gaming, and are already offered at some South African schools and higher education institutions.
- The SA gaming industry is still small and new, but growing quickly, with an estimated turnover of R200m for 2017/18.
- 50% of gaming companies are "very small", with annual turnover of less than R2 million.
- The SA gaming industry provides an estimated 457 direct jobs: 310 in gaming firms, and 125 in hybrid companies.
- Most gaming and animation firms are found in Cape Town (44%) and Johannesburg (42%).
- Most gaming and animation companies were founded in the last 10 years (65%).

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1. Introduction: Purpose and Methods

In 2018 the global gaming industry consists of 2.3 billion unique consumers who have a combined spending of $137,9 billion on games. This is a remarkable figure and can compete with the Film and Music Industries. Indeed, games are increasingly a substitute, or complement, to other entertainment formats.

Although the South African gaming industry is small, there has been fast growth in terms of revenue generated by the sector. According to an industry survey by Interactive Entertainment South Africa (2016) in 2014, the income derived by South African Gaming Industry was R29,7 million which increased to R100 million in 2016.

The PWC Media and Entertainment Outlook (2017) makes the point that, in the past, participation in games was restricted to audiences who could afford to buy an expensive personal computer (PC) or other items of gaming equipment. Even in this segment, research reported on by Hall et al. (2017) showed that there were more than 11 million digital game players in South Africa: 78% black; 8% coloured; 3% Indian/Asian and 11% white. However, the rise of mobile gaming via smartphones has meant that many more South Africans can afford to play. PWC (2017) estimate that mobile internet penetration via smartphones will grow from 52.3% in 2016 to 77.8% by 2021, opening up the market even further. The 2018 PWC report describes the South African digital video games sector as “one of the biggest success stories”, with an expected compound annual growth rate from 2017 – 2022 of 19.8%.

Gaming also has overlaps with other sectors, like the special effects used in many large-budget films, and even education. South African companies have started to produce “Serious Games”, which are informative and entertaining as they aim to educate whilst also treating the consumer to an enjoyable experience (Serious About Gaming). However, there is currently little research into this potentially promising, and fast-growing, sector.

The overall goal of the research is to provide an analysis of the international gaming industry environment in order to produce a scoping report and database of the South African gaming industry. The report will assess the potential of the South African industry to contribute to

economic growth and job creation and the challenges that the industry currently faces, with a view to making policy-relevant recommendations.

The report aims to provide inputs on the following:

- *Gaming Industry Constituents:* The gaming industry can be broken down into three main segments. These three segments are the Mobile, PC and Console industries.
- *The Size of the Gaming Industry:* Internationally and in South Africa in terms of turnover/sales, including a discussion of how the delivery platforms (Mobile, PC and Console) have developed over time.
- *The Potential Growth of the Gaming Industry:* Internationally and in South Africa, with a special focus on notable contributions from South African game developers to date.
- *Barriers to Entry*, or challenges, which may affect the ability of South African companies to compete in the international market.
- An assessment of the *Current Gaming Meta*, which refers to the marketing models used on gaming platforms ("Free to play" versus "Pay to play") and its impact on sales and innovation.

In addition to this report, a *database* of firms involved in the animation and gaming industry in South Africa, including their name, location, main business activities and contact details, is provided (Appendix 2).

Research methods included:

- A review of existing literature and research on the industry;
- A comprehensive online search for South African gaming and animation companies;
- Attendance at Games Week Africa (December 2018) to collect contextual industry data and add to the database;
- An online survey (Appendix 1) sent to all firms in the database to collect qualitative information on the business environment and industry perceptions of the challenges and opportunities faced by the sector.

All research involving human subjects has ethical implications. All research participants were informed of the purpose of the research and their rights (to remain anonymous, not to

participate, to leave out questions, to terminate participation at any time). This research was scrutinised and passed by the Rhodes University Research Ethics Committee (REF: ECO2018/07).

The rest of the report is structured as follows: Section 2 discusses the size and growth of the international gaming industry; Section 3 focuses on the South African gaming industry, with reference to the database of gaming and animation companies, as well as the results of an industry survey; Section 4 gives a narrative report of the recent (December 2018) "Games Week Africa" conference held in Cape Town, focusing on the key issues raised by the industry, such as monetisation strategies, game design curricula offered at South African higher education institutions, and the game development process. Section 5 concludes, highlighting some potential policy implications of the findings.

2. International Gaming Industry Size and Growth Potential

2.1 Gaming Industry Constituents

The Gaming Industry can be broken down into three main segments. These three segments are the Mobile, Personal Computer (PC) and the Console industries. The Mobile industry refers to any technologies that do not require a sustained power source, whilst being easy to carry and being operational almost anywhere. These would include devices such as cellular telephones, Nintendo devices and the PSP (PlayStation Portable). The PC industry encompasses all of the computer technologies such as computers and laptops. The laptops are considered part of the PC industry as they use the same versions of software and most laptops require a sustained power source whilst gaming. The console industry is currently being dominated by two companies, namely Xbox and PS4. At the moment, the two consoles are very competitive with one another due to their differences in controllers as well as having console specific games[1].

It also needs to be acknowledged that there is considerable overlap between the gaming and animation industries. A recent report on the global animation industry (Research and Markets, 2018[2]) estimated that the industry was worth US$254b in 2017 and growing quickly. The report

[1] For example, PlayerUnknown's Battlegrounds (PUBG) can only be played on Xbox and not on PS4, resulting in more income for Xbox compared to PS4 when it comes to the Battle-Royale (BR) genres.

[2] https://www.researchandmarkets.com/research/7qrks8/global_animation?w=5

pointed to the links between films (that are increasingly using animated visual effects), video games and animation:

> "Moviegoers are demanding high quality productions with engaging visual effects and realistic animation and studios are including more animation and VFX shots into films. Consumers are consuming more immersive content across channels such as ultra-high-definition TVs, tablets and smartphones to head mounted devices. Animation, VFX and games content are being consumed not only on Netflix, Amazon, Hulu and Twitch, but also on YouTube, Twitter and Facebook."

Increasingly, the sector is about an ecosystem of digital assets that links the film, gaming and merchandising opportunities to spread the income stream and mitigate risks.

2.2 Size of the International Gaming Industry

With the above explanation of these three segments of the gaming industry, the market for each of these segments becomes easier to understand. The Mobile industry accounts for $70,3 billion, which is the largest of the three segments and represented 51% of the sales in 2018. The two other segments, Console and PC together, produced similar sales volumes. The Console industry generated $34,6 billion (25% of the gaming industry sales) in revenue and the PC industry managed $32,9 billion (24% of the revenue for the gaming industry) from sales.

2.3 Mobile Market Domination of the Gaming Industry

Why is the Mobile sector dominating the gaming industry? The explanation for this phenomenon is complex, but a few of the variables will be analysed here. Firstly, the hardware of the Mobile sector, compared to that of the PC and the Console sectors is easier and cheaper to obtain[3]. The second reason is the release of two video games on Mobile that have been dominating the PC and Console industry for the last two years. Fortnite[4] and PUBG[5] were released on mobile in 2018 and unexpectedly, these games are more optimized on the mobile platform compared to the PC and Console counterparts. Another reason for the Mobile industry domination is the portability of devices[6]. Compared to PC and Console, the Mobile industry

[3] https://www.gamespew.com/2018/03/mobile-vs-console-pc-gaming-wins/
[4] https://www.androidauthority.com/fortnite-release-date-android-892804/
[5] https://www.pubgmobile.com/en-US/news.shtml
[6] https://www.tomsguide.com/us/pictures-story/1340-best-handheld-consoles.html

does not require as many peripherals to provide the same level of satisfaction when playing video games. Peripherals would include equipment such as a gaming mouse with a minimum of 10 buttons (which is 7 more than a regular mouse), a mechanical gaming keyboard that ensures precise keystrokes as well as programmable macro keys, and a gaming headset for a fully three-dimensional experience that is essential for the First-Person Shooter (FPS) games[7]. However, the most important peripheral factor is that PS4 and desktop PCs require a separate display device, which is already embedded in the mobile devices. All these factors have resulted in the rapid growth of the market share for games released on mobile platforms.

2.4 Potential Growth of the Gaming Industry

What does this mean for future growth? Clearly, the PC and Console industries cannot compete with the Mobile industry. Table 1 shows the relative percentage of the market that each of these segments own from 2012 to 2021 and how these contributions have changed over the years (note that 2019 to 2021 are projections[8]):

Table 1: Percentage of each market segment for PC, Console and Mobile gaming 2012-2021

Year	PC	Console	Mobile	Total market value (US$)
2012	37%	45%	18%	$70,6Bn
2013	38%	39%	23%	$75,6Bn
2014	36%	35%	29%	$84,8Bn
2015	34%	32%	34%	$93,1Bn
2016	30%	30%	40%	$106,5Bn
2017	27%	27%	46%	$121,7Bn
2018	24%	25%	51%	$137,9Bn
2019	22%	24%	54%	$151,9Bn
2020	21%	23%	57%	$165,9Bn
2021	19%	22%	59%	$180,1Bn

Table 1 shows how the market value of the gaming industry has increased, especially for games released on Mobile platforms. Not only has it been increasing but increasing at an increasing rate. In 2012, the Mobile industry represented less than 20% of the industry but by the year

[7] https://techbuyersguru.com/peripherals-buyers-guide
[8] The table is derived from a Bar Graph at the following website: https://newzoo.com/insights/articles/global-games-market-reaches-137-9-billion-in-2018-mobile-games-take-half/

2021, it is expected to dominate the industry with nearly 60% of the market share. This means that, by the year 2021, out of the three segments, the Mobile industry will have its own 100-Billion-Dollar market.

2.5 Advancements in the Mobile Industry[9]

What has happened to the Mobile industry over the last six years to cause such an explosive increase in its market share? Prior to 2012, the Mobile industry was already booming in terms of software, apps and web interactivity advancements. These advancements have resulted in a simple phone becoming a fully-functional pocket-sized computer.

In terms of web interactivity, high-speed, large-bandwidth mobile networks such as 3G and 4G have made it easier to access the web from smartphones. However, the decisive factor was allowing mobile phones the ability to connect to WiFi networks. The ability to connect to the wireless networks meant that users could now combat mobile data costs and fully explore the functionality of mobile devices through web browsing and gaming.

Gaming on these mobile platforms was still not ideal, as consumers would tend to wear out the device's buttons and other hardware issues would arise. Besides the buttons suffering from fatigue, in order for a mobile device to have a large enough display, the mobility of the device would be affected, as buttons would take away from the screen area. The solution to this was implementing touch screen technology, which resulted in large enough screens for gaming purposes. Along with these changes, mobile operating systems were being upgraded, processing power increased with the introduction of multiple core processors and ram, and finally the on-board storage was increased.

These improvements in mobile technology increased the demand for mobile applications and games, resulting in the development of mobile market places as well as nearly every website creating a version for mobile browsing.

[9] https://www.computerworld.com/article/3222855/mobile-wireless/11-tech-breakthroughs-that-led-to-todays-smartphones.html

2.6 Barriers to Entry

Despite the fast growth and huge potential of the section, the gaming industry is highly competitive and could pose challenges for first time developers to enter the market[10]. To illustrate just how competitive the gaming industry is, one could look at the online gaming platform Steam[11]. Steam provides developers with a medium to communicate their game to their consumers. A consumer creates a Steam Profile and can view games that are available for purchase or download. There is a need to distinguish between purchase and download as games that are available for purchase require an initial payment before the consumer may download the game. Games that are available for download are known as "Free to Play" (F2P) and require no initial payment, but may involve in-game purchases.

