

Findings from a comparison between European cities in the gaming industry
'How can Utrecht stimulate its business environment in the gaming industry?'

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Abstract

The main goal of this research is to understand how Utrecht's business environment must be developed in order to increase the region's international competitiveness in the gaming industry. Utrecht's aim is to specialize in the gaming industry. In this research it is estimated that Utrecht is focused on small digital development game companies. The results indicate that Utrecht's competitive advantages are in its policy intervention, low labor wages and real estate costs, well developed demographical factors and infrastructure compared to the other investigated European cities. However, Utrecht scores below average on the categories of investments, quality of life and human resources. Once Utrecht has a stronger promotional effort in the gaming industry, it enlarges its attraction to draw game companies and to better its international position.

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1. Introduction

The world is changing rapidly, whereby it is important for countries to stay innovative. Remaining competitive in global trade requires continuous innovation to provide a solid base for sustainable economic growth. In the European Strategy 2020¹, the European Commission set aside approximately €50 billion in the years 2007-2013 for innovation stimulation. Innovation in this case is one of five target sets for the EU. The European Strategy 2020 also includes the development of the Seventh Framework Program for Research and Technological Development (in short FP7). This is an important instrument for funding research in Europe that runs from 2007-2012 and is focused on four aspects: cooperation, ideas, people and capacities (Agentschap NL, 2011). With this program the EC wants to stimulate European competitiveness and to strengthen its worldwide leadership. This program is focused on countries' top innovative sectors. Top sectors are characterized by a strong international innovative position and by each sector's contribution to the solution of social issues. Since top sectors differ by country, it is important that new governance structures are introduced on the national level to foster the overall integration of the Innovative Union. The European Strategy is focused on both the EU and national levels. European countries should therefore be competitive within and outside the EU, but also cooperate toward the end of further integration within the Union. Here the Dutch policy has to focus on its nine top sectors: energy, agro food, water, chemicals, life science and health, creative industries, high tech systems and materials, logistics and horticulture and starting materials. The Netherlands' position worldwide in these sectors is very strong (Agentschap NL, 2011). The Dutch government is thus focusing on its existing strengths. This policy is part of the smart specialization concept. Smart specialization is developed to provide strategies to guide future smart investment for regional growth and thereby to promote innovation within regions. It is crucial that policymakers create the right policy mix to support and improve regional potentials and needs (European Commission, 2011). Regions are not homogeneous and therefore it is necessary to manage a 'no-size-fits-all' policy. Smart specialization strategies can ensure the efficient use of research and innovation resources (European Commission, 2011).

Smart specialization supports the availability of each region's top sectors. This means that each region presents different opportunities and bottlenecks, and each is dealt with using different approaches and agendas. Close networks between the state, knowledge institutions and companies must be developed to work efficiently on a joint vision – this concept is known as the golden triangle (McCann and Ortega-Argilés, 2011). The EU's regional policy describes smart specialization as 'linked to the need to support the development of more world-class clusters' in order to improve a region's specialization (European Commission, 2011). These geographic

¹ Regional policy for smart growth in Europe 2020 (European Commission, 2011)

concentrations are an important element of the strategies of smart specialization. Regional cluster policy is therefore necessary for developing regional comparative advantages. In the case of Utrecht, this means investing in the creative industry.

Utrecht's regional government has decided to focus on three top sectors – life sciences and health, gaming industry (the creative industry), and sustainability. The creative sectors, such as design, media and entertainment, music, architecture, gaming and fashion, depend strongly on a city's attractiveness (European Commission, 2011). The creative industry has a strong position in the Netherlands and offers a market with a strong potential for continued growth. That is why the Dutch government has tagged the creative industry as a 'top sector'. Utrecht has enclosed the gaming industry in its policy. The gaming industry presents a number of peculiarities, largely because of its digital influence, as well as the influence of the economic crisis. Traditional creative industries, such as fashion, music and design, are struggling. However, this is not the case for the gaming sector. The gaming industry has a more or less an *anti-cyclical* structure. Even as the economy has diminished, the video game industry has grown – and continues still to grow. Since 2003, the worldwide revenue of games has grown by 133%, while the category of books has grown by 33%. Music revenues actually declined over the 8 years (PWC, 2009). Utrecht might be wise to focus its strategy on the gaming industry in order to enhance its regional competitiveness. However, in order for further growth in its gaming industry, and therefore an increase in its regional economic growth, Utrecht needs to know against which European regions it is competing. This question has not yet been made clear for Utrecht. In order to analyze Utrecht's competitors it is first necessary to know where Utrecht stands in the context of the gaming industry. Even this first step is not clear for Utrecht's regional policymakers.

This research is focused on the gaming industry, which is a relatively new, having emerged in the early 1970s, and has the potential for continuous high growth rates. It is concerned with high technological development and its ability to integrate with art (De Vaan, 2011). It is also an industry that is very diverse, with different platforms and entertainment and serious games to consider. Though the traditional platforms – consoles and PC games – are mainly dominated by the three largest platform holders, Sony, Microsoft and Nintendo, new digital influences have changed the value chain structure of the gaming industry. Here the demand for box games (games played via a disk for consoles or PC) are decreasing but the market for games played via online platforms is strongly increasing. New markets have been tapped – markets in developing serious games, micro-payments and app stores. This shows that the gaming industry also presents a very dynamic market.

The different actors in the value chain – developers, publishers, distribution/retail – are not operating within a traditional value chain anymore. Rather, they often overlap with each other in the new value chain of digital gaming. In this paper, the value chain of the game industry will therefore be analyzed. In order to make the comparison between competing cities in Europe, it is first necessary to analyze the gaming market in detail. What are the drivers of the gaming industry? Which indicators are attractive for game companies when deciding to establish in a certain area? Once these factors are summarized and their importance is known, Utrecht's gaming industry needs to be analyzed. Once the segment of the value chain in which Utrecht specializes can be identified, the comparison between other cities can be made. This is necessary, since it would be fruitless or even counterproductive to compare Utrecht with a different segment of the value chain. Put simply, Utrecht should not be compared with a city specialized in game distribution if Utrecht is instead focused on game development.

This research will allow Utrecht (and of course the other investigated cities) to know exactly which indicators are important to further increase the growth of its gaming industry. Utrecht will also know which cities are one step ahead or might be on the same level as Utrecht. This might further improve international cooperation and competition among these competing European regions. With this research, Utrecht can improve its gaming market and establish new contacts for collaboration. Game companies also might extend their knowledge due to this research. Due to the clear overview given of the value chain, game companies can learn which segment they fit within and therefore know which location factors are vital to increasing their companies' growth. This research therefore has strong scientific and social relevance. Based on the aim of the research, the main question can be stated as follows:

“How is the city of Utrecht positioned in the gaming industry compared with other European cities and what can Utrecht learn from this comparison in order to stimulate its business environment to increase the international competitiveness of the region in the gaming industry?”

In order to answer this question carefully, these sub-questions need to be analyzed:

- What does the international literature about the business environment in the creative industry say about how to stimulate a region's competitiveness?
- Which location factors are important for the gaming industry?
- Where does Utrecht fit in the value chain of the gaming industry?
- Which European cities are competing with Utrecht in the gaming industry?
- Which recommendations can be made for Utrecht in order to improve its specialization in the gaming industry as compared with other European cities?

This research is constructed as follows. In chapter 2, the creative industry will be explored. The chapter will review the elements that are of particular interest for the business environment of the creative industry. In chapter 3, the gaming industry is explained in detail. Here the role of the actors in the value chain will be clarified and the influence of the new digital distribution mechanisms will be explained. Chapter 4 reviews the literature of regional competitiveness and the next chapter applies this literature to the gaming industry. Chapter 5 addresses 'the drivers' of the gaming industry – in other words the location factors that draw game companies to a certain area. The analysis of Utrecht's gaming industry in chapter 6 allows the location factors of the gaming industry to be applied to this case. Consequently, European cities and regions can be introduced with the knowledge that they need in order to compete with Utrecht on the same basic conditions. Finally, the regional comparison will be made in chapter 7, where the results will be used to issue a final conclusion and recommendation in chapter 8.

2. Creative industry

2.1 Characteristics of the creative industry

Over the past two decades, cultural economy emerged around the increasing economic demand for entertainment products and leisure activities (DCMS, 1998). Scott (2004) describes cultural economy as: “a group of sectors that produce goods and services whose subjective meaning is high compared to their utilitarian purpose”. The differences between ‘cultural’ and ‘creative’ industries are vague and there is still an active discussion about these two terms (Marijnissen, 2010). Differences have been determined between the output value of creative industries and cultural industries; cultural industries generate value through the more traditional arts fields, while creative industries focus more on creative content such as interactive leisure software. It is hard to set a single definition for the concept of creative industries. Nevertheless, with the aid of summaries of specialists in the field of the creative industry, the following definition has been agreed upon: Creative industries are “*those activities which have their origin in individual creativity, skill and talent and which have the potential for wealth and job creation through the generation and exploitation of intellectual property*” (DCMS, 1998). The following fields of activity are included: advertising, architecture, the arts and antiques market, crafts, design, designer fashion, film and video, interactive leisure software (video games), music, performing arts, publishing, software and computer services, radio and television (Marijnissen, 2010; Howkins, 2002; DCMS, 1998 & Wu, 2005). These activities constitute the core of the creative economy (Howkins, 2002).

Creative industries are project-based organizations (Caves, 2000). Some creative products often require various skilled and specialized workers (Caves, 2000), where each creative output differentiates itself by introducing personal tastes from different artists to a product. The artist who makes a creative good is associated with the uniqueness of that good, the resolution and harmony that is achieved in the creative art. Since individual artists differ in skills and proficiency, the reputation and the status of the artist is extremely important (Balland, 2011). How consumers will accept or reject a newly produced creative product is highly uncertain. The artist does not know beforehand whether a product will hit or miss. When there are sunk costs (as there normally are with creative products), there may be a higher risk for creative products. If a creative product is a flop, the costs cannot be recovered. This is the ‘*nobody knows concept*’; a creative product is an experienced good, where the artist does not know whether customers will like the good (Caves, 2000).

The high uncertainty in the creative industry emphasizes the role of the network. Scott (2010) mentions in his paper ‘Cultural economy and the creative field of the city’ that a localized creative industry is a complementary network, which further increases product differentiation.

Each artist wants to be unique and is always in search for something new. Firms collaborate only with each other for inspiration, updating each other, negotiating decisions and new insights and breaking apart again if these gatherings are meeting their expectations (Scott, 2010). According to 'De Vaan' (2011) in his dissertation 'The dynamics of interfirm networks along the industry life cycle', collaboration patterns in creative industries are key to producing unique products. This means that creative producers are willing to establish temporary commercial relations with one another. As such, producers must trust each other in order to collaborate efficiently. Here, mechanisms of proximity set the formation of a creative network (De Vaan, 2011). Face-to-face contact is very important to develop tight relationships. Consequently, close contact and communication is necessary to understand tacit messages which may influence the status of decision making. This in turn amplifies the localization of networks. That is why a lot of creative sectors collaborate in a larger city, where geographical proximity fosters partnerships (Scott, 2004). The local labor market also influences this localization of network (Scott, 2010). Cities often provide the right conditions to attract creative workers. Cultural workers tighten their relations due to the uncertain job market that characterizes the creative industry.

Each artist's unique inspiration can serve to create continuous product differentiation. The evolutionary path therefore contributes an important part of an artist's work. The symbolic relationship between place, culture and economy is a part of a trusted and known working environment that stimulates individual expression. Path dependency is a relevant concept in the creative industry. Cities or regions with long traditions in trade, culture, creativity and business-to-business services are often better for stimulating the creative knowledge economy than specialized regions that were departed from mass industrial production (De Vaan, 2011). These regions might have more trouble adapting themselves to the demands of the 21st century in the creative industry (Bontje and Musterd, 2009). This limits the path dependency structure.

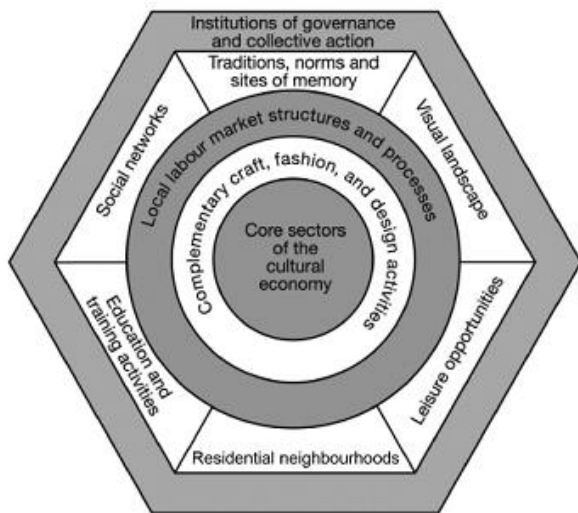
As mentioned before, the creative industry is based on project-based production where conduits of information are not the only factor affecting important for the uniqueness of a product. The latter is also influenced by an artist's reputation and status. This individual characteristic ensures the formation of a network. To collaborate with a partner of a high level of status might increase the chance of a product's success.

2.2 Optimal business environment in the creative industry

Traditional thinking holds that the capabilities and processes within firms are important internal factors to increase efficiency in the creative industry (Walz and Seibert, 2009). However, recent research indicates that the external environment is at least as important for a creative milieu.

Figure 1 shows a schematic representation of the business environment of the creative sector in a city (Scott, 2010). Here various sites of tradition and memory, the visual landscape, leisure opportunities and amenities, residential neighborhoods, education and social networks are inspiration sources for artists.

Figure 1. Schematic representation of the creative field of the city (Scott, 2010).



The figure comprises five 'circles'. The central circle represents the core sectors of the local cultural economy. These sectors ensure income, employment and economic growth. The second circle shows a field of complementary draft, fashion and design activities, where active agents might create tight networks among each other, which stimulates the creative industry. Local labor market structures and processes also influence the structure of the creative

industry by providing interpersonal contacts within the employment system. These three creative economy elements are captured within the city's 'wider urban environment'. The outer zone comprises the role of governance. The role of institutions of governance and collective actions has a vital impact on the feasibility of the network as a whole. Here, externalities such as market failures are dealt with through the support of a local government. Figure 1 illustrates clearly that the creative industry is set within complex socio-spatial networks (Scott, 2010). These intersected relationships in the creative industry must be recognized by policies in order to create a successful business environment for their creative city.

Richard Florida also holds that the external environment is important for the creative sector when he posits that creative cities have specific characteristics that attract people in creative professions (the 'creative class'). The creative class consists of people 'who add economic value through their creativity'²(Florida, 2002). Florida argues that creative cities attract creative workers through the city's cultural amenities and tolerant social atmosphere (Boschma and Wenting, 2007). A place must be multidimensional, diverse and full of stimulation to attract creative people. Here the high quality of amenities is more important than traditional economic motivations. The presence of a dynamic lifestyle, -- seen through the number of art museums, bars and nightclubs in a city or the venues for social interactions, such as coffeeshops and

² These professionals are not only artists, but also high-educated people and professors.

bookstores -- create higher value to a location than traditional access to natural resources or goods transportation routes (Florida, 2005). This is particularly true for highly educated individuals and talented artists. Creative people also value a city for the employment opportunities provided by a thick labor market, its authenticity (for example the historical buildings in a city) and the combination of the natural and built environment. These are critical factors affecting creative peoples' decisions to locate in a certain city. By contrast, the presences of negative localization externalities, such as increasing congestion and high real estate prices, might distort the attractiveness of a creative city. These negative forces might move creative people to other creative cities. Nevertheless, these negative externalities are expected to play a minor role in project-based industries (De Vaan, 2011). De Vaan (2011) explains in his dissertation that labor is the main resource in the production structure of project-based industries. This varies with other manufacturing industries in bulky tangible inputs or land. Creative individuals with specialized and exceptional skills are important for firms, whereby each additional firm competes to attract a unique labor skill. Labor tends to be immobile and is highly localized, thus increasing the competition between firms. (De Vaan, 2011). This means that negative localization externalities remain significant in a creative cluster.

Florida mentions in this book 'The rise of the creative class' (Florida, 2002) that the creative knowledge sector is based on increasing technological innovation and creative content work. This is facilitated by the support of a venture capital system, which also reduces the barriers to start a business. Startup firms often depend on venture capital to fund their startup costs. Therefore the provision of capital and credit to entrepreneurs is a fundamental element. Venture capital is often localized where it flows to creative centers (Wu, 2005).

Next to the availability of venture capital, Florida (2002) states that creativity in the capabilities and processes within a firm, and a social milieu are important tools for the social structure of a creativity industry. A social milieu must be open to all forms of creativity, such as in fields of artistic, cultural, technology and economic creativity. It also facilitates cross-fertilization between and among these forms, which leads to new ideas and innovation.

Other researchers also agree on the importance of the social milieu. These researchers include professionals such as Nathan (2005), Wu (2005) and Hartley (2005). Nathan (2005) emphasizes the importance of the quality of a place. The quality of its public education, reliable health care, public safety and a clean and attractive natural environment, are important location factors for creative people. Wu (2005) indicates that almost all creative centers are places with high concentrations of educated people and entrepreneurs. These groups are often students and educational workers. Cities with universities therefore not only provide education to produce creative personnel, products and services but also act as hubs that attract customers for the creative industry (Hartley, 2005). To have the right mix of physical, economic, social and cultural

assets fosters the creative drive of people since it increases the attractiveness of a region's business environment.

In sum, the regional business environment of the creative industry is influenced by location factors such as external environment, social milieu, innovative capacity and availability of universities.

In order to properly apply the location factors of the creative industry to the specific case of the gaming industry, it is necessary to explore the gaming industry in detail. The gaming industry is a very unique sector of the creative industry. The gaming industry creates its value by its content, the success of which is highly uncertain. With marketing ads and social influences, game producers are trying to capture the attention of the customers. Nevertheless, a game needs to be of intrinsic quality compared to other games. Games need to differentiate themselves from other video games (De Vaan, 2011). Video games rely more on technological innovation, which is a different sort of innovation compared to that seen in other sectors of the creative industry (Caves, 2000). The next chapter will analyze the gaming industry in detail.

3. Gaming industry

3.1 Overview of the market

Games are one of the fastest-growing sectors of the creative industry. As the next figure shows, games revenue has grown 188% since 2003, while the category of books has grown 33%. Music sales actually declined over the nine-year span. Even after the financial crisis in 2008, which saw widespread economic stagnation, the game industry continued to grow in popularity (PWC, 2009).

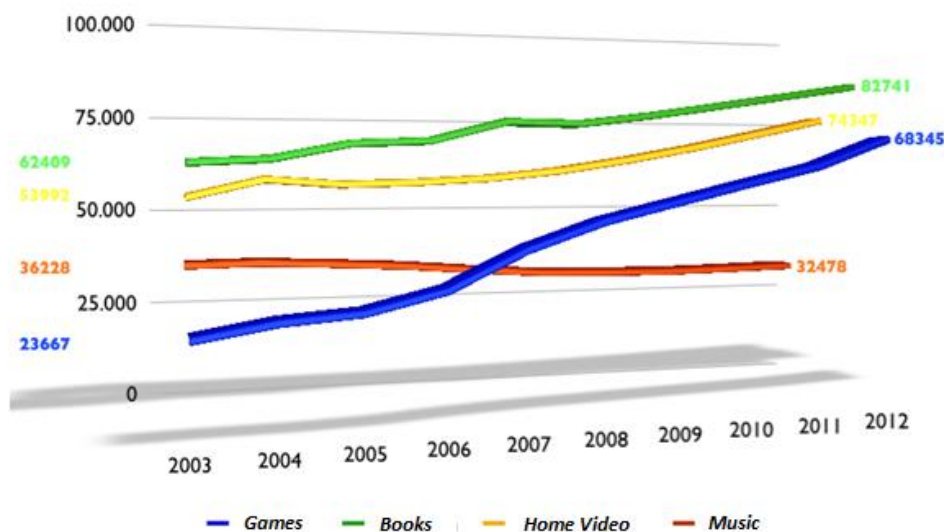


Figure 2. Developing Media Entertainment Worldwide 2003-2012 (PWC, 2009).

Gaming is a young industry, reaching back only 30 years. The first video games appeared in the 1950s. Computer games, however, did not become widely popular until the game Pong was introduced by the company Atari in 1975. This was the 'starting' point for the growth of the popularity of video games. It is a rapidly growing entertainment industry, where market expansion happens through development of online network technology (OECD, 2005).

There is not yet a clear definition of the gaming industry, but that term mostly refers to the video game, interactive online entertainment, leisure software, or interactive software industry.

Nintendo, Sony and Microsoft are hardware developers and publishers (Box 1). They have a strong influence on the game market structure, determining the price, the game and the market power. These three companies also have the largest amount of market capitalization: \$38,1 billion for Nintendo; \$32 billion for Sony; and \$251,4 billion for Microsoft. Zynga is an up-and-coming social network game developer, with a market capitalization of \$10 billion. The other illustrated companies are publishers.

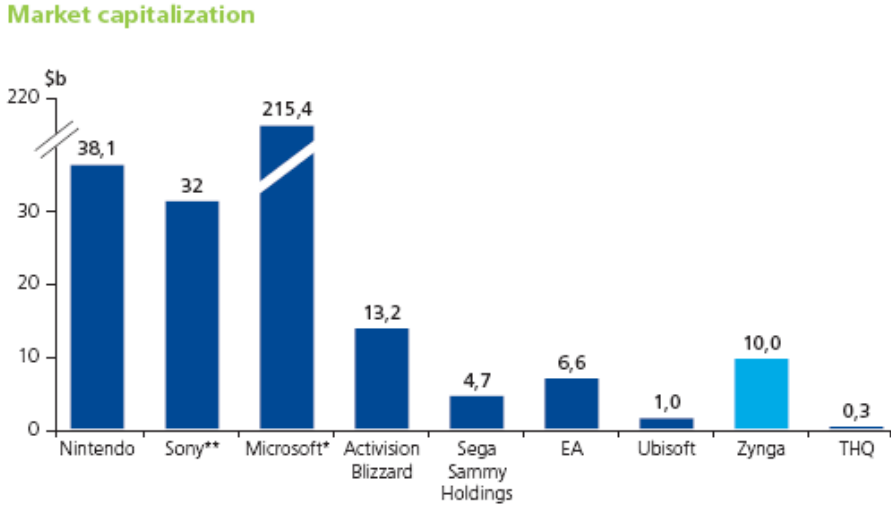
Box 1. Three platform holder (PWC, 2009).

Microsoft Xbox 360
 Microsoft was the first company to introduce its newest-generation console: the Xbox 360, which was launched in 2005. It has sold global over 50 million units in 2010, mostly in the region North America. Part of Microsoft's strength is the Xbox Live, where multiplayer gaming, social network and media suite can be played by people all over the world.

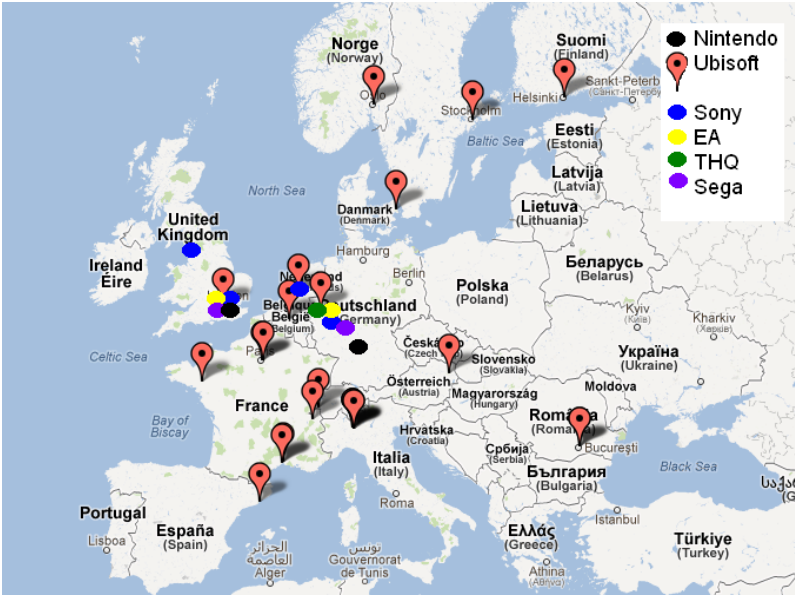
Sony Playstation 3
 The PS3 was launched in 2006, with 47 million units sold globally at the end of 2010. Sony's PS3 is more popular in Japan than the Xbox360, but sells less in North America. The PS3 has an online environment, is free to users and lets game developers control their own environments. In 2010, Sony introduced the Move, which is similar to the motion controller as the Wii.

Nintendo Wii
 The Wii was launched in 2006, whereby the controller is used for playing sports and other devices. The Wii is the top-selling console worldwide, where it has sold 85 million units worldwide. In 2012 Nintendo introduced Wii U, with more online possibilities.

