



Innovation and diversity in the digital cultural and creative industries

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Received: 27 September 2020 / Accepted: 30 April 2021 / Published online: 22 May 2021
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Abstract

The cultural and creative industries (CCIs) are increasingly being recognised in South Africa, as in other countries, as wealth-creating, given appropriate investment, rather than primarily a non-market subsidized sector. However, national innovation policy is still predominantly focused on STEM (science, technology, engineering and mathematics) skillsets and related product markets. This paper analyses how the CCIs in the Cape Town cluster innovate by combining digital technology, creative inputs, and workforce diversity. Based on a similar study conducted in Brighton, UK, a cluster of innovative CCI firms was identified that are to varying degrees “fused”, defined as combining digital technology and creative design in production. Fused firms have higher levels of innovation in business processes, goods and services. Fused firms were also more likely to employ demographically diverse people, adding insights from the South African mix to the UK studies on disciplinary diversity. While fused creative-digital firms employ greater diversity, a qualitative analysis of SA gaming and animation firms nevertheless demonstrates the challenges for improving diversity in a developing country context.

Keywords Creative industries · Innovation · Intellectual property · Diversity

JEL codes Z11 · L22

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1 Introduction

The digital environment has dramatically affected creative industries in all kinds of ways, requiring dramatic changes in all parts of the value chain, including business models, stakeholder relationships and intellectual property management (Brown & Waelde, 2018; Peukert, 2019; Weinberg et al., 2020; Schauerte et al., 2020). These effects are felt intensely in African countries, where new digital technologies provide both unprecedented opportunities for innovation and growth, as well as threats related to the insufficient protection of intellectual property (Nwauche, 2018).

An important part of adapting to the new digital environment is the ability of firms to innovate, to successfully exploit the affordances of the new technologies to generate and capture value. The expanded Oslo definition of innovation (OECD, 2018), which includes services and marketing innovation to add to familiar product and process innovation, has enabled a much broader understanding of what innovation means, and how it takes place within smaller firms.

This research examines the relationship between digital technologies, innovation, and diversity in the cultural and creative industries (CCIs) in a developing country context. Although the CCIs in South Africa are increasingly being acknowledged as an industry that can contribute to growth and job creation, innovation management and policy is still mostly STEM-focused (science, technology, engineering and mathematics). To date, there is thus little research on firms at the interface between technology and culture, and on how they innovate.

To begin to fill this gap, a study of CCIs operating in the Cape Town metropolitan area was conducted. The research design follows a study of the Brighton (UK) cluster (Sapsed et al., 2013), and some comparisons with this study are made as part of the discussion. The second part of the research focused on a sector-specific case study of gaming and animation firms in South Africa. An in-depth survey of 18 of the firms focused on the challenges and opportunities they face as producers at the cultural/digital frontier.

The article begins with a review of the theory of digital technology and innovation in the CCIs (defined, for the purposes of this research, using the 2009 UNESCO Framework for Cultural Statistics). Section 3 discusses the CCIs in a South African context. Sections 4 and 5 present the research methods and results.

2 The creative economy, digitisation and innovation

2.1 Digitisation, business models and innovation

In most national systems of innovation and related innovation policies, STEM disciplines are dominant (Jaaniste, 2009), a bias also evident in South Africa, as discussed below. The STEM bias places the cultural and creative sector outside of the innovation cycle, mostly connected with providing the cultural backdrop

in which innovation occurs and/or as a component of a broad education which enables innovation in the STEM sector. However, a broader, multidisciplinary understanding of innovation has emerged to better appreciate ‘artistic innovations’ (Castañer & Campos, 2002) and advances in design producing ‘stylistic innovation’ (Cappetta et al., 2006), the ‘soft innovation’ found in creative industries (Stoneman, 2010) contrasting with hard STEM functionality. Innovation in creative industries has different drivers to those in science and engineering, partly depending on semiotics and symbols for value creation (Jones et al., 2015). This greater understanding of innovation derived from arts and design has occurred alongside the widening horizons of innovation research and policy. (Perren & Sapsed, 2013; OECD, 2018). However, it is not that innovations from STEM and Arts and Design are insulated channels but rather that CCIs can contribute directly in a number of ways, sometimes forming complementary assets to technology (Teece, 1986). For example: taking STEM applications to markets through marketing, design and digital content; contributing to experimental research in creative sector production; producing and distributing innovation throughout creative firms for commercialisation; and contributing to social innovation and utilisation through helping to solve environmental and social policy issues (Jaanimäe, 2009).

The impacts of digitisation on the CCIs are an important testing ground for its impact in other industries: “Previously thought of as frivolous and an expensive luxury, the creative industries are now considered an industrial priority and a ‘laboratory’ for studying the transformation of modern economies and societies” (Mangematin et al., 2014:1). There are many ways in which the digital environment can drive entrepreneurship, resulting in “digital dividends” for both firms and societies that embrace the online environment (Table 1).

Galindo-Martín et al. (2019) tested their theories on a sample of 29 European countries and found that entrepreneurial innovations in the digital environment resulted in higher value added and stimulated competition, leading to further (ongoing) innovation, and faster economic growth – what they describe as “a virtuous economic circle”. However, they acknowledge the risks associated with digital innovation and entrepreneurship, such as the development of monopolistic or oligopolistic structures that could stifle the gains from competition.

Table 1 The benefits of digital entrepreneurship for firms and societies. *Source* Adapted from Galindo-Martín et al. 2019

Digital dividends for firms	Digital dividends for societies
– Access to new markets	– Job creation and improved social climate
– Facilitation of labour market information and new jobs	– Better quality goods and services at lower prices
– Increased worker productivity and lower production costs	– Better access to public services
– Economies of scale	– Governments achieve economic growth and employment improvements, leading to improved well-being

The impact of digital entrepreneurship has both “creative” and “destructive”, or disruptive, elements which fundamentally reconfigure value chains in the industry. For example, digital technologies affect the creative process in that they offer the opportunity for “users” or “consumers” to be much more active participants in the production process. Digital technologies also offer a multitude of ways to distribute and sell creative content that can be differentiated depending on the market segment, or even the individual. New technologies provide an opportunity for such arrangements to be reconfigured but may be constrained by the “dominant business logic” of the sector (Mangematin et al., 2014; Weinberg et al., 2020; Schauerte et al., 2020).

Li (2020) compared two groups of firms in the creative industries: those who were identified as using innovative business practices related to digital technologies, and those selected randomly from different CCI sectors. Carefully selected global case studies were analysed, but with a focus on global north (UK and European) markets. Li identifies three ways in which technology can change business models: through *automation* of existing activities and processes, *extension* of current ways of conducting business, and *transformation* of current business practices that replace traditional ones.

Findings showed that 90% of CCI innovators used digital technologies to transform their relationships with customers through, for example, offering personalised products and services, and different prices for different levels of exclusivity, which changed revenue models. Many were also able to provide specific services to target markets through market segmentation. 87% increased revenue through association with other firms (for example, groups of artists) and brand extension, which enabled them to increase their customer base and to enhance their credibility through such associations. The general sample of CCIs was more likely to use digital technologies to automate (rather than transform) their business models. Li (2020) concludes that digital technologies can lead to a variety of new business models, and that a new way of doing things may not completely replace a traditional model but leads to the adoption of a “portfolio of business models”.