Currently, Steam has over 800 million registered games and when consumers have limited resources in terms of time and money, it may become difficult for a new entrant to have their game noticed and highly unlikely to be purchased. Money, for obvious reasons and time because consumers would need to make a trade-off between playing different gaming titles per session or participating in other non-gaming activities. According to Steam, of the 800 million registered games, 37% (296 million) of these games have not been downloaded once.

The excess supply of games has resulted in new marketing strategies, such as the emergence of Free-to-Play (F2P) games. Simple economics states that, if there is excess supply, for the market to correct itself, the price would need to drop[12]. This is clearly evident in the gaming industry. The competitiveness has pushed the price down until the point where developers who enter the market have to make their games free, at least initially.

The purchase of in-game items makes up the biggest part of the F2P income model, otherwise known as the micro transaction, or the item-based selling model (Larsen, 2011). Game users have the option to make purchases of in-game items that could range from vanity cosmetic goods, performance related items or even virtual currencies associated with that virtual world (Oh et al., 2007). The main goal of this model is to make high volumes of sales with very low

[10] https://www.gamemarketinggenie.com/blog/how-seriously-competitive-is-the-gaming-industry?gclid=CjwKCAjw7vraBRBbEiwA4WBOn4Dzk5Y_Q7vCX0hvdVDlCCaVxPaonZDHjRiDe_dP8ivAAsm_0uwdKRoCy5UQAvD_BwE

[11] https://store.steampowered.com/about/

[12] https://financetrain.com/excess-demand-and-excess-supply/

unit prices. This model is widespread in digital markets as the marginal cost of digital and virtual goods are close to zero (Shapiro et al., 1999).

The F2P model has many benefits for users and game developers: It allows users to enjoy the core gaming service for free, removing the barriers to entry associated with cost, and also allows the users to pay for what they personally value (Larsen, 2011).

F2P games are usually released in Alpha or Beta releases which means that the game is incomplete - they are still being improved and more features implemented. Once the Beta version has been thoroughly tested, the official release of the game is rolled out[13]. This is very useful as it softens the intensity of criticism a developer receives from the community and secondly, the community provides feedback to the developer via online platforms such as Reddit. The feedback results in alterations to the game to make it better and essentially creates a good that customers demand.

However, as F2P is the current meta of game development, a challenge for first-time game developers is that they would need to be able to invest considerable resources in the development phase without deriving any income. The way that revenue is then realised is either through the official release, when the consumer would need to purchase the game in order to continue playing, or via in-game purchases such as Battle Passes, in-game cosmetics or the sale of mechanics to make progression easier. Most game developers stay away selling of merchandise that makes the game easier (although such "pay to win" strategies are frowned upon by some gamers).

2.6 Current Gaming Meta

The current meta for game developers is launching a F2P game. However, merely launching a F2P does not guarantee that the game will attract a sufficient number of consumers and result in a game that is sustainable. According to Twitch[14], a platform for gamers to stream their gameplay online so that viewers may spectate, the top five most viewed games in July 2018 thus far are as follows: Fortnite, League of Legends, PUBG, DotA 2 and CSGO. These five games will be analysed to develop what is known as the Current Gaming Meta[15].

[13] https://bordercrossingmedia.com/2010/08/alpha-beta-official-releases-whats-the-difference/
[14] https://www.twitch.tv/p/about
[15] https://www.twitchmetrics.net/games/viewership

Firstly, three (Fortnite, League of Legends and DotA 2) out of the five games are F2P. Secondly, all of the games are played competitively with DotA 2 having the tournament with the largest prize pool (the International Tournament in 2017 had a prize pool of nearly $25 million and the International Tournament in 2018 surpassed this level). Thirdly, even though PUBG does have a solo aspect, all of these games are played within teams (multiplayer). Fourthly, these games started out in Beta with Fortnite the only one that has not been officially launched yet (which could possibly be the reason why it is the most viewed game). Finally, according to genres there are two (Fortnite and PUBG) Battle-Royale (BR) games with CSGO, which is a first-person shooter (FPS), due to release its own BR version. The remaining two games are part of the MOBA (Multiplayer Online Battle Arena).

According to the current meta therefore, to break into the gaming industry, a first-time developer would have to forgo short term income for long term income by making the game F2P. The game would definitely have to be multiplayer, to promote the social aspect of gaming and finally, the game would need to either be a MOBA or BR. All these characteristics would make it more likely that the game could compete in the market, and become a financial success.

2.7 The rise and potential of *e*Sports

An important development driving the increasing popularity of online games is the rise of *e*Sports (electronic sports). According to Aviles (2018), *e*Sports are defined as competitive gaming at the professional level[16]. Competitive gaming is multifaceted as it can be played individually (as in Heartstone) or with teams of up to five players (such as DotA 2).

*e*Sports contribute to the success of the gaming industry by changing the gaming experience from a private to a public event. These events are streamed via Twitch, YouTube Gaming and Facebook to turn gaming into a spectator sport. The professionals participating in the events display skills and abilities that a consumer may previously have been unaware of, or lacked the necessary knowledge to perform. *e*Sports therefore not only stimulate the demand for a game but assists in maintaining the demand by revealing new content and new consumption behaviours.

[16] http://www.techedupteacher.com/why-we-need-to-embrace-esports-in-education/

Skills such as entrepreneurship, teamwork and management can be learnt through participation in *e*Sports. Participating in *e*Sports is, however, more expensive than traditional sports. Players require the necessary hardware, whether it be a PC or console, with all their respective peripherals. In order to obtain these, as well as funds to access events, the competitors will need to develop entrepreneurial skills to obtain funding or sponsorship. Traditional sports require a group of players to integrate and combine their skills in an effective manner in order to obtain a desired goal, which is exactly the same for *e*Sports. As in traditional sports, players need to develop their teamwork skills to increase the probability of success. The majority of *e*Sports teams are managed and owned by the players who are members of the team. Management skills are therefore essential to the team's success. One player is assigned the role of captain, and s/he needs to ensure that the team members are disciplined when it comes to practice, and manage the disputes between team members that often arise during, before and after competitions.

One of the differences between *e*Sports and traditional sports is that there is no gender discrimination in *e*Sports. In *e*Sports, performance is based on application of mental aptitude and hand-eye coordination, rather than physical strength. This may have led to a common misconception that all gamers are lazy and overweight (the typical view of players sitting in their basements, eating junk food and playing games for hours). Across the board, there are *e*-athletes with a background in traditional sport who also maintain a high level of physical fitness. (Figure 8 shows Tal "Fly" Aizik, a DotA 2 player from Evil Geniuses. According to Liquidpedia[17], Tal is a Canadian with a background in martial arts, currently applying his discipline to captaining the *Evil Geniuses* online gaming team).

[17] https://liquipedia.net/dota2/Fly

Figure 1: Tal "Fly" Aizik taken at the China SuperMajor in Shanghai[18]

In the United States and Europe there are multiple tertiary education institutes that offer *e*Sports programmes. In 2016, the University of California became the first university to launch a League of Legends (LoL) scholarship program that was partially funded by *Riot Games*. Robert Morris University, based in Chicago, was the first college to offer an *e*Sports scholarship program. The scholarship covers up to 50% of the tuition and boarding costs and simultaneously provides professional coaching. In 2015, Arlanda Gymnasiet School in Sweden enrolled seven students to be part of their new *e*Sports curriculum. The institution aims to provide their students with the best possibilities in training to support themselves from a career in *e*sports.[19]

In South Africa, the High School *e*Sports League (HSEL) was founded by Tyrone Green, a Westville Boys High School teacher. The HSEL is made up of several schools that are affiliated to Mind Sports South Africa (MSSA), which is an affiliate of the South African Confederation of Sport and Olympic Committee[20]. MSSA operate at the school, provincial and national level with a focus on three disciplines: Board Games, *e*Sports and Wargames. MSSA is also responsible for awarding Regional, Provincial, National and Protea Colours for *e*Sports[21].

[18] https://twitter.com/EvilGeniuses/status/1002196818728497152
[19] https://www.redbull.com/ie-en/schools-that-offer-esports-programmes
[20] http://mindsportsa.co.za/#
[21] https://mygaming.co.za/news/features/116713-the-rise-of-competitive-gaming-in-south-africa.html

There are 17 schools participating in the league across a variety of games, such as *CounterStrike: Global Offensive*, *LoL*, *Dota 2* and *Fifa 18*. The incorporation of more schools around South Africa would result in better advancement of *e*Sports in South Africa. Problems currently faced by the HSEL with implementing future projects are: lack of funding as schools are not willing to help financially; lack of staff; and poor internet infrastructure to support live streaming at some schools. Live streaming would allow HSEL to partner with international event organisers such as *Mettlestate* to provide much needed exposure to the league.

There are currently also two universities in South Africa that have an *e*Sports division: Stellenbosch University[22] and the University of Pretoria[23]. Maties *e*Eports, the *e*Sports division for Stellenbosch University, was established in 2016[24]. It is managed by Maties Recreation and Active Lifestyles Unit (RALU), which aims to expand Maties sport to cater for all students, including those who are passionate about competitive gaming.

TuksMindSport is the *e*Sports division of the University of Pretoria[25]. Mind sports refers to a sporting code that is inclusive of *e*Sports and board games, similar to the distinction that MSSA uses. TuksMindSport provides a platform for gamers in the Gauteng area as a whole, not only university students. Both universities are extensively involved in games such as LoL, Dota 2, Call of Duty and CS:GO.

Africans, and particularly South Africans, find it difficult to pursue a career in *e*Sports due to international boundaries. Firstly, winnings obtained from international tournaments are distinctly larger than in domestic tournaments. Appendices 3 and 4 indicate the highest paid *e*-athletes in terms of tournament earnings. The top earnings are dominated by DotA players – an expected results as DotA 2 has the largest prize-pools in the history of *e*Sports[26]. The highest earning international player in 2018 earned just over US$4 million, compared to the highest earning South African player with just under US$40 000[27] (Appendix 4).

The alternative to deriving revenue through winnings, is streaming via Twitch, YouTube or Facebook. The audience for South African streamers is very small compared to international

[22] https://www.sun.ac.za/english
[23] https://www.up.ac.za/
[24] https://diematie.com/2018/10/what-the-future-holds-for-esports-at-su/
[25] https://www.up.ac.za/mindsport-
[26] https://www.esportsearnings.com/players/highest-overall
[27] https://www.esportsearnings.com/countries/za

streamers. This is due to multiple factors, the most important being that there are only a few games that have South African servers for online play. These games include DotA 2, CS:GO and Call of Duty. If a South African streamer wishes to play the more popular titles, s/he would be at a major disadvantage, as these games only have international servers which means trying to perform at an international level with a delay of 200ms. The delay might seem small, but it makes a great deal of difference when players are required to react within split seconds[28].

The last component of *e*Sports and video gaming's impact on education, requires a discussion on *OpenAI*. *OpenAI* is a non-profit artificial intelligence (AI) research organisation aiming to promote and develop friendly AI in a way that benefits humanity as a whole as we move into the 4th Industrial Revolution. The organisation was established in 2015 and founded by Elon Musk and Sam Altman[29]. The platform that *OpenAI* chose as a testing ground was a video game already referred to extensively in this paper, known as *Defense of the Ancients 2* or *DotA 2*. The testing first took place at the International Tournament, which is the *DotA 2* world cup, on the 11th of August 2017[30].