Figure 3. Major players in the video gaming industry (Deloitte, 2011).



As the map shows, almost all of the Triple-A companies are located in London. Microsoft (games) and Activision Blizzard do not have a head office in Europe; they are located in the United States. Ubisoft, originally from France, has many offices in Europe. This might indicate that path dependency is a strong influence in location decisions. West and South Germany are also popular among the Triple-A companies. These Triple-A companies have dominated the market since the 1980s, which indicates a relatively stable and mature market (Nieborg, 2011). The



market structure of gaming is mainly influenced by these companies, meaning an oligopolistic structure is applied to the market. Large developers and publishers have substantial control over the software production process.

Figure 4. Overview of the major developers and publishers located in Europe. (Made from www.gameindustry.com, 2011)

These companies all publish – and sometimes develop – different kind of games for different platforms. The next section will expound further on these types of platforms.

3.2 Platforms

Digital games are developed for different kind of platforms, namely consoles and handhelds, personal computers, online and mobile.

The largest markets are the console games, with \$28.6 billion revenue worldwide, followed by the online games with \$16.3 billion revenue. As the table illustrates, the revenues of PC games are declining and will continue to decline. According to the report of PWC (2011) its revenue will decrease at a 1,7 percent rate compounded annually. Online and wireless games are the fast growing games market (Deloitte, 2011). The Massive Multiplayers Online Games (MMOGs), casual games and social networks will increase in their popularity on the online market. The growth of the mobile game market is from the increasing popularity of smartphones and tablets, such as the iPad. The faster speed of mobile internet network (3G/4G) will provide an environment equal to the quality of console games that further influence the expansion of mobile gaming.

	2007	2008	2009	2010	2011
Consoles	25,793	30,69	28,817	28,066	28,605
Online	7,5	9,866	11,858	14,19	16,327
Wireless	4,015	5,522	6,486	7,527	8,492
PC games	4,604	4,297	3,9	3,902	3,794
Total end user gaming	41,912	50,375	51,061	53,685	57,218
Advertising	1,032	1,361	1,574	1,845	2,075
Total	42,944	51,736	52,635	55,53	59,293

Table 1. The global video game market revenues by components (US\$ millions) (PWC, 2011).

Advertising is a relatively small market, but it is gaining in importance. According to the report by PWC, 'Global entertainment and media outlook:2011-2015' (2011), there is an emerging video game advertising market that was worth \$2,075 billion in 2011, a figure that will increase to \$3,0 billion in 2015.

3.2.1 Consoles and handhelds

The best-known companies for consoles are the American company Microsoft and the Japanese companies Nintendo and Sony (Box 1). Next to developing games, they also publish games for their personal consoles (they are called 'first-part publishers'). Developing console games is a long and costly, complicated process (Deloitte, 2011). To recoup the initial development costs, it is often a must to publish more than one game per platform to spread their chances to make sure that at least one of the games will be a success. For smaller companies, this is very hard to accomplish. The 'third-part publishers', such as Electronic Arts, Activision, Atari and Vivendi Universal, create and may publish games for different platforms if a royalty fee is paid (OECD, 2005). Consoles and handhelds (such as the Nintendo's Gameboy) can be used for motion control or to play games online with an online service. This new-generation trend of consoles will further drive the expansion of the console market growth. According to the report of Deloitte (2011), one third of console games sales will be digital by 2014.

3.2.2 PC and online games

Computer (PC) games are games sold on a CD or DVD that are then installed onto the PC (NewZoo, 2011a). Computers have the advantage of better processing power, more storage capacity and enhanced graphics cards. An online game is defined as 'any computer-based game played over the internet including PC, console and wireless games' (OECD, 2005). Here small or large groups of players can play together. MMOGs may have more than 10,000 players playing at the same time and more than 1 million players registered (e.g. games as World of Warcraft, Lords of the Rings Online) (NewZoo, 2011a). These games are mostly played on the PC, since it requires a functional keyboard. Other types of online games are social games and serious games. Social games are mostly used on the platform online gaming via a portal or are downloadable. This market is growing rapidly due to increasing network connectivity. A major player of a social

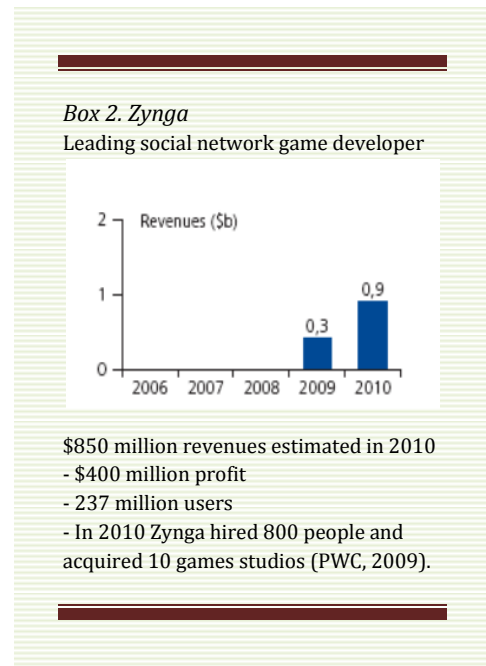
network is Facebook, where Zynga is the leader in social network game development (Box 2). Serious games have the purpose of 'teaching' something to the player audience to achieve serious, measurable, sustained changes in performance and behaviour (Cassarino, 2008). The games are focusing on practical experiences, which can be used by military, universities, hospitals, business etc. Next to learning and training, serious games are also devoted to information, networking (social networking) and marketing (advertisement games, marketing research) (Cassarino, 2008).

3.2.3 Mobile games

Mobile telephone company Nokia introduced the hardware for wireless-games in 2003. Mobile internet is becoming an important distribution platform for games. Games can be downloaded by Bluetooth, WiFi, or 3/4G internet (OECD, 2005). Mobile devices are increasing rapidly because of the increasing quality of network connectivity and the increase of the popularity of social gaming (e.g. the games AngryBird and Wordfeud) (Deloitte, 2010). Mobile and online games have lower production costs than PC and console games. iPhone app game costs between \$20,000 - \$100,000 to produce, compared to hundreds of millions for popular blockbuster titles (Deloitte, 2010). This influences the purchase price, which for mobile games is much lower (and sometimes free) compared to consoles games. Developers of mobile games increase their profits by developing extra 'tools' for a game, for example virtual goods which a game user must paid for; this is the so-called freemium model. The platform owner normally receives about 30% of these micro transactions. However, it is extremely important to have a large consumer pool for these types of games in order to be successful. Not only by the large supply of these games but as well to gain profit from the freemium model.

3.3 Advertising

Advertising is a different branch of the game industry. When the first games were developed, ads were already placed into the games. The first type of ads was static ads, for example billboards in the background of a sports event. Recently a new type of advertising has begun to stand out in the game industry, namely advergaming. These games are designed to promote a product and can be played for free. Advergaming are *applied games*, which are meant to transfer a message to the player's public. The advertisers can modify their ads as necessary, creating dynamic in-game advertising. The ads can vary, targeting different target groups throughout the day.



3.4 Game industry structure

The production of a game is a project-based event typically involving developers, publishers, distributors and retailers. In this paragraph these four important actors of the gaming industry are summarized. After that, the value chain will be explained in detail.

3.4.1 Developers

Developers are producing new games with the latest technological tools, which can be developed in-house, licensed from middleware companies, or provided by large hardware manufactures (e.g. Sony). Middleware companies provide software that runs the graphics necessary for game development. If they produce something new, they license their software to game developers. Game developers are mostly financed by publishers and are granted a fixed fee or a percentage of sales revenue (Johns, 2006). Comparative advantages were first created through technological improvements - currently they are created more through skill mixes during development. Technique, the content of a story and its design are the most important elements for a game's success. This is also called the importance of 'story-telling content'.

3.4.2 Publishers

Publishers identify the titles of newly developed games and market these via distributors, retailers and end users. Publishers can make or break a game by deciding whether they think a game is worthwhile (Nieborg, 2011). However, this does not always guarantee success. Large publishers are often global platform holders (e.g. Sony and Nintendo) who have a greater ability to finance, especially if the company develops games itself, like Nintendo does. Other examples of large publishers are Electronic Arts, THQ, Ubisoft, Take Two and Activision Blizzard. Publishers operate in different countries either directly or through local partners. Publishers usually finance developers, either from console manufacturers' in-house facilities or from independent publishers. If publishers help to finance a new game, they acquire the intellectual property rights and decision-making power for this game as well. This means, however, that publishers also deal with the largest risks in the game value chain (Johns, 2006). Publishers also negotiate with retailers and distributors regarding the value of the game sales. They also undertake product management, marketing, pricing, paying for localization, inventory management – even the creation of graphic-design elements such as the box design (OECD, 2005). Large publishers might also undertake the distribution on their own, while smaller publishers hire distribution companies to distribute the published games. Certain components of game publishing and commercialization may also be outsourced to a third party. These include advertising, IP and licensing management and data hosting (Forfás, 2011).

3.4.3 Distributors

The distributor is mainly focused on the logistics of distribution. Many large international publishers have their own in-house distribution -- for example, Electronic Arts and Activision. But instead of establishing their own distribution channels, they also have the option to outsource the distribution to a separate license distribution (OECD, 2005). The power of distributors decreased heavily due to the growing influence of digital distribution (see the value chain).

Digital distribution of PC games comes mostly from portals such as Steam, Origin and Big Fish games. These are digital distribution platforms that offer centralized services for purchasing and downloading independent game releases to facilitate the sales of games. This minimizes both distribution and investment costs. The relative ease of using payment services such as PayPal drives the spending of (micro) transactions further upwards (micro transactions are usually in casual games, games such as MMOGs are nowadays concerned with high amounts of transactions).

3.4.4 Retailers

The retailer mainly prices and presents new games. For console manufactures and publishers it is important that the games are well presented to the consumers and that the games they develop gain priority. The retailer used to be in a strong bargaining position when negotiating prices, but the retailer market power lately has dropped due to the increase of digital distribution (OECD, 2005). Box 3 illustrates the recent bankruptcy of a large retailer in Europe.

Box 3. *'The British retail store GAME is bankrupt since 2012. In March 2012 277 stores were immediately closed and another 333 establishments are searching for a solution. Due to high costs, the strong impact of the digital distribution and cutthroat competition causes the bankruptcy of GAME. More than 10000 jobs were lost'*
(Retaildetail.eu, 2012)

These four actors can carried out different game genres by a (large/small) single firm. They distinguish among competitors by measuring differences in the level of financial, technical, human and time resources that are required to produce a game (Forfás, 2011). The next section further explains the role of the actors in the value chain of the gaming industry and the influence of digital gaming.

3.5 Value chain

The next figure sets out the stages of the traditional value chain for consoles manufacturers. This model is based on the value chain of Economic Geographer Jennifer Johns (2006), but here some specific networks have been added. The figure conceptualizes the production networks of the game industry.

Hardware/Hosting

Software/Technology

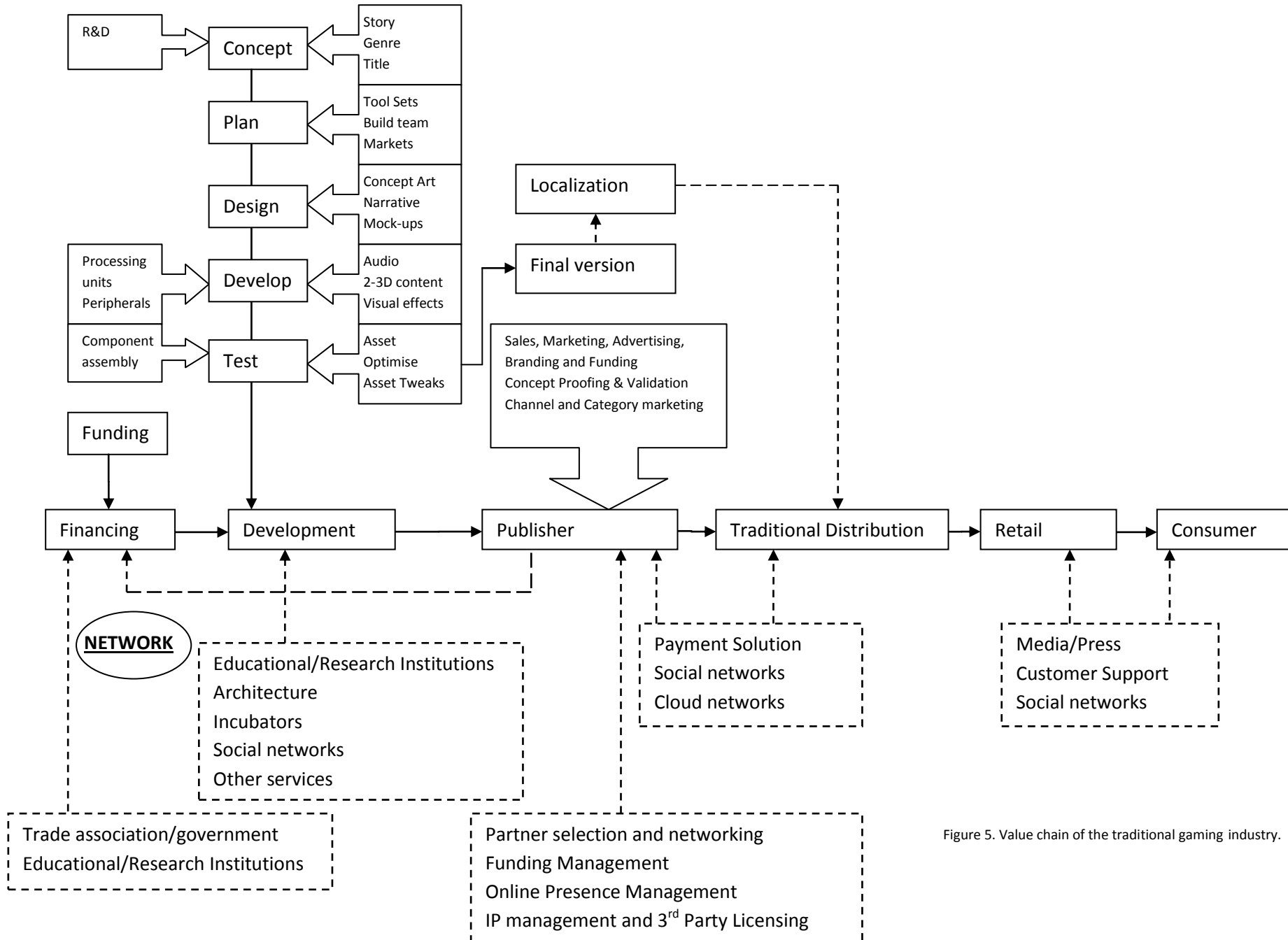


Figure 5. Value chain of the traditional gaming industry.

Here the game industry is divided into seven production sections, starting from financing and ending with consumption (figure 5). The game industry is driven by the confluence of the different actors in the creative, technical and commercial sectors. The value chain cannot be viewed in isolation; other production networks that are connected to the game industry are therefore also included in the figure. While a distinction is made between hardware and software production, these two segments are inherently interconnected. The hardware production is mainly determined by the major platform holders. The software production network is provided by developers and publishers (Johns, 2006). The traditional value chain of video games starts with a developer who develops a game or by a demo publisher that sets up an in-house development studio. The development phase, as is shown in figure 5, begins with the development of the concept for the game. The development phase provides insights on the game-play, skills and artistic designs (De Vaan, 2011). After the final test, localization is very important. The major console manufacturers operate globally, but in order to continue to control a large part of the market share it is important that games be adjusted to the cultures of each region where it is distributed. This means that a game must be localized.

The chain continues toward the publisher, who finances and highlights the title of a game. The publisher relies on the distributor for the logistics (or if possible provides itself) and the retailer puts the game on the market for consumers to purchase.

3.5.1 Digital distribution

Before the mid-1990s, big publishers and retailers had an enormous amount of power in the game distribution. Small developers were forced to find publishers who were willing to publish and distribute their game, which was not that easy (publishers refuse the game if they thought the game was not a 'hit'). Changes in technological development and broadband diffusion did affect the established actors. The value chain of the industry is changing more towards digital distribution by the advancements in internet speeds, high end mobile devices and the next generation consoles (OECD (2005); Van Oosteren (2010); Van Rijswijk (2010) & Deloitte (2010)).

Digital distribution changed the role of distributors and retailers, since games can directly be bought online instead of purchased from the retailer (PWC, 2009). The new digital distribution means that retailers and distributors have lost market power in this 'new value chain' and it favors the position of developers and publishers. It is now possible for independent game developers to sell and distribute their games worldwide with the ease of online shopping. The downside is that even though game developers may achieve rapid success, this market will attract more game developers, which creates cutthroat competition. This means that a lot of

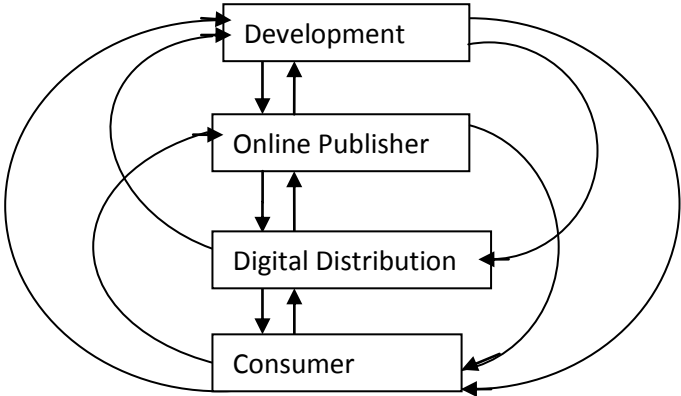
game developers exit the market more quickly. A lot of small developers were initially misguided regarding the difficulty of the role of publisher; the need for specialized publishers is still highly present.

Digital distribution also brings a new cohort of actors and intermediaries that were previously not connected to the industry. Here social networks and game and internet portals create intermediaries with virtual shop windows.

3.6 New digital value chain

The influence of digital distribution bypasses the structure of the traditional value chain. The phases in the traditional value chain are clear; there is a well-defined starting point, and the end goal is to sell the good to a consumer. However, in the new digital value chain these segments are tightly connected and should therefore be bounded with 'loops'. Since a game is never a 'final customized' good, meaning that a game will always be renewed, upgraded and updated, it will therefore move up or down the chain. For example, how the game is developed will influence whether the consumers buy it. Personal tastes and preferences in turn influence the demand for a game. If there is a high demand for a specific facet to be included in a game, this will influence how a game is developed – extra elements will be added to sustain the demand. Online games are easier to adapt than console games, which are more complex and risky. These 'loops' therefore occur in the new digital value chain. This becomes clear in the next figure.

Figure 6. The 'loops' of the value chain of online gaming industry.



In sum, the value chain has a multidisciplinary character (Forfás, 2011). The influence of digital gaming has created a different market structure for existing actors – a structure in which distributors and retailers have lost power and game developers and publishers have gained power, creating new market opportunities for new actors and intermediaries. A lot of different actors in different networks are involved in the game development process. Next to technological and creative capabilities, analytical and psychological talents are necessary to understand and respond to the development of a game. This network is therefore quite extended and vital for success. The next section analyzes the network of the game industry in more detail.

3.7 Network of the game industry

De Vaan's dissertation (2011) illustrates empirically that geographical proximity is still very important for the formation of a video game network. Firms located nearby are more likely to cooperate with each other. His findings also show that the institutional proximity has a positive and significant impact on partner selection. Firms located in the same country are more likely to work together. De Vaan mentions that since the video games are now more technologically complex, it is necessary for firms to locate within shorter distances of each other in order to intensively cooperate. At last, De Vaan shows that most video game companies work with two or more partners in the production of a game. Independent developers can benefit via relationships with larger game developers or publishers (Forfás, 2011). The fact that publishers and developers started to work together is also caused by the increase of high development costs. Vertical integration increases publishers' power through greater size and therefore causes them to be more competitive in the game market (Johns, 2006).

The core of the value chain is also influenced by other vertical segments of the game industry, such as media, film and music. The game industry is a part of the entertainment industry, in which gaming exploits cross-media segments such as motion picture and animated film industries (Forfás, 2011). It is also a part of more serious applications such as education, health and military. This 'other production network' often involves a relationship in contractual form. Relationships with investors, juridical advisors and middleware software companies are examples of other tight networks. Figure 7 is from the report of Forfás (2011). It perfectly illustrates, using selected examples of companies, the network of game companies. Social networks are important network partners for game companies to extend their game opportunities by using their greater size of gamers. As the figure shows, an example of a social network is Facebook. For internet-based payment processing, Paypal and Realex illustrate sources of network partners.

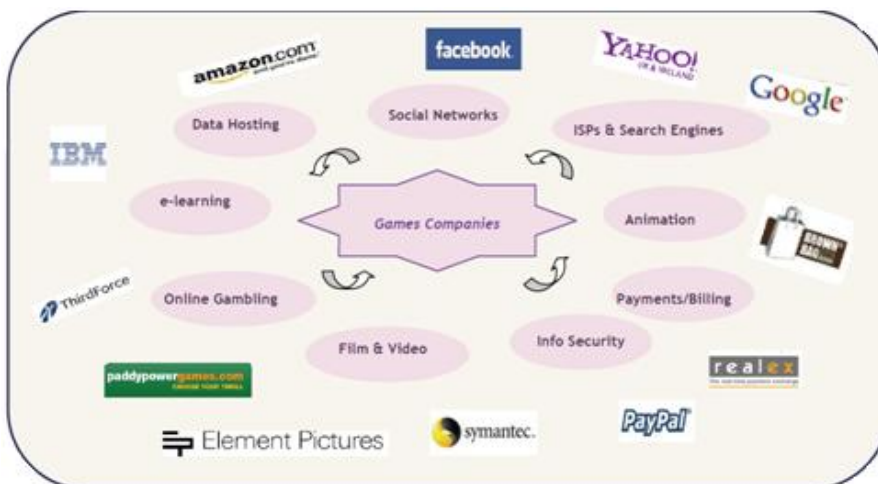


Figure 7. Games companies and its network in Ireland-selected companies examples (Forfás, 2011).

Box 4 simply illustrates its tight production network of a game, in this case Call of Duty: Modern Warfare 3. Had this game been developed and produced, for instance, by the major platform holder Sony, than its production network would have had a very tight interfirm network since it would have an in-house production structure

3.8 Business to Business and Business to Consumer market

Entertainment games are normally based on the business-to-consumer (B2C) model. This means that developing or publishing games eventually seeks to achieve the same goal; to sell the game or its accessories to consumers. The sale of games from individuals or businesses to the end-user (the gamer) happens in the retail sector. A retailer purchases games in large quantities from the publisher or distributor and then seeks to sell each purchased item to the consumer for a profit. Retailing in the traditional value chain of the gaming industry can be done in game shops, but due to the influence of digital gaming, these types of retailers hardly exist anymore. Retailing can also be done online – however, in the gaming industry this is done by the online distributors.

Games that are developed specifically to be sold to other companies or organizations use a typical business-to-business (B2B) model. These games are serious games and can be sold to organizations or institutions such as universities, health care providers or the army. Normally the risk of a B2B transaction is lower than that of a B2C. In the B2B model the developer knows he or she will earn money, even if the game is not ‘a hit’. The contract between the two parties ensures this. The B2C model is often concerned with a single transaction, and the item in question must be ‘a hit’ for the game audience. If not, the game company deals with major costs and does not earn a satisfactory profit. Gaming is an emerging B2B market, since many business use social media to connect with their consumers and employers. For example, the increasing demands for ‘advergames’ also fits within the B2B model.

3.9 Typology of the gaming industry

Different types of platforms, game genres, companies and different segments of the value chain have been mentioned in previous sections. In order to give a clear structure to these different kinds of terms, the next figure and table provide a typology of the gaming industry.

*Box 4. Production network.
Case- Call of Duty: Modern Warfare 3*

This game is developed by a cooperation between 5 game developer companies, - Sledgehammer Games, Infinity Ward, Raven Software, Treyarch (Wii), n-Space (Nintendo DS). Its main publisher and distributor is Activision Inc. Also the distributor Steam is involved. The game can be played on the three major platforms. Characters from the game are used in a Youtube video, paid by Activision. The game is sold all over the world. The game is constantly renewing by adding special new features to the game ('loops of the value chain'). There is also a free version, Call of Duty:Elite which has a downloadable content (freemium model).