There are many examples of how cultural institutions can make use of digital technologies to enhance their traditional business models. Bakhshi and Throsby (2012) consider the experiences of UK audiences at live theatre productions (using the National Theatre as the example) and art exhibitions (using the Tate Gallery as the example) compared to audiences experiencing the same works either live-streamed to cinemas, in the case of the theatre production, or via an online virtual tour, for the art exhibition. A comparison of audience demographics showed that the in-cinema live-stream and online art tours attracted audiences from a greater proportion of people from lower income groups, thus potentially enabling audience diversification and greater access.

At the firm level of the creative process, Sapsed and Tschang (2014: pp. 134) argue that digital technologies affect not only business models, but also the way in which creative work is produced. Taking the example of the development of online games from both UK and US studios involved in digital art production, they demonstrate how software tools change the production process by allowing artists to experiment and include multiple iterations at any stage of the process, rather than these

activities being confined to developmental stages. The sequencing of the production process becomes much more fluid, “enabling ideas to be [constantly] realized, tested and revised” (Sapsed & Tschang, 2014: pp. 139).

2.2 Diversity and innovation

2.2.1 Disciplinary diversity: creative-digital skills and ‘fusion’

The bringing together of separate resources as a fundamental driver of innovation has long featured in innovation studies since Schumpeter’s (1942) writing on ‘new combinations’, meaning the introduction of fresh resources or technologies to established products or equipment, or the importing of resources to be applied to one field from another. Innovation often arises from the synthesis of phenomena that were previously separate. This extends to knowledge bases and skills sets, such as bioinformatics or mechatronics. The benefits of combining skills have been shown to enhance creativity and innovation (Leonard & Sensiper, 1998) to the extent that most New Product Development activity uses the cross-functional form (Griffin, 1997). Cross-functional team working provides not only the immediate knowledge of the team assembled, but also direct channels to each member’s personal network of contacts. A pool of the team’s accumulated social capital is made available to the team (Sapsed et al., 2002) so performance is enhanced in teams with external communications (Keller, 2001). However, there are downsides of added stress through miscommunications and ‘creative abrasion’ (Leonard & Sensiper, 1998). Diverse teams tend to have lower group cohesiveness and job satisfaction, higher turnover, and stress (Keller, 2001) in spite of their innovative benefits.

UK researchers have pursued a research agenda on cross-functional diversity in the CCIs over the last decade, investigating the effects of the ‘fusion’ of digital technology with creative skill sets in urban clusters. The ‘Brighton Fuse’ (Sapsed et al., 2013) study showed that firms that combined creative design and technology to a high degree (4–5 on a 5 point Likert scale, termed ‘superfused’) had on average three-times the revenues growth of those that specialised (1–2, ‘unfused’) and higher rates of innovation. A follow-up study on self-employed individuals also showed greater income for the more fused, although interestingly lower growth rates for the ‘superfused’, probably for capacity or lifestyle reasons (Sapsed et al., 2015). Similar results were found in a study in the North East England region (Butt et al., 2017; Adamson et al., 2019). The ‘fusion’ found in these localised creative clusters was tested in a UK-wide sample of 5350, which confirmed the combination of creative and design skills with STEM knowledge enhanced small firms’ growth performance (Siepel et al., 2019). This strand of research increasingly shows a powerful effect of skills combination in the UK creative economy, although these studies have not yet explored this effect in interaction with other forms of diversity, nor whether the effect applies in Developing Country contexts.

2.2.2 Social diversity

Inclusion and diversity in the CCIs in South Africa are a matter of social justice and transformation, but as we have seen above, research also suggests that firms that can draw on Heterogeneous Sources of Knowledge (HSK) are better innovators and, as a result, more competitive. Some research has shown that firms with higher levels of HSK benefit more from formal and informal collaborations around innovations, since they have a higher absorptive capacity for new ideas (Santoro et al., 2020).

There was an initial expectation that those working in cultural occupations would be more diverse than those in other occupations, since success in the sector was assumed to be based on talent or merit, rather than formal qualifications. However, studies done in the UK and US have shown that workers in the CCIs have tended to be from middle class, affluent backgrounds, and are mostly dominated by white people (Oakley, 2006; Eikhof & Warhurst, 2013; Siebert & Wilson, 2013; O'Brien et al., 2016).

One of the reasons put forward for the lack of diversity in the creative industries is that much of the work is short-term contract in nature. This makes social networks a very important success factor, and middle-class people, who tend to have more social capital, have a better chance of success. Short-term, project-based work also results in unpredictable employment patterns and incomes and limits on-the-job training (Eikhof & Warhurst, 2013; Siebert & Wilson, 2013). Freelance, short-term, and temporary employment all make for a precarious work environment, where workers, especially those starting out in the industry, will experience periods of unemployment. Especially for people from working class backgrounds, who may not be able to afford being unemployed, and women (who are often the primary family caregivers), long hours, travel and erratic working conditions are difficult to accommodate. There are also the typical entry conditions of the CCIs of internships and unpaid assistance, what has been termed 'hope labour' (Mackenzie & McKinlay, 2020) which is likely to be more feasible for the more economically privileged than the lower classes.

A study of CCI employment in Australia, Canada and the Netherlands found that employment challenges that lead to a lack of diversity in the CCIs were remarkably similar across countries (Hannekam & Bennett, 2017). The authors suggest that policy initiatives (such as extending access to benefits and protection, such as pensions and health insurance) would go a long way towards improving working conditions, and thus diversity, in the CCIs.

Many studies have found that there is an underrepresentation of "...women in key cultural sectors such as film, TV, radio, photography, IT and architecture" (Creative Skillset, 2014, in Oakley et al., 2017). Other studies (Conor et al., 2015) have found that inequalities in terms of race, gender, age, disabilities and class, are in fact becoming worse in some fields. The authors conclude that, without intervention, employment in the CCIs has not resulted in less inequality, particularly in terms of gender-based employment. The lack of a diverse and inclusive CCI workforce may have several negative consequences related not only to a lack of social justice, but also to the kinds of products and services that are produced.

3 The CCIs in South Africa and the South African policy context

3.1 The CCIs in South Africa

In 2018, the South African Cultural Observatory (SACO) produced a baseline mapping study of the CCIs (SACO, 2018). Findings showed that in 2016, the GDP contribution of the CCIs was just over R62 billion (US\$4.2 billion), which represents approximately 1.7% of the total GDP in South Africa. However, the CCI growth rate of 4.9% (2011–2016) was considerably higher than the average growth rate for the whole economy (growth rate of 1.6% in the same period). Interestingly, the fastest growth rates (as well as the largest GDP contributions) were found in Domains E (Audio-Visual and Interactive Media) and F (Design and Creative Services). These are also domains that are more likely to be using digital technologies, and hence are relevant to this study.