Prior to the event, *OpenAI* created a program that would play multiple iterations of the game against itself and learn the core mechanics of the game. At the time of the International Tournament, OpenAI was defeating most of the top players in the world until the human players outsmarted the program by using tricks that it had not been exposed to before. However, the program then learnt from these mistakes and made the necessary adjustments in order to produce a better performance post-TI. The program however played a limited form of the game with certain stipulations and only one of the characters from the 114-character roster.

In April 2018, *OpenAI Five* emerged, where instead of one robot playing one *DotA 2* character, five robots would form a full *DotA 2* team to take on professional teams. The roster was increased from one character to 18 characters, and would eventually even contain a drafting phase. At the International Tournament 8, which took place in August 2018, the *OpenAI Five* played against the lowest ranked team at TI[31]. Although the human professional team proved to be too strong for *OpenAI Five*, this example demonstrates how important gaming is

[28] https://mygaming.co.za/news/broadband/112861-the-harsh-truth-south-africas-multiplayer-pings-cant-get-better.html
[29] https://openai.com/about/
[30] https://openai.com/the-international/
[31] https://www.theverge.com/2018/8/28/17787610/openai-dota-2-bots-ai-lost-international-reinforcement-learning

becoming in the development of artificial intelligence technologies that will drive the 4th Industrial Revolution in years to come.

Having outlined the international gaming industry context and trends, the next section of the report focuses on the South African gaming industry.

3. The South African Gaming Industry

3.1 An Introduction

As found in the recent (2018) PWC Entertainment and Media Outlook report, there is great potential for the future growth of digital entertainment in general, and the digital video games sector in particular, in South Africa. Indeed, they describe digital video games as "one of the biggest success stories" and predict a compound annual growth rate of 19.8% between 2017 and 2022. *e*Sports is also predicted to grow at an annual rate of 20.2% (Figure 2).

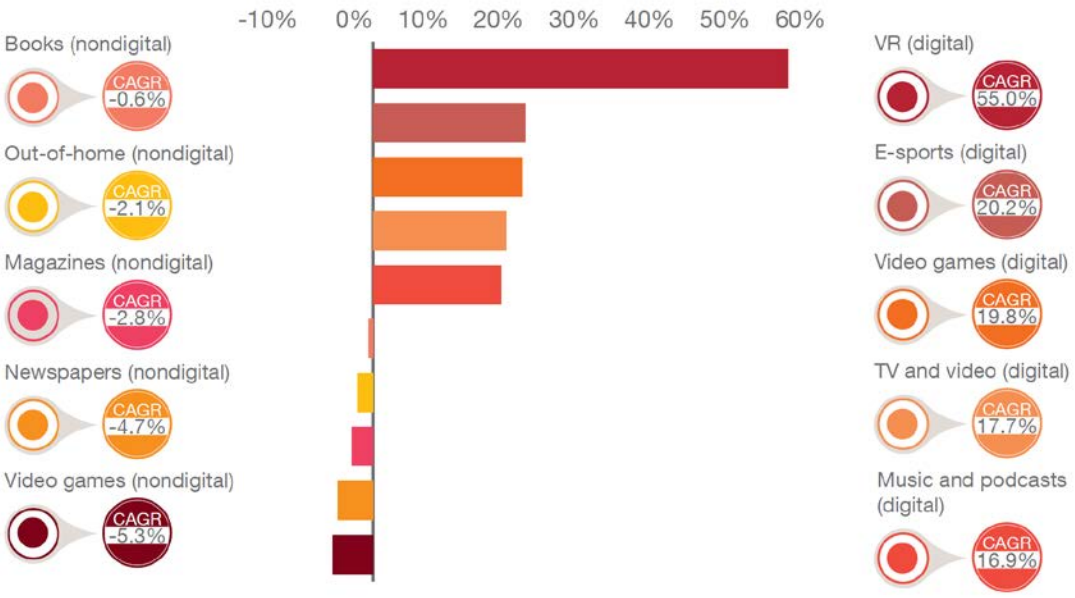

Figure 2: Fastest and Slowest growing digital and non-digital sectors in South Africa 2017 – 2022

(Source: PWC Entertainment and Media Outlook, 2018: 15).

However, a potential constraining factor in monetising the South African gaming sector is internet penetration and access. According to the PWC Entertainment and Media Outlook report (2018), South Africa has by far the largest overall Entertainment and Media sector of the African countries analysed (South Africa, Nigeria, Kenya, Ghana and Tanzania) in terms

of revenues in US Dollars. However, it has the lowest percentage of entertainment and media revenue for digital sources (44%, compared to 58% in Tanzania and 70% in Ghana). This points to the high cost of data in South Africa, which could be a constraining factor for the mobile gaming industry going forward (Figure 3).

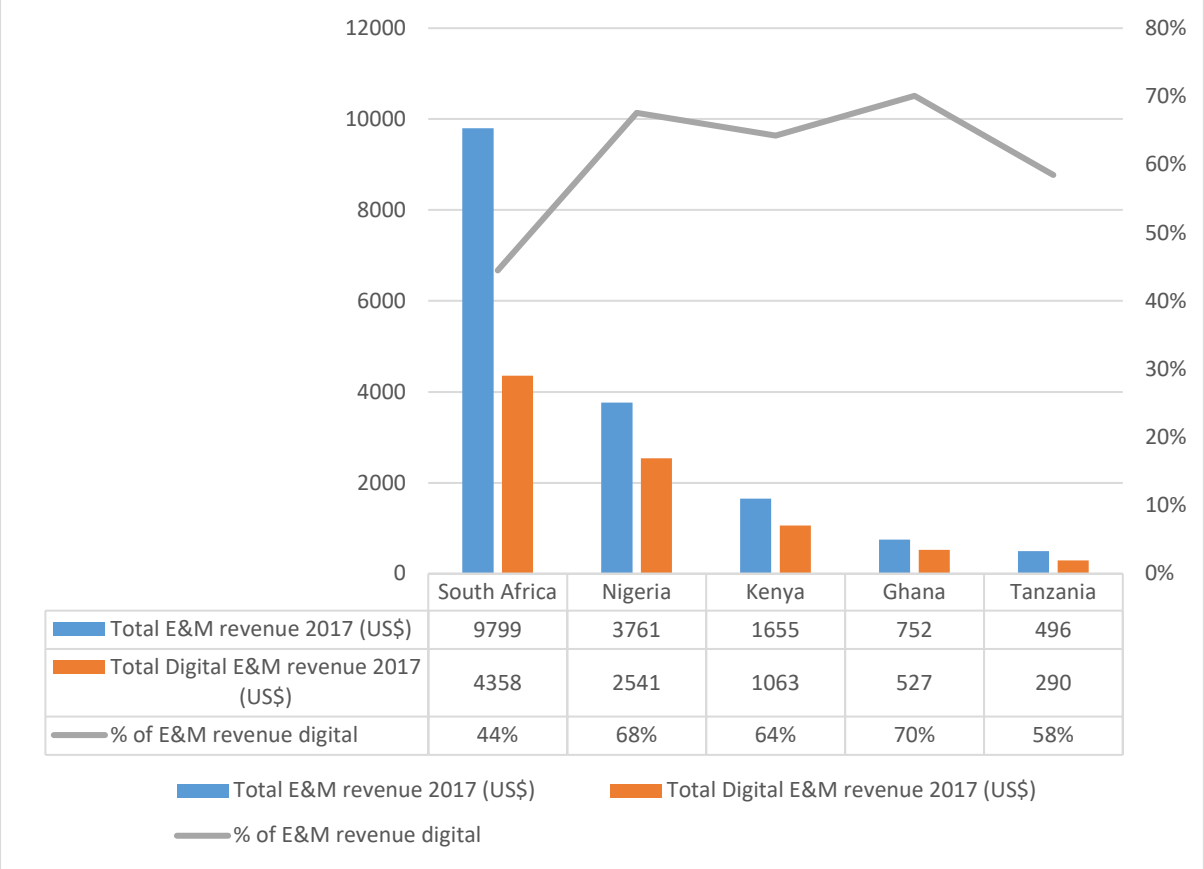

Figure 3: Revenue from Entertainment and Media in South Africa, Nigeria, Kenya, Ghana and Tanzania (2017)

(Source: Data from PWC, 2018; Figure generated by authors).

A study based on Labour Market Dynamics Survey data showed that the Audio-Visual and Interactive Media Domain, as defined by the UNESCO Framework for Cultural Statistics (FCS, 2009), accounted for only 2.3% of cultural occupations in South Africa (Hadisi and Snowball, 2019). This Domain includes film and video, podcasting and "video games (also online)"). However, the lack of very detailed occupational classification codes may be resulting in an underestimation of employment in this sector. In terms of GDP contribution, the Domain makes up 16.3% of the impact of the CCIs on GDP and had a growth rate of 6.7% per year between 2011 and 2016, compared to 4.8% growth rate for the cultural and creative industries overall (SACO Mapping Study, 2018).

There are a number of gaming industry bodies in South Africa that also produce industry relevant research from time to time. These include "Interactive Entertainment South Africa" (IESA), whose CEO is Nicholas Hall (a practicing copyright lawyer) and "Make Games South Africa" (MGSA), who provide a networking platform, seminars, and advice.

To date, there are five notable contributions from South African game developers: *Freelives, the Brotherhood*, *Thoopid*, *Runestorm* and *QCF Design*[32]. *Freelives* created *Broforce*, which is a PC and Console product. *Broforce* was released on Steam, on the 15th of October 2015 and is currently being sold at a price of R159. *The Brotherhood* released a game called *Stasis* which became available on Steam in 2015 for PC only. The game was funded through a very successful kickstarter, accumulating R1,5 million in funds. A copy of the game, besides the kickstarter, can be obtained for R100. *Thoopid* developed a game called *Snailboy* that was released on Mobile. The release of *Snailboy* on the IOS store took place in 2013. The game is free for the first three levels, however the consumer would need to purchase the other 22 levels.

Although the South African gaming industry is relatively new (compared to countries like the US, UK and Japan who have been involved in the gaming industry since the 1980s), an IESA Industry Survey indicated that there has been fast growth in terms of revenue generated by the sector: in 2014, the income derived by the South African Gaming Industry was R29,7 million which increased to R100 million in 2016. The rise was due to the international releases of *Stasis* and *Broforce*, as well as 45 other South African games (IESA, 2016).

3.2 The size and characteristics of the SA gaming and animation industry

The industry database [Appendix 2] was constructed using extensive online searches for both gaming and animation companies, and at the *Africa Gaming Summit* held in Cape Town in December 2018. It is also available as a searchable database (Microsoft Excel) on the South African Cultural Observatory website. This part of the report gives a profile of the industry based on the database.

A total of 119 companies in the sector were identified. Early on in the research, it became apparent that, both in terms of current output and in terms of future potential, there is significant

[32] http://www.mweb.co.za/games/view/tabid/4210/Article/19058/Five-video-game-studios-making-South-Africa-proud.aspx

overlap between gaming and animation companies. Both kinds of companies were thus included in the database, and in the qualitative online questionnaire (discussed in the next section of this report). 50% of companies in the database are involved in gaming: 27% (29 companies) are exclusively game producers, and 23% (25 companies) do both gaming and animation work. The other 50% (54 companies) are currently only involved in the animation sector, but have the skills, expertise and capital equipment to make the transition into gaming in the future.