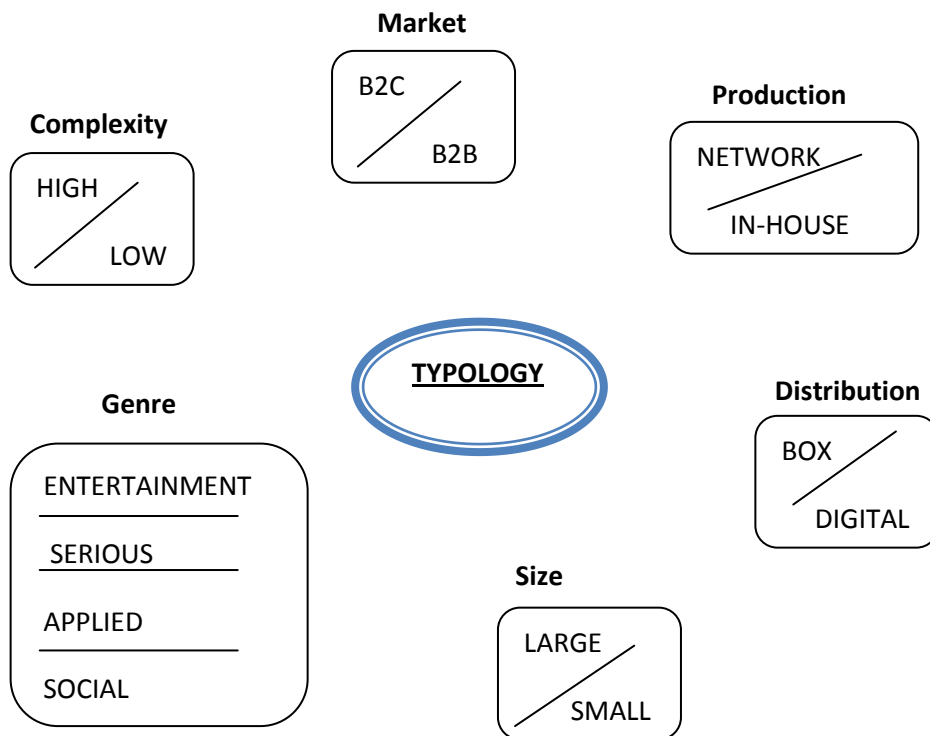


Figure 8. Typology of the gaming industry.

This typology replicates the total structure of the gaming market. Every actor in the value chain of the gaming industry may relate to a common term. Because of the complexity and highly diversified structure of the gaming market, this overview provides the most common and obvious arrangement to make things understandable and clear. For example the game market is, as shown in the foregoing figure, divided into a B2B and a B2C market and game companies can be large-or small-sized.³ A large developer might for instance be focused on a B2B market, selling a highly complex game that falls under the serious game category. The typology gives an overview that can be applied to this or any situation of the gaming market.

A small note for 'production and distribution' terms is made. The production is divided into network and in-house. This means that in the production phase of the value chain, game companies can operate more efficiently by using their networks or they can keep their production in-house). The distribution of games is divided into 'boxed' and 'digital' games. Boxed games are touchable, for example on DVD or CD, while digital games are played online on the PC, console and mobile device.

³ Here small companies are start-ups and employ less than 10 employees. Large companies typically employ more than 10 workers; this category includes Triple-A companies as well. However, since there are hardly any small (start-up) companies in the publishing and retail phase of the value chain of the gaming industry, the small-sized companies' category will only be applied to developers.

The next table shows the typology applied to the type of games. The game types are divided as follows: online/casual, serious, MMOG, advergaming, mobile, console/PC and online console/handheld games.

Table 2. Typology of the gaming industry per type of game.

Type of game	Genre games	Market	Platform Provider	Complexity (cost)	Size	Distribution	Production
Online/casual	Entertainment / Social	B2C	PC, Laptop Social networks Game portals	Low	Small/ Large	Digital	Network
Serious	Serious	B2B	Game portals PC, Laptop	Low/high	Small/ Large	Digital/Box	Network
MMOG	Entertainment/ Social	B2C	PC, Laptop Social networks Game portals	High	Large	Digital/Box	In-house
Advergaming	Applied	B2B	PC, Laptop Social networks Game portals	Low	Small/ Large	Digital	Network
Mobile	Entertainment/ Social	B2C	Mobile operating systems	Low	Small/ Large	Digital	Network
Console/PC	Entertainment	B2C	Console manufactures PC, Laptop	High	Large	Box	In-house
Online console/handheld	Entertainment/ Social	B2C	Game portals	High	Large	Digital	In-house

If a developer is focused on mobile games, the most obvious and common aspects of this developer are: it focuses on the entertainment/social market, operates in a business-to-consumer market, works via mobile operating systems, has a low complexity of games (and thus low costs), might be a small sized company and its distribution is focused on the digital gaming industry. As a final remark, his company will probably have a smaller but much more intensive network with related companies and it may need the support of larger developers and publishers. This means that good social and institutional proximity are key in this developer's network.

A publisher for console and PC games might have the same market structure as the developer of mobile games, but its complexity (and its costs) might be much higher and its company size larger. Here its distribution is focused on boxed games and its production is more likely to be performed in-house. Due to its larger size and the resulting abundance of capital and knowledge, the publisher has more opportunities and a greater interest in keeping its production in-house. Here the company has an interfirm network, within which good institutional proximity might be very important.⁴

⁴ More detailed information about proximities can be found in chapter 4 (networks).

The typology effectively clarifies the industry structure. In order for the game sector to grow and make an economic contribution, it must operate in a supportive business environment. As the sector evolves, so must its business environment. It is important to understand which elements determine the growth and structure of the game industry. Key element of the drivers of the gaming industry will therefore be analyzed in the next chapter. However, general theoretical concepts regarding the location factors of a business environment in a region must first be explained. These concepts are not specific to a sector and can therefore be applied to any sector. This means that these general concepts offer a solid basis for the next step: namely, to determine the location factors for a good business environment in the gaming industry.

4. Regional competitiveness due to the regional business environment

Despite the increasing attention on the concept of regional competitiveness, the concept is vague and poorly understood. Regional competitiveness is not a clear-cut concept. One of the earlier works on regional competitiveness comes from Storper (1997), who defines competitiveness as “the ability of an economy to attract and maintain firms with stable or rising market shares in an activity while maintaining or increasing standards of living for those who participate in it” (Storper, 1997). Similarly, Begg (2000) refers to “the presence of conditions in a region that let firms compete in their chosen markets and maintain the value these firms generate within the region”. A more contemporary view is the focus on what a region or city can offer in order to provide the best platforms for firms and people who want to locate and invest in that region or city (Huggins, 2009).

One of the best indicators of competitiveness is productivity (Porter, (1998); Krugman, (1990)). This traditional thinking focuses on internal factors, such as the capabilities and processes within firms that determine productivity and innovation. However, recent research shows that the external environment for competitiveness is at least as important (Wu, 2005). Productivity is one aspect of revealed regional competitiveness. This is strongly connected with the regional environment, where a good local business environment – offering such benefits as tax rate, strong institutions, good policies, and the absolute advantages of a region – is related to the performance of a firm (Atzema et al., 2002). These external factors are of increasing importance for the location decisions of firms.

The research of Kitson, Martin, and Tyler (2004) explains clearly regional competitiveness using the internal and external factors of a region. Their article emphasizes a distinction of ‘soft and hard’ externalities that determine regional competitiveness by the different approaches of the business environment. The ‘soft’ factors, for example attractive housing, amenities and leisure

facilities, are in general becoming more important than traditional 'hard' ones (Florida, 2002; Kitson et al, 2004; Musterd and Gritsai, 2010; and Landry, 2000). Soft location factors are harder to quantify and their influence on profit is indirect. The hard factors, for example job availability, the quality of public services and transport accessibility, are easier to quantify and have a direct influence on the costs or revenues of a business. Although the traditional hard factors have declined in the explanatory power of a region's success, they are still very important. Cost factors, like the cost of labor, offices and taxes, remain key factors in deciding where to locate a business (Musterd and Gritsai, 2010 and Taylor, 2004).

Kitson, Martin, and Tyler (2004) identify six characteristics as drivers of business environment development (figure 9): productive capital, human capital, social-institutional capital, cultural capital, infrastructural capital, and knowledge/creative capital.



Figure 9. Drivers of business environment development to create regional competitive advantages (Kitson et al., 2004).

The figure clearly shows the determinants that influence regional productivity. Human capital can be measured by the quality or skills of the labor force. Difficulty in attracting skilled labor will limit regional productivity. Social-institutional capital comprises social network and institutional forms, where 'good' institutions provide a better business environment which influences the competitive advantage of a region. Furthermore, the quality of cultural facilities and assets (cultural capital), the quality of public infrastructure (infrastructural capital), and the presence of an innovative and creative class (knowledge/creative capital) are regional externalities that influence an efficient productive base (productive capital) within the regional economy (Kitson, Martin, and Tyler, 2004).

The importance of these drivers differs among industries. Since this research is focused on a specific industry, it is important to look at location factors that determine the regional

competitiveness of an industry. Here the process of *agglomeration* is important. The following paragraph describes its main characteristics.

4.1 Spatial concentration of economic activities

Spatial concentration of economic activities has been a matter of interest of researchers and politicians for many decades. Geographers and economists have different approaches to study these remarkable patrons. Economists explain the patterns of spatial concentration by developing abstract models that aim to explain spatial concentration by considering the role of increasing returns to scale. For example, the Nobel Prize-winning economist Paul Krugman explains that spatial concentration is based more on increasing returns (Krugman, 1991). Firms and people geographically concentrate because of the benefits offered by larger markets, in addition to their greater variety in products and their higher wages. Scott (2000) employs the transaction costs approach, whereby clusters gain in efficiency and enable specialization by reducing the transaction costs. Here geographical proximity between firms decreases internal transaction costs, because of the relative ease of monitoring competitors' behaviour. Fewer misunderstandings about agreements arise because distances are shorter, which also makes it easier to establish regular face-to-face contacts that might also head off potential problems.

Geographers explain spatial concentration with the concept of agglomeration (Porter, 2008). The benefits of agglomeration were first introduced by Alfred Marshall (1890), who argued that firms gain productive efficiency when they cluster in similar industries. According to the author this 'localization' demonstrated three important characteristics.

The production of non-tradable specialized goods of a firm, where specialized supplies refers to the external effects of economies of scale, scope and experience; the creation of a large skilled-labor pool resulting from the concentration of people and firms; and the benefits to production created by

"Economies of scale entail higher efficiency at higher volume of a given product. Economies of scope entail higher efficiency due to the pooling and costs sharing of different products".

informational spillovers – a term that refers to the external effect of cognitive scope (Visser, 2009). As workers and firms locate at one specific place, they develop better and more efficient production methods due to the cohesion of economies of scale, scope and expertise. This kind of cooperation can create large agglomeration benefits. However, agglomeration of industries only partly explains the competitiveness of a region or a city. It is not only the huge concentrations of resources that benefit economic activities -- the spread of knowledge is also important for a region's business environment. This knowledge spread is further stimulated by clusters and networks (Porter, 2000).

Michael Porter introduced the term 'Cluster', which definition states: 'Clusters are geographic concentrations of interdependent companies and institutions in a particular field which interact with each other as well as with clients and suppliers' (Porter, 2008). According to his book 'The competitive advantages of nations' (1990), firms perform better in global competition when spatially clustered with similar firms. It is beneficial to locate in a cluster because clusters enhance productivity by sharing a common pool of specialized labor, business, financial services, R&D and training facilities which can be accessed and utilized by established firms in a cluster (Porter, 1998). Also, within a cluster specialized information can be attained at lower cost than outside the cluster. Access to this information flow is facilitated by proximity, supply and technical linkages. *Tacit knowledge* is hard to exchange over large distances. It is essential that a successful exchange of tacit knowledge be cognitively tuned, in order to understand the innovation process and to develop new inventions. Also, personal relationships and community ties within a cluster foster trust for clustered firms –which do not extend to firms that are isolated from the cluster (Porter, 2008).

The structure of a business environment might strongly be influenced by the degree in which a region is specialized or diversified. If companies start to focus on a specific process within the production chain, this might lead to the specialization of a cluster. Core activities in a cluster may link to a specific sector. However, this does not mean that cluster always specialize in a specific sector. Clusters often include activities from other sectors, since clusters comprise horizontal and vertical linkages with competitors (Visser, 2009). Clusters might therefore be highly diversified as well. These different ideas will be reviewed briefly in the next section.

4.2 Specialization versus diversification

The literature on agglomeration remains inconclusive regarding which regional character is the best setting for a good business environment (Van der Panne, 2004). The specialization thesis argues that the concentration of firms belonging to the same industry in a location tends to spur more innovation, since it allows knowledge spillovers between firms. The MAR theory (Marshall – Arrow- Romer) predicts that knowledge spillovers only arise between concentrated firms in the same industry. Firms that operate in the same industry face similar problems and use common technologies, which might contribute to economies of scale in production (Harrison, 1996). The MAR model argues that local monopoly favors innovation and growth since it restricts the flow of ideas to competitors. Porter (1990) agrees that knowledge spillovers in specialized, geographically concentrated industries stimulate growth, but emphasized the importance of competition. If more related companies compete in a region, this might spur innovation and growth among the involved companies because they will imitate and improve upon the innovator's ideas.

This contrasts with the ideas of Jane Jacobs (1969), who emphasized the importance of diversification. Knowledge spillovers occur between companies that are not operating in the same industries. In cities or extended geographical concentrations there are opportunities for companies operating in different industries to combine different resources and better exchange different ideas, which might create new markets. Here a diversified local production structure leads to urbanization or 'diversification' externalities (Van der Panne, 2004). Regions with diversified industries are also in a better position to absorb external shocks. Here a strong decreasing demand in one specific sector might be captured by other sectors, while for a specialized region external shocks are more difficult to handle. This means for example that employment security is more favourable in a diversified region than in a specialized region (Weterings et al, 2007).

In short, both frameworks hold that knowledge spillovers foment a better business environment that might increase innovation and economic growth in a specific area. In the creative industry, it is well known that creative activities tend to concentrate in specialized creative clusters (Hall, 2000; De Vaan, 2011). Due to its project-based characteristics, the creative industry has a complex socio-spatial network, which is further stimulated by specialized creative clusters. Think for example about fashion design in Paris, Milan and New York or film production in Hollywood and Bollywood.

4.3 Evolutionary approach

Recently a third approach has arisen to explain spatial concentration using an institutional and evolutionary approach (Boschma, 2006). In the evolutionary theory, the insights from the evolutionary biology are connected with economic geographical concepts. Here 'survival, selection and mutation' are applied to economic concepts like 'routines, competition and innovation' (Boschma et al, 2002). This means that companies will act mostly according their trusted routines, but when the business environment in which they are operating changes, firms will adapt these routines. To survive, a firm must change its 'path' in order to participate better on the market. The evolutionary approach on clusters is largely determined by its path-dependency and by coincidences. This can create inertia, since specific knowledge, existing relations and sunk costs make it hard for companies to mutate their routines (Boschma et al, 2002).

Institutions have a huge impact on the economic performances of companies (Maskell, 2001). The cluster dynamic exists mainly within its institutional context – this is characterized by the condition of the infrastructure, the markets, (suppliers, buyers, consumers) or the regulatory apparatus. Just like with inert firms, institutions can be tailored to a specific industry. This can make it difficult to improve and develop technology, thus hindering the competitiveness of a

region. On the other side, institutional proximity within cluster companies can benefit by limiting the spillovers and transaction costs.

In short, why does one specific cluster outperform another? Besides the impact of geographical proximity, the share of knowledge spillovers, the structure of competition and the cooperation between clustered firms, the impact of the institutional and evolutionary approach also influence the business environment that determines a region's competitiveness.

Economic geographers also highlighted the social interactions of firms within networks. Networking is very important, for it is the process whereby a firm negotiates with suppliers, governments, labor unions and other institutions that fundamentally affect the firm's production strategy (Brouwer et al, 2004). The presence of a social network fed by solidly embedded firms can increase the industry's attractiveness and help to draw more firms to that region. This approach is shaped by a society's cultural institutions. The next paragraph reviews this perception of networks.

4.4 Networks

While the phenomenon of clusters has drawn increased scrutiny from researchers and policymakers in the past decades, the concept of networks has emerged as well. Networks and cluster are somewhat interchangeable, but there are important distinctions between these two concepts as concerns the development of knowledge, learning and innovation. Clusters are more focused on the efficient exploitation of knowledge, whereas networks promote new knowledge (Visser, 2009). Yet clustering can also induce cognitive lock-in, where an over-reduction of proximity can lead to decline and inefficiency in economic performances. Networks are strategic and cooperative interactions between firms and other organizations. These may operate in close proximity but do not necessarily have to (Visser, 2009). Being part of a network engenders several benefits for a company. According to Fischer (2006), cooperation between networked companies may lead to benefits such as economies of scale and scope, and the sharing of risks and costs. Due to the globalization of markets and the increase of technological developments, the demand for more variation in products increased. To answer these customer needs, firms must have a flexible production structure (Nooteboom, 1999). A network enhances firms' flexibility for firms by creating a pool of exchange resources. This allows firms to jointly develop new ideas and skills (Powell et al, 2005).

Networks can be formed either through formal contractual relations, like mergers and acquisitions, or through personal relationships. The stronger the relationship within a network is, the greater the commitment between the participants and the more intensive knowledge sharing ensues (Powell et al, 2005).

A firms' embeddedness into a knowledge network is key for their economic success. But what are the factors that influence the structure of knowledge networks? Boschma (2005) determines five different forms of proximity that influence the probability that a knowledge link will be established between economic agents. These five dimensions are cognitive, organizational, social, institutional and geographical proximity. Too much or too little of each type of proximity may be harmful for effective interactive learning and innovation (Boschma, 2005). The dimensions may be strongly interconnected but they may also simply be complementary (Box 5).

In addition to these proximity dimensions, network formation may also be influenced by the individual characteristics of organizations -- such as age or size -- and by endogenous structural network effects (Balland et al, 2011). Firms may establish relationships if they can help each other out when they need each others' capabilities. For example, larger firms have better access to financial resources than smaller firms, while smaller firms are often more flexible.

4.5 Conceptual model

The conceptual model provides a framework for assessing the regional competitive advantages that derive from a good business environment in a specific industry. This model generally includes the factors or key components of a good business environment and the relationships between those factors. The following conceptual model is based on the coherence of the streams of regional competitiveness.

Box 5. Proximity per type (Boschma, 2005).

Cognitive Proximity

Effective learning by interaction between individuals get more stimulated if there is an existing overlap in knowledge basis. This may be accomplished by maintaining some cognitive distance (too much cognitive distance provides large differences in the cognitive structure) while securing cognitive proximity (limiting the cognitive overlap).

Organizational Proximity

Via an organizational agreement the uncertainty and opportunism in knowledge creation within and between organizations are controlled. Too much organizational proximity may strengthen lock-in and a lack of flexibility, too little increase the lack of control which increases opportunism.

Social Proximity

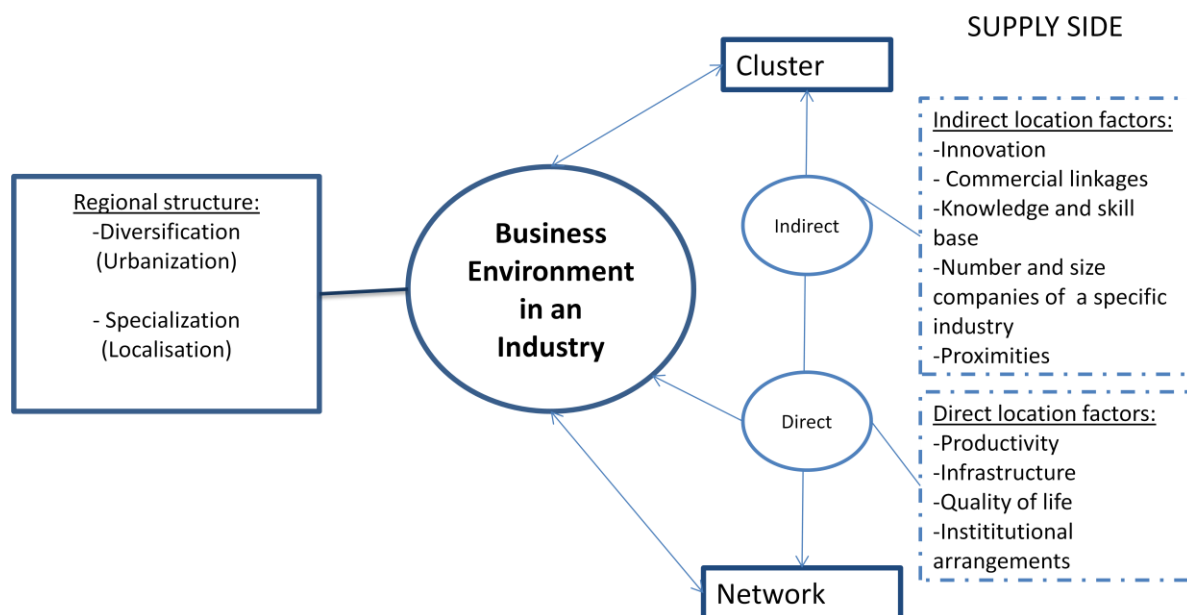
Socially embedded relation between agents at the micro-level which involves trust-based relationships. Too much social proximity may lead to underestimation of opportunism, where agents cannot act economic rational, where too little may weaken the innovative capacity of firms.

Institutional Proximity

The institutional framework of the environment provides stable conditions for interactive learning. Institutions are strongly connected to culture, norms and value, and regulation. Too much institutional proximity may develop inertia and lock-in (no significant learning can be achieved), where too little is detrimental to collective action and innovation due to weak formal institutions.

Geographical Proximity

The spatial and physical distance between network relations. Knowledge is transferred by face-to-face contact. The larger the distance is, the more difficult is to transfer tacit knowledge."



Conceptual model 'Regional competitiveness due to its business environment in a specific industry'.

This concept provides a clear, simplified overview with generic location factors⁵. Here the supply side of a business environment in an industry consists of indirect location factors and direct location factors that influence a regional's network and cluster. The direct location factors also directly impact the business environment of an industry. This business environment is also influenced by its network and cluster. If there is a good, healthy business environment this will increase the appeal of its regional competitiveness and therefore create a larger network and cluster. It is thus a two-way stream.

Diversification and specialization are the region's characteristics, which are therefore attached to its regional business environment. If a region (or a city) is more focused on a specialized industry, this means specific industrial factors are important to increase its overall regional competitiveness. If a region (or a city) is more focused on a diversified environment, than general urbanization benefits may increase its regional business environment to enlarge its competitiveness.

The aim of the next chapter is to explore the location factors of the gaming industry. A supportive business environment in the gaming industry of a specific area (e.g. city) will contribute to its growth and attract more game companies to that area. This is the *demand side* of the gaming industry, where the gaming industry demands the right location factors for an optimal business environment. The location factors of the gaming industry will therefore be handled in the next chapter.

⁵ This model will be further specified into an operative model in chapter six.

5. Drivers of the game industry

As the above literature already mentioned, productivity, infrastructure, investment, quality of life, knowledge, skill and commercial linkages are important factors that influence the concepts of clusters and networks, which in turn influence the business environment in the creative industry. These location factors are now applied to the gaming industry. The location factors of the gaming industry may differ according to the game type and the actors of the value chain. The location factors are dealt with in turn below.

This research maintains the input of the typology table (table 2). The typology is divided into seven categories. Due to the complexity of the gaming market, the typology table will more and less 'adjust' into a simple and understandable table (table 3). After each main location factor, this table will be shown. The reason why the other elements of the typology table are left out of the table is because those elements remain static, location factors notwithstanding to further increase the clarity of the total overview.

Table 3- Example: Layout of the summary table

Type of game	Size	Distribution	Actors of the value chain		
			Developer	Publisher	Distributor/retail
Online/casual	Small	Digital			
	Large	Digital	D	D	A,D
Serious	Small	Digital			
	Large	Digital	D	D	A,D
		Box		D	

In this 'summary' table, the elements' *type of game*, *size* (small/large), *distribution* (box/digital) and the different *actors* within the value chain (developer/publisher/distributor) are shown. The location factors are categorized into capital letters. The position of a capital letter shows that the location factor is important for the actor, size and distribution structure in question. A red capital letter indicates a very important location factor. The capital letters are divided according to the acquired knowledge gained from the mentioned literature and are verified with interviews hold with experts in the gaming industry and game companies.⁶

As previously mentioned, small companies are not included in the category of publishers and distributors.⁷ In the category of distribution of box games small game companies are once again not included, since box games are much more complicated and involve higher costs; they are

⁶ An overview of the interviews of experts- see appendix A. An overview of interviews with game companies - see appendix D.

⁷ See note three on page 24.

often developed and published by larger companies. Further, the terms B2B and B2C will be maintained as shown in the typology model. It is thus necessary to keep in mind that B2B concerns serious games and advergames, while B2C covers the remaining types of games

A last remark -- some of the sub-indicators are generic factors. These factors can be applied to any sector of any industry. The generic factors have been left out of the 'summary table'.