Using data from the Labour Market Dynamics household survey conducted by Statistics South Africa, Hadisi and Snowball (2019) showed that the creative economy in South Africa (including both cultural and non-cultural support jobs in the CCIs) provided employment for 6.94% of the working population in 2016.

While not yet representative of the population demographics, there is some evidence that people working in cultural occupations in South Africa are becoming more diverse. A report (Hadisi & Snowball, 2019) based on national labour market data found that 86% of those in cultural occupations are black (made up of 73.2% Africans, 9.3% “coloured¹” people; and 3.3% people of Indian/Asian origin). White people make up 14% of workers in cultural occupations, although they represent less than 10% of the population. Some domains are more representative, such as the Visual Arts and Crafts domain, where 94% of workers are black; while others, like Design and Creative Services still have an over-representation of white people (33.4%). Young people (under 35 years old) make up 35% of cultural employment, but are more likely to be employed informally (47.2%) than youth working in non-cultural jobs (33.6%). A concerning finding is that there is a far lower percentage of young women in cultural occupations (29.2%) than young men (38.4%). However, the reasons for these patterns (causality) in the South African context are not well established (Table 2).

There is limited data on ownership patterns in the CCIs in South Africa, but survey findings indicate that it is still biased towards white people and men in most parts of the industry. Analysis of a survey of 2400 CCI firms across all domains conducted in 2014 found that the most demographically representative domain was performance and celebration, where 65% of firms had a least on black owner, and the least diverse was Books and Press, where only 44% had at least one black owner. In terms of gender, firms with at least one woman owner were found in only two domains (58% in Visual Arts and Crafts, and 50% in Design and Creative services),

¹ The authors are aware that the use of the term “coloured” may be regarded as insulting in some contexts. In South Africa, it is used to refer to a population group with a specific cultural heritage (Afrikaans-speaking, with Cape Malay and sometimes Khoi-San heritage). In such a context, the use of terms like “mixed race” would not be appropriate.

Table 2 Cultural group and gender of those in cultural versus non-cultural occupations. *Source* Hadisi & Snowball, 2019; based on data from statistics South Africa, labour market dynamics survey

Cultural group/Gender	Cultural occupations (%)	Non-cultural occupations (%)
African	71.8	75.1
Coloured	10.1	10.4
Indian/Asian	1.8	3.1
White	16.4	11.4
Male	58.7	57.0
Female	41.3	43.0
Male: youth	37.8	39.5
Female: youth	30.3	36.6

and were lower in domains like Audio-Visual and Interactive Media (31% female ownership) and Books and Press (41% female ownership) (Snowball et al., 2017).

The Audio-Visual and Interactive Media Domain (which includes, film and video, podcasting and “video games (also online)”) accounted for only 2.3% of cultural occupations in South Africa in 2016. However, it made 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 CCIs overall (SACO Mapping Study, 2018).

Although the South African gaming industry is currently 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 are able to afford to play online games. *eSports*, 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. Yet, other than industry reports, there has been little research on how the sector operates.

3.2 Cultural policy and innovation in South Africa

Twenty-five years after the advent of democracy in South Africa, several important policy documents are undergoing revision. At the same time, national interest in the CCIs and their role in the fourth industrial revolution are increasing. The South African Revised White Paper on Arts, Culture and Heritage (DSAC, 2017) recognises the importance of the link between the CCIs and digital innovation, both in terms of potential spillovers to other sectors of the economy, as well as for increasing productivity and innovation within the sector itself.

The White Paper proposes the establishment of a National Cultural Skills Academy to promote enterprise development and technological innovation for the sector (DSAC, 2017). Technology and innovation are also recognised as having an important role to play in the transformation agenda of the policy, where transformation can be broadly defined as the inclusion and empowerment of more diverse and demographically representative people in the industry:

“The township and village economy entails the transformation of cultural knowledge into goods and services. In this respect, creating links between cultural knowledge – which includes science, technology and innovation – and cultural enterprises development is one of the most important challenges facing the township and village economy.... Digital technologies enable great advantages to the cultural industries such as opening up of new markets, easier and more efficient distribution and direct communication with the consumers of goods and services” (DSAC, 2018:49,52).

However, the White Paper acknowledges the challenges for the sector that new digital technologies pose, in terms of leaving some parts of the sector behind, and also in terms of intellectual property and copyright protection. To support innovation and digital transformation in the sector, the White Paper (2017:52–3) proposes that the DSAC should, for example, provide grants for digitisation and innovation in sectors much affected by the changes, support digital entrepreneurship in the CCIs, and incentivise network and cluster developments that facilitate spillovers between creative firms, and the rest of society. The Revised White Paper on Arts, Culture and Heritage was adopted in 2020, at a time of great economic hardship, even before the COVID-19 crisis, with government department budget allocations expected to fall as a consequence. It remains to be seen how implementation of these ideas will take place.

The South African Draft White Paper on Science, Technology and Innovation (STI) was released in 2018 (DST, 2018) and is still under discussion. The main aims of the new policy are to promote the use of science, technology and innovation in accelerating inclusive economic growth and development. Some of the proposed interventions around innovation include providing sector-specific innovation funding, and up-scaling support to smaller firms so that they can access equipment and support in commercialisation of new products and technologies. In general, the Draft White Paper on STI aims to broaden the understanding of innovation in line with the Oslo definition (OECD, 2018), to include not only formal research and development (R&D), but also incremental innovations occurring in smaller firms and even in the informal economy. Nevertheless, the STI White Paper still has a significant STEM bias and does not directly refer to the cultural sector or the CCIs.

In addition to aims related to the development of the country’s national system of innovation, an important aim of the STI White Paper is to “Promote inclusivity and transformation”, especially regarding race and gender representation. In monitoring the performance of the policy interventions proposed, indicators of inclusivity and diversity will be used. Specific support, for example, around the use of intellectual property for publicly funded research and development, will also be offered to under-represented groups (DST, 2018: p. 24).

4 Research methods and context: the Cape Town fuse and the gaming and animation surveys

The research methods used included a quantitative survey of CCIs in the Cape Town creative cluster in South Africa, and a qualitative analysis of diversity and transformation in the gaming and animation sector in South Africa. We choose these mixed methods to investigate both the breadth of the phenomenon across the range of CCI sectors with a larger sample of firms and practitioners, in tandem with deep insights into typical digital sectors known for their ‘fused’ creative work.

The City of Cape Town Metropolitan Municipality is South Africa’s second largest metro (after Johannesburg) with a population of 3.7 million (Statistics South Africa, Census, 2011). In terms of population groups, 84% of the population are black (including 39% black African, 42% “coloured”; and 1.4% Indian/Asian). 16% of the population are white, a greater proportion than in South Africa as a whole (9%). Compared to many other parts of South Africa, living conditions are good, with 78% of the population living in formal housing, and 94% having access to electricity for lighting.