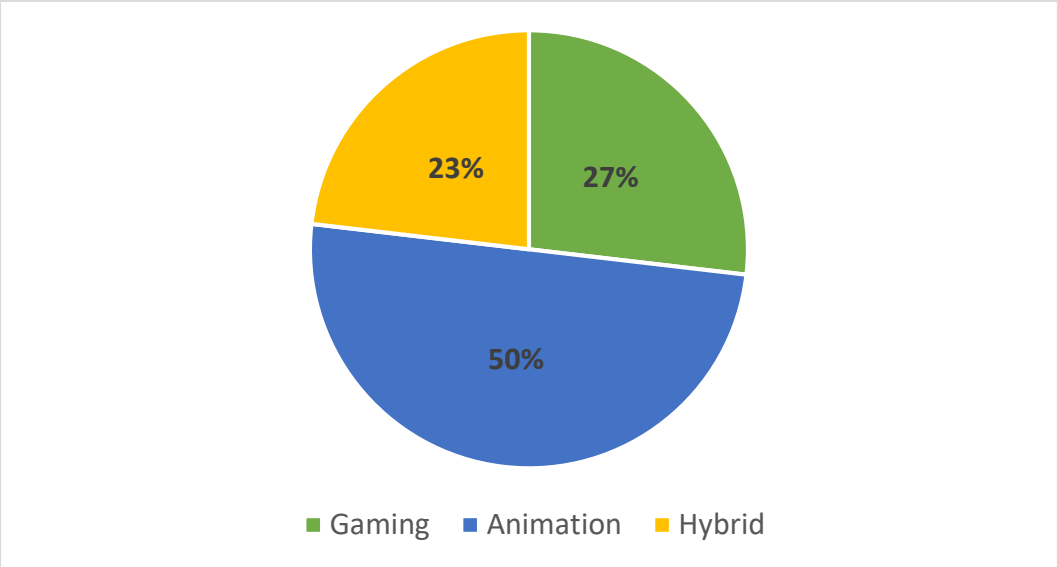

Figure 4: Proportions of Gaming and Animation companies in South Africa

These results are comparable with the IESA (2016) report, which identified 31 active gaming studios, indicating some growth in the number of firms in the sector (from 29 in 2015 to 54 in 2018). The majority (78%) of the gaming firms that responded to the IESA survey indicated that they had secondary sector participation, including virtual reality, “serious games” and augmented reality. This also points to the overlap between the film (animation and special effects) and gaming sectors.

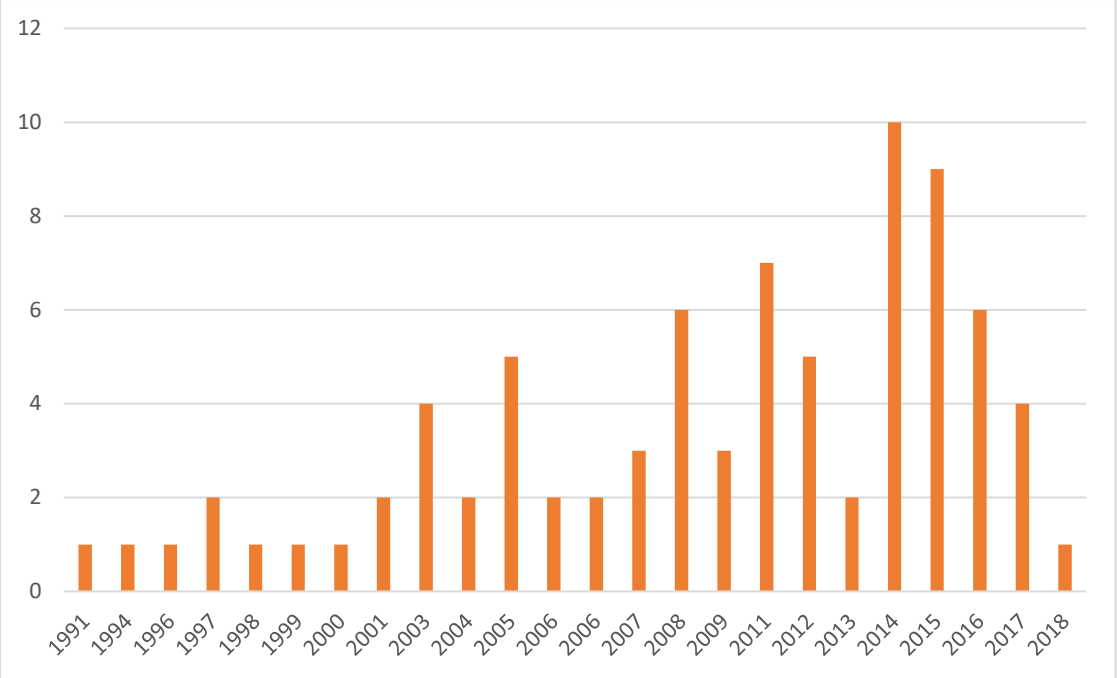

Figure 5: Gaming and Animation companies by year founded

Most of the gaming and animation companies in the database were founded in the last 10 years (65% have been founded since 2008). This is an indication of the growth of the sector over this period, as well as evidence of growing capacity to drive growth in the future. The finding also aligns with the IESA (2016) report, which found that most respondents had been in operation for five years or less (as of 2015).

Table 2: Location of Gaming and Animation companies by city and province

City	Number	Percentage
Johannesburg	44	42%
Cape Town	50	47%
Durban	6	6%
Port Elizabeth	2	2%
George	1	1%
Pretoria	3	3%
Province		
Gauteng	47	44%
Western Cape	51	48%
KwaZulu-Natal	6	6%
Eastern Cape	2	2%

In terms of location, previous research on the cultural and creative industries has shown that the CCIs tend to cluster in metropolitan areas, especially when access to specialist skills is needed. The IESA (2016) report found that Cape Town was the most popular location (57%)

for gaming companies. This is also true of the gaming and animation companies found in the current database, with 88% of the firms located being in Johannesburg (42%) or Cape Town (44%).

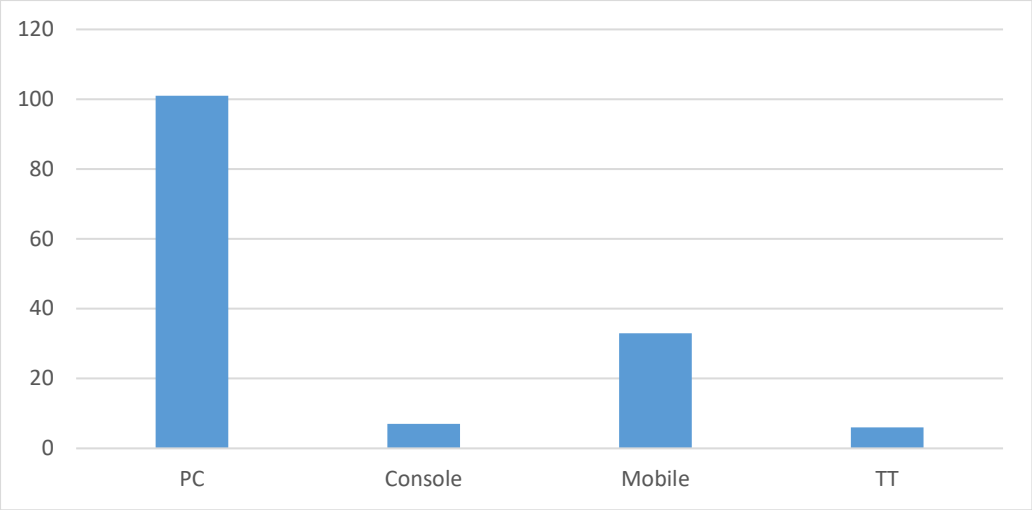

Figure 6: Gaming platforms used (number of companies)

As discussed previously, the platform used for content release is important, and is changing from personal computers (PC) to mobile (smart phones and tablets). This shift is starting to show in South Africa as well, although the most common platform is still PC: 101 companies, compared to 33 who release on mobile platforms (note that numbers do not add up to the total sample because some companies use multiple platforms). Far fewer had console releases (such as on PlayStation or Xbox), and even fewer on all three (referred to as TT, or "Triple Threads").

The average number of games developed and released per gaming firm was 4.38, and 4.12 for Hybrid firms (those involved in gaming and animation).

In terms of company type, the majority (84%) of firms were private companies, followed by Partnerships (9%). This is similar to the IESA (2016) report, which also found that private companies made up the majority of the gaming sector (68%).

Table 3: Company type for animation and hybrid (animation and gaming) companies in the database

Company Type	Number of responses	Percentage (Total)	Animation	Gaming and Hybrid
Private	75	84%	74%	93%
Public	3	3%	5%	2%
Sole Proprietorship	2	2%	2%	2%
Partnership	8	9%	16%	2%
Freelance	1	1%	2%	0%
	89	100%	100%	100%

Based on the detailed data collected from a sample of companies who completed the online survey, the size of the industry in terms of annual turnover can be estimated. Statistics South Africa defines businesses as "Very Small" if their turnover is less than R2 million and as "Small" if their turnover is between R2 million and R13 million (in the "Community, Social and Personal" industries). Turnover categories used for the gaming and animation sector research were thus defined as R2 million or less; R3 million – R8 million; R9 million – R13 million; more than R13 million.

Table 4: Estimated Industry Turnover per year.

Turnover (Category Median)	% of sample in this category	Total Turnover
R1,000,000	50%	R59,500,000
R6,500,000	44%	R343,777,778
R11,000,000	6%	R72,722,222
	TOTAL	**R476,000,000**

Based on the proportion of the sample who reported their turnover in these categories (using the median category value for the estimation) and the number of firms in the industry, annual turnover for the gaming and animation sector in South Africa in the 2017/18 financial year is estimated to be in the region of R476 million. Of this, the gaming companies (including hybrid companies that work in both gaming and animation) make up R198 million. The Interactive Entertainment South Africa Industry Survey (2016) estimated revenue in the gaming sector in the 2015 financial year to be R100 million. Even allowing for inflation and a possible over-estimate because not all the turnover of hybrid companies is the result of game development, this provides further evidence of the fast growth of the sector[33].

In terms of employment, the total number of direct jobs created by the gaming and animation sector is estimated to be 1225, of which 310 are in gaming companies and 125 are in hybrid companies. The IESA (2016) survey estimated that there were 255 game industry jobs in South Africa in 2015 (an increase from 240 in 2013 and 253 in 2014).

Table 5: Employment creation in the gaming and animation industry in South Africa

	Gaming	Animation	Hybrid	Gaming & Hybrid	Total
Number of firms	34	60	25	59	119
Average number of jobs per firm	9,1	5,9	5	7,75	7
Median number of jobs per firm	6	4	3	4	4
Total number of jobs	310	460	125	457	1225

[33] Caution should be exercised when making this comparison, however, because the current study deliberately included "hybrid" companies (those involved in both animation and gaming), whereas the IESA (2016) study did not appear to do this. It may also be that the size of the animation industry is being under-estimated because of the growing tendency for some film and advertising companies to employ their own "in house" animation teams.

3.3 Challenges and Opportunities: Industry survey results

In addition to the database construction, 18 responses to an online survey were received from the industry, which included responses to qualitative opinion questions on industry challenges, opportunities, skills development and transformation.

Of the gaming companies interviewed, 54% released PC games, 38% Mobile and only 8% Console. This approximates the patterns found in the industry database (Figure 5). Altogether, the seven gaming companies had released 51 games, or an average of 7.3 games each. Excluding one very large outlier company in the animation sector, companies were relatively small, employing an average of 7.4 people (gaming) and 6.9 people (animation). Transformation in the industry is slow: Only 19% of gaming company employees and 30% of animation company employees were black, coloured or Indian/Asian people. This can be compared to employment in cultural occupations in South Africa in general, where 86% of people are black, coloured or Indian/Asian people (Hadisi and Snowball, 2019).

