A survey of the video game industry in Portugal

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Abstract

Despite the impressive growth of the video game industry in Europe and a growing interest emerging in that industrial sector, there is still a knowledge deficiency in respect of its characteristics, and its contribution to urban and regional development. This paper explores the characteristics of the industry communities, location factors, types of games developed, tools used, marketing and sales channels and economic impact. This research is based on data collected in Portugal through a survey of 70 economic agents, under the auspices of the *First Atlas of video games Industry in Portugal* research project. The paper concludes with an elaboration of the opportunities and challenges associated with the industry and the potential role of public and institutional policies in supporting its development and sustainability.

Keywords: Video Game Industry, Creative Industries, Public Policies, Portugal

Título: Um inquérito aos agentes do sector dos Videojogos em Portugal

Resumo

Apesar do grande crescimento do sector dos Videojogos no contexto europeu e do crescente interesse que tem despertado, pouco se sabe sobre as suas características e o seu contributo para o desenvolvimento de novos caminhos de crescimento urbano e regional. Este trabalho explora as características do seu tecido empresarial, os fatores de localização e as redes criadas, tipos de jogos desenvolvidos, ferramentas utilizadas, canais de marketing e vendas, e impacto económico. O artigo desenvolve-se a partir de dados recolhidos em Portugal através de um inquérito respondido por 70 agentes económicos, e resulta do trabalho desenvolvido no âmbito do projeto 'Primeiro Atlas do Sector dos Videojogos em Portugal'. O artigo conclui com uma reflexão acerca das oportunidades e desafios associados ao sector dos Videojogos, bem como do papel que as políticas públicas podem ter no suporte a novos caminhos de desenvolvimento urbano e regional relacionados com este sector de atividade.

Palavras-chave: Sector dos Videojogos, Inovação, Políticas Públicas, Portugal

1. Introduction

The video game industry is currently exhibiting greater growth potential than many others of the creative industries. In 2016 worldwide revenues were estimated to be $91 billion (SuperData Research, 2017), well above previous estimates, representing a sustained growth over 8% per year (SuperData Research, 2016). This level of growth is predicted to continue over the next few years. In many European countries, the video game industry represents an important part of the GDP, greater than other creative industries such as Music or Film. This occurs in the United Kingdom, Sweden and Finland, where this sector contributes with more than $1 billion to the GDP of these three countries[1] [2] [3].

Video games with good production values can now be made relatively inexpensively by small teams using tools such as Unity and Unreal. Games can be sold and distributed electronically in large quantities, using Apple or Google stores in the case of mobile apps, or Steam in case of PC games. Hardware and Console manufacturers have also been lowering the barriers to entry for small and independent developers. Since 2008 these factors have led to an explosion of game production by small teams. There are numerous successful examples. Minecraft started in 2009 as an independent project by Swedish programmer Markus Alexej Persson and the company he founded was sold to Microsoft in 2014 for $2.5 billion[4]. Supercell is a mobile game development company founded in June 2010 in Helsinki, Finland with $250 000 initial investment by its founders. The company saw its valuation double to $10.2 billion in the last 18 months after its games Hay Day, Clash of Clans and Clash Royale attained worldwide success[5].

In parallel, games are being used for multiple purposes, for entertainment and increasingly for learning, and many European businesses are taking this opportunity (Hollins, Yuan, Santos, Becker, & Riestra, D7.1 - Summary Report of Business Models., 2016), (Hollins, Yuan, Santos, Becker, & Riestra, D7.2 - Summary report of Value Chain analysis, 2016). One can ask then what is the impact of the current *low barrier to entry - crowded environment - high prizes for success* environment on the Portuguese industry?

The Portuguese video game industry history can be divided into three distinct phases (Zagalo, 2013). The first phase, starting in the 1980s was associated with the success of the first personal computers (PC) and was driven by young amateur programmers. The second phase, of the mid 1990s, was associated with the establishment of the Internet. The Internet provided a strong impulse to the development of video games in Portugal by facilitating information access via forums and online tutorials. Finally, a more recent third phase witnessed the formation of game development studios. In the last few years the higher education (HE) sector, identified the potential student interest and commenced offering specific degrees in the various disciplines of video game development.

[1] http://www.tiga.org/news/the-uk-video-game-development-sector-is-back-on-track
[2] http://www.swedishgamesindustry.com/news/2016/9/23/swedish-game-exports-closing-in-on-truck-sales.aspx
[3] https://www.tekes.fi/en/whats-going-on/news-from-tekes/finnish-game-industry-grew-into-a-two-billion-euro-business/
[4] https://en.wikipedia.org/wiki/Mojang
[5] http://www.dfcint.com/dossier/softbank-sells-supercell-for-8-6b/

This paper provides an insight in to the current state of the Portuguese video game industry in 2016, in presenting preliminary results from the project *First Atlas of video games Industry in Portugal*, developed by a team from INESC-ID and CEGOT, a study integrated in the European Project RAGE (*Realising an Applied Gaming Eco-System*). This project has the objective of strengthening the European video game industry, namely the applied games sector. This study represents an initial attempt to map and systematically characterise the Portuguese video game industry.

The Portuguese video game industry has thus far not been seriously studied, due largely to its emergent state and informality. There has been some work focused on the historical perspective (Zagalo, 2013) and on some specific regions within Portugal (Nunes & Romeiro, 2016). There has been little analysis on the economic activity generated by video game development (Nunes & Romeiro, 2016). In this study the authors contribution overcomes this lack of information and provides new insights into the dimension and characteristics of this still immature and emergent industry and provides the information needed to support the strategies and policies required to the strengthen and ensure sustainability of the industry in Portugal.

The first section of this paper describes and discusses the methodology used in the study. This is followed by a section presenting the results and analysis, organised into five key areas: businesses, employment, products, economic situation and institutional support. The final section speculates on the future prospects of the industry as seen by the economic agents and actions the authors suggest should be taken to support the industry.

2. Methodology

In order to prepare a characterisation of the video game industry in Portugal we applied a mixed methodology that referenced a wide range of information sources: websites and trade social networks; general and specialised media; aggregator or brokerage platforms; several publications, e.g. (Microsoft, 2014, 2015; Zagalo, 2013); attendance lists at industry events; to supplement the personal contacts of the project team. Triangulation of these sources resulted in the creation of a database that aggregates the businesses and creators engaged in the industry, as well as another database that identifies video games produced and marketed in Portugal to date. The task was hampered by several factors, including the wide dispersal of information on the sector, high business mortality rate, the intense mobility of workers and contradictory data.

This was the starting point for the collection of primary data, by conducting a survey directed toward businesses and individual entrepreneurs (hereinafter referred to as Businesses) and the self-employed and freelancers from this sector (hereinafter called Creators). The survey was available for completion online between December 2015 and February 2016 and was directly publicised to the businesses and creators (using e.g. email, social networking, phone) or through aggregator platforms and intermediary organisations

(e.g. SPCV[6]), university research centres, incubators and business centres). A total of 38 businesses responded to the survey (representing 20.7% of the 183 businesses inventoried in the database -- some are no longer active -- and 49.4% of the 77 businesses that we confirmed were still operating) and 32 independent creators for a total of 70 agents involved in the video game industry in Portugal.

In order to collect detailed information on the operation of the video game industry in Portugal, we also carried out 12 in-depth interviews to targeted businesses, selected to cover a range in terms of volume of business, type of produced video games (applied or entertainment) and geographical location. For this paper the data was particularly useful in order to provide context for the survey. It will also be subject to in-depth treatment in the context of other outputs to be developed in the near future by the team.

This paper presents the preliminary results of the study in English. A more detailed analysis and the complete results were compiled as part of a report published by SPCV and the Rage Project (Santos, Romeiro, Nunes, & Pinheiro, 2016).

It should be noted that it was not the aim of this (first) study to cover the entire video game economic footprint in Portugal, such a project would include the import, marketing and sales of video games, together with games' journalism, video content producers and research activities. We opted, given the challenges and limited resources, to cover only the game development industry.