In 2014, Cape Town was designated the World Design Capital by the International Council of Societies of Industrial Design, and it is generally recognised as a city with a vibrant cultural and creative industry sector, especially in the film sector. A report on cultural occupations in South Africa (Hadisi & Snowball, 2019) found that the Western Cape province (where Cape Town is located) has 12.1% of all cultural occupations in South Africa, the third highest proportion after Gauteng (34.6%) and KwaZulu-Natal (17.6%).

The first research method was a quantitative survey of small, medium and micro CCI enterprises based in the Cape Town metropolitan area. Since no comprehensive business directory exists, a database of 349 CCI firms located in Cape Town was developed from publicly available sources (including data from the SA Cultural Observatory database, online telephone directories and web scraping of other social media platforms). All the firms in the database were invited to participate in the survey (Fig. 1).

The survey instrument was based on the Brighton Fuse project in the UK, which demonstrated how firms “connecting the arts, humanities and design with digital and ICT” could enhance their innovation levels and business performance (Sapsed et al., 2013). It included sections on activities, clients and business models; talent and skills; innovation; and barriers and enablers. A section on the demographics of owners and employees was included in order to explore issues of transformation, diversity and inclusion in a South African context.

Data were collected via telephone interviews and an online survey (using the same questionnaire). Only the director, manager or owner/operator of each firm was requested to participate. A challenge was that, although firms were carefully targeted, some declined to participate on the basis that they did not regard themselves as part of CCIs. Even some of those who clearly did qualify seemed not to be aware that they were part of a distinct economic sector. This speaks to the relatively low profile of the CCIs as a sector in South Africa, which, unlike mining, manufacturing and even tourism, has not received much policy or press attention. In total, 74 usable responses were

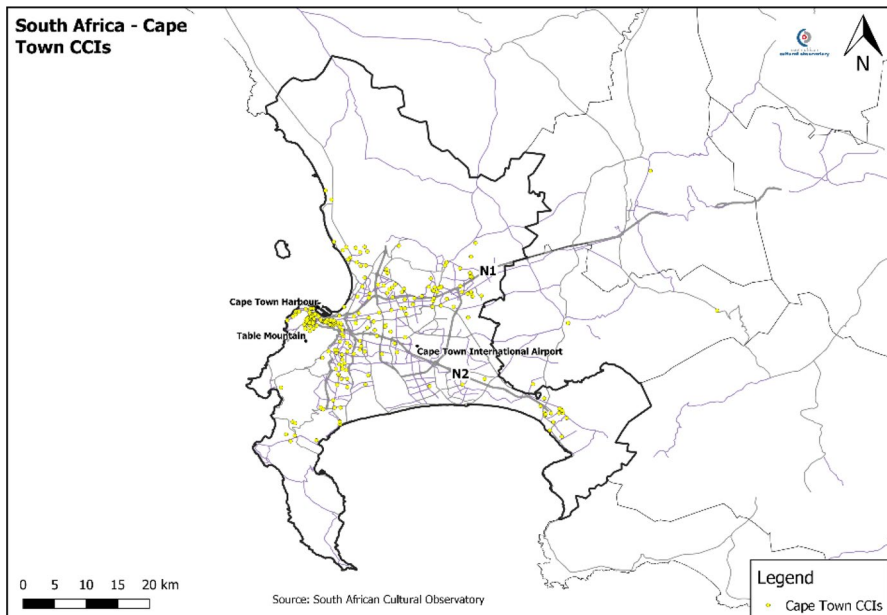


Fig. 1 The location of CCIs in Cape Town

received. Given the lack of a business registry, it is not possible to say to what extent the surveyed firms are representative of the overall CCI population in the study area, which limits the generalisability of the results. Methods of analysis included the production of descriptive statistics and an econometric model.

In 2018, the global gaming industry consisted of 2.3 billion unique consumers who had a combined spending of US\$137.9 billion on games. This is a remarkable figure and can compete with the film and music industries. Games are also increasingly a substitute, or complement, to other entertainment formats, such as the special effects used in many large-budget films, and even education. Although the South African gaming industry is currently small, there has been extremely fast growth in terms of revenue generated by the sector (Interactive Entertainment South Africa, 2016), and the number of people who participate in online gaming in South Africa (Hall et al., 2017). However, there is currently little research into this potentially promising, and fast-growing, sector in developing country contexts.

Following a similar method, a database for the gaming and animation industry was constructed using extensive online searches for both gaming and animation companies, and via requests for participation at the Africa Gaming Summit (2019). One hundred and nineteen companies involved in gaming and/or animation in South Africa were identified. Qualitative data on the challenges and opportunities faced by the industry were collected via an online questionnaire, to which there were 18 responses. Thematic analysis was used to identify dominant themes within categories.

5 Results and discussion: the Cape Town fuse

5.1 Firm characteristics, business models and innovation

Of the CCI firms who responded, the largest group was related to Design (Design and Designer fashion 19%; Graphic design 14%, Architecture 1%), which fall into the UNESCO Domain “Design and Creative Services” (34%). This was followed by Audio-Visual and Interactive Media (film, television, video and radio), which made up 12% of the sample, and crafts (12%). More than half of the firms who responded (57%) had been established in the last 10 years, with 36% being younger than 5 years old at the time of the study. Just less than a quarter (23%) were owner operated (one owner with no employees) (Fig. 2).

The Brighton Fuse (Sapsed et al., 2013) study found that the average firm in their study employed 7 people (median of 2). In the Cape Town study, the average number of permanent staff was 19, but this was influenced by a few large companies. A more representative number is the median, which was 4 permanent staff. Each firm employed an average of 8 freelance (or contact) workers over the previous financial year (median of 5). What this indicates is that, as in many countries, creative industry firms are small, but use freelance workers to manage the project-based nature of their work and demand volatility (Table 3).

An important question in both studies was the responses to the statement about the extent to which businesses combined “ideas from creative arts” and “technology”. Responses were recorded on a 1–5 scale, where 1 indicated “not important at all” and 5 indicated “very important”.

33% of firms in the Brighton study were classified as “fused”, that is, they combine creative design and technology in their work, and a further 33% were classified as “super fused”, that is, they regard the combination of creativity and technology as “very important” for their work (Table 4).