Table 6: Characteristics of companies who responded to qualitative survey

	Gaming*	Animation
No of Companies	7	11
No of Games	51	0
Average No. of Games	7.29	n/a
Number of Employees	52	179
Average number of Employees per company	7.43	6.9**
Percentage of Black, coloured, and Indian/Asian employees	19.23%	30.17%
Percentage of permanent employees.	90.38%	55.87%

Notes: *For the purposes of this analysis, only companies who had developed at least one game were classified as “Gaming”; **Including one very large company, the average number of employees for animation companies was 16.27.

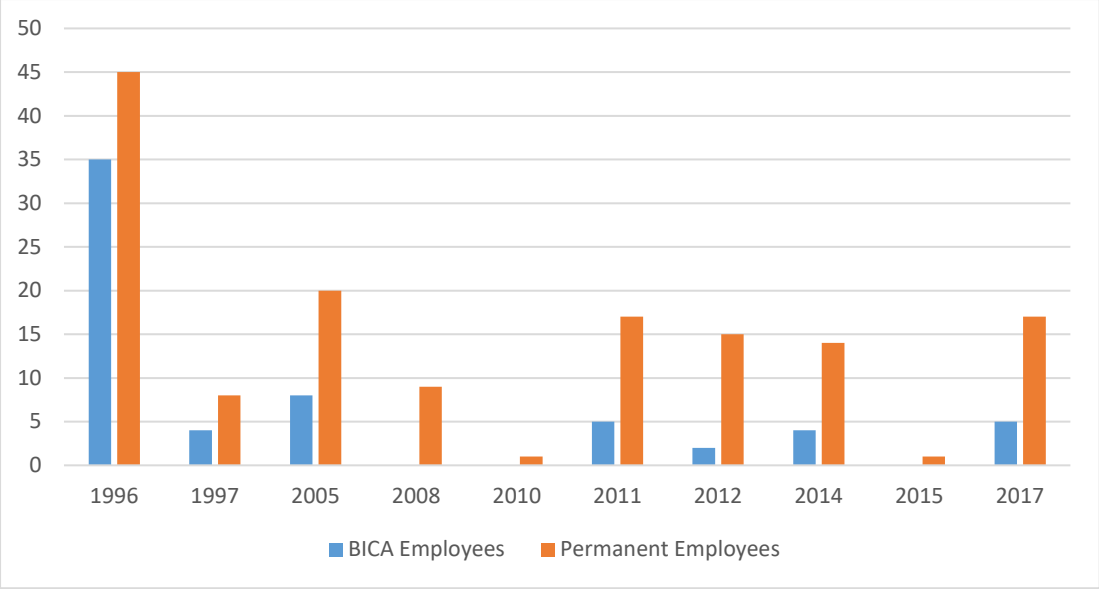

Figure 7: Number of permanent employees and number of Black, Coloured and Indian/Asian employees by company founding year

Nine of the respondents had businesses with a turnover of R2 million or less in the 2017/18 financial year. Most of the companies in this group were limited private companies (Pty. Ltd.) and, except for a non-profit founded in 2005, they had all been founded since 2010. They employed an average of 4.8 people each. Four of these companies had developed and released online games. These companies are designated as **"Group 1"** in the analysis, and can be defined as smaller companies.

Eight of the respondents had turnovers of R3 million to R8 million in the 2017/18 financial year, and employed an average of 9.75 people each. With the exception of one of them (founded in 1997), these companies were also new, founded since 2011. One company had a turnover of R9 million to R13 million and employed 110 people, and was founded in 1996. Three of these nine companies had developed and released games. These companies are designated as **"Group 2"** in the analysis and can be defined as larger companies, some of which have been in the industry for longer.

What would you say are some of the major challenges faced by SA gaming and animation companies in terms of getting established, and then growing, in the industry?

The most frequently mentioned challenges faced by Group 1 companies were lack of skills and experience, especially at the intermediate and senior levels. While two respondents mentioned funding directly, others mentioned excessive regulations as making it difficult for small firms to become established. Gaining access to international markets was also flagged as a difficulty,

along with competition from larger, more established companies. As in many parts of the creative industries, inconsistent demand was also mentioned – what one respondent referred to as “feast or famine cycles” associated with seasonal work.

For Group 2 companies, many of the same issues occurred, but a greater proportion of respondents mentioned the difficulty of finding skilled and experienced workers. Market access was mentioned, as was inconsistent demand. One respondent explained that advertising agencies, who commission much of their animation work, were establishing their own in-house animation studios, thus reducing the demand for commissioned work. Another respondent flagged the cost of data and connectivity as a limiting factor.

What do you think are some of the potential opportunities in the SA gaming and animation industries?

Group 1 companies identified the high quality of work being produced by South African companies, “unique African stories” and the cultural diversity of the country as being key factors in creating potential opportunities for the industry. One respondent flagged lower production costs as an advantageous factor when bidding for international service work. Two respondents mentioned the increasing demand for their work.

The majority of companies in Group 2 identified opportunities to provide international service work because of South Africa’s lower production costs as important. They also pointed to the talent available in the industry and access to technology and infrastructure enabling the production of high quality work. One respondent mentioned the potential benefit of creating their own intellectual property (as compared to servicing international productions) as a potential area of growth. The young, growing population was also identified as an opportunity because “this is a youth business”.

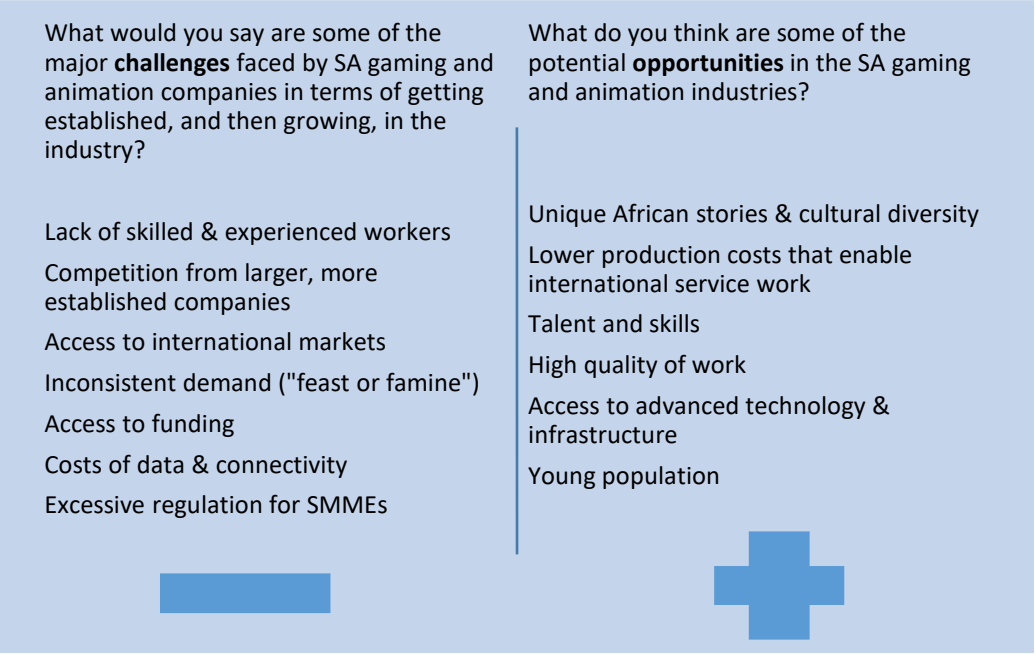

Figure 8: Challenges and Opportunities identified by firms in the gaming and animation sector in South Africa

How transformed would you say the SA gaming and animation industry is? How can this be improved in the future?

In responses to this question, there was very little difference between Group1 and 2 companies: The majority of respondents admitted that the sector is not transformed in terms of including black South Africans (meaning black Africans, coloured people, and people of Indian/Asian origin). There was also general agreement that the sector is male dominated, and currently driven by "privileged white South Africans" who can:

(i) afford to attain the high levels of education and training needed;

(ii) afford to be in a risky industry with inconsistent demand and uncertain income; and

(iii) were exposed to gaming and animation when they were young, and so recognise it as "a viable career path".

In terms of how to improve transformation, respondents most often flagged access to education and technical skills training, but also to industry experience, as key. They suggested that subsidies (such as tax breaks) and other business support, especially to smaller companies, would help to reduce the financial risk of being in the sector, thus encouraging more start-ups. Quite a number also mentioned the importance of being exposed to gaming and animation at schools so that there is more awareness and interest in the sector. With the increase in mobile

gaming platforms that do not require such expensive equipment, this is more likely to occur in the future.

> "From my experience, game development in South Africa is a luxury niche sector that only a few can afford. To put it frankly, being a person of colour, coming from a financially struggling or even a financially comfortable background, whoever is funding your education is not going to want you to further your studies in an industry that is expensive and almost unheard of. As a result, you see people furthering their studies in the more popular "tried and tested" industries. Gaming is one of the biggest industries in the world and South Africa is missing out on a lot of opportunity by not tapping into it enough". (*Group 1 Respondent).*

Some respondents, especially in Group 2, identified industry transformation that was already taking place. One respondent described how their company had gone from employing "all white males" five year ago to now having half their staff being women and black people. Another respondent emphasised that, "There is a chronic skills shortage so everyone who studies animation should find a job, if they are capable. More black people studying would transform the industry within a few years" (Group 2 Respondent).

How easy is it to source the kinds of skills and experience that your company needs? How could training/education in the industry be improved?

Only three of the respondents reported that it was easy or fairly easy to find skills needed by their company. Most others noted that, while there was an abundance of some kinds of graduates (artists), more technical skills (programmers) were difficult to find. One respondent also noted that, for programmers, competing industries (corporate and financial) offered larger starting salaries.

There was also a wide consensus that the specific skills and expertise needed by the industry were not taught at educational institutions, with one respondent stating that it took "at least a year" of additional training and upskilling for graduates to become useful to the business.

In terms of what could be done to increase or improve skills, a number of respondents flagged the need to develop skills beyond those specific to gaming and animation, such as the financial skills needed to exploit the products that had been developed. The mix of creative talent, technical skills, and professionalism needed to succeed in the industry were highlighted, along with "self-development and an extreme work ethic".

> "It's EXTREMELY difficult to find talented or even promising 3D artists/developers. We've identified 3 crucial skills sets that any successful candidate MUST have in order to thrive:
> 1. Highly talented in a creative sense (natural artistic ability)
> 2. Confident in the areas of technical proficiency. (They must be able to learn any software quickly, and confident in self-learning and problem solving in order to overcome the vast array of daily technical challenges.
> 3. They need to conduct themselves in a professional manner. Many millennials struggle with this, but it's simple stuff like coming to work on time, clear and consistent communication, ownership of tasks and taking responsibility for outcomes". *(Group 2 Respondent)*

In terms of transformation and industry sustainability in the future, several respondents felt that educational funding (bursaries) for black students would be important. Some recognised that, given the current small size of the sector (especially gaming), dedicated tertiary education courses or degrees might not be practical. One respondent described how she/he had taught themselves via online tutorials and videos, and suggested online education as a way forward.

International competition in game production is fierce, particularly in the F2P (free to play) market. What would SA gaming companies need to be more competitive?

All the respondents to this question agreed that there is significant international competition in the market. Suggestions on what would make South African companies more competitive can be divided into three main areas: Marketing, Skills, and Support/Resources.