Nevertheless, since these factors are still important for the gaming industry, they will be used at a later point in this research. Now the drivers of the game industry will be handled.

5.1 Infrastructure

Game developers rely on well-developed physical infrastructure. Important input drivers for the game industry include developments in broadband and internet networks.

5.1.1 Broadband

The use of online games (as well as mobile games and casual games) is increasing quickly thanks to the development of broadband internet (NFIA, 2009). Fast internet such as ADSL and Cable are improvements from broadband. The availability of broadband affects every aspect of online gaming, including game playing, game development, assistance and support and so forth (OECD, 2005). Upload and download speeds are important for each actor in the value chain of the gaming industry, in order to meet up and to continue offering increasingly advanced applications in online and computer games (OECD, 2005).⁸ Penetration of broadband is equally important in digital distribution and retail because the involved companies target online masses of customers to buy games online.

Although the internet facilitates communication across longer distances, face-to-face contact with suppliers, investors and other employers remains important. The availability of local data centers in a region might therefore be important to game development companies and digital publishers who stand to gain from a more personal contact. This however might only be necessary for large-sized companies, since they have more negotiating power compared to start-up companies.

Games on mobile devices continue to grow in popularity (PWC, 2009). In the Netherlands, mobile access to the internet increased by almost 300% from 2004 through 2009 and continues to grow by an average of 13.5% compounded annually (PWC, 2009). According to PWC (2009), the Netherlands score with wireless telephone subscribers above average (10%) in Western Europe till 2011 (figure 10).

⁸ This generic indicator is for any sector of any industry very important to operate with.

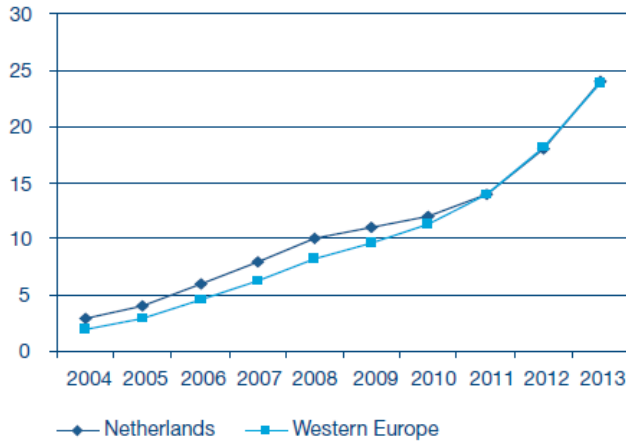


Figure 10. Mobile access subscribers as a percent of wireless telephone subscribers (PWC, 2009).

The graph shows that mobile broadband and wireless internet has increased in importance and thus might be an important driver of the game industry. The development of new internet capabilities stimulates the mobile wireless game sector. Good access to mobile broadband is therefore very important for digital retailers and distributors.

5.1.2 Transport

For digital game developers and publishers, basic transportation is decreasing in importance, since these companies communicate mostly via the internet. Nevertheless, accessibility by public transport or car remains important. Game companies still need to welcome their clients or employees. Given the fact that the game industry is operating in an international network, accessibility is further enhanced by a short distance to an international airport. For traditional distributors and retailers, good accessibility is very important -- these organizations have to attract suppliers, buyers and consumers. Since most boxed games are transported by boat, good accessibility to a port is important for retailers and distributors.

The indicator infrastructure is summarized and categorized into the following sub-indicators and capital letters:

INFRASTRUCTURE	
Penetration of broadband	A
Fixed (wired) broadband (upload/download speed)	B (generic factor)
Mobile broadband (3G/4G)	C
Local data center	D
Distance to nearest international airport	E (generic factor)
Accessibility by car	F
Accessibility by port	G
Accessibility by public transport	H (generic factor)

Table 4- Overview of the main indicator infrastructure⁹

INFRASTRUCTURE	Size	Distribution	Actors of the value chain		
			Developer	Publisher	Distributor/retail
Type of game					
Online/casual	Small	Digital			
	Large	Digital	D	D	A, D
Serious	Small	Digital			
	Large	Digital	D	D	A, D
		Box	D		G
MMOG	Small	Digital			
	Large	Digital	D	D	A, D
		Box	D		G
Advergame	Small	Digital			
	Large	Digital	D	D	A, D
Mobile	Small	Digital			
	Large	Digital	D		A, C
Console/PC	Large	Box	D		G
Online console/handheld	Small	Digital			
	Large	Digital	D	D	A, D

5.2 Innovation

Innovation in games software and hardware development is strongly influenced by the availability of venture capital and R&D support, and its intellectual property abilities.

5.2.1 Venture capital

For small (start-up) game developers, access to venture capital is very important (Deloitte, 2011). This concerns only to the B2C market for smaller game developers. Game developers in B2B market receive their required capital mainly from their clients. According to the OECD, the exact definition of venture capital is: *'Private capital provided by specialized firms acting as intermediaries between primary sources of finance (insurance, pension funds, banks, etc.) and private start-up and high-growth companies whose shares are not freely traded on any stock market'* (OECD, 2011). It is hard to access venture capital -- especially in Europe -- partly due to the intangible aspects of a game, such as game software and graphics, and partly due to the structure of the industry. Small firms often can develop only a specific part of a product, whereas

⁹ As mentioned in the introduction of this chapter, the generic factors are left out in the table. This means that these factors are for every actor and every type of game important.

game publishers already wish to have fully developed products before signing contracts with developers (OECD, 2005). This increases the financial burden on small firms.

Venture capital investment for start-ups and for the early stages of production in OECD countries was the highest in Finland, Switzerland and the USA in 2009 (figure 11). This was about 6% of the total GDP of these countries. Magnified are the countries Italy, Hungary, Poland, Luxembourg and Slovenia. These countries hardly have any venture capital investment for start-ups and other venture capital. Though this data does not show the availability of venture capital for the digital game industry (due to limited amount of data), it indicates that venture financing for games software and hardware development is a very important indicator for small game developers. Since publishers have their own financing, they do not require the availability of venture capital; for game developers, venture capital is indispensable.

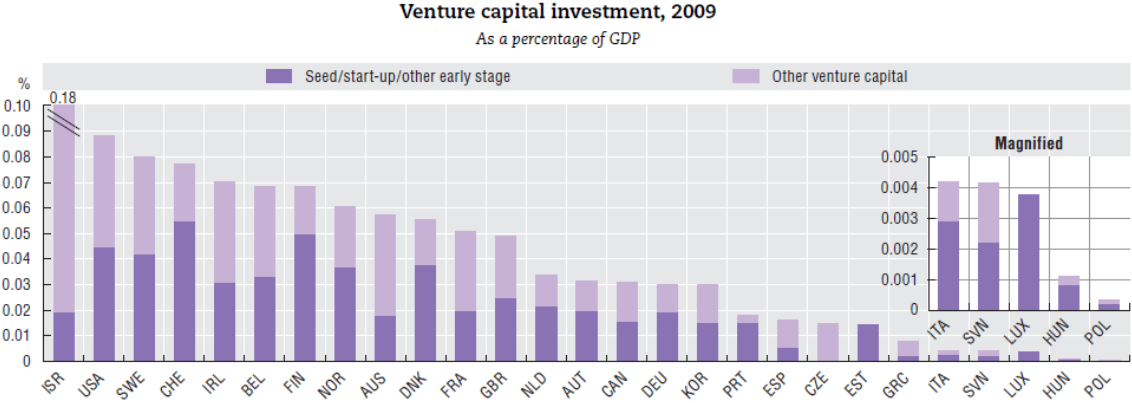


Figure 11. Venture capital investment as a percentage of GDP. (entrepreneurship at a glance) (OECD, 2011).

5.2.2 R&D expenditure by ICT sector

R&D (research and development) expenditure is for the game industry an investment to develop new knowledge, products or processes. Here investments in software and related development are necessary to develop advanced infrastructure, hardware and software in order to create superior games. Game developers and publishers gain the most through improvements in game design and technology quality (see figure 5- the value chain of game industry-, where game developers are focused on developments in the 'Alpha- phase' and publishers on the 'Beta-phase'). This means that R&D expenditure in the ICT sector is important for game developers and publishers, regardless whether they are operating in B2B or B2C market and whether they are small- or large-sized companies.

5.2.3 IP creation

Software developments can be patented, and the innovativeness of the gaming workforce is commonly reflected in the number of patents filed.

To acquire new IP creation is important mostly for publishers, for whom a game's IP is a very important revenue input. Publishers derive a large part of their revenue from the creation, exploitation and control of intellectual property (Nieborg, 2011). Since this material is further integrated with software, game publishers will therefore retain its market power, meaning it is hard for publishers (especially newcomers) to generate new IP. To own technology IP is important aspect for the continuous efficiency of production.

The investment indicator is summarized and categorized into the following sub-indicators and capital letters:

INVESTMENT	
Venture capital	A
R&D investment	B
New IP generation and ownership	C

Table 5- Overview of the main indicator investment

INVESTMENT	Size	Distribution	Actors of the value chain		
			Developer	Publisher	Distributor/retail
Type of game					
Online/casual	Small	Digital	A, B		
	Large	Digital	B	B,C	
Serious	Small	Digital	B		
	Large	Digital	B	B,C	
		Box	B	B,C	
MMOG	Small	Digital	A, B		
	Large	Digital	B	B,C	
		Box	B	B,C	
Advergame	Small	Digital	B		
	Large	Digital	B	B,C	
Mobile	Small	Digital	A, B		
	Large	Digital	B	B,C	
Console/PC	Large	Box	B	B,C	
Online console/handheld	Small	Digital	A, B		
	Large	Digital	B	B,C	

5.3 Demography factors

The gaming industry aims at no specific single target group – the audience is very broad and depends on the type of game. For example, the serious gaming branch targets companies and institutions, while the other game branches are aimed at game users who like to play on their computer, smart phone, or via a console. It is important for boxed-game distributors and retailers to know the target group in their region, since they often have to sell their games

locally. For digital distributors this is less important since they can sell games worldwide. The diversity of game players is also an interesting factor for game companies. The new value chain often shows overlaps between the different segments in the value chain; small developers also provide publishing and distribution skills. That is why a diverse target group might be very interesting to a game company. A university city might provide this kind of dynamic for game developers, regardless of whether the firm is operating in a B2C or B2B market.

The presence of other companies might also be important for game developers, both operating markets and in sizes. The number of (international) companies in a region is an important indicator, since these companies might attract other specific game companies to stimulate their network relations (NFIA,2009; Van Rijswijk, 2010). Face-to-face contact remains important for small game developers, not only for the exchange of new ideas and concepts, but also for personal contacts that can be gleaned. Game developers often gravitate toward the same networks -- foreign employees in particular tend to find their own familiar network. A final remark about demographical factors regards the presence of a high-tech industry in the region. This is especially important for large-sized development companies and publishers when considering a new location to establish. However, for large developers this concerns only the B2C market, since in the B2B market the clients have more influence.

DEMOGRAPHICAL FACTORS	Size	Distribution	Actors of the value chain		
			Developer	Publisher	Distributor/retail
Type of game					
Online/casual	Small	Digital	A		
	Large	Digital	A	C	
Serious	Small	Digital	A		
	Large	Digital	A	C	
		Box	A, C	C	B
MMOG	Small	Digital	A		
	Large	Digital	A	C	
		Box	A, C	C	B
Advergame	Small	Digital	A		
	Large	Digital	A	C	
Mobile	Small	Digital	A		
	Large	Digital	A	C	
Console/PC	Large	Box	A, C	C	B
Online console/handheld	Small	Digital	A		
	Large	Digital	A	C	

Table 6- Overview of the main indicator demographical factors

The indicator demographical factors are summarized and categorized into the following sub-indicators and capital letters:

DEMOGRAPHICAL FACTORS	
Number of companies in the gaming industry	A
Number of gaming users	B
High technology specialism in region	C
Student city	D

5.4 Human resources

The structure of the gaming industry leans highly on human capital (OECD, 2005). Since the gaming industry is a project-based organization, it benefits from pools of creative and specialized individuals. Firms rely much more on their employees' skills than firms from other sectors, such as manufacturing. Employees' experience in previous projects and their personal networks are also important aspects for the performance of the company (De Vaan, 2011). Human resources are therefore the most important main indicator in this research.

5.4.1 Educational institutions and human capital base

Highly skilled employees in programming and design are necessary for coping with the advanced technology in the video game industry (OECD, 2005). The availability of highly educated personnel in a region helps to give shape to a highly innovative and creative region. For a region it is important to have advanced education and research institutions that can deliver highly skilled personnel and a robust number of software developers. Highly educated people are often multilingual. A region's ability to provide a multilingual workforce and have a multilingual audience is very important for the game industry (NFIA, 2009; Deloitte, 2011). A hit game can easily move internationally, therefore it has a major benefit if the game is written in more than one language. Since most of the trend games are written in English, it is important that the audience also understand this language.

The need for highly skilled and trained people is definitely of interest for developers needing to craft improvements in their hardware and software. Also for publishers this is of interest, since their need for trained people with a background in management and economics. In this case, advanced game education is of less need for publishers and distributors. The need for higher education institutions and research facilities is especially urgent for large developers and publishers in both market structures and for smaller developers only in the B2B market, since these games are often developed for universities. Therefore, cooperation between universities is acquired as well. High labor force is not necessary for smaller companies since they are often in their startup phase -- this is more necessary when the company is growing in size.

The ease of labor migration in a country influences the flexibility of attracting labor. If there is a need for specialized labor skills that a region cannot provide, labor must migrate from other regions or even other countries. Therefore, the ease of labor mobility might strongly influence

game companies, especially larger companies, regardless of the market in which they operate. For example, Ireland’s migration policy is attractive for migrants. After its accession to the EU, Ireland welcomed labour migrants, together with Sweden and the UK, which stimulated the Irish population by approximately 200,000 migrants (that is a significantly high number in proportion to the overall population in Ireland).

Also, it is well known that Western labor wages are much higher than, for instance, in Eastern Europe or in Asia. This might also be a reason for attracting cheaper labor from abroad.

Knowledge and labor costs are therefore important reasons why larger game companies need flexible labor mobility.

The indicator human resources factors are summarized and categorized into the following sub-indicators and capital letters:

As mentioned before, human resource is the most important indicator for this research. That is why this main indicator is also marked in red.

HUMAN RESOURCES	
Number of higher education institutions and research facilities	A
Number of game education	B
Number of advanced game education	C
Labor force with tertiary education	D
Cooperation companies and university	E
Multilingualism	F
Labor mobility	G

Table 7- Overview of the main indicator human resources

HUMAN RESOURCES	Size	Distribution	Actors of the value chain		
			Developer	Publisher	Distributor/retail
Type of game	Small	Digital	B, C, F		
	Large	Digital	A, B, C, D, F, G	A, D, F, G	
Online/casual	Small	Digital	A, B, C, D, E, F		
	Large	Digital	A, B, C, D, E, F, G	A, D, E, F, G	
		Box	A, B, C, D, E, F, G	A, C, D, E, F, G	
Serious	Small	Digital	B, C, F		
	Large	Digital	A, B, C, D, F, G	A, C, D, F, G	
		Box	A, B, C, D, F, G	A, C, D, F, G	
MMOG	Small	Digital	A, B, C, D, E, F, G	A, D, E, F, G	
	Large	Digital	A, B, C, D, F, G	A, C, D, F, G	
		Box	A, B, C, D, F, G	A, C, D, F, G	
Advergame	Small	Digital	A, B, C, F		
	Large	Digital	A, B, C, D, F, G	A, D, F, G	
Mobile	Small	Digital	B, C, F		
	Large	Digital	A, B, C, D, F, G	A, D, F, G	
Console/PC	Large	Box	A, B, C, D, F, G	A, C, D, F, G	
Online console/handheld	Small	Digital	B, C, F		
	Large	Digital	A, B, C, D, F, G	A, D, F, G	

5.5 Quality of life

The role of cultural amenities in a firm's location is increasing in importance. Diversity and creativity are key factors for a city's or a region's growth and development (Florida, 2002). People move to a certain city or region for the lifestyle, even if a job has not yet been secured. People expect more from places they live. This can be applied to the gaming industry as well. Game developers, especially small-game developers who just started a business or are in the early phases, prefer a city with a dynamic lifestyle. Important indicated amenities are the number of bars, theaters, museums, clubs, and art galleries. Since these smaller game developers are often younger in age, their preferences for a dynamic city are therefore broader than those of the larger companies. The image a city projects might also be an important indicator; a city with authenticity (presence of old fashioned buildings) attracts more game companies than a city with no history and unattractive buildings. This is definitely true for developers and publishers in B2B market. These companies have to receive their clients in their office and therefore it is quite necessary to have a nice entrance.

The indicator quality of life factors are summarized and categorized into the following sub-indicators and capital letters:

QUALITY OF LIFE	
Amenities	A
Authenticity	B

Table 8- Overview of the main indicator quality of life

QUALITY OF LIFE	Size	Distribution	Actors of the value chain		
			Developer	Publisher	Distributor/ retail
Type of game					
Online/ casual	Small	Digital	A		
	Large	Digital			
Serious	Small	Digital	A, B		
	Large	Digital	B	B	
		Box			
MMOG	Small	Digital	A		
	Large	Digital			
		Box			
Advergame	Small	Digital	A, B		
	Large	Digital	B	B	
Mobile	Small	Digital	A		
	Large	Digital			
Console/PC	Large	Box			
Online console/ handheld	Small	Digital	A		
	Large	Digital			

5.6 Labor wages and real estate costs

High costs of real estate and labor wages are negative costs for every company in any sector. Especially for start-ups, which have limited personal capital, rent for offices and houses should be low. These costs differ heavily between large cities and countryside areas; high rental costs are negative externalities that might keep digital game companies away.

The indicator labor wages and real estate costs are summarized and categorized into the following sub-indicators:

LABOR WAGES AND REAL ESTATE COSTS	
Real estate costs (commercial)	generic factor
Housing costs	generic factor
Labor wages	generic factor

Since these sub-indicators are generic factors and can be applied to any type of game and any actor, it is not necessary to show the table to summarize the sub-indicators.

5.7 Policy interventions

Creating a network between the creative industry, research and education institutes and other business sectors is important in gauging the regional business environment for the game industry. Technical developments in computer games may lead to spillovers from the game industry into other industries. A good cluster policy program would optimize this network. Collaboration between other firms or organizations in a network is important for game developers (e.g. it creates scale and scope advantages). The next figure shows large and small firms in OECD countries that collaborated on innovation with higher education or government research institutions in the years 2006-2008. Almost 70% of the large firms in Finland collaborate with universities and research institutions, which is a very high rate compared to other OECD countries. This might indicate that Finland has a good policy, especially when compared to countries such as Turkey, Brasil and Chile.

Furthermore, the figure shows that larger firms have collaborate more than smaller firms in all of the OECD countries. This indicates that it is for smaller firms more difficult to gain access to a network of universities and research facilities, even though it might be even more important for them to do so.

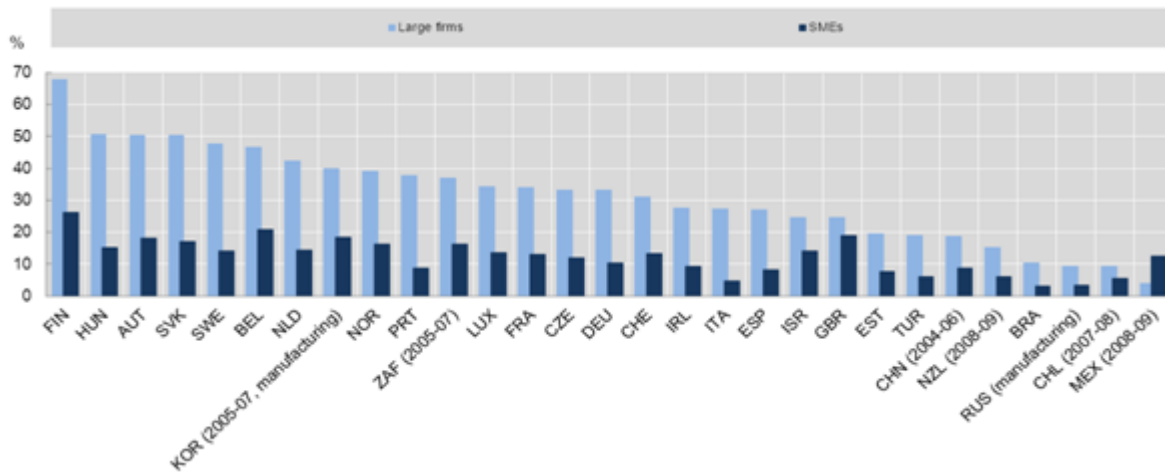


Figure 12. Large and small firms of OECD countries that are collaborating on innovation with higher education or government research institutions in the years 2006-2008 (OECD, 2011: based on Eurostat (CIS-2008) and national data sources).

Additionally, government initiatives are important to stimulate the regional digital game industry. Here, tax advantages in the game industry, support for enterprises in funding, innovation box, flexible procedure to obtain work permits and subsidies to promote research and education, are all aspects of a good policy (Deloitte, 2011). Tax advantages are more important for larger companies than for smaller companies. However, tax advantages are also generic factors, since they are important for any industry. Game subsidies and funds are more useful to smaller companies, since these mostly provide support for startups or early beginners. Therefore, these indicators are applied to smaller game developers, regardless which market they are operating in (B2B/B2C).

Incubator facilities, where an organization provides support to starting game companies, also increase the attractiveness of a region's business environment and spur companies in the digital game industry to invest and to locate (NFIA, 2009). Incubator facilities are important for smaller game developers, since the latter require help from government organizations or support from regional development agencies in order to survive. A final remark is the importance, for the purposes of marketing and promotion, of the presence of game events in a region or city. This concerns almost all phases of the value chain, with the exception of publishers in the B2B market (then it is in the hands of its client).

The indicator policy interventions are summarized and categorized into the following sub-indicators and capital letters:

POLICY INTERVENTIONS	
Game funds/subsidies	A
Availability of a game cluster	B
Cooperation government and gaming industry	C
Tax advantages	D (generic factor)
Incubator facilities	E
Game events	F

Table 9- Overview of the main indicator policy interventions

POLICY INTERVENTIONS	Size	Distribution	Actors of the value chain		
			Developer	Publisher	Distributor/retail
Type of game	Small	Digital	A, B, C, E, F		
	Large	Digital	B, C, F	F	F
Serious	Small	Digital	A, B, C, E, F		
	Large	Digital	B, C, F	F	F
		Box	B, C, F	F	F
MMOG	Small	Digital	A, B, C, E, F		
	Large	Digital	B, C, F	F	F
		Box	B, F	F	F
Advergame	Small	Digital	A, B, C, E, F		
	Large	Digital	B, C, F	F	F
Mobile	Small	Digital	A, B, C, E, F		
	Large	Digital	B, C, F	F	F
Console/PC	Large	Box	B, C, F	F	F
Online console/handheld	Small	Digital	A, B, C, E, F		
	Large	Digital	B, C, F	F	F

This section has reviewed the drivers of the gaming industry in detail. The main indicators are infrastructure, investments, demographical factors, human resources, labor wages and real estate costs, quality of life and policy interventions followed by its sub-indicators. The next section will review an overview of the mentioned variables.

5.8 Competitive demand structure

The next framework defines the specified indicators as applied to the different phases of the value chain, in accordance with the two-market structure, by the type of games and by size. Since it was clear that proximity (network) and complexity, as mentioned in the typology, did not change regardless of the input of the different location factors, these terms are left out of the total summary. For the total overview of the typology, refer back to the table of typology (table 2). The bold indicators in the following framework are location factors that are relatively more important.

The generic factors have been left out in this model, since these factors can be applied to any sector of any industry. Nevertheless, since these factors are still important for the gaming industry, they will be used later in this research. The generic factors are as follows:

- Accessibility by car
- **Accessibility by public transport**
- Distance to nearest international airports
- Fixed (wired) broadband (upload/download speed (kb/s))
- Housing costs
- Labor wages
- **Real estate costs**
- Tax advantages

During the interviews the indicators 'accessibility by public transport' and 'real estate costs' are also verified as extremely important¹⁰. This means later in this research these two bold indicators will differently be dealt with.

This clear framework is necessary to designate the regional business environment in the game industry. If the location factors for each segment of the value chain are known and allocated according to market structure, type of games and size, the next necessary step in this research is to find out where Utrecht is positioned in this model. This will be explored in chapter six.

¹⁰ See appendix D.