A broader research study of the video game sector in Portugal should be a priority for subsequent study.

3. Results and Analysis

The authors will present and analyse next the results obtained from the survey and interviews to businesses and creators, characterising the state of the industry in six key areas: businesses and creators, employment, products, economic situation, structuring networks and institutional support.

3.1. Businesses and Creators

Respondent businesses and creators have emerged from 2001, with between 1 and 3 businesses and creators commencing activity per year through to 2011, with the one exception of 2005 when no new Businesses appeared. This trend was succeeded by a new phase in which the sector's dynamism has strengthened considerably, with the annual appearance of 10 or more businesses and creators from 2012. The most active year was 2013 when 21 new agents started activity (11 businesses and 10 creators).
There appears to be a decrease in new activity over the last year (2015), but that observation could be due to new ventures that started recently being operating below the radar coverage, until results are visible.

[6] Sociedade Portuguesa de Ciências dos Videojogos

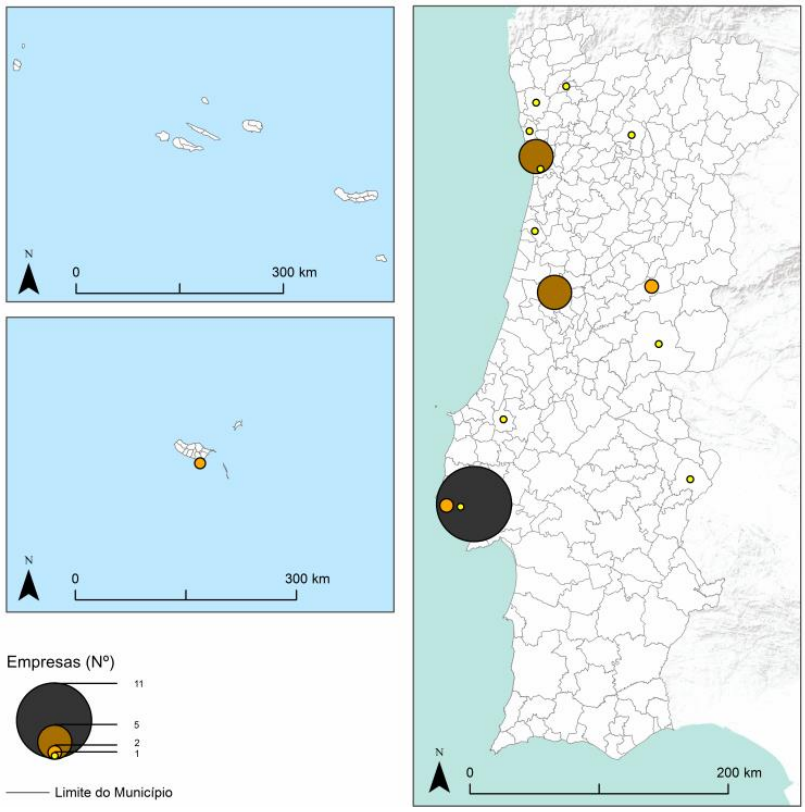

Figure 1. Geographical distribution of game development businesses in Portugal, 2016.
Source: Survey to Businesses and Creators (January 2016)

It is thus a very young industry, evidenced not only by the fact the oldest company emerged only in 2001, but also by the fact that almost two thirds of businesses (65%) have had 3 or fewer years of activity. The information from the interviews suggests that this recent dynamism is mainly the result of the (re)emergence of game platforms -- PC, mobile, web -- and easy access to more intuitive tools for creating and editing video games.

The analysis of the geographical distribution of the surveyed businesses (see Figure 1) indicates that this is an economic activity still not distributed evenly in Portugal and concentrated in some cities. Most municipalities have no businesses or creators, as they are concentrated on only 16 of the 308 Portuguese municipalities.

Only three municipalities recorded more than 3 businesses on its territory, Lisbon having 11 units, compared to Porto and Coimbra that each have 5 businesses. If we to these also join the creators, individually dedicated to video game development in Portugal, the role of the capital is even more remarkable, with a total of 24 businesses/creators, this is followed by Porto with 8 and Coimbra with 7. It must be also mentioned that the municipality of Oeiras hosts the largest Portuguese studio, with over a hundred employees.

This is an economic sector still emergent in Portugal, which is going through the first stages of a geographical diffusion process which is clearly urban driven. Almost half of the Portuguese businesses and creators involved in this activity are concentrated in the Lisbon Metropolitan Area, followed by almost 1/4 in the North of Portugal, namely in the most densely urbanized area, often referred to as *Porto City Region*.

Answers to questions on the factors influencing location showed that businesses and creators do not attach the same order of importance the factors that in some way influence their location. For businesses the most relevant factor is their proximity to other complementary creative industries, the intersection of learning that such proximity provides. This is followed by, in order of importance, the proximity to other businesses or creators who develop video games and then the ease of interaction with universities, the inference being that these are the source of preferential recruitment for the building of work teams. In turn, creators attach more importance to the existence in the vicinity of other businesses or creators who develop video games, as a result of the working links that often establish with these agents. The second locative factor most valued by creators is the proximity to other creative industries. The proximity to research centres is assumed as the third most important factor that determines the location of where the creators operate.

In terms of activities, the majority of businesses are dedicated exclusively to the development of video games. In fact, less than 1/3 of these accumulates this activity with other services not directly related to the creation of video games. However, the same situation does not occur with creators, as most of them accumulate the development of digital games with other activities. Of the businesses that are not dedicated exclusively to the development of video games (32% of all surveyed businesses) most are involved in activities related to programming, as well as web design and consultancy. The creators who are not exclusively dedicated to the development of video games (56% of respondents) join that activity with involvement in activities related to programming (similar to what happens with the businesses), or other digital activities such as illustration, multimedia animation or training.

Analysing the main activities performed in the development of video games one can detect, in the case of businesses, a tendency for a greater dispersion of their expertise. All businesses indicate the creation of original games as a main activity. Then, among the other activities stand out design and prototyping, publishing and artistic creation (sound, 3D modelling, illustration, ...). Creators tend to demonstrate more a concentrated expertise profile focused on two distinct activities. These are design and prototyping, activity performed for about 60% of creators, and artistic creation that was mentioned by about 40%. Video game ports for other platforms and the development of middleware (to integrate in the pipeline from other businesses) are done only by a residual percentage, both in the case of surveyed businesses and creators (see Table 1).

Table 1. Main activities. Source: Survey to Businesses and Creators (January 2016)

	Businesses		Creators	
	Nº	%	Nº	%
Original Game Development	37	**100**	28	**87.5**
Design / Prototyping	10	**27.0**	19	**59.4**
Publishing	9	**24.3**	4	**12.5**
Artistic Creation	8	**21.6**	13	**40.6**
Subcontractor	7	**19.0**	22	**69.0**
Distribution/Exploitation	4	**10.8**	3	**9.4**
Porting	3		2	**6.3**
Middleware Development	2	**5.4**	0	**0.0**
Research	0	**0.0**	1	**3.1**

3.2. Employment and qualifications

The surveyed businesses reported 272 full-time and 48 part-time employees, and 55 freelancers, which corresponds to a total of 375 workers. Thus, it is estimated that the total number of direct jobs generated by the industry in Portugal is in the range of 658-1204 employees. The values that define the boundaries of this range were extrapolated based on a projection calculated from the sample used in this study, which represents 25% of the 154 businesses that are in the project database and about 50% of businesses confirmed to be effectively in operation - 77 businesses[7]. These calculations do not consider the creators identified in the database, in order to avoid double counting of workers (many of whom are referred to by the businesses as a freelancer workers).