> "We are getting there, however it didn't help that the Google Play Store took so long to allow local developers to potentially make a living off of game development by allowing merchant accounts to be set up in SA. While there are FTP games available, most still generate revenue through 3rd party advertising often monetised through the development platform, Unity or UnReal, but the advertisers in SA don't realise the size and impact of the audience they can reach. We always have had a tradition and culture of being able to solve problems and to tenaciously take on challenges, [so] I feel that given the opportunities available in the rest of the world, South Africa and Africa will be a force to be reckoned with in the next 5 to 10 years". *(Group 2 Respondent)*

Quite a number of respondents mentioned the importance of *Marketing* of games that were already being developed, especially in the absence of "mega marketing budgets" available to more established companies. Suggestions included:

- Development of partnerships with large international distributors;
- Improved awareness of international trends;
- Targeting small niche markets to build studio brands;
- Having more local events and awards; and
- Lobbying for more local media coverage.

Skills were also mentioned by quite a few respondents, particularly in developing a "talent pipeline" in the industry (linked to the need to develop sustainable career paths already discussed), and maintaining and developing "skilled teams". However, most respondents were quite positive about existing skills and creativity, "we have the creativity and skills, now we need resources and a [marketing and distribution] platform". One person simple stated that "more innovation and less copying" would improve industry competitiveness.

Support and Resources took a number of forms. Some were directly related to the need for government support in the form of grants and tax rebates. Financial resources, especially access to capital at the development phase, were flagged as a need, as well as access to "cutting edge technology". Some factors related to the ease of doing business, such as relaxing exchange controls and intellectual property regulations, were also suggested.

In terms of policies or regulations: Are there specific things that government could do to help the gaming and animation industries in South Africa grow?

Responses to this question could be divided into two main areas: Funding and Finance; and Ease of doing Business.

The most commonly mentioned item under *Funding and Finance* was the provision of tax breaks or incentives (to encourage international companies to outsource more of their work to South Africa), as currently already available in the film industry. Financial support for improving skills, as well as for events and sponsorships to increase the profile of the industry were suggested. Access to investment capital, especially at the development phase of the project, was identified as very important by a number of commentators. The high cost of data and internet access, and the need for regulation was also mentioned. One respondent suggested that state platforms should be more active in commissioning animations and short films.

In terms of the *Ease of doing Business* theme, suggestions included:

- Reducing the "red tape" related to forming and running a small business;
- The need for a "quick and easy" way to bring in foreign workers with specific skills for short periods of time (restrictive work visas mentioned);
- Making the skills levy funding easier to access for small firms; and
- "Outdated" exchange controls are a barrier to working internationally, and need to be reformed.

In general, firm owners in the gaming and animation sectors show a strong entrepreneurial drive. While they are struggling to source skills and finance, some of these shortages are likely to be solved by the market as the sector expands and becomes better-known. However, for growth to reach the potential identified in the PWC report (2018), there is scope for public supports. This is particularly the case in achieving sector transformation.

4. Games Week Africa Narrative Report

Games Week Africa is a conference designed to investigate the current climate of the game development industry in Africa but predominantly within South Africa. The first edition of a planned annual event took place in Cape Town from the 28th of November to the 2nd of December 2018. The programme lasted five days and included developer focused talks, workshops, gaming exhibitions and an opportunity for aspiring developers to meet international publishers and investors. Industry contributors were Make Games Africa, Playtopia, Google Play, and a developer contest hosted by *nordicgame*. This section is a narrative report on the Games Week Africa conference, which was attended by the first author (Delon Tarentaal).

4.1 Make Games Africa

The first two days of the event were managed by *Make Games Africa*. The programme focused on providing developers and studios with the necessary knowledge required to have a successful start in the industry and to maintain growth of the company. Sidick Bakayoko gave a presentation titled "Entertain in order to educate using *e*Sports and video games: The story of Paradise Game".

Bakayoko is founder and CEO of *Paradise Game*, an Ivorian gaming company focused on *e*Sports in West Africa. *e*Sports in Africa is relatively small compared to the global standard,

largely due to the immaturity of the gaming industry within the African continent. African *e*-athletes do participate in global *eS*ports events, such as WESG, which provide essential experience to players and help to promote *eS*ports growth in Africa.

Romain Mardot, manager of top game developers from Central and Eastern Europe such as Playrix and Wargaming provided insight on the different monetisation strategies for gaming. According to *Spilgames* there are 5 monetisation strategies for game developers[34]:

1. Offline shops are the traditional way of monetizing games. This involves selling a physical copy of the game at a physical store. This is more challenging for smaller studios as merchandise needs to be physically and correctly distributed to derive optimal revenue from the good. This model is preferred amongst the single player adventure gaming genre as it allows consumers to sell the product on the secondary market once they have completed all the challenges.
2. Online shops (such as Steam or the PlayStation Store) are the most popular means of acquiring games, as the consumers simply goes to the online store, selects a game from a list of games, enters their banking details and downloads a digital copy of the game. However, this monetization method is subject to the willingness of the platform to include your game in their market. This method is popular amongst games that have replayability, which means that each time the game is played the experience is different.
3. In-game purchases are part and parcel of most social or mobile games. The game will either be "Free to Play" (F2P), which means that installation of the game is free, or "Pay to Play" (P2P), where the game requires an initial purchase before installation can occur. In-game purchases of virtual goods are generally presented in two forms: aesthetic or advancement. Aesthetic purchases allow the consumer to enhance the appearance of the game character or other assets, but do not give an advantage over other players in terms of performance. Advancement purchases, sometimes referred to as "Pay to Win" (P2W), allow users to speed up their progress in the game (such as by skipping levels or purchasing items to overcome obstacles faster). This is frowned upon by the gaming community because, instead of competing fairly against another player through skill and strategy, players who can afford advancement purchases are likely to win.

[34] https://spilgames.com/11-monetization-strategies-for-game-developers/

4. Add-ons allow developers to release 'unfinished' games by removing components from the initial game and later selling them to the community as extras. These are often referred to as expansion packs which allow the consumer to add more levels or assets to their standard game.
5. Subscriptions games, such as *DotA Plus* or *PS Plus*, allow the consumer to obtain an extra benefit whilst playing the game or open different avenues such as providing access to online play. These extra benefits can also be seen as part and parcel of the P2W regime.

Monetisation strategies are seldom used in isolation of one another but rather a combination that the developers believe will best optimise sales. For instance, *Call of Duty: Black Ops 4* have both offline and online purchase options. The game can be obtained as a standard product with the battle edition (which includes two out of the three modes) or the deluxe edition, which contains all of the modes and extra benefits. The battle edition can also be upgraded by purchasing the third game mode. A battle pass is also on offer, which allows the consumer access to battle pass exclusive content such as new maps. The consumer can also purchase cosmetic items or levels to advance through the tiers.

Make Games Africa ended their segment with a discussion on the game design curriculum within South Africa. There are currently six institutions that offer either a degree or a diploma in game design: University of Cape Town (UCT), University of Witwatersrand (Wits), Vega, Friends of Design, PixelSmithStudios and Learn 3D.

UCT offers a 3-year undergraduate program for Computer Game Development with a major in Computer Science. The course is aimed at providing the student with a deep understanding of the technical side of Computer Games design and implementation. Appreciation of roles such as animators is emphasized as being the key development of a successful game. The course is designed to fit the South African climate as the student will not merely be a game developer but also acquire skills to excel as a computer scientist in different fields[35].

Wits provides students with two degree opportunities which encompasses a collaboration between Electrical and Information Engineering as well as Digital Arts to bridge the gap

[35] http://www.science.uct.ac.za/usr/science/departments/compgamesdev.pdf

between the creative and technical aspects of game creation. The courses focus on gaming history and theory, gaming mechanics, programming, puzzle design, level design, character design and many more elements of games. Each of the theoretical concepts are partnered with a practical project allowing students to be creating games from the start, whether it be a board game or a digital game[36].

Vega offers a more comprehensive package when it comes to game design. The BCIS degree on offer is a 3-year program that educates students on the principles of game design and development, 2D and 3D animation, drawing and last but not least, branding and marketing which is very important with the current climate and volatility of the gaming industry[37].

The above the institutions summarise most of the topics covered by the institutions in South Africa, however it is difficult to assess what the requirements for a good South African game designer are at the moment, as the domestic gaming industry is far behind the rest of the world in terms of resources and skills. Lack of exposure also impacts on the number of admissions to these institutions, therefore limiting the number of graduates being produced.

4.2 Playtopia

After the conclusion of the *Make Games Africa* segment, *Playtopia* continued the conference with a three-day indie (independent) games and playful media festival. The definition of an indie game varies, but essentially it means to develop a game independently without the assistance of a publisher. The *Playtopia* festival featured South Africa's top interactive artist and more than 30 alternative, art and party games.

The first order of business was a discussion on concept art delivered by Andrew Avvakoumides. Andrew is the Head of Concept Art at *Friends of Design*. A concept artist is a designer who visualizes and creates art for characters, creatures, vehicles, environments and other creative assets.[38] Concept art is the pre-production phase where ideas are visualised in a highly detailed manner so that modellers, animators and VFX teams can transform these ideas into products. Every aspect of a video game or a film is initially designed by a concept artist.

[36] https://www.wits.ac.za/wsoa/digital-arts/undergraduate/game-design-/
[37] https://www.vegaschool.com/full-time/bachelor-of-computer-and-information-science-in-game-design-and-development-degree
[38] https://conceptartempire.com/what-is-concept-artist/

According to Avvakoumides, an important part of any concept artist's repertoire is to build a strong visual library that is essentially a database of ideas, shapes, textures and similar concepts to be used as templates. The best artists should be able to project an idea from multiple perspectives as well as different actions that make the task of idea transformation for animators and game developers easier.

The indie game development process was broken down by Francois van Niekerk. The image painted by him with regards to indie game development was a very negative one. There is no money in gaming due to the extremely competitive nature of the industry, and it takes an extremely long time to become successful. His message was that game designers should always plan for failure. An indie developer should therefore initially be designing games part time and doing contract work, such as developing applications and assisting larger and more established institutions.

However, there are positives. The process of development is highly rewarding in terms of personal growth. Aspiring developers should constantly be prototyping – van Niekerk suggests approximately 3 to 4 times per year. The prototyping phase is repeated multiple times until the particular goal is reached, such as obtaining positive feedback from testers.

As the game development is constantly changing, game developers should constantly be "learning how to learn". As Van Niekerk puts it, there are numerous "unknown unknowns". What this means is that game developers may be unaware that they are ignorant about certain concepts. The process of constantly learning should initially transform unknown unknowns to known unknowns and finally into known knowns. Through this process, game designers become more skilled, but van Niekerk estimates that it may take up to 8 years of being in the industry to make a sale.

5. Conclusions and Policy Implications

The global Gaming Industry is large and highly competitive. The global gaming industry in 2018 consisted of 2.3 billion consumers, who spent nearly US$ 138 billion on games. Although the South African gaming industry is small, it is growing at an exponential rate. A recent PWC (2018) report identifies the digital video games sector as one of "the biggest success stories" in the South African entertainment and media industries.

The rise of mobile gaming via smartphones means that many more South Africans will be able to afford to play online games. *e*Sports, competitive online games watched by spectators, are driving the popularity of online gaming, and are already offered at some South African schools and higher education institutions.

International competition is fierce: 37% of the 800 million games released on the gaming platform, *Steam,* have zero downloads. To date, there are five notable contributions from South African game developers: *Freelives, The Brotherhood, Thoopid, Runestorm* and *QCF Design.*

The research identified 59 gaming, or gaming and animation (hybrid), companies in South Africa. Nearly half (48%) are based in the Western Cape. The most commonly used gaming release platform is still PC, which, given the international shift to mobile platforms, may be a future constraining factor (along with high data costs).

There is considerable overlap between gaming and animation: 46% of companies producing games also did animation work. Most of the gaming and animation companies (65%) in the database were founded in the last 10 years. 57% of gaming companies are "very small", with annual turnover of less than R2 million.