The Cape Town study had similar results, with 62% of firms regarding the fusion of creative arts and technology as either important (rating of 4, 22%) or very important (rating of 5, 40%) for their business. A quarter of firms were “unfused”, with

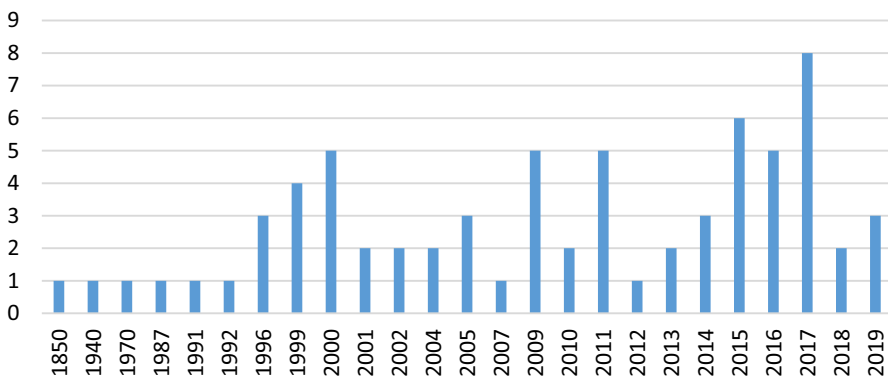


Fig. 2 Firms in the Cape Town sample by founding year

Table 3 Permanent and freelance employment in Cape Town CCI firms

	Permanent	Freelancers	Total
Number of firms with employment data	68	50	71
Full-time employees	1273	405	1678
Average	18.7	8.1	23.6
Minimum	1	1	1
Maximum	360	50	360
Range	359	49	359
Median	4	5	4

Table 4 A comparison of firm attributes in the Brighton and Cape Town study

	Brighton	Cape town
Mean (median) number of permanent employees per firm	7 (2)	19 (4)
Percentage of firms owner-operated	33%	23%
Percentage of firms in operation in the 10 years prior to the survey	50%	57%
Percentage of firms in operation in the 5 years prior to the survey	25%	36%
Fused (combining digital technology with creative arts important or very important)	66%	62%
Percentage of firms that engaged in innovative activity in 3 years prior to the survey	99%	82%

15% regarding it as “not important at all” and a further 10% giving it an importance rating of 2 out of 5.

The Brighton study also found that firms that were fused or super fused grew almost twice as fast as firms that were unfused. Fused firms were also more likely to be recent start-ups. Sapsed et al. (2013:20) suggest that “Old firms that remain unfused may face decline that could be offset if they were to open up to diverse knowledge bases”.

In the Cape Town study, there was also some evidence that fused firms were slightly more likely to have experienced growth in the last financial year. Unfused firms had a slightly higher proportion of firms that became smaller or contracted in the last financial year (20%) compared to fused firms (16%).² However, the differences are not large, suggesting that fusion has, in general, not yet paid off for firms in Cape Town CCI firms (Table 5).

In terms of innovation, fused firms were significantly more likely to have engaged in some form of innovation in the last financial year (89%) than unfused firms (67%). Innovation was broadly defined in terms of innovation in products and services, processes, organisational innovation, marketing innovations, and formal R&D. In this

² Note that, because of the small sample size, caution should be exercised when interpreting the findings of the “neutral” group (importance rating of 3 out of 5), which consisted of only 9 observations.

Table 5 Levels of fusion, innovation and growth in Cape Town CCI firms

Level of Fusion	N = 72	Proportion of firms in fusion category (%)	Proportion of firms that engage in innovation (%)	Proportion of firms that contracted in size (%)	Proportion of firms who reported constant earnings (%)	Proportion of firms who reported moderate or substantial growth (%)
Unfused (1 or 2)	18	25	67	20	20	60
Neutral (3)	9	13	78	44	33	22
Fused (4 or 5)	45	62	89	16	30	54

expanded definition of innovation, only 1% of Brighton firms did not participate in any innovative activity. The most common form of innovation was process innovation (the way of running the business), which was undertaken by 71% of firms. 61% introduced new services, and more than half produced materials eligible for copyright protection. However, IP rights (such as patents, trademarks and registered designs) were used by a tiny minority of firms in the cluster.

In Cape Town CCI firms, 82% of firms reported being involved in some form of innovation over the last three years. As in the Brighton study, the most common type was process innovation (82%). Within this category, digitisation (82%), big data usage (21%), and artificial intelligence (18%) were the most frequently mentioned. The next two most frequently chosen categories of innovation were the development of new products or services (72%) and/or the significant improvement of existing products or services (72%). Marketing innovations (50%) and organisational innovation (41%) were less frequently chosen. 45% of firms engaged in R&D, defined as “creative work undertaken to increase knowledge for the development of new and improved products, services and processes”. Cape Town CCI firms thus show high levels of innovation (in the expanded definition), which provides further support to the argument that innovation policy should include the creative economy and that arts and cultural policy should include innovation (Fig. 3).

In the Brighton Fuse, 60% of firms identified direct service provision as an important revenue source, while only 8% identified royalties and licencing of other kinds of IP as important for revenue. Cape Town CCI firms had similar results, with by far the most frequently chosen source of income as the sale of services (both online and face-to-face), closely followed by sale of products. As in the Brighton survey, only a minority of firms listed IP (13%) or royalties (13%) as sources of revenue.

In terms of business models, Brighton cluster firms were largely business-to-business service providers. Sapsed et al., (2013) note that a challenge from small firms in the creative sector is often how to progress from being a service provider to bigger firms to being able to develop intellectual property and products in their own right. However, such progressions may be part of a pre-digital creative economy model in the modern era, a wide variety of business models were identified, such as the Retainer Model, Project Model, and Online Business Models.

Cape Town CCI firms also showed a mix of business models (Fig. 4). Respondents were asked to rate the importance of various ways of generating

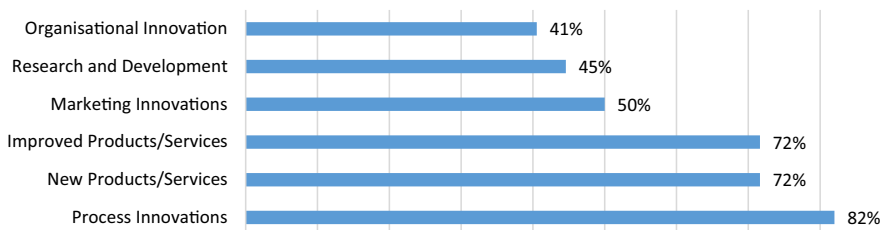


Fig. 3 Types of innovative activity undertaken in Cape Town CCI firms

revenue on a one to five scale, where one meant “not important at all” and five meant “very important”. As shown in Fig. 4, the most important revenue source was direct sales of products and services (rated as very important by 56% of the sample and important by another 14%). This was followed by being commissioned, defined as “you deliver work for a client over a period with a clear end date and you keep the IP”, which was very important for 39% of firms, and important for another 22%. Next most important was work for hire (“you deliver work for a client over a period with a clear end date and the client keeps the IP”) which was very important or important for 54% of the sample. For just over a third (36%) of firms, the retainer model (“a client pays you to work for an extended period, often with an indefinite end date or intention of continuity”) was an important or very important revenue source. For only a small proportion of CCI firms in Cape Town were online sources of revenue, such as freemium (“you provide free access to online services or content with extras chargeable for fee”) or online micro-transactions, important sources of revenue.

To investigate Li’s (2020) argument that firms adopting new technologies use a “portfolio of business models”, the proportion of firms using multiple business models was analysed. Findings show that 57% of firms in Cape Town CCI firms rated three business models as “important” or “very important” for their sources of revenue, and that 32% were using four business models. This seems to support the idea that, rather than replacing the “dominant business logic” (Mangematin et al., 2014) (sales of products and services in this case), firms in the cluster are experimenting by adding additional models.