Although the average number of employees per company being 10.1 infers an industrial base composed of small businesses, this does not correspond to the reality of this sector. If we subtract the 120 employees that are allocated to a single company (based in Lisbon Metropolitan Area) from the total of 375 workers who collaborate with these businesses, we get an average of 7 workers per company (or only 4 workers per company considering full-time employees). This is similar to other sectors with higher levels of expertise and which are technology-intensive and knowledge-intensive, this is an ecosystem consisting of micro enterprises.

The video game sector covers very demanding activities in what regards the qualification of its workforce. In the vast majority of the businesses (86%) more than half of the workers have a higher education degree. It should be pointed out that in more than 45% of the businesses, the total number of employees have a Bachelor degree (Figure 2), which shows the high degree of qualification of the human resources involved in this sector.

[7] To calculate these estimates, we have not considered the 120 employees working in one company that has responded to the survey, because that number represents a singular reality.

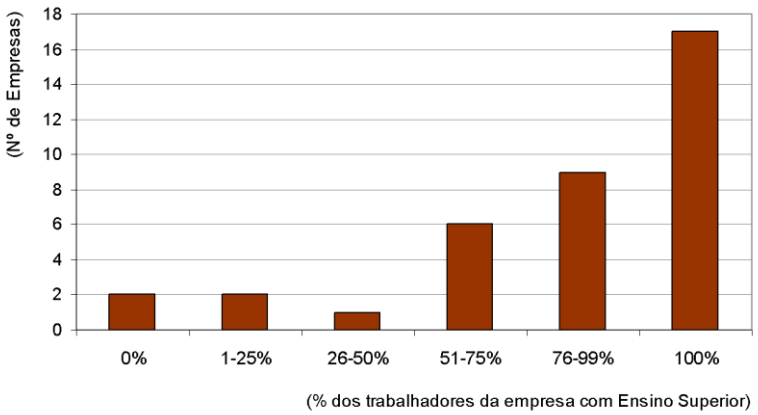

Figure 2. Businesses working in Game Development, by proportion of workers with higher education degree. Source: Survey to Businesses and Creators (January 2016).

In the case of creators, 69% of them have completed a higher education degree, a proportion that corroborates the idea of the high qualification and strong specialization of the human resources of the videogames sector in Portugal.

3.3. Portuguese Video Games

The businesses surveyed were responsible for the development of 127 video games. Of this total, 110 (92%) were sold on the international market. This stems from the facility that currently exists in publishing games for mobile platforms or PC through the App stores and Steam as well as the small size of the domestic market.

On average each company produced approximately 3 games. This figure however hides a great disparity of situations in the number of video games produced. One company has produced 15 of these games and there are 15 that were responsible for the development of a single one (Figure 3).

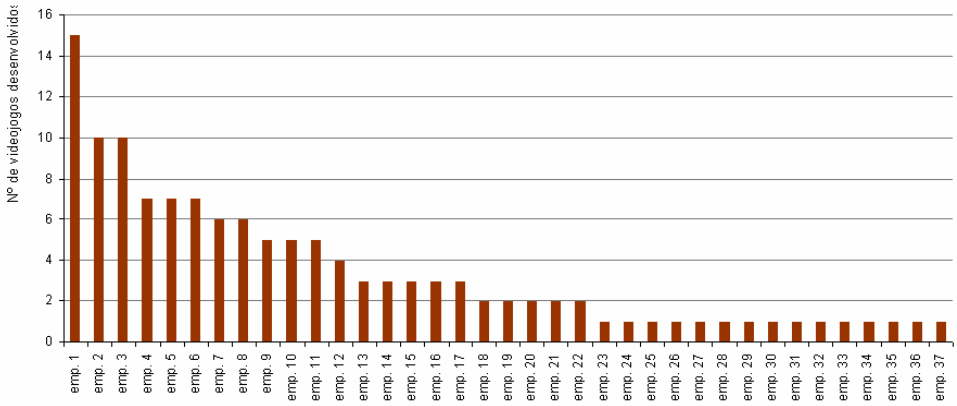

Figure 3. Games developed by businesses in Portugal. Source: Survey to Businesses and Creators (January 2016)

3.3.1 Genre, target audience, tools

There is a wide variety in the genre of video games developed either by businesses or by the creators. The genres most represented in the portfolio of Portuguese businesses and creators are arcade, action, puzzle and adventure games. At least 30% of businesses and/or creators claim to have developed these types of video games. It should be noted that over 50% of the creators said they had worked in either Arcade games or Action games (Figure~\ref{fig:genreVG}).

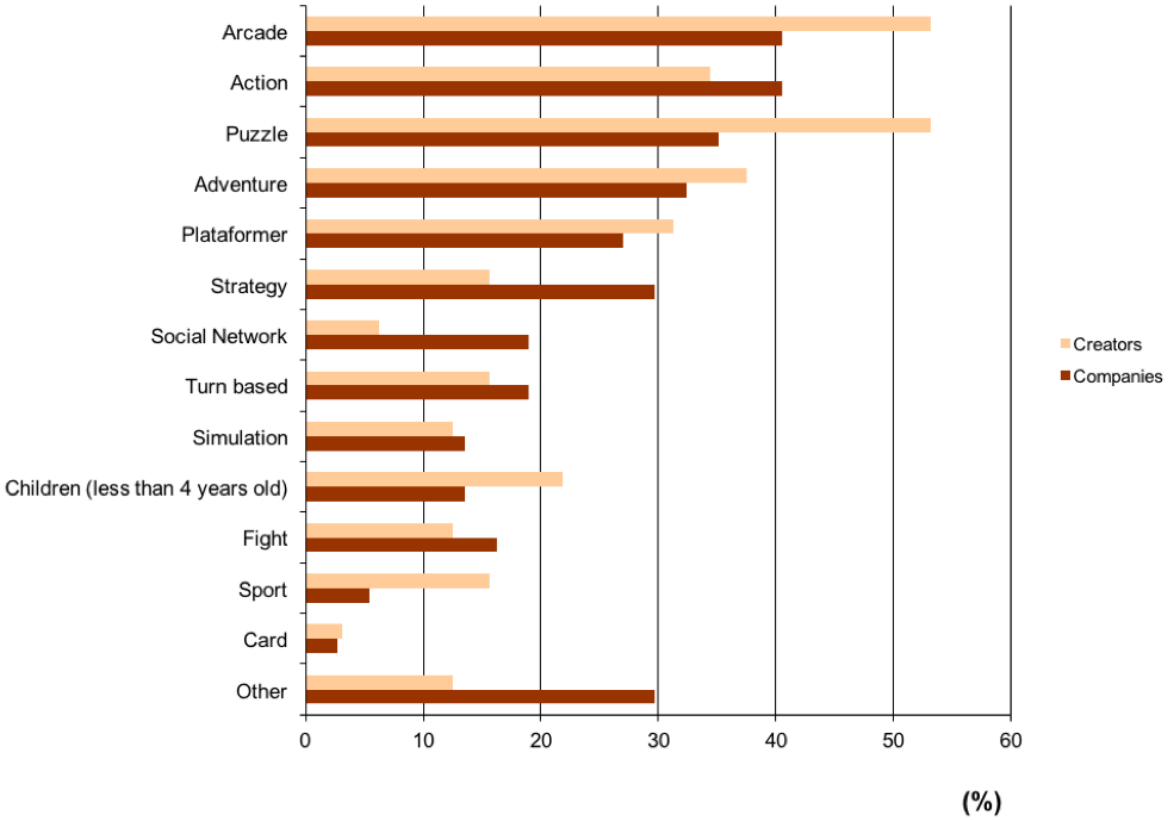

Figure 4. Percentage of businesses and creators working by genre. Source: Survey to Businesses and Creators (January 2016)

Video games developed by businesses and creators share a similar target audience (Figure 5). Video games developed in Portugal are intended primarily for young people and adults, following by children and, finally, the senior public.