Turnover data was provided via an online survey. It is estimated that the turnover for the gaming and animation industry in the 2017/8 financial year was R476 million, of which R198 million was attributed to gaming companies (including hybrid companies, who do both gaming and animation work). This is a considerable increase from the R100 million revenue for the gaming industry in 2015 found in a previous study (IESA, 2016).

South African gaming companies currently create 310 jobs, an increase from 255 direct jobs found in previous research (IESA, 2016). Including hybrid companies increases this figure to 460. A challenge for the gaming and animation sector is transformation – the majority of people working in the sector are white men (as also found in previous studies). Part of the reason for this pattern is that the current gaming *meta* is "Free-to-Play" (F2P). In this business model, game developers release early versions of their game that users can play at no cost, in exchange for user feedback that aids development. Later on, players may have to pay for additional game levels, and/or for virtual goods that are part of the game.

While useful for development, this business model means that only those who can afford to have periods of no, or low, income can afford to work in the industry. To help establish the gaming industry as a viable career path for more diverse participants, policy suggestions include:

- Providing more financial support for the technical training required, especially in areas such as 3D animation;
- Considering financial support, such as tax breaks and development finance, for smaller companies to encourage more start-ups;

The approach by *Serious About Gaming* bridges the two competing industries in South Africa by producing what is known as 'Serious Games'. These "Serious Games" are informative and entertaining as they aim to educate whilst also treating the consumer to an enjoyable experience. This may be the most profitable route for South African companies to take, given the highly competitive international market for pure entertainment games.

Although the size of the South African animation and gaming sector is comparatively small, the international rise in demand for their content, and the growing quality and recognition of South African products, shows that the sector is maturing.
Challenges faced by the sector (and thus the need for policy interventions) include:

- Skills development and training with a view to greater sector transformation;
- Keeping key skills in South Africa;
- Providing continuous work so that a career in the sector is more attractive;
- Developing (and maintaining control) of own Intellectual Property, while also attracting and developing profitable international work;
- The difficulty in accessing development (pre-production) finance.

Advantages identified by those in the industry included: Unique African stories and cultural diversity; lower production costs that enable international service work; a significant pool of talent and skills; the high quality of the work produced; and access to advanced production and infrastructure.

Policy interventions that could help to unlock the potential of the industry include:

- Relaxing restrictions on short-term work visas so that local firms can more easily bring in, and learn from, international partners;
- Making it easier for small businesses in the sector to do business by, for example, providing easier access to the skills levy fund, and relaxing exchange controls;
- Upgrading base infrastructure, such as internet, fiber and electricity supply to improve internet speed and stability, which will be important for stimulating both the supply and demand sides of the industry.

The gaming and animation sectors show a strong entrepreneurial drive, as demonstrated by their organisation of *Games Week Africa* in December 2018. There are active gaming industry bodies in South Africa that produce industry-relevant research, provide a networking platform, run seminars, and give advice. These include *Interactive Entertainment South Africa* and *Make Games South Africa*. Support to the sector through these existing institutions could be a very effective way to help the sector expand and transform. For growth to reach the potential identified in the PWC report (2018) there is scope for public support. This is particularly the case in achieving sector transformation.

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Appendix 1: Online Questionnaire

South African Gaming and Animation Industry Survey

The South African Cultural Observatory (SACO) has been mandated by the Department of Arts and Culture to undertake research into the development potential of the South African Gaming and Animation industries.

As part of the research, we are constructing a database of companies that are involved in the Gaming and Animation sector. Your company was identified, and we would like to request that you complete a short survey.

The database will be made publically available on the SACO website, and will be used to construct a baseline report of the industry. If you participate, you will have access to both the database and the report. You can choose if the additional data that you provide will be publically available, or will be kept confidential. You can leave out any questions you don't want to answer, and can exit the survey at any time.

Company Details

1. Company name.
2. Year in which the company was founded
3. Company type
    a. State-Owned Company (SOC)
    b. Private Company ((Pty) Ltd.)
    c. Personal Liability Company
    d. Public Company
    e. Non-Profit Company
    f. Sole-Proprietorship
4. What kind of work does your company do?
    a. Gaming
    b. Animation
    c. VFX
    d. Film & TV
    e. Other
5. Does the company have any games developed and released?

Gaming Development Details

1. Number of games developed
2. How many of these games are Free to Play (F2P)
3. Platforms
    a. PC
    b. Console
    c. Mobile
4. Please provide a short list of the games the company has developed

Company Demographics and Employment

An important part of developing the cultural and creative industries is the inclusion of more black, coloured, and Indian/Asian South Africans. It would help us to know what the level of transformation in the industry currently is, but you can choose not to answer these questions, or to answer them, but for the information to be kept confidential (that is, not to be included in the publically available database with your company name).

1. Total number of people employed (including the owner/s)
2. Total number of EMPLOYEES who are Black African, Coloured, Indian/Asian

3. Total number of company OWNERS who are Black African, Coloured, Indian/Asian:
4. Number of permanent employees (as compared to short-term contract workers)
5. A goal of the Department of Arts and Culture is to encourage the participation of more black (meaning Black African, Coloured, and Indian/Asian South Africans) in the creative industries. How transformed would you say the SA gaming industry is? How can this be improved in the future?
6. Growing future talent is an important part of industry sustainability. How easy is it to source the kinds of skills and experience that your company needs? How could training/education in the industry be improved?

Turnover and Finances

Turnover (the total Rand amount of all the business your company has done in the last year) will help to determine the size and value of the sector. You may decide if you want this information to be kept confidential, or included in the online database.

1. Turnover for the last financial year (2017/2018)
    a. R2 million or less
    b. R3 million to R8 million
    c. R9 million to R13 million
    d. R14 million to R24 million
    e. R25 million or more
2. What percentage of your turnover, on average, comes from game development?

Qualitative Questions

1. Some industry reports show very fast growth in the SA gaming and animation industries. What do you think are some of the potential opportunities in the SA gaming and animation industries?
2. What would you say are some of the major challenges faced by SA gaming and animation companies in terms of getting established, and then growing, in the industry?
3. International competition in game production is fierce, particularly in the F2P market. What would SA gaming companies need to be more competitive?
4. In terms of policies or regulations: Are there specific things that government could do to help the gaming and animation industries in South Africa grow?

Appendix 2: South African Gaming Industry Database

Name	Location		Year Found	Industry			Employment	Platforms				Number of Games	Company Type
	City	Province		Gaming	Animation	Hybrid		PC	Console	Mobile	TT		
24 Bit Games			2012	Y	N	N	15	Y	Y	Y	Y	14	Private Company
3DTree Animation and VFX	Johannesburg	Gauteng		N	Y	N		Y	N	N	N	0	Private Company
3rdFloor	Cape Town	Western Cape	2014	N	Y	N	5	Y	N	N	N	0	Partnership
67 Games	Johannesburg	Gauteng	2015	Y	N	N	11	Y	N	N	N		
ACT Animation Films	Johannesburg	Gauteng	2005	N	Y	N		Y	N	N	N	0	
Aruze Gaming South Africa	Kyalami	Gauteng	2014	Y	N	N		Y	N	N	N	25	Private Company
Astral Studios	Johannesburg	Gauteng	1991	N	Y	N		Y	N	N	N	0	Private Company
Atomedge	Cape Town	Western Cape	2010	N	Y	N		Y	N	N	N		
Atomedge Solutions				N	Y	N	2				N		Sole Proprietorship
Balisti Studios (Pty) Ltd			2017	N	Y	N	16				N		Private Company
BIGBrave			2008	Y	N	N	9	Y		Y	N	20	Private Company
Biowire Media	Johannesburg	Gauteng	2017	Y	Y	Y		Y	N	N	N		Private Company
Bla Bla Bla Studios	Cape Town	Western Cape	2009	Y	Y	Y	20	Y	N	N	N	27	Private Company
Black Ginger	Cape Town	Western Cape	2005	N	Y	N		Y	N	N	N	0	Private Company
Black Ice Digital	Pretoria	Gauteng	2009	N	Y	N		Y	N	N	N	0	Partnership
Blatch	Johannesburg	Gauteng	2006	N	Y	N	1	Y	N	N	N	0	Freelance
Blink Tower	Cape Town	Western Cape	2010	N	Y	N	7	Y	N	N	N	0	Private Company
Bugbox	Johannesburg	Gauteng	2003	N	Y	N		Y	N	N	N	0	Partnership
Cardboard Edison				Y	N	N		N	N	N	N	2	
Celestial Games	Johannesburg	Gauteng	1994	Y	N	N	4	Y	N	N	N	4	Private Company
CherriBomb	Johannesburg	Gauteng	2015	N	Y	N		Y	N	N	N	0	Private Company
Chocolate Tribe	Johannesburg	Gauteng	2014	N	Y	N		Y	N	N	N	0	Private Company
Chowklaar Studios			2017	N	Y	N	4				N		Private Company

Name	Location		Year Found	Industry			Employment	Platforms				Number of Games	Company Type
	City	Province		Gaming	Animation	Hybrid		PC	Console	Mobile	TT		
Clint Sutton	Cape Town	Western Cape		Y	Y	Y	1	Y	N	Y	N	7	Private Company
Clockwork Acorn			2014	Y	N	N	3	Y			N	1	Private Company
Conduit Productions	Cape Town	Western Cape	2003	N	Y	N		Y	N	N	N	0	
Cool Your Jets			2011	N	Y	N	3						Private Company
Courtney	Cape Town	Western Cape		N	Y	N		Y	N	N	N		
Craft	Johannesburg	Gauteng		Y	N	N	5	Y	N	Y	N	3	Private Company
DNA Studios	Cape Town	Western Cape	2014	N	Y	N		Y	N	N	N	0	Private Company
Dondoo Studios	Johannesburg	Gauteng	2015	N	Y	N		Y	N	N	N	0	Private Company
Emile Ferreira	Cape Town	Western Cape	2016	Y	Y	Y		Y	N	Y	N	2	Private Company
Eralith Studios	Cape Town	Western Cape	2017	N	Y	N		Y	N	N	N	0	Private Company
Every Single Soldier (pty) Ltd				Y	N	N	1	Y		N	N	5	Private Company
Firefly Animation	Johannesburg	Gauteng	2004	N	Y	N		Y	N	N	N	0	Private Company
Flint Studio	Johannesburg	Gauteng	2003	N	Y	N		Y	N	N	N	0	Private Company
Flying Circus	Johannesburg	Gauteng		N	Y	N		Y	N	N	N	0	Public Company
Formula D interactive			2005	Y	N	N	20	Y	N	Y	N	5	Private Company
Free Lives	Cape Town	Western Cape	2012	Y	N	N	16	Y	Y	N	N	8	Private Company
Fuzzy Logic	George	Western Cape	2011	Y	N	N		Y	Y	Y	Y		Private Company
Gravity VFX	Cape Town	Western Cape	2016	N	Y	N		Y	N	N	N	0	Sole Proprietorship
Guinea Pixel	Cape Town	Western Cape	2014	Y	N	N		Y	N	Y	N	8	Private Company
I-Imagine Interactive	Johannesburg	Gauteng	1999	Y	Y	Y		Y	Y	Y	Y	2	Private Company
Inessoft Game Development Studio	Port Elizabeth	Eastern Cape	2009	Y	N	N		Y	N	Y	N		Public Company
Interactive Entertainment South Africa			2015	N	Y	N	1						Non-Profit Company
Keyframe Animation Studio Pty Ltd			1997	N	Y	N	8				N		Private Company