5.2 Ownership, talent and diversity

The Brighton study found that most firm owners were quite experienced, which could be a contributing factor to their success. The average age of firm owners was

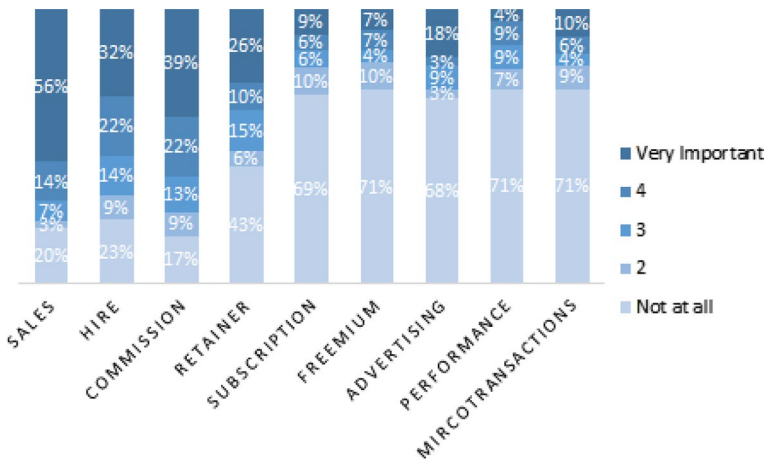


Fig. 4 Business models in Cape Town CCI firms: Importance of revenue from various sources

nearly 42 (with a range of 21–73). Two-thirds of owners were in their 30 s or 40 s. They were also highly educated – 85% had at least one degree, and 27% had post-graduate qualifications.

As found in a previous study (Snowball et al., 2017), most CCI owners (86.5%) were South Africans, but white South Africans are still over-represented. Like the Brighton cluster, Cape Town CCI firms are quite “grown up”, with 64% of owners being older than 35. However, it does still provide important opportunities for young people – 30% of owners are in the 26 to 35-year-old age group and 6% are 18 to 25 years old. Gender distribution of owners was relatively equal: 42% of owners were women (7.5% indicated that they preferred to not answer the question, and the remaining 50.5% were men).

Employee demographics were somewhat less diverse than cultural occupations overall in South Africa. Of those firms who reported employee demographics (some firms in the sample were owner-operated), they employed on average 48% women, and 54% black people. No owners reported identifying as having a disability, but 8% of firms reported employing people with a disability (an average of 1.4% of their workforce).

The Brighton cluster study found that it was an “interdisciplinary cluster”, with 31.4% having studied an Arts or Humanities subject at university, followed by nearly 25% who studied a STEM discipline. This is also the case in Cape Town CCI firms, which has a good mix of employee human capital (Fig. 5). An average of 51% of employees had a university degree in design (including graphic and product design); 42% had an arts or humanities degree; 32% had studied commerce (economics, business, management); and 20% had a STEM (science, technology, engineering, mathematics, also including computer science) degree. This finding suggests that the exclusion of the cultural and creative sector from South Africa’s Draft White Paper on Science, Technology and Innovation (2018) may be a mistake, since there is clearly some overlap between the sectors, and given the high levels of innovation found in such multi-disciplinary firms.

In addition to the skills of internal employees, Cape Town CCI firms also made use of a wide variety of freelance (external) skills. The most commonly used skills overall were multimedia or web design skills (including audio, graphics, text still pictures, animation, video etc.), which were used by 80%

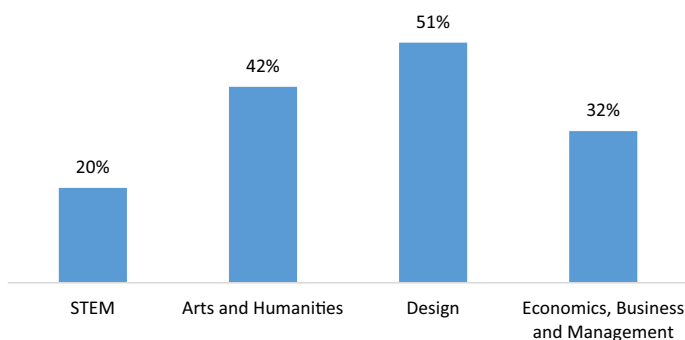


Fig. 5 Educational qualifications of Cape Town cluster employees

of CCI firms in Cape Town. Design (of objects or services) was the next most used skill (41% in-house, 23% external, and 9% both), followed by graphic arts (including layout and advertising), used by 70% of firms. In fourth place was market research, used by 54% of firms, followed by software development and/or database management, used by 53% of firms (30% external). Minorities used skills such as mathematics and statistics (31%), engineering (24%) and performing arts (27%) (Table 6).

Following the method from Snowball et al. (2017), a “transformation score” was constructed for each firm to give a composite measure of their level of diversity and inclusion. The transformation score has two components: employees and owners. The employee transformation score (ETS) was calculated by adding the proportions of female, black (including black, coloured and Indian/Asian people) and disabled employees for each firm at a particular level of fusion. The owner transformation score (OTS) was calculated by adding the proportions of female, black, and disabled owners for each firm at a particular level of fusion. Weightings were based on the relative importance of the variable in the South African context, as discussed earlier. The final transformation score (FTS) is calculated by doubling the OTS (since ownership is arguably a more important, and currently less diverse, dimension of inclusion) and adding it to ETS, the sum is then divided by 3. All scores are out of three (Table 7).

What the results clearly show is that fused firms have higher levels of diversity and inclusion at both the levels of employees and owners, than unfused firms. Cultural diversity, more equal gender representation, and a range of age groups could provide Heterogeneous Sources of Knowledge for firms, as discussed by Santoro et al. (2020). For innovative firms combining digital technologies and creative arts, demographic diversity could be an important part of developing their competitive advantage. From a social justice point of view, it is also encouraging that firms in these new areas are more inclusive than those (generally older) organisations that are unfused.

5.3 An econometric analysis of the determinants of growth

Econometric analysis was limited by the sample size,³ but to further investigate the determinants of firms’ growth, the following logit model was run:

$$\ln \left(\frac{p}{1-p} \right) = \beta_0 + \beta_1 \text{FA} + \beta_2 \text{FS} + \beta_3 \text{F} + \beta_4 \text{IA} + \beta_5 \text{FP}$$

³ Several models investigating the determinants and characteristics of fused firms were run. However, these were constrained by the limited sample size, often exacerbated by missing data for some variables, and resulted in few statistically significant results. To avoid over-fitting, we used a relatively simple logit model, which produced the most statistically significant results, but we acknowledge the limitations of the analysis.