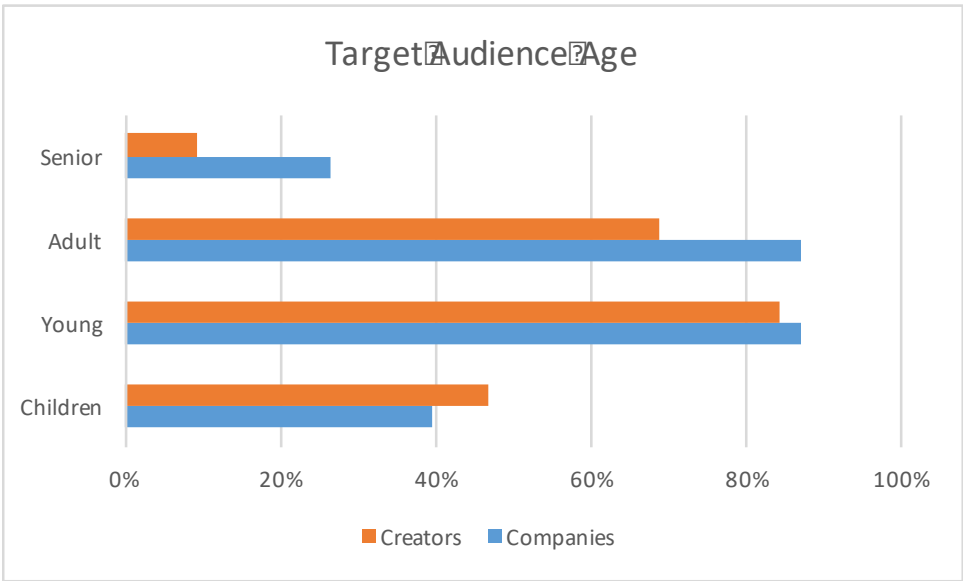

Figure 5. Target audience the agents produce gams for. Source: Survey to Businesses and Creators (January 2016)

Both businesses and creators develop games primarily for Mobile and PC, with about a third of businesses and 15% of creators having worked or currently working on console games. Also about a third of the businesses and creators worked or are working in video games designed to be played online (Figure 6).

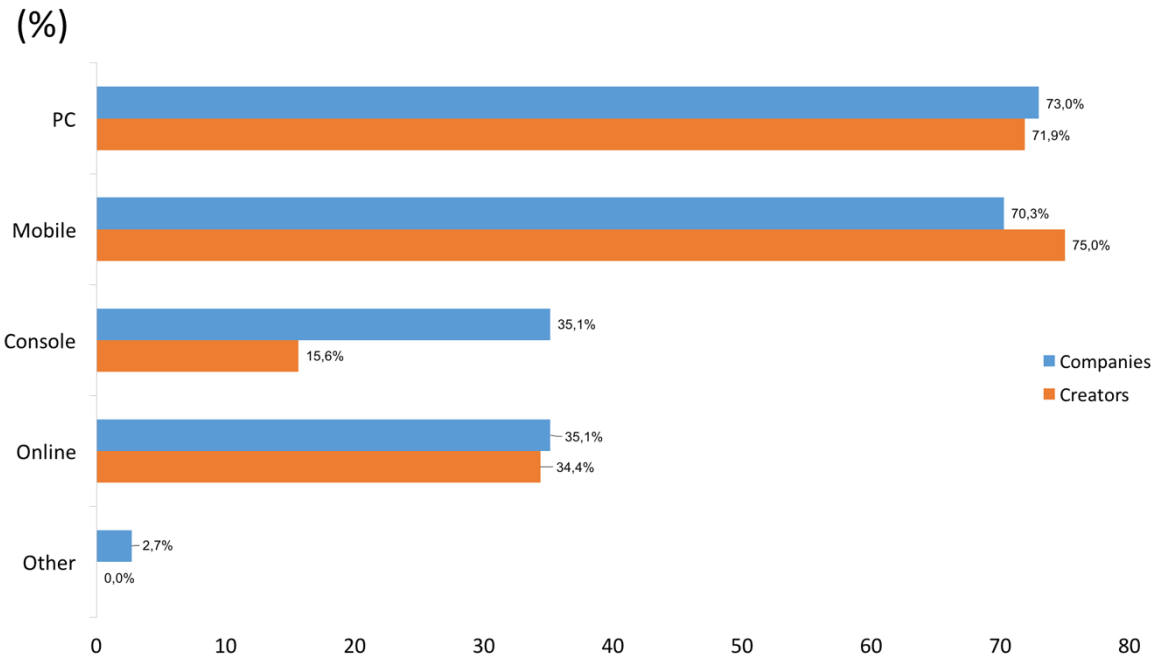

Figure 6. Target platforms of Portuguese games. Source: Survey to Businesses and Creators (January 2016)

Regarding development tools, Unity3D is currently the dominant development platform among the Portuguese businesses and creators. More than 70% say they use it. In a distant second place comes the Unreal Engine used by about 13% of businesses and creators, and in third place Game Maker Studio, used by 8% to 9% of cases (Table 2). Note also that Cocos2D is a main tool and platform used by the largest company considered in this study.

Table 2. Main development tools and platforms. Source: Survey to Businesses and Creators (January 2016)

	Businesses (%)	**Creators (%)**
Unity 3D	**73.0**	**75.0**
Unreal Engine	**13.5**	**12.5**
Game Maker Studio	**8.1**	**9.4**
HTML 5	**8.1**	**0.0**
Cocos 2D	**5.4**	**0.0**
Haxe Family	**5.4**	**0.0**
XNA	**5.4**	**0.0**
Own Engine	**5.4**	**0.0**
Flash	**0.0**	**9.4**
Libgdx	**0.0**	**9.4**

3.3.2 Marketing and distribution

The main channels used for advertising video games developed in Portugal are social networks and the businesses' own websites. For about 60% of the businesses, but only 30% of creators, the specialized press is also a channel used. Youtubers or an owned YouTube channel, as well as the video game industry events are also channels with expression which are used by about half of the businesses and between 20% and 40% of the creators. About 35% of businesses and creators resort to advertising. For cross advertising one needs to have already a successful portfolio and so this channel is less used (Figure 6.a).

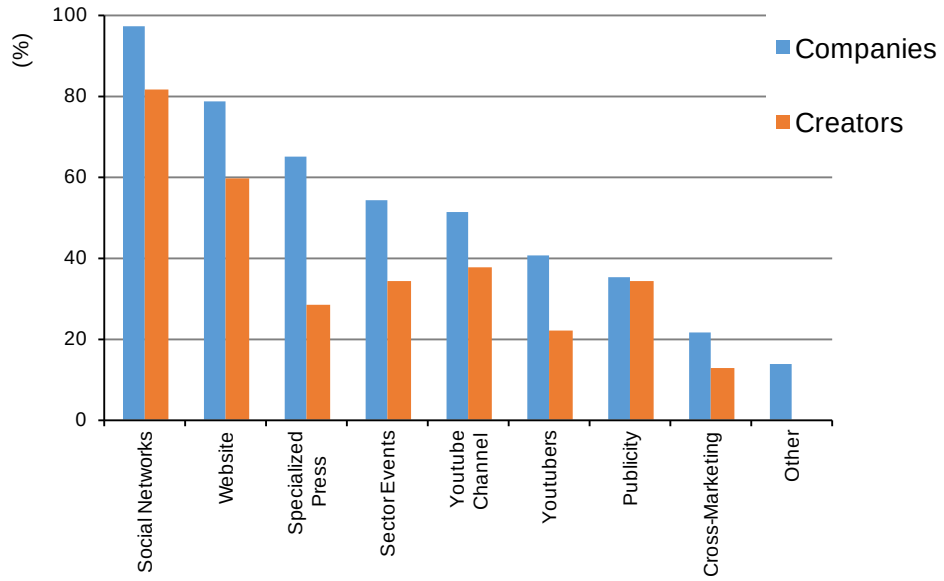

Figure 6.a. Marketing of Portuguese games. Source: Survey to Businesses and Creators (January 2016)

In terms of distribution channels and sales, there is dominance by the Google and Apple stores, with more than 60% of businesses declaring their use. Creators use less the Apple App Store (less than 45% compared to over 70% for Google Play), probably derived from its annual cost. The corresponding Microsoft service, Windows Store, has just over 30% of businesses and 20% of creators as users (Figure 7).