Name	Location		Year Found	Industry			Employment	Platforms				Number of Games	Company Type
	City	Province		Gaming	Animation	Hybrid		PC	Console	Mobile	TT		
Killer Robot VFX	Cape Town	Western Cape	2010	N	Y	N		Y	N	N	N	0	
Kopskop Games	Cape Town	Western Cape	2016	Y	N	N	7	Y	N	N	N	1	Private Company
Loco VFX	Johannesburg	Gauteng	2011	N	Y	N		Y	N	N	N	0	Private Company
Luma Animation Studio	Johannesburg	Gauteng	2001	N	Y	N		Y	N	N	N	0	Private Company
Luma Arcade	Johannesburg	Gauteng	2006	Y	Y	Y		Y	N	Y	N	7	Private Company
Lung Animation	Cape Town	Western Cape	2007	N	Y	N		Y	N	Y	N	0	Partnership
MAAN Creative			2014	N	Y	N	9						Private Company
Made With Monster Love	Cape Town	Western Cape		Y	N	N	1	Y	N	Y	N	2	Private Company
Magos Media	Johannesburg	Gauteng		N	Y	N		Y	N	N	N	0	Private Company
Mann Made Media	Johannesburg	Gauteng	2000	N	Y	N		Y	N	N	N	0	Private Company
Marsh Town Madness	Cape Town	Western Cape	2016	Y	N	N		Y	N	Y	N		Private Company
Masood	Cape Town	Western Cape		Y	Y	Y					N		
Maxxor	Cape Town	Western Cape	2004	Y	N	N		Y	N	Y	N		Private Company
Mind's Eye Creative			2011	N	Y	N	16						Close Corporation
Moshi Moshi	Cape Town	Western Cape		N	Y	N					N		
Motif Studios	Cape Town	Western Cape	2011	N	Y	N		Y	N	N	N	0	Private Company
Motion-Max	Johannesburg	Gauteng		Y	Y	Y					N		
Nyamakop	Johannesburg	Gauteng	2015	Y	N	N		Y	Y	Y	Y	1	Private Company
OrangeSpice Games			2015	Y	N	N	1	Y		N	N	4	Private Company
Piehole.TV	Port Elizabeth	Eastern Cape	2012	N	Y	N	10	Y	N	N	N	0	Private Company
Pixel Thieves	Cape Town	Western Cape	2015	N	Y	N	2	Y	N	N	N	0	Partnership
Pixelnator	Johannesburg	Gauteng		Y	Y	Y		Y	N	Y	N	2	Private Company
Pixelsmith Studios	Cape Town	Western Cape	2010	Y	Y	Y		N	N	N	N	0	Sole Proprietorship

Name	Location		Year Found	Industry			Employment	Platforms				Number of Games	Company Type
	City	Province		Gaming	Animation	Hybrid		PC	Console	Mobile	TT		
Polycat	Cape Town	Western Cape	2015	N	Y	N		Y	N	N	N	0	Partnership
Pyro Graphix			2010	N	Y	N	3						Sole Proprietorship
Quarter Circle Forward (QCF) Design	Cape Town	Western Cape	2008	Y	N	N		Y	Y	Y	Y		Private Company
Red Oxygen	Johannesburg	Gauteng	2017	Y	Y	Y		Y	N	Y	N		Private Company
RenderHeads	Cape Town	Western Cape	2011	Y	Y	Y	3	Y	N	Y	N		
retroEPIC	Cape Town	Western Cape	2011	Y	N	N		Y	N	N	N	1	Private Company
Rogue Moon Studios	Durban	Kwazulu-Natal	2012	Y	N	N		Y	N	N	N	1	Private Company
RuneStorm			2014	Y	N	N	3	Y			N	2	Private Company
Sabre Visual Effects Connection	Johannesburg	Gauteng		N	Y	N		Y	N	N	N	0	Private Company
Sea Monster	Cape Town	Western Cape	2011	Y	Y	Y	5	Y	N	Y	N	24	Private Company
Shine Interactive	Pretoria	Gauteng	2003	Y	Y	Y		Y	N	Y	N	5	Private Company
Simone	Durban	Kwazulu-Natal		Y	Y	Y		Y	N	N	N		
Skillpod Media	Johannesburg	Gauteng	2007	Y	N	N	31	Y	N	Y	N		Private Company
Solid Black	Johannesburg	Gauteng	2010	N	Y	N		Y	N	N	N	0	Partnership
Sphere Animation Studio	Johannesburg	Gauteng	2001	N	Y	N		Y	N	N	N	0	Private Company
STARBOY	Johannesburg	Gauteng	2014	Y	Y	Y		Y	N	N	N		Private Company
Stormcraft Studios	Durban	Kwazulu-Natal	2016	Y	N	N		Y	N	Y	N	15	Private Company
Studio Bolland			2014	N	Y	N	7				N		Private Company
Studio Woo	Cape Town	Western Cape	2005	N	Y	N	2				N	0	Private Company
StudioZoo	Johannesburg	Gauteng	2016	N	Y	N		Y	N	N	N		Private Company
Sunrise Productions	Cape Town	Western Cape	1998	N	Y	N		Y	N	N	N	0	
Tasty Poison Games	Cape Town	Western Cape	2010	Y	Y	Y		Y	N	Y	N	9	Private Company
Team Lazerbeam	Cape Town	Western Cape	2014	Y	N	N		Y	N	Y	N	8	Private Company

Name	Location		Year Found	Industry			Employment	Platforms				Number of Games	Company Type
	City	Province		Gaming	Animation	Hybrid		PC	Console	Mobile	TT		
The Brotherhood Games			2010	Y	N	N	2	Y	N	N	N	3	Private Company
The Kinetic	Johannesburg	Gauteng	2010	N	Y	N	7	Y	N	N	N	0	Private Company
The Motel	Cape Town	Western Cape	2008	Y	N	N		Y	N	N	N		Private Company
The Training Room Online (OTTRO)	Cape Town	Western Cape	2008	Y	Y	Y		Y	N	N	N	0	Private Company
Theunis Duvenhage	Cape Town	Western Cape		Y	Y	Y	1	Y	N	Y	N		Private Company
Thoopid	Cape Town	Western Cape	2013	Y	Y	Y	3	Y	N	Y	N	3	Private Company
Tincup Studios	Cape Town	Western Cape	2007	N	Y	N		Y	N	N	N	0	
Toon53 Productions cc	Johannesburg	Gauteng	2008	N	Y	N		Y	N	N	N	0	Private Company
Triggerfish	Cape Town	Western Cape	1996	Y	Y	Y		Y	N	Y	N	0	Partnership
Triggerfish Animation			1996	N	Y	N	110				N		Private Company
Tumelo	Johannesburg	Gauteng		N	Y	N		Y			N		
Twin Sister Studios	Cape Town	Western Cape	2014	N	Y	N		Y	N	N	N	0	Private Company
Two Plus Games	Johannesburg	Gauteng	2015	Y	N	N		Y	N	Y	N	12	
Two Tales Animation (PTY) LTD	Pretoria	Gauteng		N	Y	N		Y	N	N	N	0	Private Company
Visual Renders	Johannesburg	Gauteng		N	Y	N		Y	N	N	N	0	Private Company
VS Gaming	Centurion	Gauteng	2008	Y	N	N		Y	Y	Y	Y		Private Company
Wicked Pixels	Johannesburg	Gauteng	1997	N	Y	N		Y	N	N	N	0	Private Company
Wind FX Studios	Johannesburg	Gauteng		N	Y	N		Y	N	N	N	0	
Zeropoint Studios	Cape Town	Western Cape	2010	N	Y	N		Y	N	N	N	0	Private Company

Appendix 3: Top 20 Overall eSports Earnings

	Player ID	Player Name	Total (Overall)	Total (Game)
1.	KuroKy	Kuro Takhasomi	$4,136,926.95	*Dota 2*
2.	N0tail	Johan Sundstein	$3,742,055.59	*Dota 2*
3.	Miracle-	Amer Al-Barkawi	$3,701,337.28	*Dota 2*
4.	MinD_ContRoL	Ivan Ivanov	$3,492,411.76	*Dota 2*
5.	Matumbaman	Lasse Urpalainen	$3,476,116.04	*Dota 2*
6.	JerAx	Jesse Vainikka	$3,313,463.82	*Dota 2*
7.	SumaiL	Sumail Hassan	$3,305,914.94	*Dota 2*
8.	GH	Maroun Merhej	$3,095,344.84	*Dota 2*
9.	UNiVeRsE	Saahil Arora	$3,035,737.67	*Dota 2*
10.	ppd	Peter Dager	$2,906,766.36	*Dota 2*
11.	ana	Anathan Pham	$2,853,875.76	*Dota 2*
12.	Fear	Clinton Loomis	$2,500,460.84	*Dota 2*
13.	7ckngMad	Sébastien Debs	$2,332,596.81	*Dota 2*
14.	Somnus丶M	Lu Yao	$2,263,924.22	*Dota 2*
15.	Topson	Topias Taavitsainen	$2,257,909.97	*Dota 2*
16.	s4	Gustav Magnusson	$2,206,343.71	*Dota 2*
17.	fy	Xu, Linsen	$2,160,733.44	*Dota 2*
18.	Puppey	Clement Ivanov	$2,103,245.83	*Dota 2*
19.	Fly	Tal Aizik	$2,012,585.80	*Dota 2*
20.	y`	Zhang Yiping	$2,011,675.56	*Dota 2*

Top 44 earnings by DotA 2 players due to large prize pools at The Internationals.

45th highest earner is a Counter-Strike: Global Offensive player.

Appendix 4: Top 20 South African eSports Earnings

	Player ID	Player Name	Total (Overall)	Highest Paying Game
1.	Sonic	Aran Groesbeek	$39,628.89	*Counter-Strike: Global Offensive*
2.	Detrony	Dimitri Hadjipaschali	$39,227.02	*Counter-Strike: Global Offensive*
3.	Elusive	Ruan van Wyk	$37,983.21	*Counter-Strike: Global Offensive*
4.	Shiaan Rugbeer	- -	$33,400.00	*FIFA 18*
5.	JT	Johnny Theodosiou	$33,118.21	*Counter-Strike: Global Offensive*
6.	Thabo Mike Moloi	- -	$32,400.00	*FIFA 18*
7.	Fadey	Rhys Armstrong	$30,293.57	*Counter-Strike: Global Offensive*
8.	bLacKpoisoN	Robby Da Loca	$19,721.44	*Counter-Strike: Global Offensive*
9.	Domsterr	Dominic Sampaio	$19,225.20	*Counter-Strike: Global Offensive*
10.	flexye	Rieghardt Romatzki	$16,180.75	*Counter-Strike: Global Offensive*
11.	kaNibalistic	Trevor Morley	$14,739.38	*Counter-Strike: Global Offensive*
12.	Takbok	Jan Theron	$14,195.89	*Counter-Strike: Global Offensive*
13.	Golz	Ashton Muller	$12,961.93	*Counter-Strike: Global Offensive*
14.	Irshaad Mahomed	- -	$12,150.00	*FIFA 18*
15.	Zuhair Ebrahim	- -	$12,150.00	*FIFA 18*
16.	Th3jok3r	François Neethling	$12,011.00	*Hearthstone*
17.	sythe	- -	$9,918.00	*Hearthstone*
18.	stYle	Riaan van Niekerk	$8,544.97	*Counter-Strike: Global Offensive*
19.	g4mbit	Christopher Lautre	$7,696.43	*Counter-Strike: Global Offensive*
20.	Hellhound	Jannie van Niekerk	$7,696.43	*Counter-Strike: Global Offensive*