Table 6 Employee skills utilised by Cape Town CCI firms

	Graphic arts	Design	Multimedia web design	Software develop	Engineer	Maths stats	Market research	Performing arts
Internal	41%	41%	34%	22%	7%	18%	31%	14%
External	22%	23%	36%	30%	16%	14%	19%	11%
Both	8%	9%	9%	1%	1%	0%	4%	3%
Used	70%	73%	80%	53%	24%	31%	54%	27%
Not Used	30%	27%	20%	47%	76%	69%	46%	73%
Total	74	74	74	74	74	74	74	74

Table 7 Levels of diversity by fusion

Level of fusion	Number of companies	ETS	OTS	FTS
Unfused	18	0.944	0.556	0.685
Neutral	9	0.763	0.667	0.699
Fused	45	1.117	0.689	0.832

ETS - Employee Transformation Score

OTS - Ownership Transformation Score

FTS - Final Transformation Score = (ETS + 2 × OTS) ÷ 3

$$\ln \left(\frac{p}{1-p} \right) = -0,726756 - 0,051117FA + 0,033860FS - 0,210103F \\ + 0,411939IA^* + 2,093088FP^*$$

where:

$$\ln \ln \left(\frac{p}{1-p} \right) = \log \text{-odds of Growth} \in (-\infty; \infty) \cap R$$

FA = firm age $\in (0;170) \cap Z$ FS = firm size $\in (0;360) \cap Z$ F = level of fusion $\in [1;5] \cap Z$ IA = number of innovation activities $\in [0;5] \cap Z$ FP = freelance proportion $\in [0;1] \cap R$

The estimated logistic regression reveals the impact of the listed independent variables on the log-odds of a firm experiencing growth (Table 8). Out of the five independent variables, only the number of innovation activities and the freelance proportion has a significant impact of the log odds of a firm experiencing growth. Both of these, in addition to the size of a firm, indicate that the log odds of a firm experiencing growth increases as the number of innovative activities, proportion of freelancers used, and the size of the firm increases. This is to be expected because as the number of employees increases (up to a certain point due to diminishing marginal returns of labour), the production of a company can increase due to a larger workforce coupled with an increase in innovation, and this can reduce

Table 8 Variables used in logit model

Variable	Measurement
Growth	1 = Firms who reported moderate or substantial growth 0 = Firms who reported constant or declining growth
Fused	1 = fused (4 or 5) 0 = unfused/neutral (1, 2, or 3)
Firm age	Years since firm was founded
Firm size	Number of permanent employees
Freelance employees	Proportion of freelance versus permanent employees
Innovation	Number of innovation types that the firm engages in

the time and cost of production (by making the production process more efficient) and/or increase the quality of the product, which in turn can lead to increased probability of growth.

To examine the logistic regression, inter-programming was deployed to determine the optimal values of the independent variables such that the probability of growth is maximised or minimised. $\ln\left(\frac{p}{1-p}\right)$ will be denoted as y^* to assist in the conversion of log-odds to probabilities:

$$y^* = \ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1FA + \beta_2FS + \beta_3F + \beta_4IA + \beta_5FP$$

$$p = \frac{e^{\beta_0 + \beta_1FA + \beta_2FS + \beta_3F + \beta_4IA + \beta_5FP}}{e^{\beta_0 + \beta_1FA + \beta_2FS + \beta_3F + \beta_4IA + \beta_5FP} + 1}$$

$$\therefore p = \frac{e^{y^*}}{e^{y^*} + 1}$$

To maximise the probability of growth, which will be referred to as the objective function, constraints need to be introduced such that the optimal values for the independent variables remain as integers (such as firm size which is calculated as the sum of employees which cannot be a fraction) and variables have to be in a certain range (firm age cannot be negative or exceed a certain level) as follows:

$$p = \frac{e^{y^*}}{e^{y^*} + 1} \text{ subject to:}$$

$$1 \leq FA \leq 50$$

(Only 3 out of the 74 firms have ages greater than 50 which is why it is considered the maximum age for the estimation)

$$FS \geq 1$$

(Firm size must at least be equal to 1 and not zero to capture the owner-operated firms)

$$1 \leq F \leq 5$$

(Minimum fusion level is 1 and maximum fusion level is 5)

$$0 \leq IA \leq 5$$

(Minimum number of innovation activities can be 0 and the maximum is 5)

$$0 \leq FP \leq 1$$

(Minimum proportion of freelancers is 0, whereas the maximum proportion is 1).
FA; FS; F; IA are integers.

The optimisation results are captured in Table 9 and compared to the results of the average firm:

Table 9 Optimisation results

Variables	Minimum	Maximum	Average
<i>C</i>	1	1	1
FA	50	1	15
FS	1	1	19
<i>F</i>	5	1	4
IA	0	5	3
FP	0	1	0,32
y^*	-4,3	3,2	0,2
<i>p</i>	1,34%	96,08%	55,35%

The maximisation of the growth probability indicates that higher growth rates are positively associated with firms that maximise hiring freelancers and the number of innovative activities while minimising the longevity of a firm, the number of permanent employees and level of fusion. The minimisation indicates that firms older than 50 years that are owner-operated with no freelancers or innovation activities and high levels of fusion only have a 1,34% chance of experiencing growth. The average firm analysis indicates that half of the firms in this study are more likely to be associated with achieving growth.

In interpreting the results, a few limitations should be noted: (i) the small sample size reduces the validity and reliability of the results; (ii) “survivor bias” is commonly noted in studies of entrepreneurship (that is, that more successful firms survive longer and are thus likely to be over-represented in the sample) and may be affecting the results here; and (iii) that cross-sectional data, while showing how variables are related, do not imply causality. Causality may indeed run in both directions, in that more successful firms have greater mean to invest in innovation and diversity their revenue streams, which in turn leads to better growth. There are several virtuous circles that could be set in motion in creative clusters, regarding resource availability, the attraction of talent, the demand-readiness and ability to quickly configure and reconfigure projects and arrangements, and many of these conditions are mutually reinforcing.

6 Diversity and inclusion in South African gaming and animation firms

6.1 Firm characteristics and the size of the sector

As an in-depth case study into firms using creative and digital inputs in South Africa, a database of gaming and animation companies was constructed, and a qualitative online survey sent to all companies who could be reached. The focus was on industry transformation (that is, the increased inclusion of black South Africans and women).

Using the methods described in Sect. 4, 59 gaming, or gaming and animation companies were found in South Africa, the largest group (48%) of which are in the Western Cape. 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. There was considerable overlap between gaming and animation: 46% of companies producing games also did animation work. 57% of gaming companies were classified as “very small”, with annual turnover of less than R2 million (US\$150,314) (Table 10). It is estimated that the turnover for the gaming and animation industry in the 2017/8 financial year was R476 million (US\$35.8 million), of which R198 million (US\$14.9 million) was attributed to gaming companies (including hybrid companies). This is a considerable increase from the R100 million (US\$7.8 million) revenue for the gaming industry in 2015 found in a previous study (IESA, 2016).

Excluding one large outlier in the animation sector, companies were relatively small, employing at average of between 6.9 (animation) and 7.4 people (gaming). Overall, it is estimated that 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 number to 460.

6.2 Challenges and opportunities

A challenge identified by the gaming and animation sector participants themselves is transformation – most people working in the sector are white men. 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 & Snowball, 2019). Part of the reason given for the lack of diversity is that the dominant business model in online games is “free-to-play”,

Table 10 Characteristics of companies who responded to qualitative survey

	Gaming*	Animation
Number of companies	7	11
Number of games	51	0
Average number 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%

*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

which means that users do not have to pay anything in order to try out the game, at least initially. Once the game is more developed, and the market is established, users have to pay to access further levels, or virtual goods. From a production perspective, the model aids game development, but it also means that, in the early stages of developing the game, there is no significant income. As is the case with other parts of the CCIs, where unpaid internships are common, the consequence is that only those from middle-class backgrounds (who do not need to immediately earn an income) can work in the sector. The sector is also prone to inconsistent demand, which was also identified as a challenge – what one respondent referred to as “feast or famine cycles” – associated with seasonal work.