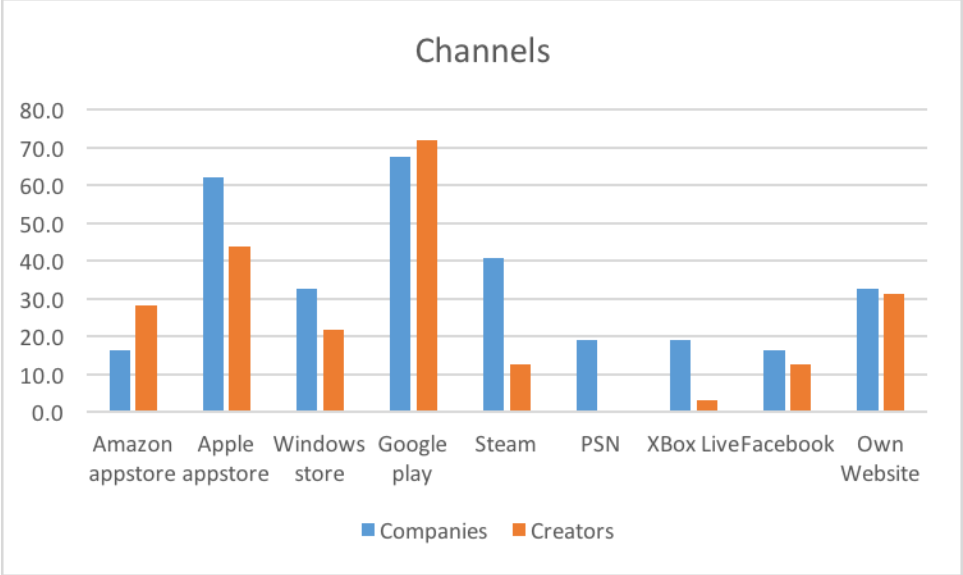

Figure 7. Distribution Channels. Source: Survey to Businesses and Creators (January 2016)

Steam is used by 40% of Enterprises and just over 10% of creators. The reason for this difference is not clear, since both declare to develop PC games. It could be due to the fact

that many of the creators working on PC games do not publish them directly, this being an activity that requires more resources. To publish a game on Steam, for example, it is currently required to go through a greenlight quality process, which requires additional effort and some investment.
About 20% of businesses distribute their games on digital channels connected to game consoles such as Xbox Live or PSN. Their own website is used by about 30% of businesses and creators, Other channels, such as Facebook or physical distribution are not currently significant.

3.3.3 Applied Games in Portugal

Only about 11% of businesses and 16% of creators declare that applied games represent most of their income, while another 10% of the businesses and 20% of creators declare some activity in this type of games (see Figure 8).

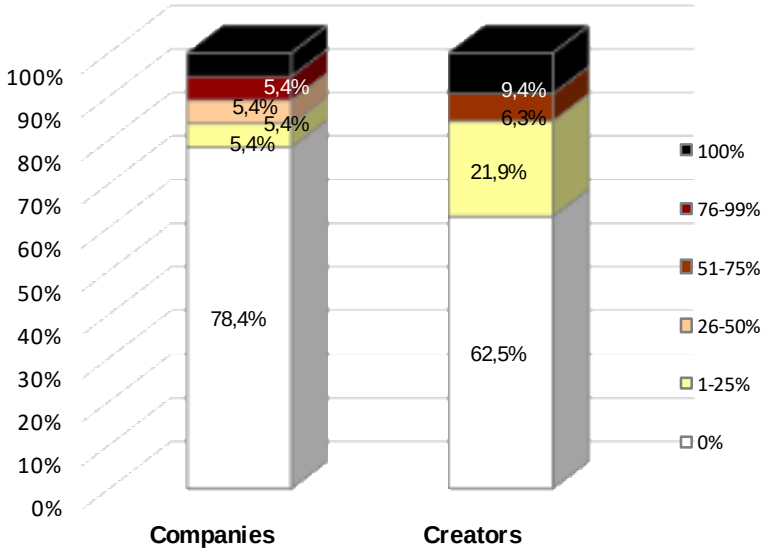

Figure 8. Percentage of income derived from applied games. Source: Survey to Businesses and Creators (January 2016)

Regarding the sectors of application of the games produced, 60% of businesses and 75% of creators working on Applied Games indicate education and formation. There is also some presence in the areas of information/comunication, health, logistics, architecture and construction, security, and insurance (see Figure 9).

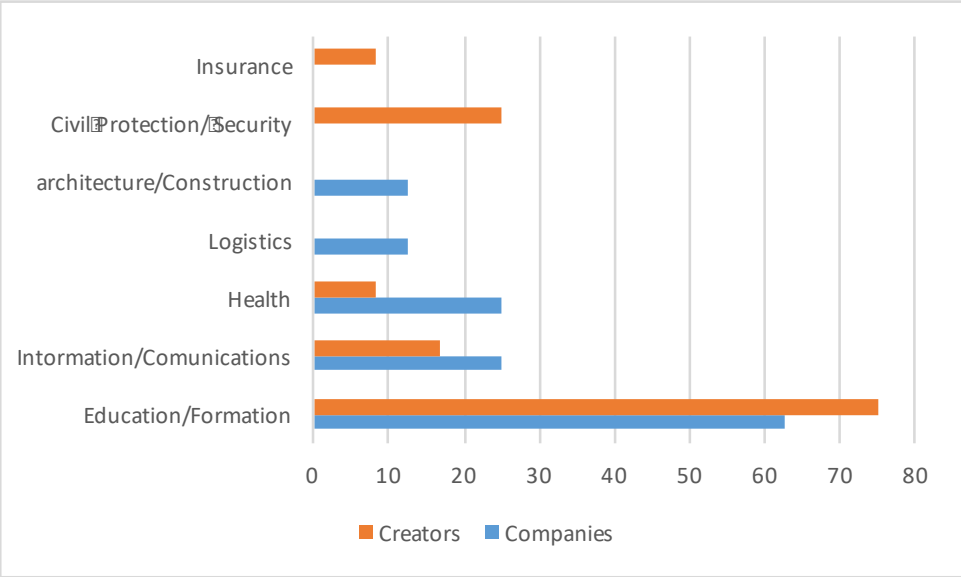

Figure 9. Application sectors of applied games made in Portugal. Source: Survey to Businesses and Creators (January 2016)

3.4. Economic Situation

For the development of video games in Portugal and in terms of funding there is a heavy reliance on equity, with less than 50\% of businesses and creators refering recourse to alternative sources of funding. This is a signal of the lack of connection between the videogame production industry players in Portugal and possible investors (see Figure 10).

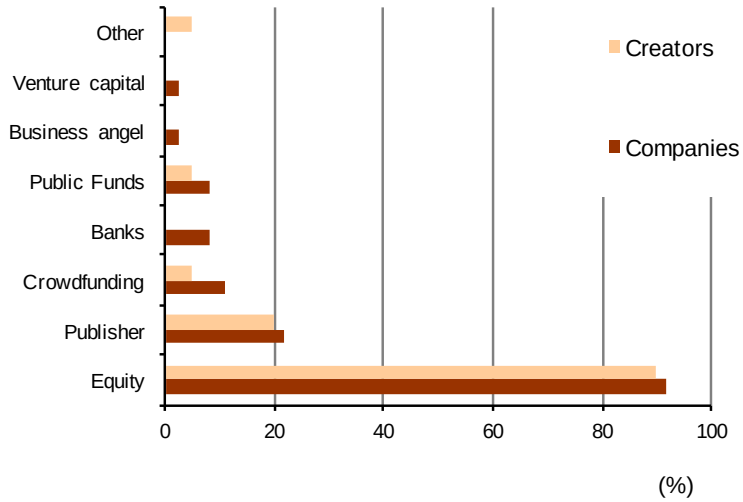

Figure 10. Origin of the financing for game production in Portugal. Source: Survey to Businesses and Creators (January 2016)

It should be noted the lack of venture capital expression in game development in Portugal, as well as the limited use still made by Portuguese businesses and creators of alternative funding sources such as crowdfunding.