TYPE OF GAME

(applied to market)

DEVELOPMENT

PUBLISHER

DISTRIBUTION/RETAIL

SMALL COMPANIES

LARGE COMPANIES

B2C market:

Online/casual
MMOG
Mobile
Console/PC
Online console/
handheld

<p><u>Digital</u></p> <ul style="list-style-type: none"> • Amenities • Availability of a game cluster • Cooperation government and gaming industry • Game events • Game funds/subsidies • Incubator facilities specific in gaming industry • Multilingualism • Number of advanced game education • Number of companies in the gaming industry • Number of game education • R&D investment • Student city • Venture capital 	<p><u>Box</u></p> <ul style="list-style-type: none"> • High technical specialized region <p><u>Box and digital</u></p> <ul style="list-style-type: none"> • Availability of a game cluster • Cooperation government and gaming industry • Game events • Labor force with tertiary education • Labor mobility • Local data centers • Multilingualism • Number of advanced game education • Number of companies in the gaming industry • Number of game education • Number of higher education institutions and research facilities • R&D investment • Student city 	<p><u>Digital</u></p> <ul style="list-style-type: none"> • High technical specialized region • Local data centers • New IP generation and ownership • Student city <p><u>Box and digital</u></p> <ul style="list-style-type: none"> • Game events • Labor force with tertiary education • Labor mobility • Multilingualism • New IP generation and ownership • Number of higher education institutions and research facilities • R&D investment 	<p><u>Digital</u></p> <ul style="list-style-type: none"> • Local data centers • Mobile broadband (3G/4G) • Penetration of broadband <p><u>Box</u></p> <ul style="list-style-type: none"> • Accessibility by port • Number of game users <p><u>Box and digital</u></p> <ul style="list-style-type: none"> • Game events
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B2B market:

Serious
Advergame

<p><u>Digital</u></p> <ul style="list-style-type: none"> • Amenities • Authenticity • Availability of a game cluster • Cooperation government and gaming industry • Cooperation companies and University • Game events • Game funds/subsidies • Incubator facilities specific in gaming industry • Multilingualism • Number of advanced game education • Number of companies in the gaming industry • Number of game education • Number of higher education institutions and research facilities • R&D investment • Student city 	<p><u>Digital</u></p> <ul style="list-style-type: none"> • Availability of a game cluster • Authenticity • Cooperation government and gaming industry • Cooperation companies and University • Game events • Labor force with tertiary education • Labor mobility • Local data centers • Multilingualism • Number of advanced game education • Number of companies in the gaming industry • Number of game education • Number of higher education institutions and research facilities • R&D investment • Student city 	<p><u>Digital</u></p> <ul style="list-style-type: none"> • Authenticity • Cooperation government and gaming industry • Cooperation companies and University • High technical specialized region • Labor mobility • Labor force with tertiary education • Local data centers • Multilingualism • New IP generation and ownership • Number of higher education institutions and research facilities • R&D investment • Student city 	<p><u>Digital</u></p> <ul style="list-style-type: none"> • Game events • Local data centers • Mobile broadband (3G/4G) • Penetration of broadband
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6. Regional comparison of European competing gaming cities

6.1 Overview of Utrecht game industry

6.1.1 Enterprise Profile

During research conducted by the municipality of Amsterdam (2010), it was found that 25% of Utrecht's developer companies were single-branched, 40% of the companies had 2-4 employees and the rest had more than 4 employees. This shows that Utrecht's gaming structure is centered largely on small-sized game companies. This pattern varies slightly from that of neighboring Dutch region Noord-Holland (Amsterdam), where a company has on average 7 employees.

The most Dutch game companies are found in Amsterdam and Utrecht. According to the report by Deloitte (2010), the region of Utrecht had a total of 32 developers and publishers in 2010¹¹. The Noord-Holland region is the favored location among Dutch developers and publishers. Fifty-one developers and publishers established themselves in Noord-Holland in 2010 (figure 13).

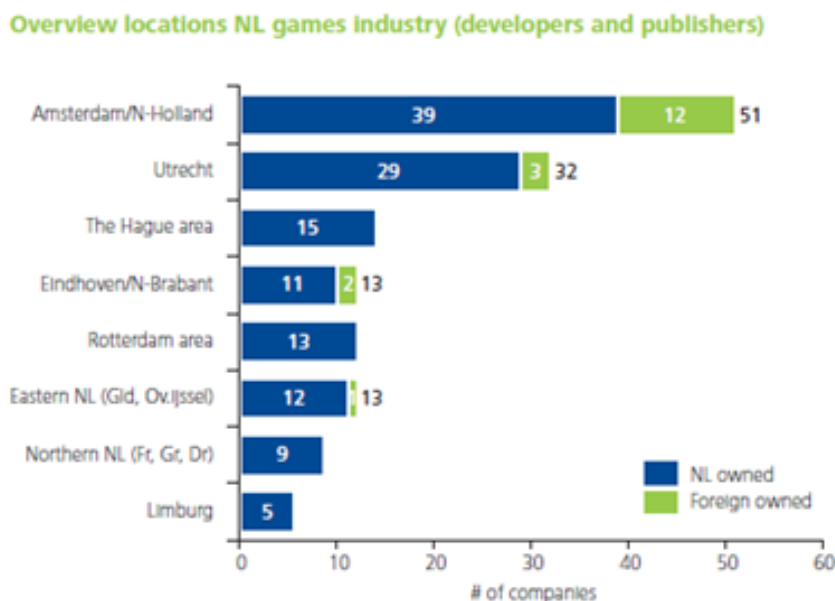


Figure 13. Amount of Dutch and Foreign game developers and Publishers in the Netherlands in 2010. (Deloitte analyses, 2010)

The core of the Dutch game industry centers first on developers, second on hardware publishers, and third on distributors & retail (Deloitte, 2011). Dutch companies specialize in the ability to design and to produce unique and innovative games (Dutch Games Go Global, 2011). The games are mostly designed and built using locally developed technology. Dutch products are an integral part of mainstream international gaming (Dutch Games Go Global, 2011).

¹¹ Nowadays this number has been expanded to 50 companies (Van Wingerden, 2012).

The core of Utrecht's game industry reflects that of the Netherlands; on the first place there are many small Dutch developers located in Utrecht. As the next figure shows, developers account for the largest proportion of Dutch game companies in Utrecht (Van Oosteren, 2010). Utrecht has one large publisher and one large distributor, namely Ubisoft and Nintendo. The majority of indigenous companies are involved in development-related activities where the size of the firm is often micro. Only U-Trax, a Dutch game company focused on game localization, employs more than 40 employees.

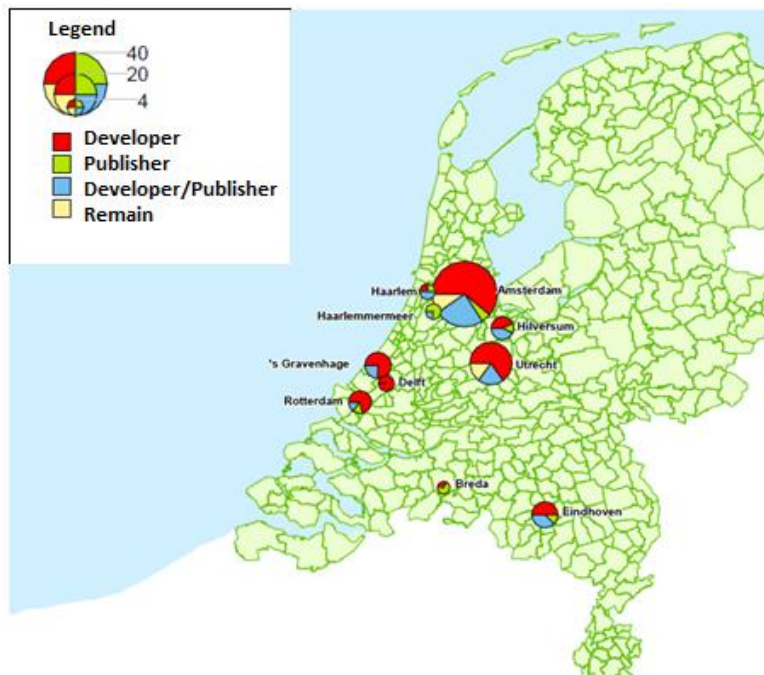


Figure 14. Overview Dutch game companies in the Netherlands by size in employers. (Van Oosteren, 2010).

Figure 14 indeed shows that the majority of Dutch game companies in Utrecht are developers, while a smaller part is made up of a combination of game developers and publishers. Utrecht positions third with 232 employers in gaming industry in the Netherlands (Van Oosteren, 2010). This number is based on the core of the gaming industry structure, so it excludes complementary linkages that the game sector has with related activities such as film and music.

6.1.2 Game development

The primary function of most game companies in Utrecht is game development. The majority of game companies are Dutch-owned companies. The game companies are mostly focused on the Business to Consumer market, however the Business to Business market is an upcoming market in Utrecht (and in the

Box 6. Booster Media (BM)

BM focuses on game development in the mobile and online games. It provides mobile gaming solutions for social networks. It is unique due to its open mobile web (instead of a 'normal' app store). It is a small sized company in Utrecht but does has international employees all over the world. It is focused on B2B (has advergaming and game websites as customers) and B2C (also develop mobile casual games) (Moelker, 2012).

Netherlands) due to good education and institutions. Game developers in Utrecht are relatively young, often have lower development costs and are therefore more focused on mobile, online and casual games. Game developers in Utrecht include, for example, Boostermedia (Box 6), Monkey Bizniz, Xform and Game Oven.

Box 7. Istox

Istox is a game developer and publisher which develop entertainment MMOG games (known for the Mid East Geisis and Iron Grip). They extend their distribution to large online distributors such as Steam and Amazone. Istox's games have a downloadable content since box games are too expensive and have a too small audience group (Geel, 2012).

6.1.3 Game developers and publishers

The introduction of digital gaming offers a lot of game companies an opening to act at once as developers and publishers. This is the second largest group of gaming companies in Utrecht. In these sectors as well, most game companies create games for mobile and online/casual platforms. A growing game developer and publisher in Utrecht is the company Istox (see box 7).

6.1.4 Serious gaming

As mentioned before, serious gaming (B2B) is a booming market in the Netherlands, and thus in Utrecht as well. In this sector, games are developed as a tool for use by hospitals as well as for educational and military institutions. Game companies in Utrecht that are focused on this market include Active World (Box 8), Digital Dreams and Dreams of Danu.

Box 8. Active World Europe (AW)

AW focused on B2C and B2B, where the university is its main target. They created an aviator (virtual body) to meet other people for pleasure as well for business. This can be virtual meetings between business, government and entertainment. Here small payments are made via digital payment systems. AW focuses to develop games for children with special abilities (Grujts, 2012).

A number of foreign-owned companies, including some of the major players like Nintendo and Ubisoft, are also established in Utrecht. The presence of major foreign companies not only shows the attractiveness of Utrecht, but also brings a higher level of international visibility to Utrecht's gaming industry.

6.1.5 Dutch Game Garden

The attractiveness of the game sector in Utrecht has resulted in the growth of small-scaled game companies. The Dutch Game Garden had an establishment of 30 companies in 2009, and by 2011 that number had increased to 39 companies (Bucar, DGG). The Dutch Game Garden (DGG) is an incubator focused specifically on the gaming industry. It provides support for start-ups by

housing, providing tools and a network of technical, financial and legal experts. (Dutch Game Garden, 2012). The DGG also provides a Game Development Business Center, which is a gaming hotspot facilitating worldwide cooperation between game companies, universities and institutions. This cooperation also expresses itself in DGG’s Developers Club, where graduates and students from Dutch game educational programs can collaborate on different joined projects. The DGG also supports these groups by organizing events and game activities. The DGG is a project that grows out of the European Regional Development Fund of the European Commission. Companies that are located in the DGG include Abbey games, Digital Dreams, Game Oven, Boostermedia and Xform.

Interviews with experts within the game industry¹² indeed show that Utrecht is focused on software production in the development phase of the value chain. Small-sized developers specialize in developing new design and programming for online games, mobile games and serious games. This means that Utrecht, beside its focus on the business-to-consumers concept, also has a very important branch in the business-to-business structure. Since the game companies are small in size, the intensity of networking among companies and institutions is strong. Social and institutional proximity (see section 4.4 networks) are important dimensions of this dynamic. Social contact and good policy interventions help to stimulate the growth of a game company. A final characteristic of Utrecht’s gaming industry is its specialization. Utrecht wants to expand its knowledge and experience in the gaming industry. Utrecht does not aim to be more diversified in the gaming industry (e.g. attract other segments of the gaming industry), but rather wants to create a more specialized gaming cluster in Utrecht.

Apply these characteristics to the model of typology:

Table 10- Utrecht’s typology overview

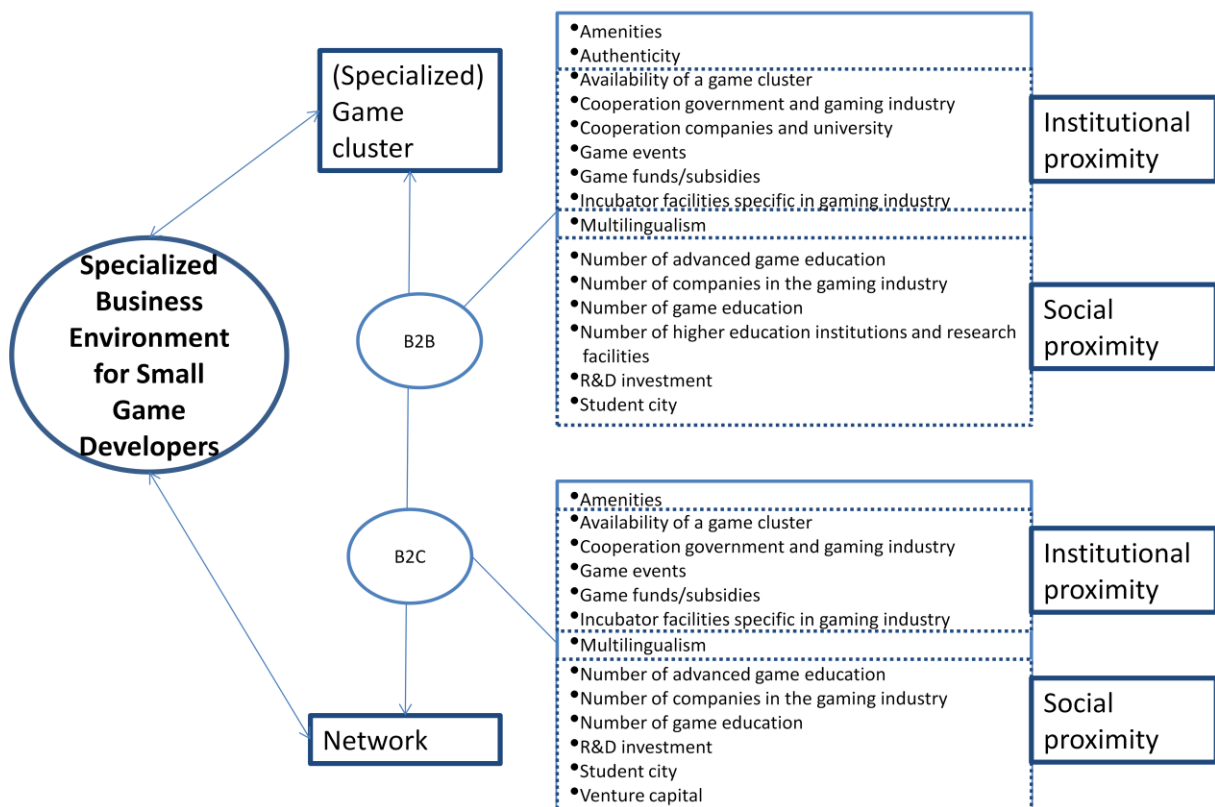
	Utrecht gaming industry	
Platform	Digital (pc/mobile/online/console/handheld)	
Genre games	Online/casual games	Serious games
Market	B2C	B2B
Complexity/cost	Low	High/Low
Size	Small	
Proximity	Social and institutional proximity	
Specialist	Game Developer	
Regional structure	Specialization (localization)	

¹² Interview Derk van Wingerden – Invest Utrecht on March, 2012
 Interview Jan Pieter van Seventer – Dutch Game Garden on March, 2012
 Interview David Nieborg- University of Amsterdam on June, 2012
 Interview Rick van Beem- Gamania, May, 2012

6.2 Operational model

In the previous chapters' literature review of regional competitiveness, the creative industry and the gaming industry, it became clear which drivers of the gaming industry influence a city's business environment in the field of the gaming sector. The availability and accessibility of these drivers differ per cities and therefore some cities and regions score higher on some elements than other cities and regions in the game industry.

In the operational model, these drivers are classified into B2B and B2C factors. Since it has become clear that Utrecht is focused on the development phase of the digital gaming value chain, and specifically on small-sized developers, the operational model is applied to this dynamic as well. Along with existing clusters and networks, and the proximity of (particularly) social and institutional, these factors determine the business environment for small-game developers in the digital gaming industry. Since Utrecht's aim is to create a more specialized gaming cluster, the concept of clustering is also implemented in the operational model.



Operational model 'Specialized business environment for small game developers in Utrecht'

This research focuses on comparing Utrecht with competing European cities. It sheds light on 11 competing cities in particular: Utrecht, Amsterdam, Edinburgh, Birmingham, Manchester, Lyon, Hamburg, Dusseldorf, Karlsruhe, Malmö and Dublin. These cities are located respectively in the following regions: Utrecht and Noord-Holland (the Netherlands), Lothian, West Midlands, Greater Manchester (the UK and Scotland); Rhône-Alpes (France); Hamburg, North Rhine-

Westphalia, Baden-Wurttemberg (Germany), Scania (Sweden) and Dublin (Ireland). The next section will provide more information about why these cities are chosen.

6.3 Overview of the competing European cities

6.3.1 Amsterdam

Amsterdam is the capital of the Netherlands and hosts a rich diversity of economic activities in sectors such as in transport, business finances and the creative industries. The gaming industry is a particularly important sector of the creative industry. The Amsterdam Metropolitan Area is one of the most important creative platforms in Europe. It is almost on the same creative level as large, creative cities such as New York and London; however Amsterdam operates on a much more intimate scale. Companies are often located a stone's throw away from each other, which facilitates networking (Iamsterdam, 2008). Amsterdam's region has around 70 game companies, of which around 50 are established in Amsterdam itself (van Rijswijk, 2010)¹³. Amsterdam's main core is focused on game development (around 30%). Amsterdam has also a relatively large percentage of game companies focused on advergames (around 20%). This illustrates one of the characteristics of Amsterdam's creative industry, namely its specialization in advertising. Here 17% of the game companies are developers and publishers. Around 8% is focused on serious gaming (van Rijswijk, 2010). The majority of the game companies have between 0-10 employees (60%) and the companies are often very young. Amsterdam's game market is therefore very similar to that of Utrecht.

6.3.2 Manchester

Manchester is Europe's second-largest creative, digital and media hub (MIDAS, 2011). Beside its major strength in film and TV development, Manchester has a growing market in game development. Manchester's private and public sectors both invest heavily in the city. One major investment is the MediaCityUK, a large-scale convergent media complex. Around 55 game companies have established in Manchester, just as in Birmingham (UKIE, 2011).¹⁴ This group consists largely of smaller game developers and publishers.

The UK games industry is clustered around ten regional centers across England and Scotland (UKIE, 2011). These clusters are highly successful in that large studios are established in each of them. Clusters exist in Edinburgh, Dundee, Newcastle, Liverpool/Manchester, Guildford, Cambridge, Oxford, London and Brighton (UKIE, 2011). Birmingham and Edinburgh are the next

¹³This is also acknowledged by Annelies van 't Veld, Iamsterdam, See appendix A

¹⁴This is also acknowledged by Wouter Schuitemaker, MarketingBirmingham, See appendix A

two cities analyzed in this research. These cities are also acknowledged as suitable for this research by an expert in the UK gaming industry.¹⁵

6.3.3 Birmingham

Birmingham is a city with great potential in the creative sector. It is one of the fastest-growing clusters in the UK (Darch, 2011). Innovation has always been a major cornerstone of development in West Midlands. Lately this focus has settled more on the knowledge-based ICT and creative industries, particularly in games and social media (Zabouta, 2009). Birmingham has some major players located in the area – companies such as Sega, Daden and Microsoft games Studio – but the majority of the game companies are smaller game developers and publishers. Together, these two groups account for the presence of 55 game companies in Birmingham (UKIE, 2011). The strength of West Midlands' game industry lies in serious games development (Zabouta, 2009). Birmingham is furthermore unique thanks to its societal richness.

6.3.4 Edinburgh

The game industry has historically been strong in Scotland, but lately it has suffered the effects of Scotland's falling economic growth. Edinburgh is an important hub for Scottish creative industries; almost half of all Scottish employees in Edinburgh have a job in the creative industry. Edinburgh hosts some major game companies, including Grand Theft Auto, Microsoft, and Amazon's software development center (Edinburgh Inspiring Capital, 2011). The regions of Edinburgh and Dundee are the region's most important cities for game developer establishments; together they have around 80 game developers, of which around 50 are located in Edinburgh's city (Scottish Development International, 2011). According to Edinburgh-Inspiring Capital Organization, Edinburgh is one of the top locations for computer games in the UK. Edinburgh Interactive Festival is a growing, popular event that showcases the influence of video games in Scotland (Edinburgh Inspiring Capital, 2011).

6.3.5 Lyon

The French video game sector has around 350 game companies, which is good for approximately 10.000 jobs in this sector. Characteristically, these small publishers, joint developers and designers and they work in many small development studios (Brize, 2011). Ubisoft, one of the largest worldwide publishers, has its origins in France and is established in Paris. Ubisoft's sales in the third quarter of 2011 were €652 million (Ubisoft, 2011).

¹⁵ Damian Willems, NBSO-Manchester, See appendix A

The Rhône-Alpes region is strong in the high-tech industry and is accompanied by R&D activities in sectors such as health, nanotechnology and software and digital technology. The Rhône-Alpes region has a very similar focus to that of the region of Utrecht. Rhône-Alpes' digital game cluster is called 'Imaginove'. The Rhône-Alpes region is ranked second for interactive digital entertainment in France – behind only Paris – and has around 120 game companies, most of them game developers (Franck and Noel, 2009). The most important city here is Lyon, which was the first French city to join UNESCO's 'Creative Cities' network initiative. Lyon has approximately 30 game developers, which are mostly focused on online, mobile and web games (Berliet, 2011). An upcoming market is the field of serious games, a sector for which Lyon holds a major event (Berliet, 2011).

6.3.6 Dusseldorf

In Germany, the structure of the gaming industry is built first on developers, then publishers and finally a mix of the two – just like in the Netherlands. Germany has around 250 game companies, which provide approximately 10.000 jobs (BIU, 2011).

Many small developers are concentrated in the metropolitan regions of North Rhine-Westphalia, Munich, Berlin, Hamburg and the Rhine-Main area. This research analyzes the regions of Hamburg, North Rhine-Westphalia (NRW) and Baden-Wurttemberg (BW), which respectively feature the main cities Hamburg, Karlsruhe and Dusseldorf. These cities are more comparable in size to the city of Utrecht than are Berlin and Munich. The chosen cities are also acknowledged as suitable for this research by an expert in the German gaming industry.¹⁶

Dusseldorf is part of Medien.NRW, a gaming cluster with the highest revenue in Germany. Dusseldorf is home to one major international publisher, namely Ubisoft. One of the pioneers of game development, Blue Byte GmdH, is also established in the city (Film und Medien NRW, 2011). Dusseldorf has around 35 game companies and its region has around 460 game companies (Oentrich, 2011)¹⁷. This makes it one of the largest game establishments in Germany. The NRW region has a historically strong tradition in media and boosts in its digital media landscape, especially in online/mobile games. Dusseldorf plays a large role herein and is also home to the telecommunications, mobile phone and advertising market. It is also one of Germany's top business locations for companies in information and communication technology (ICT).

¹⁶ Julia Oentrich, Germany Trade and Invest, See appendix A

¹⁷ This is also acknowledged by Simona Pede, MFG

6.3.7 Karlsruhe

The creative industry has a strong presence in the Baden-Württemberg (BW) region. The BW region is known for its automotive industry and its engineering branch, but also has a rising market in culture and creativity. The main sectors in its creative industry are publishing, interactive design and content, games, software development and advertisement & marketing (Walz and Seibert, 2009). Additionally, the region has a small but specialized branch in visualization and animation technologies. BW region has a very rich cultural landscape that is attractive for its creativity (Walz and Seibert, 2009). The next figure shows that within the BW's region, the city of Karlsruhe (Mittlerer Oberrhein) is important for its establishments of small and micro enterprises in the software/game industries.