There was general agreement amongst respondents that the sector is male dominated, and currently driven by “privileged white South Africans” who (i) could afford to attain the high levels of education and training needed; (ii) could 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. As one respondent put it:

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 (Survey Respondent, 2019).

The most frequently mentioned challenge faced by companies in the sector was the lack of skills and experience, especially at the intermediate and senior levels. 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 emphasised that, to be successful in the sector, a person had to be both “highly talented in a creative sense” and “confident in the areas of technical proficiency”, such as being able to learn new software quickly. Another respondent also noted that, for people with programming skills, 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.

However, many respondents confidently expected things to improve at the time of the survey (2019), or said that they were already improving, as the industry expanded and became better known. One respondent described how their company had gone from employing “all white males” five years 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”. Others discussed ways in which they could develop a “talent pipeline” in the industry (linked to the need to develop sustainable career paths), and maintaining and developing “skilled teams”.

Respondents also identified several advantages associated with being in the gaming and animation sectors in South Africa. These included: the high quality of work being produced by South African companies; “unique African stories” and the cultural diversity of the country; lower production costs than competitors when bidding for international service work; talent already available in the industry; and access to world class technology and infrastructure. One respondent mentioned the potential benefit of creating their own IP (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”.

The gaming and animation sector case study demonstrates the potential of these, mostly small, newly established, CCI firms to contribute to growth and job creation in South Africa. While a highly entrepreneurial sector, they face the dual challenges of skills shortages (particularly with regard to the mix of creative and technical skills) and the need for transformation.

7 Concluding remarks

New digital technologies provide both unprecedented opportunities for innovation and growth in the CCIs. This research is the first, to our knowledge, to examine the nexus between digital technologies, innovation and diversity in the CCIs in a South African context.

The results of the Cape Town survey identified a group or cluster of CCI firms that are “fused”, that is, they regard both digital technology and creative inputs as an important or very important parts of their production process. These firms employ people with interdisciplinary skills, and engage in much innovation, defined broadly as innovation in business processes, goods and services. Thirty-five percent of firms were founded in the past 5 years, pointing to a relatively new cluster.

While most firms are small, they supplemented the expertise and capacity of existing employees by drawing on freelancers – a medium of 5 freelancers were employed per firm in the previous financial year. Similar to what was found in the Brighton study, this business model allows them to be agile and productive in the volatile, project-based world of CCIs.

The logit model showed that firms that employed a higher proportion of freelance (versus permanent) employees were statistically significantly more likely to have experienced growth in the year prior to the survey. It may be that there is a short-term trade-off between workforce diversity and growth, as the results suggest that operating firms based on freelance contracts generate better growth prospects. It may well be more efficient for a small firm to contract freelancers as project needs occur, rather than retaining them as employees with all the continuous and incidental

costs. However, it may not enhance growth prospects in all cases, since capacity is often limited, and practitioners in the animation and games sector study report that it is typically difficult to source talent when it is required.

There seems to be two groups of CCI firms in the sample: older, larger firms, that are currently unfused; and smaller, newer firms with higher levels of fusion. Although there is currently no statistically significant difference between their growth (turnover) rates, the Brighton study suggests that, as the cluster develops, these may occur. The implication is that firms in the first group may need to consider combining digital technologies with creative inputs in the future to keep up with the newer firms already doing so.

On a national level, firms in the Audio-Visual and Interactive Media, and Design and Creative Services domains contribute the most to cultural sector GDP, and are growing more quickly than the rest of the economy. Cape Town firms in these sectors are thus likely to grow in the future as they become more established. At present, they are more of a “developing fuse”, being hindered to some extent by factors such as access to finance and infrastructure (internet speeds and bandwidth). It may also be that demand for digital marketing and other creative digital services that have driven the UK growth is not yet articulated in Developing Countries like South Africa.

More fused firms showed higher levels of innovation (defined broadly as innovation in products, processes and organisation). The logit model showed that firms that had engaged in more innovation activities were statistically significantly more likely to have experienced growth in the year prior to the survey.

An important finding in the South African context unexplored in the prior UK studies is that although they are not yet representative of the country’s full demographic profile, fused firms were more likely to have demographically diverse employees and owners. This suggests that the skills diversity already known to support innovation is also enhanced by social diversity. Support for these kinds of firms would thus also feed into the public social justice and transformation agenda. The qualitative analysis of the gaming and animation sector highlighted the difficulty of transformation in the South African context, where population group (race) is still at least partly divided along income and education lines. Highly qualified black South Africans may not be able or willing to enter a sector where earnings are uncertain, and employment precarious. This is especially the case for the CCI sector, which is not generally recognised in South Africa as an important economic sector that offers viable career options.

In terms of policy implications, the findings suggest that the South African Draft Science, Technology and Innovation policy, which is currently under discussion, should also include the CCIs. The draft policy focuses almost exclusively on the innovation of STEM sector firms, leaving out sectors such as Design and Creative Services and Audio-Visual and Interactive Media. Firms in these domains contribute to South Africa’s GDP and are also engaging in innovative activities at the interface between technology and creative inputs. In the same way, the South African White Paper on Arts and Culture currently does not pay much attention to ways in which the CCIs could contribute to innovation. Bringing these policies into alignment could help both the CCIs and promote industrial innovation.

Several research limitations are noted: Without a comprehensive national register or database of CCI firms, it is not possible to determine to what extent the findings are generalisable to the whole population. The small sample size also limits the reliability and validity of econometric analysis. Future studies could be improved by developing an indicator of fusion based on revealed preference, rather than self-classification (attitudinal) data used in this research.

Funding This article is based on two reports funded by the South African Cultural Observatory, which is a research institution funded by the South African Department of Sport, Arts and Culture. The reports are:

Tarentaal, D. and Snowball, J. (2019). Unlocking the growth potential of the online gaming industry in South Africa: Challenges and Opportunities. Report commissioned by the South African Cultural Observatory <http://southafricanculturalobservatory.org.za/>

Snowball, J., Tarentaal, D. Van der Linde, J.C., Waelde, C., Nwauche, E. and Sapsed, J. (2019). The Overlaps between the digital and creative sectors: Innovation and Technology in the Creative Economy. Report commissioned by the South African Cultural Observatory <http://southafricanculturalobservatory.org.za/>

Funding for the Cape Town survey was provided as part of an international collaboration entitled *The roles of IP and diversity in the creative industries: Networking South Africa and the UK* that was funded by the Arts and Humanities Research Council (UK). Principal investigator: Prof Charlotte Waelde, Coventry University, UK.

Declarations

Conflicts of interest The author declares that they have no competing of interest.

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