About 95% of businesses and 85% of creators assess access to credit as difficult or very difficult. This difficulty experienced in accessing credit helps explain the weak presence of the traditional sources of financing for the development of video games in Portugal (see Figure 11).

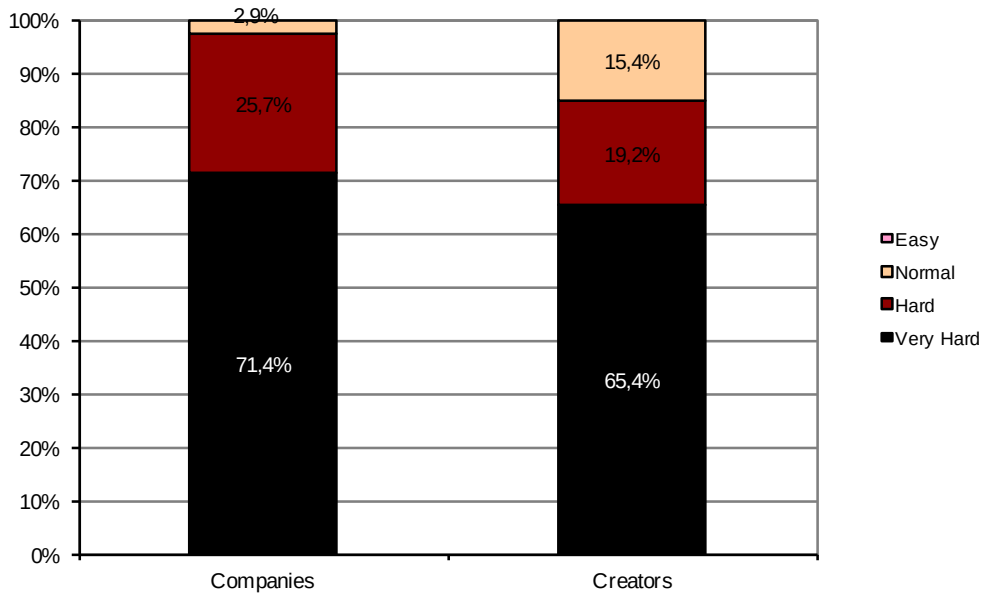

Figure 11. How easy is to access credit. Source: Survey to Businesses and Creators (January 2016)

Regarding the sources of revenue associated with the video games produced in Portugal, businesses mention that the most common source is the sale of the game itself (65%). About half of these agents also report sales within the game (micro-transactions) and just over 40% refer to advertising or sponsorship. This final source of income is the most common among creators, with over 50% mentioning it. Other sources of revenue such as subscription, crowdfunding or early access, services or merchandising sales are always referred to by less than 10% of respondents (see Figure 12).

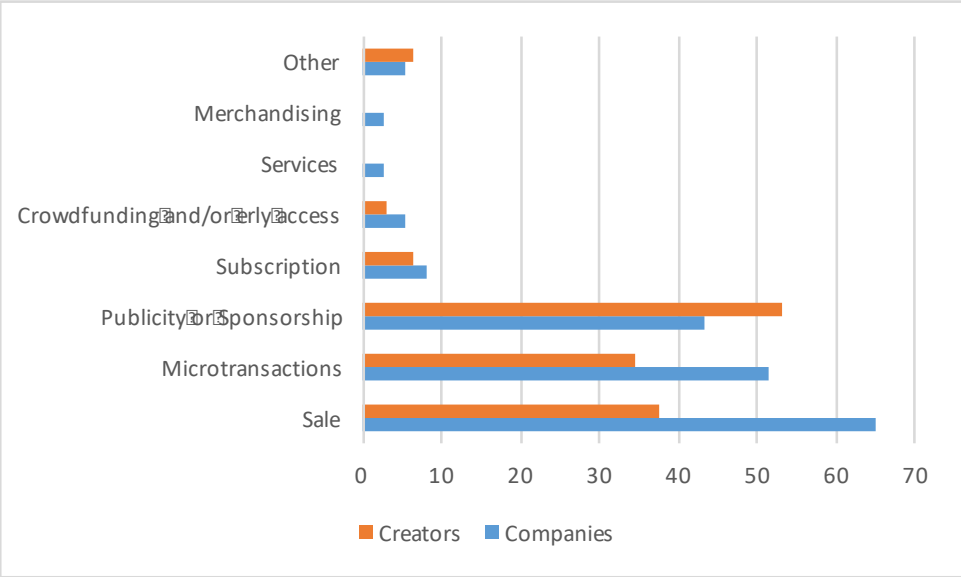

Figure 12. Revenue streams. Source: Survey to Businesses and Creators (January 2016)

Only about 20% of businesses reported having revenues exceeding 50,000 Euros annually, with one third of businesses saying they had income lower than 10 000 Euros per year, which would not make them sustainable as sources of employment (Figure 13). As for the creators, 56% said they had annual revenues related to video games of less than 2,000 Euros.

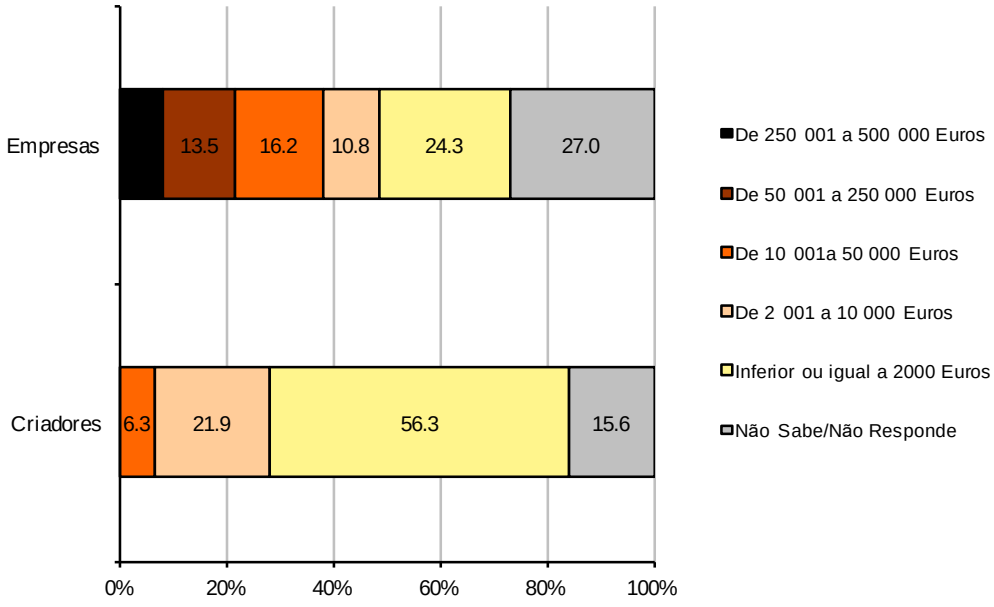

Figure 13. Revenue. Source: Survey to Businesses and Creators (January 2016)

This infers that many businesses and creators are still in an early investment phase, without their games generating revenue that enables a sustainable activity. Note that three businesses declared turnovers of between 250,000 and 500,000 Euros. It should also be noted that several businesses have declined to reveal their revenues, including the company that employs the most people (in our sample).

Despite the high percentage of businesses that claims to have low revenues, over 70% of businesses consider their financial situation regular or favourable, which corroborates our assertion that these businesses are in their investment phase. On the other hand, on the creators' side, the financial situation is a cause for concern in 75% of cases.