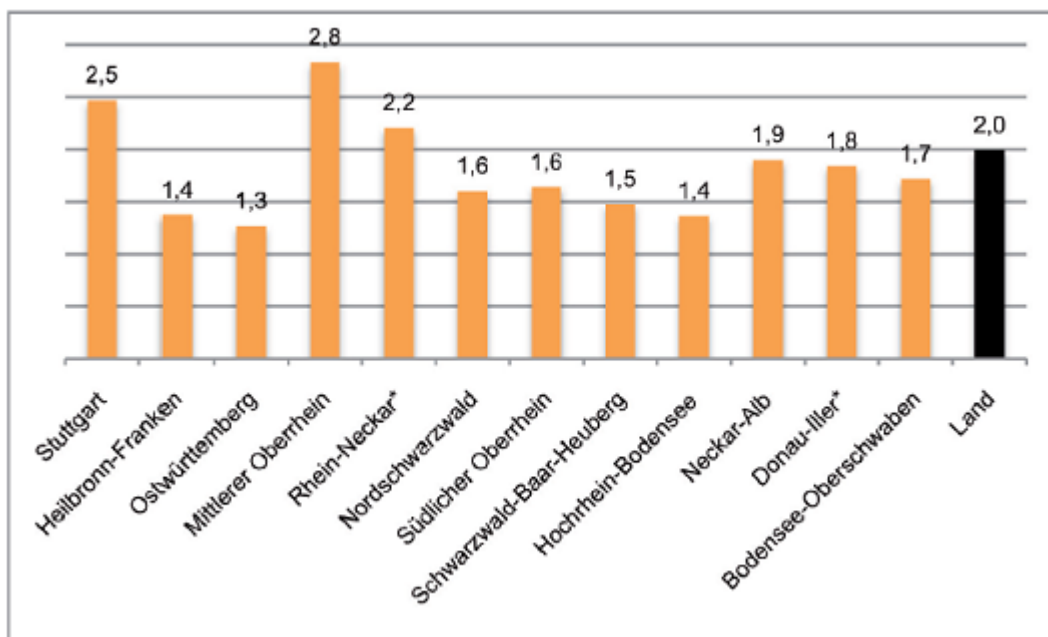


Figure 15. Regional priorities: Share of companies in Software/games industry of the total companies in the region Baden- Württemberg as a percentage, in 2007 (Walz and Seibert, 2009).

It has the highest percentage (2,8%) of smaller enterprises operating in the digital gaming industry in the BW region in 2007. The region houses approximately 55,000 companies in animation and computer games (but this number is calculated with numbers of the sector 'other software development') (Walz and Seibert, 2009) and around 35 game developers are located in Karlsruhe.¹⁸

6.3.8 Hamburg

With 1,8 million inhabitants, Hamburg's urban center is the second-largest urban region in Germany (Klein and Quinke, 2011). Though this is a large area, Hamburg is particularly of

¹⁸ Simona Pede, Innovation.mfg, See appendix A

interest for its focus on digital gaming. The city of Hamburg is very important for the gaming industry in Germany. In 2003 the Gamecity:Hamburg project was created by Hamburg@work, which focuses on supporting the gaming industry in Hamburg. There are around 150 game companies and about 3.000 employees in the digital game industry of Hamburg (Klein and Quinke, 2011). Here the inner core is composed of game developers and publishers. Gamecity:Hamburg houses events and consultancies and, as happens in Utrecht, it also offers housing to start-ups and small game companies. Hamburg is additionally focused on its media center, which includes sectors – such as advertising, film, music and online agencies – that have small ties with the gaming industry (Klein and Quinke, 2011).

6.3.9 Dublin

The Irish game industry initially focused on middleware companies, and the market was dominated by two major foreign publishers: Intel and Activision (Gameindustry, 2011). These publishers owned the Irish game companies Havok and Demonware, respectively. It was hard for small-scale studios to start up in this oligopolistic structure and without any state support. This situation changed a few years ago, when more local developers had established themselves successfully in Ireland. Nowadays, a vast majority of Irish-owned companies are developers. 56% of these are game developers, 14% operate in customer support, 18% are localization companies and 7% are middleware companies (Forfás, 2011). Ireland has approximately 2400 workers in the game industry, and most of these are employed by foreign companies. More than 280 companies are involved in the Irish game industry (Forfás, 2002).

Dublin accounts for around 40-55% of total employment in Ireland's creative industry (Gritsai, 2008), making it the most important cluster in Ireland. Around 87% of these companies are based in the south city centre and south coastal areas¹⁹ (Forfás, 2002). The companies are both small- and large-scaled and are focused on the entertainment and business markets (B2C and B2B).

6.3.10 Malmo

Sweden is at the forefront of game development in Europe (Lindel, 2010). The Swedish digital game market is largely determined by game developers. There are around 100 game developers in Sweden, with a turnover of approximately 100 million Euros in 2009. This helped create 1102 jobs in this field (Lindel, 2010). The game developers are characterized by small-scale studios. More than 50% of the game developers have 0-3 employees and about 25% companies have 4-10 employees (Lindel, 2010). Most of the game developers have established themselves in the capital city, Stockholm, and in the cities Malmo and Gothenburg.

¹⁹ This was estimated in 2000 (Forfás, 2002).

In this research, the city of Malmö will be analyzed in further depth. Beside the presence of small size game developers, the city also has a central location in Scandinavia. It has a good connection with Denmark (Malmö is a part of the Öresund region, a collaborative region between Denmark and Sweden) and Stockholm is reached by train in only 35 minutes. Malmö is home to around 20 game companies that are focused on the digital gaming sector (Lindel, 2010).

In sum, together with the city of Utrecht, there are a total of 11 European cities chosen for this research. All these cities have a strong focus on the creative industry and specifically on the gaming industry. These cities are chosen according to the basic condition that a large number of small-sized game developers have established themselves in a city that is specialized in the digital gaming industry. That is why cities such as Berlin, London and Paris are excluded from this research (more Triple A and large publishers are located in those cities).

The next chapter will analyze the results per indicator and will determine which of the investigated cities has the best business environment for small sized-game developers in the digital gaming industry. The chapter begins with a small summary of the used methodology and the way this is applied to the research.

7. Methodology and results

7.1 Benchmarking

Benchmarking is a popular concept among politicians and businesspeople. Benchmarks are often used as tools of analysis to determine an optimal location for businesses and people to settle. With the help of a set of indicators established to measure a location's ability to attract people and businesses, regions can be evaluated and subsequently scored. When a region scores high on the benchmark list, it is said to be an interesting and attractive region for other businesses to (re)locate. This means in practice that benchmarks help build a comparative structure on which to evaluate the scores of different regions (Van Oort et al, 2010). However, a common mistake as regards benchmarking is that lot of benchmark researchers do limit their research to competitive regions or cities, but often include *all* regions or cities of a sector or industry. Another mistake that often occurs takes place when the results of benchmarking are used in regional policy making. Since regions and cities specialize in different sectors and technologies, regional policies should be shaped to adhere to these differences, yet regions have in this matter often been treated as similar entities. These benchmarks should therefore be *'supplemented with insights of actual networks conditions of a region's industry'* (Van Oort et al, 2010).

The disadvantages of benchmarks are their arbitrariness and their sensitivities for weighting factors per given indicator (Van Oort et al, 2010). Weighting factors for each benchmarking difference per report and do not have a common formulation. This means benchmarks can have a certain risk when applied to policy objectives, since the results might differ when using different ‘weighting techniques’.

7.1.1 Benchmarking applied into this research

This research analyzes in detail the network structure and the game segments of the value chain of the gaming industry. This research concludes that Utrecht specializes in game development, specifically in games played via online and mobile portals and in serious games. The competing European cities are selected for a large part that matches this basic condition. Therefore this research complements the first rule of benchmarking: the supplementation of cities in the online gaming industry.

Each sub-indicator will be assigned a specific amount of points. Each sub-indicator has been divided into factors (“sub-sub-indicators”) in which the points have been distributed accordingly. These points have been summed into total points and are divided by the number of information sections to obtain a total average amount of points, as shown in the example underneath.

Table 11- Explanation of points

Region	Utrecht	Noord-Holland	Lothian	West Midlands	Greater Manchester	Rhône-Alpes	Dublin	Skane	Baden-Wuerttemberg	North Rhine-Westphalia	Hamburg
City	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Total points	(X1+X2)/2	(X1+X2)/2	(X1+X2)/2	(X1+X2)/2	(X1+X2)/2	(X1+X2)/2	(X1+X2)/2	(X1+X2)/2	(X1+X2)/2	(X1+X2)/2	(X1+X2)/2
Points	X2	X2	X2	X2	X2	X2	X2	X2	X2	X2	X2
Information 1	A	B	C	D	E	F	G	H	I	J	K
Points	X1	X1	X1	X1	X1	X1	X1	X1	X1	X1	X1
Information 2	A	B	C	D	E	F	G	H	I	J	K

The highest amount of points in a certain indicator given to a certain city indicates that this city performed better than the other cities in that category. After the total amount of points is tallied, the highest number of points indicates the best city for small game developers to locate. Some of the investigated sub-indicators are considered very important. As known, these sub-indicators are designated in red. In total there are 22 sub-indicators; from these, 6 sub-indicators are indicated as very important and 16 sub-indicators as regular. On the basis of information gleaned from the interviews, different weighting factors have been added to these 6

sub-indicators²⁰. From the six interviews that are applied to the category ‘digital developers’, all six interviewees found game education very important. This sub-indicator thus doubled its weighting factor. Three out of six interviewees found accessibility by public transport, venture capital and incubator facilities important, which gives these indicators a weighting factor of 1,5 times. Four out of six interviewees found real estate costs and subsidies very important, which gives indicators a weighting factor of 1.67 times. See table 12 for an overview.²¹

Table 12- Important sub-indicators

Sub-indicator	Average	Weighting factor
Accessibility by public transport	0,5	1,5
Venture capital	0,5	1,5
Game education	1	2
Real estate costs	0,67	1,67
Incubator facilities	0,5	1,5
Subsidies	0,67	1,67

The main indicator Human Resources is also indicated as a very important variable given the mentioned literature and interviews. Since all of the interviewees mentioned this main indicator as very important, its weighting factor is 2.

How are the points divided? The points are divided into this classification of ‘excellent-good-average-bad-worse’.

Excellent	2 points
Good	1 point
Average	0 point
Bad	-1 point
Worse	-2 points

Standard deviation is used to define the range of each classification element. For each sub-indicator, data has been collected. From this data the average and the standard deviation are calculated. The standard deviation is an often used measurement in research and presents the amount of variation from the average of a variable (mean). By the use of standard deviation in this research, statistical conclusion will be rendered more reliable because the margin of error is decreased. The reported results will therefore be closer to the population ‘true’ figures. Thereby the standard deviation increases the ease to show what the average is and what the outer edge of the average is of each dependable value of an indicator. The standard deviation adjusts to the size of these values and is therefore a useful instrument in determining the ranges of the data points. As an example, the above described method applied to the sub-indicator *amount of universities in a city*:

Utrecht	Amsterdam	Edinburg	Birmingham	Manchester	Lyon	Dublin	Malmo	Karlsruhe	Dusseldorf	Hamburg
1	2	2	2	2	4	3	1	1	1	3
AVERAGE	STDV	AVER-STDV/2	AVER+STDV/2	AVER-STDV	AVER+STDV					
2,0	1,0	1,5	2,5	1,0	3,0					

Table 13- Example amount of universities per city

²⁰ See overview interviews in appendix B.

²¹ Robustness is shown if the weighting factor is out of its disproportion. This is for example if the weighting factor is 6. Here the results are highly influenced by a too large weighting factor. This example is shown in appendix E.

Here the average of the total collected data of the amount of universities is 2. The standard deviation is 1. If the standard deviation is subtracted from the average, this creates a range of <1 to infinity. If it is summed, the range is >3 to infinity. In order to be more specific and more detailed about the range, the standard deviation is divided by two (50% of the standard deviation) to create a range of 1.5-2.5. See the figure 16.

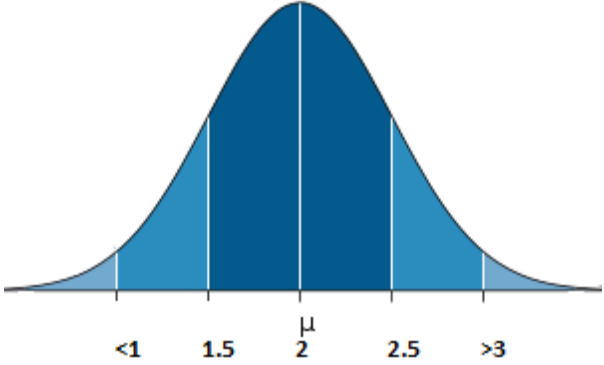


Figure 16- Standard observation

As follows:

Range	Points	Status
>3	2	Excellent
2,5-3	1	Good
1,5-2,5	0	Average
1-1,5	-1	Bad
<1	-2	Worse

The average plus standard deviation has the status of excellent and therefore receives the highest amount of points, 2 points. The average minus standard deviation has the status of worst and receives the lowest amount of points, -2 points etc.

The most points given to a sub-indicator are of course if this sub-indicator is positive for the business environment. If this is not the case, than this rule is inverse; the lowest range receives a status of excellent and collects the highest amount of points, namely two points.

For some sub-indicators the data structure differs. These variables are incubator facility, multilingualism, tax advantages, presence of a cluster, RDA and NDA, research facilities and authenticity. This data has a 'yes or no' structure, which creates a 'dummy' as variable. With a normal standard deviation the standard observation is 60%, with a dummy it always is 50% (yes or no). These sub-indicators with a yes/no structure, points will be given a 'good' or 'bad' status, thus 1 point for a yes and -1 point for a no. To complicate things even more, three of these sub-indicators -- multilingualism, incubator facility and availability of a computer lab (research facilities)--, have a different yes or no structure. For example, multilingualism: there are some cities where the citizens speak more than 2 foreign languages instead of 1 foreign language. This means three option exists, namely 'yes+2', 'yes', 'no', which are translated as 'good', 'average' and 'bad' (1/0/-1 points).

7.2 Limitations of the research

For the results of this research, the procedure to obtain specific information for each city of the gaming industry involved the use and citation of several resources. First of all, personal email contacts were established with regional and national development agencies, game trade organizations and consultancies. These contacts provided documents, reports and personal information. Secondly, web portals have been used to find data. These data method approaches lead to a procedural limitation since data gaps will remain that would have been lessened had each city been personally visited. This could result in a higher margin of error for some (sub)-indicators than for others.

A second limitation of this research involves the difference between a city's status and its size. Some of the investigated cities are more internationally involved than others and may thus where enjoy a higher profile in culture, entertainment and education. The size of a city might influence this (a larger city offers more potential for personal interaction and networking, for example). This means that some of the gathered data is biased because of a city's status and size.

7.3 Explanation of the data

As mentioned before, different resources are cited for this research. This section will shortly provide some information about the data per indicator

- *Infrastructure*

Data on internet speed – cable, DSL, average download speed and the percentage of household broadband connection per region- comes from OECD²² and Eurostat²³. The distance in kilometers to the airport per city is self calculated using the help of *googlemaps*²⁴. Further, the information on public transport and accessibility by road and train is garnered from Eurostat²⁵. The most congested cities are judged from the ranking list TomTom²⁶.

- *Investment*

The data of early-stage venture capital investment per country (as a percentage of the GDP) is from OECD²⁷ whereas the information of the total GDP amount comes from Eurostat²⁸. The data of venture capital amount to IT and computers per country comes from national venture capital

²² OECD Broadband statistics, 2011

²³ Household Internet connection type: broadband, percentage households, Eurostat, 2010

²⁴ <https://maps.google.nl/maps?q=www.goog&ie=UTF-8&hl=nl&authuser=0>

²⁵ Accessibility by rail and road (EU27=100), Eurostat, 2003-2006

²⁶ TomTom European most congested cities, 2012

²⁷ http://www.oecd-ilibrary.org/science-and-technology/oecd-science-technology-and-industry-scoreboard-2011_sti_scoreboard-2011-en, 2011

²⁸ http://epp.eurostat.ec.europa.eu/portal/page/portal/region_cities/introduction, 2012

organizations themselves – these include the Dutch NVP and BVCA²⁹. VC companies that are operating in the field of software have been left out in this research because the founded data was strongly biased. The information of the largest VC companies' amount in a city is from the organization 'The Business Place.'³⁰ Research and Development investments by region and sector are respectively from Eurostat³¹ and KEA³².

- *Demographical factors*

The amount of game companies per city comes from personal contact with regional development agencies. These professionals provide this data per email.³³ The percentage of a student city is self calculated by data on the amount of students per university and the amount of citizens per city (using the help of universities website and Eurostat). The ranking on 'best student city' comes from the ranking list Topuniversities³⁴.

- *Human resources*

Quality of the universities are judged from the Shanghai ranking list, the World Ranking list and its national ranking is from Webometrics³⁵. (Except for Birmingham another source is used, namely 'Birmingham University Guide'). The best scored university per city in these ranking lists is used, since the demand of companies for labor knowledge is mainly to the best university in a city (rather than to a worse quality university in that city). The sub-indicator Academic Ranking of World Universities in Computer Science – 2011, has been left out in this research because of the large biased data of this sub-indicator.

Data on research facilities is divided into a presence of a computer lab and game research center. This data consists of the yes/no structure. The computer lab that primarily concerns with gaming (yes+2) receives 1 point, a normal computer lab 0 points and a non-presence of a computer lab -1 point. Data on research centers is categorized into 'a yes' (1 point) or 'a no' (0 points). Further information of the amount of (advanced) game education and cooperation between universities and companies are collected from the universities websites. The sub-indicator *multilingualism* also has the structure of a 'yes/no' question where more than 2 languages spoken in a city receives 1 point, more than 1 language 0 points, and only 1 language

²⁹ www.nvp.nl; www.bvca.co.uk; www.afic.asso.fr ; www.ivca.ie; www.svca.se; www.bvkap.de

³⁰ <http://www.thebusinessplace.com/venture-capital-all-countries>

³¹ Total intramural R&D expenditure (GERD) by sectors of performance and NUTS 2 regions, all sectors, 2009

³² The economy of culture Europe, KEA 2006

³³ See appendix A for the name of list of regional agencies developments

³⁴ <http://www.topuniversities.com/student-life/best-student-cities/2012/>

³⁵ <http://www.timeshighereducation.co.uk/world-university-rankings/2010-2011/europe.html>;

<http://www.shanghairanking.com/ARWU2011.html>; http://www.webometrics.info/top100_europe.asp?country=fr&submit=go;

http://www.webometrics.info/top100_europe.asp?country=fr&submit=go

Birmingham: "University guide 2011: University league table". The Guardian (London). 2010-06-08.

-1 point. Patents in the gaming field by university come from the source FAQs³⁶ and patent applications to the EPO by priority year at the regional level by IPC sections and classes come from Eurostat³⁷. Ranking by annual research income are judged from the Shanghai Ranking list³⁸.

- *Quality of life*

Data on annual visitors to museums, cinema seats per 100 visitors, amount of public libraries and theaters come from Eurostat³⁹. The amount of hotels per city is from Booking.com and Tripadvisor⁴⁰. Data on the amount of cinemas in a city is collected per city using the help of the internet. Data on the amount of restaurants in a city also comes from the source Tripadvisor. The sub-indicator *authenticity* is divided into yes/no questions, respectively 1 and -1 points --are there canals, a historical center, world heritage monuments or influence of war? (War might have destroyed historical buildings replacing into modern buildings). Data is collected from several cultural websites per city⁴¹.

- *Labor wages and real estate costs*

Data on rents for apartments and housing comes from Eurostat⁴². Only Dublin's data comes from another source, namely an article from Rent Ireland⁴³. The rent for apartments and housing is between 1000-1500 Euro, which is averaged (€1250) for further use in this research. Labor costs data comes from Eurostat and Loonwijzer⁴⁴. Here as well the average of some data (such as the amount of Euros per hour of a programmer in Utrecht is between 14-16 Euro, its average is of €15) is used. Data on commercial real estate costs, the prime yield and office prime are collected from Jones Lang La Salle⁴⁵.

- *Policy interventions*

Data on tax advantages comes mostly from the provided documents by each regional agency. Points are given on basis of the yes/no structure except for cooperate taxes and income taxes.

³⁶ www.faqs.org/patents/asnl/um

³⁷ Patent applications to the EPO by priority year at the regional level by IPC sections and classes, Eurostat 2008

³⁸ www.shanghai-ranking.com/Ranking-Lab/indicator.jsp?param=ari

³⁹ Annual visitors to museums per resident and cinema seats per 1000 inhabitants, Eurostat Amsterdam, Edinburg, Birmingham, Manchester, Dublin (1999-2002), Utrecht, Lyon, Malmo (2003-2006), Karlsruhe, Dusseldorf and Hamburg (2007-2009); theaters (2003-2006 except for Edinburg, Birmingham and Manchester 1999-2003, Dublin: http://www.dublinevents.com/dublin-theatres.php?Im_offset=0). Number of public libraries (2003-2006).

⁴⁰ <http://www.tripadvisor.nl>; www.booking.com

⁴¹ www.lonelyplanet.com;

http://web.archive.org/web/20070522050108/http://www.edinburgh.gov.uk/internet/Environment/Planning_buildings_i_i/Built_heritage/CEC_conservation_in_edinburgh; <http://www.rhinecyclerroute.com/stages/from-basel-to-karlsruhe-through-alsace-and-the-german-vineyards>.

⁴² Average price for an apartment/house per m², Eurostat 2007-2009, except Amsterdam and Utrecht 2003-2006.

⁴³ http://www.rent.ie/houses-to-let/renting_dublin/2_beds/

⁴⁴ Labour cost, wages and salaries, and direct remuneration by NUTS 2 regions – Eurostat, 2008; www.loonwijzer.nl

⁴⁵ www.joneslanglasalle.se

Data on the amount of game funds and game events per city and whether the presence of a game cluster (yes/no question) or a game incubator (yes+2/yes/no question) come mostly from the documents/articles of the regional agencies or game organizations. Cooperation between government and game companies is divided into the presence of a RDA and NDA (yes/no question) and the amount of trade organizations and remaining gaming networks. This data also comes from documents provided by the regional development agencies per city⁴⁶. Data on firms collaborating on innovation with higher education or government research institutions by firm size comes from OECD⁴⁷.

7.4 The results

In this section, the results of the location factors contributing to the business environment of the gaming industry between the 11 European cities will be analyzed and summarized. The business environment to stimulate regional competitiveness in the gaming industry is estimated based on the analysis of:

- Infrastructure (section 7.4.A)
- Investment (section 7.4.B)
- Demographical factors (section 7.4.C)
- Human resources (section 7.4.D)
- Quality of life (section 7.4.E)
- Labor wages and real estate costs (section 7.4.F)
- Policy interventions (section 7.4.G)

The overall results are represented in section 7.5

⁴⁶ See the list of RDAs in appendix A.

⁴⁷ Firms collaborating on innovation with higher education or government research institutions by firm size, OECD 2006-2008.

A. Infrastructure

This main indicator is roughly divided into two subjects: internet speed and the physical accessibility of a city.

Table 14- Internet speed: Fixed (wired)-broadband (upload/download speed (kb/s))

Region	Utrecht	Noord-Holland	Lothian	West Midlands	Greater Manchester	Rhône-Alpes	Dublin	Skane	BW	NRW	Hamburg
Total Points	1.25	1.25	0	0	0	0	0.25	2	0	0	0
Points	0	0	0	0	0	-2	0	2	0	0	0
Cable speed	125.829	125.829	104.858	104.858	104.858	31.457	102.400	209.715	104.858	104.858	104.858
Points	2	2	-1	-1	-1	0	0	2	-1	-1	-1
DSL speed	52.429	52.429	20.972	20.972	20.972	29.360	25.166	62.915	16.777	16.777	16.777
Points	1	1	-1	-1	-1	0	-1	2	-1	-1	-1
Average download speed	50 192	50 192	35 270	35 270	35 270	53 215	26 326	102 763	19 172	19 172	19 172
Points	2	2	2	2	2	2	2	2	2	2	2
%households, broadband	84	75	63	75	80	75	65	82	75	79	78

Malmo scores the highest amount of points with its upload and download speed of fixed broadband, as indicated in the above table. The Nordic countries lead in internet compared to other European countries. For example, cable speed in Sweden is 209.715 Mbps, while in the UK it registers a moderately lower 104.858Mbps. DSL speed and average download speed is also highest in Sweden. The Netherlands ranks second, France ranks third and Germany, the UK and Ireland have on average the lowest kb/s for internet connection possibilities. To compare the percentage of household internet broadband connection per region, the region of Utrecht scores above Skane: 84% of the households have a broadband connection (broadband is the second-fastest internet type). In Dublin and Lothian, 64% of the households have a broadband connection, which is lower than the EU average. The regions in the UK, Germany and France have on average a percentage of 75-80.

The second element of infrastructure is physical accessibility per city, which is divided into accessibility by car and public transport, and distance to the nearest international airport. Since chapter 5 revealed the importance for small-sized game developers of accessibility by public transport, this indicator is weighted 1,5 times (indicated in the red numbers).

Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Total Points	0.67	0.33	-1.33	-0.33	0.33	-1.33	-1.33	-0.67	1	1.67	0.67
Points	0	1	0	0	2	-2	-2	-2	0	1	2
Highways	A2 A27 A12 A28	A10 A4 A2 A1 A8 A9	M8 M9 M90	M5 M6 M40 M42	M61 M60 M602 M67 M56 M62 M66	A46	M50 M1	E20 E6	A5 A65 A8	A 44 A 52 A 46 A 59 A 57 A 3	A1 A7 A23 A24 A25/252/ 253/255 A26/251 A39
Points	1	0	-2	-1	-1	-2	0	2	1	2	0
Most congested %	21,8	26	31,7	27,5	29,5	32,6	24,2	>20	21,3	>20	22,8
Points	1	0	-2	0	0	0	-2	-2	2	2	0
Accessibility by road (EU27=100)	175	152	48	129	113	135	36	49	188	207	148

Table 15 – Accessibility by car

The city of Dusseldorf scores the highest in the accessibility by road index (EU baseline=100). Dusseldorf scores an index of 207.0. Dublin and Edinburgh rank at the bottom, respectively with an index of 36.0 and 48.0. Utrecht scores an index of 175.0. The city of Hamburg has the highest number of nearby highways (as well as major highways), such as the A1, A27 and A24. Lyon, Edinburgh and Dublin have the lowest scores in total; the cities are not connected by a high number of highways, have a high percentage of congested roads (which limits access to the city) and have a low index of accessibility by road.

Table 16 – Accessibility by public transport

Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Total Points * 1,5 points	0.5 0.75	0.75 1.125	-1 -1.5	-0.75 -1.125	0.5 0.75	0.5 0.75	-0.75 -1.125	-0.75 -1.125	0.5 0.75	0.5 0.75	0.5 0.75
Points	0	2	0	0	2	2	2	-2	0	0	2
Kind of transport	Utrecht central	Amsterdam Centraal, Sloterdijk, Zuid, Amstel en Bijlmer ArenA	Edinburghh Waverley, Haymarket railway station	New Street Station	Station Manchester Piccadilly, victoria, Oxford road, Deansgate	Lyon-Part-Dieu, Lyon-Perrache	Heuston , Connolly stations	Öresund Bridge	Karlsruhe Citytbahn	Dusseldorf central	Hamburg Central
	Tram, busses, train	Tram, busses, train, metro	Tram, busses, train	Tram, busses, train	Tram, busses, train, metro	Tram, busses, train, metro	Tram, busses, train, metro	Busses, train	Tram, busses, train	Tram, busses, train	Tram, busses, train, metro
Points	1	1	-2	-2	-2	0	-2	1	1	0	0
Cost of a monthly ticket	35,1	32,6	110	unknown	110,8	46,1	unknown	38,5	44,5	61	54
Points	0	-1	0	-1	2	0	-1	0	-1	0	0
Number of buses per 1000 pop	0,7	0,4	2,6	unknown	7,7	0,9	unknown	0,6	0,2	0,6	0,9
Points	1	1	-2	0	0	0	-2	-2	2	2	0
Accessibility by rail (EU27=100)	197	180	60	127	117	162	35	58	210	233	156

Accessibility by public transport is the best in Amsterdam among the competing cities. Utrecht scores 'an average', together with the all the German cities as well as Manchester and Lyon.. The cost of a monthly ticket for public transport in Utrecht is one of the lowest ((€35,- against the highest €110,- in Edinburgh). Utrecht has one of the highest indexes of accessibility by rail (EU baseline=100). It has an index of 197 compared, compared to the highest index of 233 from Dusseldorf or Karlsruhe's 210. Again Edinburgh scores very low in this index – namely, it scores an index of 60, the worst in this category by -2 points

Table 17 - Distance to the airport

Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Total points	0	1	0	1	0	0	1	0	-2	1	0
KM	45	20	16	20	20	34	13	35	133	9	16
Minutes	30	20	25	20	25	30	20	35	90	15	25
Which airport	Schiphol	Schiphol	Edinburghh	Birmingham	Manchester	Lyon	Dublin	Copenhagen	Frankfurt am main	Dusseldorf	Hamburg

Dusseldorf's airport is only 15 minutes away from its international airport, Dusseldorf Weeze, while Amsterdam's international airport, Schiphol, as well as Birmingham's and Dublin's airports, are distant 20 minutes by car. Furthermore, Hamburg, Utrecht, Edinburgh, Manchester and Lyon have airports within 30 minutes' distance. Only Malmo has a longer drive to an international airport (Copenhagen in this case), namely a drive of 90 minutes.

The city of Amsterdam ranks the highest in the category infrastructure. It scores above average (good) in the indicators of fixed broadband, public transport and distance to airport, while it scores average on accessibility by car. Utrecht ranks in third place, scoring good on the fixed broadband indicator and on accessibility by public transport. Malmo is the only city that scores excellent on internet connection. At the bottom are Edinburgh and Dublin, which score worst on accessibility by public transport and score bad on accessibility by car.

Table 18 - Total score of the indicator infrastructure

Region	Utrecht	Noord-Holland	Lothian	West Midlands	Greater Manchester	Rhône-Alphes	Dublin	Skane	Baden-Wurttemberg	North Rhine-Westphalia	Hamburg
Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Accessibility by car	0.67	0.33	-1.33	-0.33	0.33	-1.33	-1.33	-0.67	1	1.67	0.67
Accessibility by public transport	0.75	1.125	-1.5	-1.125	0.75	0.75	-1.125	-1.125	0.75	0.75	0.75
Distance to nearest international airport	0	1	0	1	0	0	1	0	-2	1	0
Fixed (wired)-broadband	1.25	1.25	0	0	0	0	0.25	2	0	0	0
TOTAL POINTS	2.67	3.705	-2.83	-0.455	1.08	-0.58	-0.455	0.205	-0.25	3.42	1.42
RANK	3	1	11	8	5	10	8	6	7	2	4

B. Investment

This main indicator is divided into two sub-indicators namely R&D investments and venture capital.

Table 19 - R&D investments

Region	Utrecht	Noord-Holland	Lothian	West Midlands	Greater Manchester	Rhône-Alpes	Dublin	Skane	BW	NRW	Hamburg
Total Points	0	-1	0	0	0,5	1	0	0	-0,5	-0,5	-0,5
Points	0	-2	-1	-1	0	0	-1	2	2	0	0
Total intramural R&D expenditure by sectors of performance , % of GDP	1,82	1,17	1,66	1,26	2,25	1,78	1,62	3,89	4,83	2,05	2,3
NUTS 2 regions	West-NL	West-NL	Region	Region	North-West	Center-West	North-Ireland	South-Sweden	Region	Region	Region
Points	0	0	1	1	1	2	1	-2	-1	-1	-1
Total amount for media/culture/creative economy per country in M€	33,372	33,372	132,682	132,682	132,682	78,424	132,682	18,155	126,06	126,06	126,06
% of GDP	2,70%	2,70%	3%	3%	3%	3,40%	3%	2,40%	2,50%	2,50%	2,50%

The total amount in Euros allocated to media, culture and creative economy (on a national level, in the year 2003) is used to indicate which country spends the highest percentage of its GDP on the creative sector. France, as it turns out, spends the highest amount of its GDP on this sector, namely 3,4%. The UK ranks second with 3%, the Netherlands is third with 2.7% and Germany and Sweden rank last (respectively 2.5% and 2.4%). Since these are national-level, figures, this research has also tried to collect data on the regional level. However, specific data for the gaming sector does not exist. Data is collected from the total R&D investments per region. Baden-Wurttemberg and Skane have the highest total intramural R&D expenditure as a percentage of GDP, namely 4.83% and 3.89%. The regions Noord-Holland and West Midlands score the lowest with a percentage of 1.17 and 1.26.

Table 20 - Venture capital investments

Region	Utrecht	Noord-Holland	Lothian	West Midlands	Greater Manchester	Rhône-Alpes	Dublin	Skane	Baden-Wurttemberg	North Rhine-Westphalia	Hamburg
Total Points *1.5 points	0	0.67 1.005	0	-0.33 -0.495	-0.33 -0.495	-0.66 -1.005	0	1 1.5	-0.33 -0.495	-0.33 -0.495	-0.33 -0.495
Points	0	0	0	0	0	-1	-1	2	-1	-1	-1
VC investments per country	110,632	110,632	404,647	404,647	404,647	353,206	29,935	111,808	436,222	436,222	436,222
% GDP	1,86%	1,86%	2,25%	2,25%	2,25%	1,78%	1,66%	3,43%	1,76%	1,76%	1,76%
GDP total	594,481.0	594,481.0	180,071.1	180,071.1	180,071.1	1,993,195.0	179,989.8	333,255.7	2,473,800.0	2,473,800.0	2,473,800.0
Points	0	0	0	0	0	0	0	2	0	0	0
VC amount IT million-Per country	52	52	90	90	90	63	90	111.2	82	82	82
% GDP	0.87%	0.87%	0.5%	0.5%	0.5%	0.32%	0.5%	3.3%	0.3%	0.3%	0.3%
Points	0	2	0	-1	-1	-1	1	-1	0	0	0
# largest VC companies	7	34	5	2	1	1	18	2	12	12	12

Since this research concerns small-sized game developers, which include start-ups and early-stage companies, venture capital is very important, especially at an early stage. Sweden allocates the highest percentage of its GDP to venture capital investments for companies in an early stage, namely 3.43% of its GDP. This is followed by the UK with 2.25% and the Netherlands with 1.86%. Ireland ranks at the bottom, with 1.66% of its GDP. This data concerns venture capital at an early stage, and it includes all sectors. Subsequently, the comparison of total amount of venture capital to IT/Computers is also made. Sweden spends 112 million Euros on this sector, which is 3.3% of the total GDP. Sweden scores 'an excellent' on this. The remaining cities all score average on this sub-indicator.

Since this is national-level data, an expansion of regional data is made. Here international venture capital companies specialized in the field of software/computers is added to the data. Amsterdam scores 'an excellent' with 34 word wide VC companies and Dublin scores 'a good' with 18 VC companies. The rest of the cities score between 'average and bad'.

The region Skane has the most points and therefore ranks the highest in the category investments. It scores 'a good' in the indicator of venture capital investment, while it scores average on R&D investments. Overall, the cities score average on R&D investments, while only Lyon scores 'a good' and Amsterdam 'a bad' on this indicator. The sub-indicator of venture capital contradicts, Amsterdam scoring good and Lyon bad. The German cities position at the bottom of the ranking.

Table 21 - Total score of the indicator Investments

Region	Utrecht	Noord-Holland	Lothian	West Midlands	Greater Manchester	Rhône-Alpes	Dublin	Skane	Baden-Wurttemberg	North Rhine-Westphalia	Hamburg
Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
R&D	0	-1	0	0	0,5	1	0	0	-0,5	-0,5	-0,5
Venture capital	0	1.005	0	-0.495	-0.495	-1.005	0	1.5	-0.495	-0.495	-0.495
TOTAL POINTS	0	0.005	0	-0.495	0.005	-0.005	0	1.5	-0.995	-0.995	-0.995
RANK	4	2	4	8	2	7	4	1	9	9	9

C. Demographical factors

The main indicator demographical factor is divided into two sub-indicators: number of game companies in a city and whether the city is a student city or not.

Hamburg's region has an exceptional large amount of 150 game companies. Only Malmo, Lyon, Karlsruhe and Dusseldorf score lower than 50 game companies (Lyon's amount of 40 game

companies is however still between the range of ‘the average score’ and therefore receives 0 points).

Table 22 - Number of game companies in a city

Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Points	0	0	0	0	0	0	0	-2	-1	-1	2
Number	50	50	50	55	55	40	50	20	35	35	150

To determine which city scores the best on the sub-indicator of student city, the following data is used:

Table 23 - Student city

Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Points total	2	0	2	-1	1	2	0	-1	-1	-2	-2
Points	2	0	2	-1	1	2	0	-1	-1	-2	-2
Region residents (*1000)	884,4	1.003,50	1.816,30	417,9	2.039,80	141,8	1.313,60	112,1	300,7	523,9	2.357,60
City amount citizens	294737	747093	471700	1019200	473200	472400	505 739	286535	290736	584217	1772100
Amount of students (*1000)	65	80	100	65	80	120	70	24	19	20	38
% Students	22%	10,70%	21,20%	6,40%	16,90%	25,40%	13,80%	8,30%	6,50%	3,40%	2,10%

Utrecht, Edinburgh and Lyon score ‘an excellent’ on the amount of students in their city, respectively 22%, 21,2% and 25,4% of their citizens are students. Dusseldorf and Hamburg score ‘a worse’ since their percentage of students in their cities is respectively only 3,4% and 2,1%.

Table 24 - Total score of the indicator demographical factors

Region	Utrecht	Noord-Holland	Lothian	West Midlands	Greater Manchester	Rhône-Alpes	Dublin	Skane	BW	NRW	Ham-burg
Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Number of companies in the gaming industry	0	0	0	0	0	0	0	-2	-1	-1	2
Student city	2	0	2	-1	1	2	0	-1	-1	-2	-2
TOTAL POINTS	2	0	2	-1	1	2	0	-3	-2	-3	0
RANK	1	5	1	8	4	1	5	10	9	10	5

Utrecht, Edinburgh and Lyon rank the highest among the other cities. They score ‘an excellent’ on the sub-indicator of student city. Malmo, Karlsruhe and Dusseldorf rank at the bottom. The cities score ‘a worse’ on the sub-indicator of student city and Malmo also score worst on the amount of companies in the gaming industry. Hamburg scores ‘an excellent’ on the sub-indicator of the number of game companies in the gaming industry.

D. Human resources

This indicator is divided into sub-indicators; number of higher education and research facilities, number of (advanced) game education, cooperation between game companies and universities and whether appearance of multilingualism in the region occurs.

First, an overview of the higher education institutions:

- Utrecht: Utrecht University
- Amsterdam: VU University Amsterdam, University of Amsterdam
- Edinburgh: University of Edingburg, Herriot- Watt University
- Birmingham: University of Birmingham, Birmingham city University
- Manchester: University of Manchester, Manchester metropolitan University
- Lyon: Claude Bernard University Lyon 1, University Lumière Lyon 2, University Jean Moulin Lyon 3, ENS de Lyon
- Dublin: Trinity College Dublin , University College Dublin (UCD), Dublin City University (DCU)
- Malmo : Malmo University
- Karlsruhe: Karlsruhe Institute of Technology
- Dusseldorf: Heinrich Heine- University
- Hamburg: University of Hamburg, HAW - University of applied science, Technische University Hamburg

The universities are tested on their quality and their research facilities (if there is a computer science lab and a research center which focuses on gaming).

Table 25 - Number of higher education and research facilities

Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Points total	0,5	0.16	1	0	0.5	1	0.83	-1,33	-1	-1.5	0.33
Points	-1	0	0	0	0	2	2	-1	-1	-1	2
Universities amount	1	2	2	2	2	4	3	1	1	1	3
Quality of universities (rank position)											
Points	-1	-1	2	-1	0	2	1	-2	-2	-2	-2
Worldrank	143	VU.139	Uni Edin.40	UB.145	Uni Man.87	ENS.28	Trinity.76	Not	187	Not	Not
Points	2	0	2	0	2	-1	-1	-2	-2	-2	0
Shanghai rank	48	126	53	126	38	250	250	Not	350	Not	176
Points	2	1	1	0	0	1	2	-1	-2	-2	0
National rank	1	UVA.3	Uni Edin. 4	UB. 10	Uni Man.8	Claude.2	Trinity. 1	17	43	24	Uni ham.10
Research facilities											
Points	0	0	0	0	0	1	0	-1	0	-1	1
Computer science lab	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes
	Game technology	Intertain home lab HSC-Lab	IDEA lab	Birm Uni lab	HCW Lab	LIP	Open source lab		EMCL lab		Gamecity lab
						LIRIS-research lab (focus on game)					
Points	1	1	1	1	1	1	1	-1	1	-1	1
Research centre	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes

The universities of Utrecht, Amsterdam, Manchester and Dublin rank high on the World and Shanghai lists. The universities of Malmo, Dusseldorf and Hamburg are not included in these lists. These universities also score below average on national level. The University of Utrecht and Dublin Trinity College rank first on national level.

Only the universities of Malmo and Dusseldorf do not have a computer science lab. Hamburg and Lyon have a specialized computer science lab in games, namely the Gamecity Lab (cooperation between HAW and Hamburg Gamecity organization) and LIRIS-research lab in the innovative cluster Imaginove. Except for Heinrich Heine University in Dusseldorf, all the other universities have research centers in the field for gaming.

The sub-indicator ‘number of game education’ is marked in red, which indicates a very important element for game developers.

Table 26 - Number of game education and advanced game education

Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Points	0	-1	0	1	2	1	1	-1	-1	-1	-1
*2		-2		2	4	2	2	-2	-2	-2	-2
Game education	12	6	25	29	52	31	26	5	6	4	6
Points	-1	-1	1	0	2	2	0	-1	-1	-1	0
Advanced game education	2	1	10	7	18	16	5	1	2	2	5

Comparing the availability of game education among the universities, the universities in Manchester, Birmingham, Dublin and Utrecht have the highest amount of game educations. University of Malmo and Heinrich Heine University are positioned last. Since game educations also concern game design and animation, a separation of advanced game education is made (programmers and informatics). The universities of Manchester, Dublin and Edinburgh rank the highest on the sub-indicator of advanced gaming. While University of Utrecht only has two educations that are focused on game advanced education- Informatics and game technical development- informatics rather has a strong focus on game specialization due to its study of Gametechnology.⁴⁸

Data on the amount of patents application in the field of gaming is used to indicate the rank of cooperation between companies and universities. The universities of Karlsruhe, Dublin and Edinburgh score high which points out a good cooperation between academic and practice level. Utrecht has a relatively high patents application but none of these applications are for software/hardware. This data was not available for all the universities, that is why data on the annual research income per university and the number of patent applications per region is used

⁴⁸ See for specific details about the game education appendix B

as well. German cities score relatively high in the indicator patent applications (average around 285.000 patent applications in 2008), while annual research income index is below average (except for Karlsruhe IT University). Also, the regions of Lyon and Malmo score quite high for regional patent application (227.000 and 320.000 respectively) but have a much lower annual research income index. Utrecht ranks quite high in their annual research income index (national position of 48) and but has a lower amount of patent applications, around 131.000 patent applications in 2008.

Table 27 - Cooperation between universities and companies

Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Total Points	0.25	-0.5	0.5	-0.5	0.5	-0.5	0.25	0.25	0.75	-0.25	0
Points	0	0	0	0	0	0	2	0	1	0	0
Patents in gaming field by university	0	0	0	0	0	1	8	0	2	0	0
Points	2	0	2	0	2	-1	-1	0	-2	-1	0
Ranking by Annual Research Income National	48	126	53	126	38	250	250	126	350	250	175
Points	0	-1	0	-2	-2	0	-1	2	2	1	0
Patent applications regional level	131,619	92,332	123,464	41,853	33,552	227,068	66,169	318,721	406,356	524,28	243,387
	Region	Region	City	Region	Region	Region	City	Region	City	City	City
Points	-1	-1	0	0	2	-1	1	-1	2	-1	0
Research centers collaboration within the game industry	5	4	23	26	49	11	31	3	63	3	12

The last element within the sub-indicator cooperation universities and companies is the availability of research centers in the universities that cooperate with game companies. The universities of Karlsruhe, Edinburgh and Dublin have a lot of research centers per departments. Karlsruhe has for example an innovation Park (MFG) and the department of informatics has several institutes which focus on software/computer research such as *Chair for Computer Architecture and Parallel Processing* (Institute of Computer Engineering) and *software design and quality* (Institute for Programme Structures and Data Organisation). In Dublin, the Trinity University and UCD have several institutes which focus on research for computer systems, information systems, software systems and engineering and technology. The University of Edinburgh has a special *Research and Innovation* department, where several institutes focus on digital communication research, computing systems architecture systems and high performance computing.

Utrecht has some excellent research centers, as well as Utrecht's University as the HKU (Creative Xcellerator) but Utrecht has the disadvantage to be quite smaller compared to other universities.

The sub-indicator multilingualism also is an important element for the business environment of game developers. The English, Scottish and Irish cities do not score high, since English is the only spoken language (even if this language is the most important language for game developers). The cities of the Netherlands and Sweden score the highest points since habitants in these countries often speak more than 2 foreign languages.

Table 28 - Multilingualism

Region	Utrecht	Noord-Holland	Lothian	West Midlands	Greater Manchester	Rhône-Alpes	Dublin	Skane	BW	NRW	Hamburg
Points	1	1	-1	-1	-1	0	-1	1	0	0	0
Multilingualism	Yes >2	Yes >2	No	No	No	Yes	No	Yes >2	Yes	Yes	Yes

Manchester has the best position in the category human resources. Manchester scores elevated on the amount of game education as well as on the number of advanced game education. It also has a good cooperation environment between companies and universities and a high number of higher education and research facilities. Lyon ranks second, scoring excellent on the number of game (and advanced) education and average on its cooperation environment. The University of Utrecht scores below average on advanced game education. It ranks fifth in the category of human resources.

Table 29 - Total score of the indicator human resources

Region	Utrecht	Noord-Holland	Lothian	West Midlands	Greater Manchester	Rhône-Alpes	Dublin	Skane	BW	NRW	Hamburg
Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Number of higher education institutions and research facilities	0,5	0.16	1	0	0.5	1	0.83	-1,33	-1	-1.5	0.33
Number of game education	0	-2	0	2	4	2	2	-2	-2	-2	-2
Number of advanced game education in programmers	-1	-1	1	0	2	2	0	-1	-1	-1	0
Cooperation companies and university	0.25	-0.5	0.5	-0.5	0.5	-0.5	0.25	0.25	0.75	-0.25	0
Multilingualism	1	1	-1	-1	-1	0	-1	1	0	0	0
TOTAL POINTS	0.75	-2.34	1.5	0.5	6	4.5	2.08	-3.08	-3.25	-4.75	-1.67
*2 points	1.5	-4.68	3	1	12	9	4.16	-6.16	-6.5	-9.5	-3.34
RANK	5	8	4	6	1	2	3	9	10	11	7

As mentioned before, the main indicator 'human resources' is indicated as a very important among the other main indicators. Therefore this main indicator is weighted 2 times.

E. Quality of life

This indicator is divided into two sub-indicators, namely amenities and authenticity.

The sub-indicator ‘amenities’ is measured by the number of museum visitors, hotels, theaters, cinemas, public libraries and restaurants. Amsterdam and Hamburg score the highest amount of points.

Table 30 - Amenities

Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Total points	-1.28	0.86	0.43	-0.28	0.43	0.14	0.14	-1	-0.86	-0.43	0.86
Points	-1	2	2	-1	0	-1	-2	0	0	0	-1
Annual visitors to museums per resident	1	10,2	8,4	0,8	2	0,8	unknown	1,4	2,6	1,6	1,3
Year	2003-2006	1999-2002	1999-2002	1999-2002	1999-2002	2003-2006		2003-2006	2007-2009	2007-2009	2007-2009
Points	-2	2	1	0	0	0	0	-2	-1	0	1
# Hotels	26	530	312	139	126	157	196	36	57	237	322
Points	-1	2	-1	-1	-1	1	1	0	-2	-1	2
# Theaters	8	49	10	8	10	31	26	15	3	6	34
Points	-1	0	-1	0	2	0	0	-1	-2	0	2
# Cinemas	7	15	8	11	23	13	13	7	5	11	28
Points	-1	-1	2	0	2	-1	0	-2	2	0	-1
Cinema seats per 1000 habitants	12,9	15,2	31	19,1	39,3	14	24,2	8	29,5	16,3	10,8
Year, Eurostat	2003-2006	2003-2006	1999-2002	1999-2002	1999-2002	2003-2006	2003-2006	2007-2009	2007-2009	2007-2009	2007-2009
Points	-2	1	0	-1	0	0	0	-1	-2	0	2
# restaurants	191	1480	1114	573	808	1080	973	280	57	947	2427
Points	-1	0	0	1	0	2	2	-1	-1	-2	1
# Public Libraries Year 2003-2006	14	25	30	44	23	74	51	14	16	9	44

Utrecht scores the highest amount of points with the sub-indicator ‘authenticity’, which is divided into the presence of canals, a historical center and world heritage monuments. Also, whether a city has been bombed during the World Wars, influences the authenticity of a city (if so, then there is a higher presence of more modern buildings instead of old-traditional buildings). Amsterdam, Edinburgh and Lyon also have high amount of points with authenticity. Manchester, Malmo and Dusseldorf score the lowest scores with no presence of canals, historical heritage monuments and a non historical center.