To determine the overall turnover of the videogame industry in Portugal, we consider the average value of each class considered in this question, and just for the sampled businesses that responded we obtain the approximate annual total amount of 2,100,000 Euros. Thus, considering the employment data, we estimate the total annual turnover generated by the sector's businesses in Portugal to be in a range of between 6 and 12 million Euros.

3.5. Networks in the Portuguese video game sector

Portuguese businesses in the video games sector mainly have interactions with higher education and research institutions at the national level, although the regional scale is highlighted in the case of outsorcing agreements. Also relevant is the international scale when it comes to interactions with other complementary creative industries and with other companies that hire their services or to whom they provide services (Figure 14). On the Creators side there is a clear predominance of interactions with organizations at national level, valid for networks established with all types of agents with whom they interact.

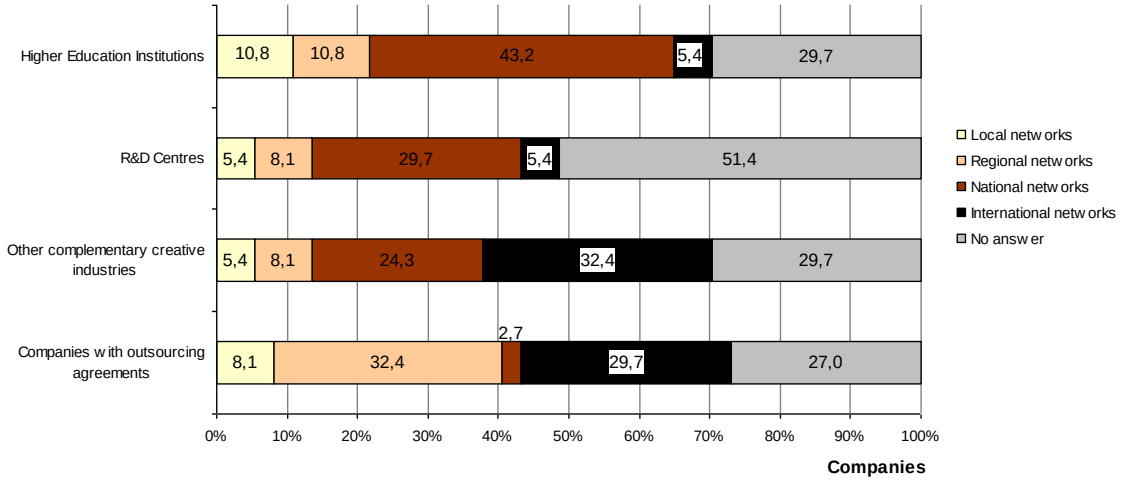

Figure 14. Territorial scope of relationships. Source: Survey to Businesses and Creators (January 2016)

The most frequent relationships that Portuguese businesses in the video games sector establish are with other businesses/creators related within the video games production, and

at a second level with two types of agents: other complementary creative industries and with higher education institutions. Research and development institutions play a more limited role in these networks.

3.6. Institutional Support

It is not frequent the recourse to public support for the development of video games in Portugal. In fact, 94.6% of businesses and 62.5% of creators have not benefited from any support of this kind for the development of their activity. A small number of businesses benefited from support of the programs `Compete'- QREN and MEDIA or MEDIA Mundus. In the case of the 37.5% of creators who were recipients of public support, we highlight the MEDIA and MEDIA Mundus programs, support from University institutions and the support provided by local authorities.

The public support that benefited businesses and creators had as a purpose the development of video games. Specifically, this was the sole purpose identified by the businesses (66.7%), while the creators received support not only for the development of video games (50%), but also for the establishment of partnerships and networks (25%), the acquisition new technologies (15%) and, to a lesser extent, access to new markets (5%).

The future application for national or European support programs is mostly likely to support businesses. In fact, most of these (60%) consider as `probable' or `very probable' that this will happen, in contrast to the 31% probability in the case of creators. Many of these creators (47%) consider `Improbable' future application for public support (see Figure 15).

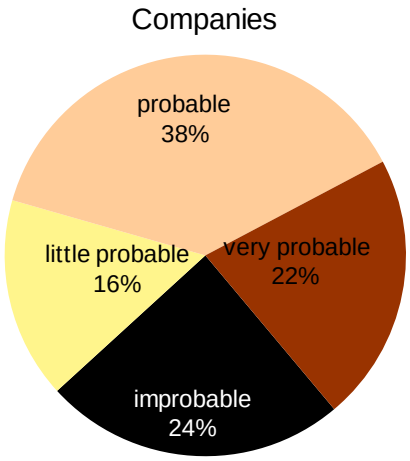

Figure 15. Future support application. Source: Survey to Businesses and Creators (January 2016)

A final question in the institutional support section of the survey regarded the `Sociedade Portuguesa de Ciências dos Videojogos' (SPCV). This is a non-profit association that aims to promote and develop the science of video games in Portugal. In the absence of a proper industry body, SPCV, despite having academic roots, has tried to promote dynamics in video game industry community.

The answers to the survey indicate that there is still work to do regarding visibility and participation in SPCV activities. Less than 25% of both businesses and creators affirmed to have already taken part in activities or events sponsored by SPCV, and almost half of creators were not aware of the society (see Figure 16).

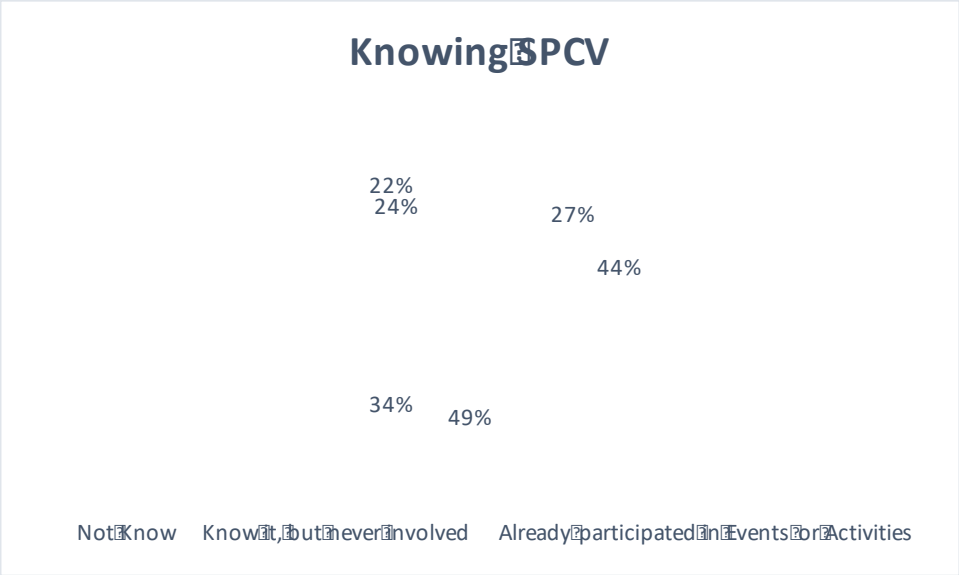

Figure 16. Relation with SPCV; outer circle represents the creators. Source: Survey to Businesses and Creators (January 2016)

4. Future perspectives for the Portuguese Video Game Industry and actions to take

Despite all the difficulties that were highlighted by the survey, the general tone is one of optimism for the future. Asked about their opinion of the future evolution of the economic and financial situation of the Portuguese video game industry a large majority believe it will improve. Also around 60\% of businesses and 70\% of creators are confident of the future affirmation of Portugal in the global video game industry (see figures 17 and 18).

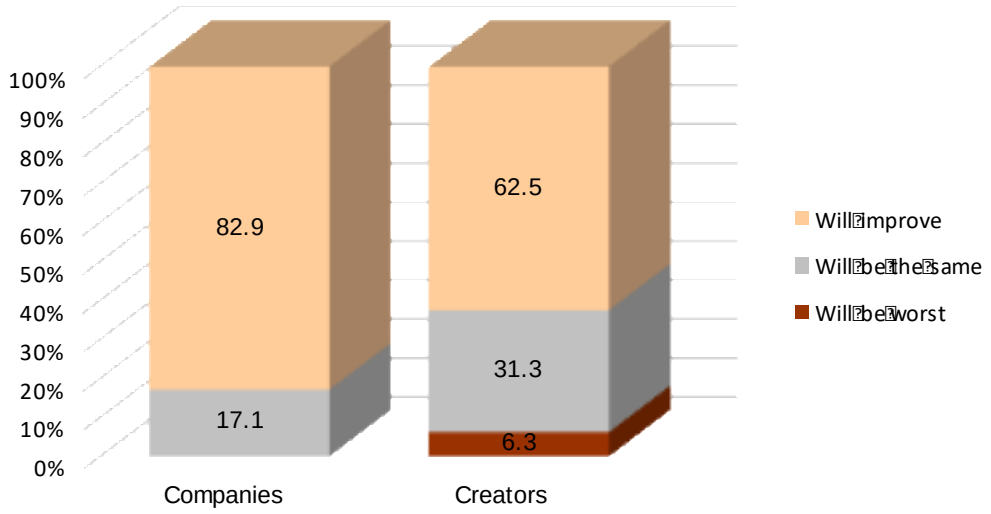

Figure 17. Confidence in the future. Source: Survey to Businesses and Creators (January 2016)

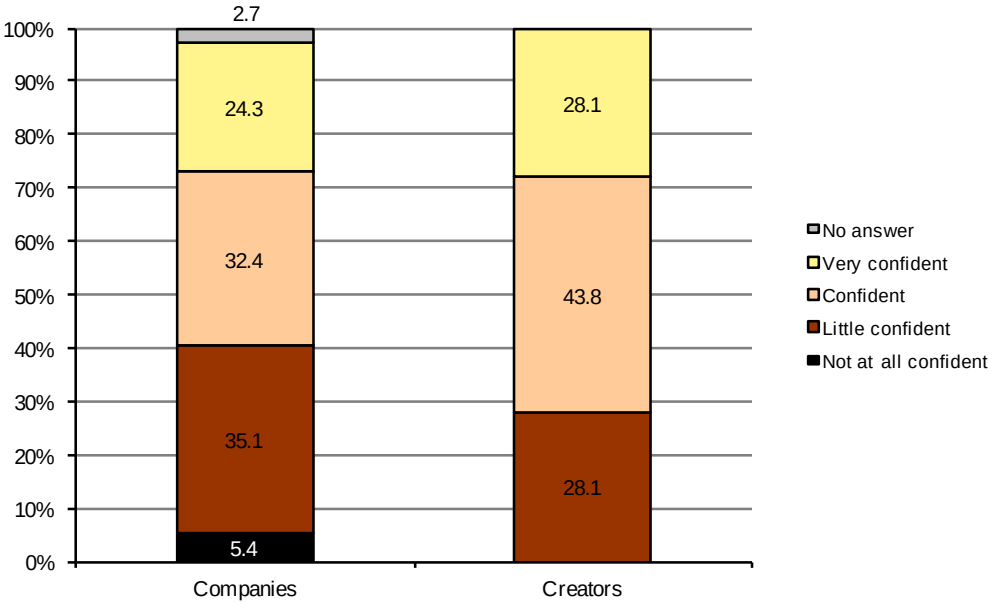

Figure 18. Confidence in the future affirmation of Portugal. Source: Survey to Businesses and Creators (January 2016)

We also asked the industry players what were in their opinion the main barriers to the further development and affirmation of the video game industry in Portugal. Both businesses and creators ranked them as described in Table~\ref{tab:barriers}. Lack of investment capital was identified as the main factor holding the sector, followed by a lack of public support (regulation, fiscal incentives, etc), and human resources in third place.

Table 3. Main barriers to the development of the video game industry in Portugal. Source: Survey to Businesses and Creators (January 2016)

	Businesses (%)	Creators (%)
Lack of Capital	1st	1st
Lack of public support	2nd	2nd
Human resources	3rd	3rd
Institutional Support	4th	4th
Localization	5th	6th
Facilities	6th	5th

Given the state of the Portuguese video game industry as characterised by the survey and interviews, we have identified a few institutional actions that should should be undertaken in order to strengthen the sector.

Know better

The work presented here is pioneer in trying to characterize the industry of video games in Portugal. Given the growing international importance of the sector and its dynamics in Portugal, there is the need to continue and deepen this work in the years ahead. The regularity in the collection of information, as well as increasing the response rate to the survey appear to be the main challenges to the characterization and monitoring of this industry. While the presented results are just descriptive, more data and its evolution along time will allow to extract trends and best practices that will allow better decision making by the industry agents.

Game on, Portugal

The lack of private funding and public support in its different facets (eg. Industry regulation, fiscal and / or financial incentives, etc) are the main barriers to the development of the video game Industry in Portugal. The sector's potential as a development lever justifies the design of specific public policies, given the importance of video games as a cultural product with great capacity to export and with high added value as well as its strong contribution to innovation in other sectors. The introduction of public incentives in Portugal (as already happens in other countries where the development of video games is comparable to film-making) could prove to be critical to retain, attract and leverage benefit-generating resources for the national economy. This in order to, first, not to waste the investment made in recent years at the level of higher education in this area and, second, to support the maturation and growth of enterprises and the enormous talent and energy that characterizes them.

The triple helix

The triple helix model (Leydesdorf & Etzkowitz, 1998) was developed in the context of knowledge based economies, and it considers three 'sub-dynamic' interactions between Education, Industry and Government. Applying this model, we need, besides public support, to strengthen innovation, differentiation and added value by supporting industry collaboration with the Scientific and Technological System through communication lines that reflect the specific and transdisciplinary aspect of video game innovation. Many successful games start as student projects, exploiting new ideas and technologies from the safe harbour of higher education facilities. We need to find support mechanisms that allow those students to transfer that work and experience to enrich the Portuguese industry.

5. Conclusions

The video games development in Portugal is an economic activity that quite clearly seems to benefit from the innovative and creative dynamism that tends to characterize the main urban-metropolitan agglomerations. Those urban spaces are the ones where are located the most qualified human resources on which these businesses depend, as well as where it is possible to find the most creative activities, with higher specialization and technological intensity, with whom collaborate the businesses and creators of the video game sector. This location pattern seems to suggest advantages derived from economies of agglomeration, even in the digital era where interactions are facilitated by telematic networks. These businesses and creators value the geographical proximity between them, as it facilitates the learning process that comes from exchange of experiences, or the establishment of partnerships and outsourcing networks.

This study represented a new approach to understand the dynamism of the Portuguese Video Game industry at a time where a shift towards smaller businesses and indie development has occurred in the global market due to technological evolution. It is an opportunity that a small but growing industry in Portugal is aware, and wants to take advantage off. This industry is constituted mainly by micro enterprises that produce games for the international market. It is a fragile sector, much dependent on own equity for investment funds, and almost totally ignored by the Portuguese state. If Portugal is to take advantage of the moment to create a sustainable industry, several actions should be taken.

A first action to take has to do with a better knowledge of the Portuguese video game industry, this study being a first contribution to this necessary effort. Another important action relates to state industry incentives, namely in what regards funding and tax incentives. Given the strategic potential of the video games industry, many countries offer co-funding or tax incentives to their companies. We believe the Portuguese state should do the same, learning from the best experiences. Finally, we think that differentiating progress can be obtained by the reinforcement and a closer connection between the industry and the academy.

Acknowledgments
This work has been partially supported by national funds through Fundação para a Ciência e a Tecnologia (FCT) with reference UID/CEC /50021/2013 and by the EC H2020 project RAGE (Realising an Applied Gaming Eco-System); http://www.rageproject.eu/; Grant agreement No 644187.

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