Table 31 - Autenticity

Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Total Points	1	0.5	0.5	-0.5	-0.5	0.5	0	-0.5	0	-1	0
Canals	1 Yes	1 Yes	-1 No	1 Yes	-1 No	-1 No	-1 No	-1 No	-1 No	-1 No	1 Yes
Historical center	1 Yes	1 Yes	1 Yes	-1 No	1 Yes	1 Yes	1 Yes	-1 No	1 Yes	-1 No	1 Yes
Influence WWs	1 No	1 No	1 No	-1 Yes	-1 Yes	1 No	1 No	1 No	-1 Yes	-1 Yes	-1 Yes
World heritage monument	1 Yes	-1 No	1 Yes	-1 No	-1 No	1 Yes	-1 No	-1 No	1 Yes	-1 No	-1 No

Amsterdam ranks first in the category quality of life. Amsterdam scores high on their amenities as well as Hamburg, however Hamburg's authenticity scores below average. Utrecht ranks seventh in the category of quality of life. It scores first on authenticity but scores 'bad to worse' on amenities.

Table 32 - Total score of the indicator quality of life

Region	Utrecht	Noord-Holland	Lothian	West Midlands	Greater Manchester	Rhône-Alpes	Dublin	Skane	BW	NRW	Hamburg
Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Amenities	-1.28	0.86	0.43	-0.28	0.43	0.14	0.14	-1	-0.86	-0.43	0.86
Authenticity	1	0.5	0.5	-0.5	-0.5	0.5	0	-0.5	0	-1	0
TOTAL POINTS	-0.28	1.36	0.93	-0.78	0.17	0.64	0.14	-1.5	-0.86	-1.43	0.86
RANK	7	1	2	8	5	4	6	11	9	10	3

F. Labour wages and real estate costs

This indicator contains costs for a game company which are divided into labor wages and real estate costs (commercial and personal housing).

Table 33 - Labor wages

Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Total points	0	-0,5	0,5	0,5	0,5	-1,5	0,5	-2	1,5	1	0,5
Points	0	-1	1	1	1	-2	1	-2	1	1	0
Computer programming, consultancy and related activities, per hour	15	15,5	8,02	8,02	8,02	21,17	8,02	25	8,35	7,85	9,50
Points	0	0	0	0	0	-1	0	-2	2	1	1
Motion picture, video and television progr. production, sound recording and music publishing activities per hour	11	11	8,02	8,02	8,02	11,33	8,02	19	5,95	7,50	6,92

The city of Karlsruhe has the lowest wages for programmers and video design program production per hour (respectively €8.35 and €5.95). Malmo scores worst with its high labor wages, respectively €25 and €19 per hour.

The real estate cost of housing is measured in the monthly rents of houses and apartments. The cities Dublin and Lyon score 'an excellent' with low average renting prices between 1000-1500 Euro per month, compared with the average renting prices of Edinburgh (around 3000 Euro per month).

Table 34 - Housing costs

Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Total points	0	0	-2	0,5	-1	2	2	0	0	-1,5	0
Points	0	0	-2	0	-2	2	2	1	1	-1	0
Price appartement (rent), €	1.939,00	1.921,00	3.039,00	2.172,00	2.579,00	1.266,30	1250	1.558,10	1.700,00	2.500,00	1.930,00
Points	0	0	-2	1	0	2	2	-1	-1	-2	0
Price house (rent), €	2.012,00	2.044,00	3.164,00	1.962,00	2.041,00	1.543,50	1250	2.696,90	3.000,00	3.700,00	2.300,00
Year	2003-2006	2003-2006	2007-2009	2007-2009	2007-2009	2007-2009	2009	2007-2009	2007-2009	2007-2009	2007-2009

Karlsruhe has the lowest real estate costs of commercial building (in this case; offices with a minimum of 1.000m²) compared to other cities. Since this sub-indicator is very important for game developers, it is weighted 1.67 times. This sub-indicator is measured by the prime yield (return of investments) and office prime rents per year per m² (in Euros). The prime yield is highest in the city of Dublin (7,5% gives an excellent score), followed by Karlsruhe and Manchester (both 6,5%). Utrecht has a prime yield of 5.8%. The office prime rents are the highest in Manchester and Birmingham (respectively 447 and 425 Euro per m² per year). The lowest costs for commercial buildings are found in Karlsruhe, which is around 140 Euro per m² per year. Utrecht's commercial buildings costs are relatively low by its 220€ per m² and therefore scores quite high on real estate costs.

Table 35 - Real estate costs

Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Total points	0,5	0	-0,5	-1	-0,5	0	1	0,5	1,5	-1	-1
*1.67 points	0.835		-0.835	-1.67	-0.835		1.67	0.835	2.505	-1.67	-1.67
Points	0	0	0	0	1	0	2	0	1	-2	-2
Prime yield	5,8	5,55	6	6	6,5	6	7,5	5,5	6,5	4,95	4,75
Points	1	0	-1	-2	-2	0	0	1	2	0	0
Office prime rents per year in Euros per m²	220	335	349	425	447	270	344	235	139,2	288	288

Dublin scores the highest points on the indicator labor wages and real estate costs. The city scores excellent in housing costs, good in real estate costs and average in labor wages. Lyon also scores excellent in housing costs. Utrecht ranks third on the indicator labor wages and real estate costs, scoring average on all the sub-indicators. Only Malmo and Edinburg score worse in labor wages and housing costs. The rest of the cities score average on the three sub-indicators.

Table 36 - Total score of the indicator labor wages and real estate costs

Region	Utrecht	Noord-Holland	Lothian	West Midlands	Greater Manchester	Rhône-Alpes	Dublin	Skane	Baden-Wurttemberg	North Rhine-Westphalia	Hamburg
Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Labor wages	0	-0,5	0,5	0,5	0,5	-1,5	0,5	-2	1,5	1	0,5
Real estate costs (commercial)	0.835	0	-0.835	-1.67	-0.835	0	1.67	0.835	2.505	-1.67	-1.67
Housing costs	0	0	-2	0,5	-1	2	2	0	0	-1,5	0
TOTAL POINTS	0.835	-0.5	-2.335	-0.67	-1.335	0.5	4.17	-1.165	4.05	-2.17	-1.17
RANK	3	5	11	6	9	4	1	7	2	10	8

G. Policy interventions

The indicator policy interventions consists of five sub-indicators: incubator facilities; game events; cooperation between government and the gaming industry; tax advantages; game funds/subsidies and the presence of a game cluster in a region.

The sub-indicator ‘incubator facilities’ is red marked, which indicates a very important element for the game developers.

Table 37 - Incubator facilities

Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Points	1	0	0	-1	-1	-1	-1	-1	-1	-1	1
*1.5 points	1.5			-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	1.5
Name	DGG	Matrix innovation center	ETTC @ Informatics Incubatees	No	No	No	No	No	No	No	gamecity: hamburg; gamecity port
	Also housing										Also housing

Only the cities Utrecht and Hamburg have game incubator facilities. Utrecht has the Dutch Game Garden organization and Hamburg ‘Gamecity:Hamburg’. These organizations also provide housing for game developers for a special renting price. These housings are very beneficial for networking as well. Amsterdam and Edinburgh also have incubators (Matrix innovation center and ETTC Informatics Incubatees) but these incubators are focused on all the aspects of computers and informatics, not per se on games.

With the 'availability of game events' in a city, Utrecht and Hamburg score the highest amount of points among the other cities. Utrecht's DGG and Hamburg Game city play herein an important role. Karlsruhe does not provide any game events, even though one of the most important game events is in the region Baden-Wurttemberg (Gamescom in Cologne). Therefore Karlsruhe, as well as Lyon and Manchester have the lowest scores. Remarkable is the city of Malmo. Though Malmo is a smaller city compared to the other cities, the largest game events of the Nordic countries are hold in Malmo; The Nordic game event and the Swedish game Awards.

Table 38 - Game events

Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Points	1	-1	-1	0	0	-2	-1	0	-1	0	1
Total Amount	4	2	2	3	3	1	2	3	2	3	4
Events	Holland Animation Film Festival TFI symposia NLGD Festival of Games INDIGO	Amsterdam City Games GotGame Conference	Edinburgh Interactive Edinburgh International Science Festival	2Digital Days Launch Conference Games & Digital Meet-Up	Manchester Design Symposium Playexpo Future everything	Game connction	SV Forum World innovation	the Nordic Game Dataspels galan (awards) Swedish Game Awards	Film und medien festival Creativity world forum	Gamescom-cologne ADVANCE - International Web Conference & Startup GDC Europe	Clash of Realies Deutscher Entwickler preis Living Games Festival Spieleent wicklertreffen NRW

The cooperation between government (whether on national or regional level) and business environment is divided into several aspects as table 39 shows.

Manchester scores the highest points compared to the other cities. The UK cities allocate the highest percentage of firms collaborating with universities and government research institutions, namely 19%. The Dutch cities have a percentage of 14.4 and Sweden of 14.3. Irish companies have the less tight cooperation among universities, companies and government, with a percentage of 9.3. All cities have regional and national development agencies (RDA and NDA) operating in the gaming sector. Examples for RDAs are Invest Utrecht, Invest Skane and MIDAS (Manchester). Examples for NDAs are UKTI, Invest Sweden and Invest Germany. Game trade organizations are most often found in Germany (G.A.M.E, BUI, BDW). The remaining networks in the gaming industry are most often found in Lyon, Hamburg and Karlsruhe, such as networks as ISLE, Edic Economic Cluster, Harbour of the Games Industry PROJECT.

Table 39 - Cooperation between the gaming industry and the government

Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Total Points	0.4	0.4	0.2	0.6	1	0.4	-0.6	0	0.6	-0.2	0.8
Points	0	0	2	2	2	0	-2	0	-2	-2	-2
Firms collaborating on innovation with higher education or government research institutions by firm size, 2006-08											
% of innovative SME firms, per country, 2006-2008											
%	14,4%	14,4%	19%	19%	19%	13,1%	9,3%	14,3%	10,3%	10,3%	10,3%
Points	1	1	1	1	1	1	-1	1	1	1	1
RDA	Invest Utrecht	IAM Amsterdam	Edinburgh inspiring capital	Business Birmingham	MIDAS	Aderly/only Ardi Lyon	Not	INVEST SKANE	BWI (Stuttgart)	Landeshauptstadt Dusseldorf Wirtschaftsförderungsamt NRW.INVEST GmbH	HWF Hamburgische Gesellschaft für Wirtschaftsförderung mbH
Points	1	1	1	1	1	1	1	1	1	1	1
NDA	NFIA	NFIA	Scottish development international	UKTI	UKTI	Invest in France	Enterprise Ireland IDA Ireland	INVEST SWEDEN	Invest in Germany AMCHAM Germany Germany trade and invest	Invest in Germany AMCHAM Germany Germany trade and invest	Invest in Germany AMCHAM Germany Germany trade and invest
Points	0	0	-2	0	0	-2	-1	0	1	1	2
Trade organisation	Federation Dutch creative industries DGA Gamesindustrie NewZoo	Federation Dutch creative industries DGA Gamesindustrie NewZoo	Creative Scotland	TIGA ELSPA INTERNATIONAL GAME DEVELOPERS ASSOCIATION (IGDA Midland)	TIGA ELSPA INTERNATIONAL GAME DEVELOPERS ASSOCIATION (IGDA West UK) Manchester Digital	SNJV_Syndicat National du Jeu Vidéo	The Interactive Games Association of Ireland (IGAI) Gamedevelopers.ie	The Swedish game industry Swedish Computer Games Industry Dataspelebranschen Elektronik IGDA	BUNDESVERBAND DIGITALE WIRTSCHAFT E.V. *CONNECTED GAMES G.A.M.E (der Bundesverband der Entwickler von Computerspielen) BUI (Bundesverband Interaktive Unterhaltungssoftware) MFG Medien- und Filmgesellschaft Baden-Württemberg MFG innovatie für IT und Media RKW-kreative	BUNDESVERBAND DIGITALE WIRTSCHAFT E.V. *CONNECTED GAMES G.A.M.E (der Bundesverband der Entwickler von Computerspielen) BUI (Bundesverband Interaktive Unterhaltungssoftware)	BUNDESVERBAND DIGITALE WIRTSCHAFT E.V. *CONNECTED GAMES G.A.M.E (der Bundesverband der Entwickler von Computerspielen) BUI (Bundesverband Interaktive Unterhaltungssoftware)

Points	0	0	-1	-1	1	2	0	-2	2	-2	2
Amount	9	9	7	7	10	11	9	3	11	5	11
Remain networks	Agentschap.nl Utrecht.inc Cultuur ondernemen Expertisecentrum Games en Game-Design Level up! Taskforce Innovatie Regio Utrecht (TFI) GATE U-Design Dutch Games go Global	Agentschap.nl Cultuur Ondernemen Dutch Games go Global Institute Waag society Creative cities Amsterdam area Pakhuis de Zwijger AIM Control Magazine Expertisecentrum Games en Game-Design	Scottish executive Smart: Scotland Creative Edinburgh Digital Markets Creative life Digital Media & Creative Industries Cultural Enterprise Office	Games investor consulting Network LYON-B-W- Piermont Department for media, culture and sport All Party Computer Video games industry group Cultural industrie development agency Creative industries technology and innovation Knowledge transfer network	Games investor consulting Sharpproject, greater Manchester Department for media, culture and sport East manchester's the sharp project. Manchester network access point Mdda Manchester masters The SME club Design initiative Institute of directors North West	Network stuttgart-barcelona-milaan-lyon Entreprise Rhone-Alpes International EDIT economic cluster Minalogic ICLSI ISLE Creative Cities network Network DW-west midlands-piemont Artist Kaleidoscope Network met DW-catalyna-italia	CEB BIC Technology Transfer Office The Irish Internet Association Irish software Association ICT Ireland Engineers Ireland MicroTrade Dublin Regional Authority	Nordic game program Oresond region Swedish agency for economic and regional growth	Corporation WRS MFG-Medien und filmgeschellschaft BW <i>*virtual worlds & digital games lab</i> CREATE 2009 network LYON- west midlands- piemont network stuttgart-barcelona-milaan-lyon European Creative Cluster Lab Baden-Württemberg: Connected e.V., Cluster Visual Computing Biotic Valley Crealys	Media NRW Film en Media Foundation NRW Games.com the Game Design Initiatief dysenterie (GDI.Ruhr) Ruhr games factory (GFR)	Harbour of the Games Industry PROJECT Networks/associations BVDW: Fachgruppe Connected games eco – Verband der deutschen Internetwirtschaft e.V. GameParents.de e.V. GDI – Game Development Initiative Ruhr

The two main important tax credits for games are ‘tax credit video games’ and ‘R&D tax credits’. The video game tax credit only occurs in the UK and France. In the Netherlands a similar tax credit occurs that concerns of income tax paid for game companies. In the UK the tax credit video is as follows: game developers that have a cost above 3 million pounds, have a 20% tax relief. If it is between 50,000-3 million pounds, this tax relief is 25%. In France there is a tax relief above €150,000 development costs. In the Netherlands the ‘income tax’ includes that game companies have a 50% income tax paid up to earnings <€250000, and above €250000 the income tax is reduced by 18%.

Table 34 - Tax advantages

Region	Utrecht	Noord-Holland	Lothian	West Midlands	Greater Manchester	Rhône-Alpes	Dublin	Skane	BW	NRW	Hamburg
Total Points	0.16	0.16	-0.16	0.16	0.16	1	0	-0.66	-0.83	-0.83	-0.83
Points	1	1	-1	1	1	1	-1	-1	-1	-1	-1
Tax Credit Video Games	Yes	Yes	No	Yes	Yes	Yes	No	No	No	No	No
Detail											
NL: paid up to earnings: <250000; >250000 income tax reduce by 18%											
UK: game development cost more than 3million, than 20% tax relief; Game costing between 50,000-3m, than 25% tax relief											
FR: >150000, 20 % tax relief											
Points	1	1	1	1	1	1	1	-1	-1	-1	-1
R&D tax credits	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No
Detail											
NL: start-up:60% van 110000, After each year 14%											
UK: 150% R&D costs relief for profit											
FR: R&D costs till 100 mi, 40% refund, 2 ^e yr 35%, 3 ^e yr 30%											
Points	-1	-1	-1	-1	-1	1	-1	-1	-1	-1	-1
Creation Tax Credit	No	No	No	No	No	Yes	No	No	No	No	No
Points	-1	-1	1	1	1	2	-2	-2	1	1	1
Income max. tax rate%	52%	52%	45%	45%	45%	41%	55%	56,6%	45%	45%	45%
Points	1	1	-1	-1	-1	-1	1	1	-1	-1	-1
Foreign tax credit	Yes, the 30% ruling	Yes	No	No	No	No	Yes, foreign dividends via 12.5% tax rate	Yes, SARP, income tax till 50% >100,00	No	No	No
Points	0	0	0	0	0	2	2	0	-1	-1	-1
Corporate tax %	25%	25%	27%	27%	27%	33,30%	12,5%	26,3%	30%	30%	30%

The R&D tax credit does not occur in the countries of Sweden and Germany (In Sweden, its most important public contribution is its free-use of schooling system). The other countries have different rates of the R&D tax credit. The ‘creation tax credit’, maximum income tax rate and the

foreign tax credit (a lot of game developers have foreign experts in their teams) are other important taxes in the gaming industry. Only France has the creation tax credit, which is to stimulate innovation in products and services in creation and the diffusion of interactive multimedia, digital and audiovisual content. It covers up to 20% of production costs for certain innovative games. The foreign tax credit occurs in the Netherlands (30% ruling tax), Ireland (Foreign dividends via 12.5% tax rate) and Sweden (SARP; no income tax till 50% if above €100,000). These countries also have the highest maximum income tax rate, respectively 52%, 55% and 56,6%. France allocates the lowest percentage of 41.

Lyon scores here the highest amount of points, scoring good in the total average. The three German cities score worst in tax advantages.

Table 35 - Amount of regional funds

Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Total Points *1.67 points	-0,25 -0.418	-0,25 -0.418	-1,5 -2.505	1 1.67	1 1.67	1,25 2.087	-1 -1.67	-0,25 -0.418	0,25 0.418	-0,75 -1.253	-0,5 -0.835
Points	-2	-2	-2	0	0	2	-2	0	2	0	0
Regional Game funds	0	0	0	2	1	3	0	2	3	1	2
Points	-2	-2	-2	1	1	1	0	0	2	0	1
Funds total	1	0	0	7	7	7	4	4	10	5	7
Points	2	2	-2	1	1	2	-2	0	-1	-1	-1
National Game funds	6	6	0	5	5	7	0	3	2	2	2
Points	1	1	0	2	2	0	0	-1	-2	-2	-2
Funds total	14	14	11	19	19	8	7	6	3	3	3

The sub-indicator game funds is indicated as very important and therefore it is weighted 1.67 times. Game funds and game subsidies are on regional level rare⁴⁹. Lyon, Malmo and the German cities have each two or three regional gaming subsidies. There are more funds and subsidies that concern to the whole creative industry or to the software/IT sectors. If these sectors are included as well, then beside the German cities, Birmingham and Manchester also score quite high. Utrecht and Amsterdam score worst in regional funds and subsidies.

On national level the Dutch cities have more subsidies related to the gaming industry. Important funds are 'Game funds; Funds for the creative industry and Research & Innovation in Smart Creative Contexts (RISCC)'. Edinburgh and Dublin score 'a worse' on national game funds and

⁴⁹ For more specific details on the game funds see appendix C

subsidies. Funds concern to a broader national scope mostly occurs in Birmingham and Manchester. The trade organization UKTI and the state department media, culture and sport heavily support these cities.

The presence of a game cluster occurs in the German and Dutch cities as well as in Lyon, Birmingham and Manchester. These clusters are associated with strong promotion for the gaming industry. Clusters are for example Kreativwirtschaft Baden-Württemberg, Medien.NRW, Gamecity:Hamburg, DGG, De Metropool regio, Imaginove (Lyon), BusinessBirmingham and Mediacity (Manchester).

Table 36 - Game cluster

Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Points	1	1	-1	1	1	1	-1	-1	1	1	1
Cluster	Yes	Yes	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Name	Utrecht, DGG	De Metropool Regio Amsterdam		Business Birmingham	MIDAS	Imaginove			Cluster Kreativwirtschaft Baden-Württemberg	MEDIEN. NRW	GAMECITY: Hamburg

Utrecht ranks first in the category policy interventions. The city scores in total 'a good', scoring well in game events and it has the presence of a game incubator and a game cluster. Hamburg ranks second and Manchester third. Lyon scores the highest amount of points in tax advantages and game funds/subsidies but has disadvantages in incubator facilities and the presence of game events. At the bottom are Dublin and Edinburgh, which score worst on availability of game funds and game events.

Table 37 - Total score of the indicator policy interventions

Region	Utrecht	Noord-Holland	Lothian	West Midlands	Greater Manchester	Rhône-Alpes	Dublin	Skane	Baden-Wurttemberg	North Rhine-Westphalia	Hamburg
Main city	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Incubator facilities	1.5	0	0	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	1.5
Game events	1	-1	-1	0	0	-2	-1	0	-1	0	1
Cooperation government and gaming industry	0.4	0.4	0.2	0.6	1	0.4	-0.6	0	0.6	-0.2	0.8
Tax advantages	0.16	0.16	-0.16	0.16	0.16	1	0	-0.66	-0.83	-0.83	-0.83
Game funds/subsidies	-0.418	-0.418	-2.505	1.67	1.67	2.087	-1.67	-0.418	0.418	-1.253	-0.835
Presence of a game cluster	1	1	-1	1	1	1	-1	-1	1	1	1
TOTAL POINTS	3.642	0.142	-4.465	1.93	2.33	0.987	-5.77	-3.578	-1.312	-2.783	2.635
RANK	1	6	10	4	3	5	11	9	7	8	2

7.5 The overall results per city

Table 38- The overall results per city

Region	Utrecht	Noord-Holland	Lothian	West Midlands	Greater Manchester	Rhône-Alpes	Dublin	Skane	Baden-Wurttemberg	North Rhine-Westphalia	Hamburg
City	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Infrastructure	2,67	4	-2,83	-0,455	1,08	-0,58	-0,455	0,205	-0,25	3,42	1,42
Human resources * 2 Points	1.5	-4.68	3	1	12	9	4.16	-6.16	-6.5	-9.5	-3.34
Quality of life	-0,28	1,36	0,93	-0,78	0,17	0,64	0,14	-1,5	-0,86	-1,43	0,86
Labor wages and real estate costs	0,835	-0,5	-2	-0,67	-1	0,5	4,17	-1	4,05	-2,17	-1,17
Policy interventions	4	0,142	-4	1,93	2,33	0,987	-5,77	-4	-1	-3	3
Investment	0	0,005	0	-0,495	0,005	-0,005	0	1,5	-0,995	-0,995	-0,995
Demographical factors	2	0	2	-1	1	2	0	-3	-2	-3	0
TOTAL POINTS	<u>10,367</u>	<u>0,032</u>	<u>-3,7</u>	<u>-0,47</u>	<u>15,25</u>	<u>12,542</u>	<u>2,245</u>	<u>-13,698</u>	<u>-7,867</u>	<u>-16,458</u>	<u>-0,225</u>
OVERALL RANK	3	5	8	7	1	2	4	10	9	11	6

Manchester ranks first among the eleven European cities. Manchester is the city in this research that provides the best business environment for small game developers in the digital gaming industry. Manchester ranks very high on the indicator human resources. The points of this indicator are weighted two times, which gives Manchester a large advantage among the other cities. Manchester's universities provide a large amount of (advanced) game educations and Manchester University scores high in quality. Also, the universities in Manchester have a good cooperation network between government and companies. The city scores also high in policy interventions, with a high availability of game funds and subsidies. This shows a strong regional focus on gaming. It does not however has a game incubator.

Lyon ranks second with high scores in human resources and demographical factors, while scoring low in infrastructure and investments. Utrecht

ranks in total third. Utrecht scores the highest amount of points on indicators of policy interventions and demographical factors. Utrecht also scores high on infrastructure but scores remarkable lower in quality of life and human resources.

At the bottom are Karlsruhe, Malmo and Dusseldorf. These cities provide the worse business environment for small game developers. They score low on human resources, demographical factors, quality of life and policy interventions. Though Dusseldorf ranks first in infrastructure, Malmo first in investment and Karlsruhe first in labor wages and real estate costs, these cities are overruled by their disadvantage of human resources. They hardly have any advanced game education and their quality of universities is low.

8. Conclusion and recommendations

This research has developed a typology of the gaming industry. This typology illustrates the most common combinations of specific game elements. The structure of the gaming industry depends critically on six combined variables: complexity (high or low), market sector (business-to-consumer or business-to-business), production (by network or in-house), distribution (box or digital), size (large or small) and genre (entertainment, serious, applied or social). These combinations of elements are then applied to the complexity and the highly diversified structure of the gaming market – specifically, to the type of game and the function of a firm, which can operate as a developer, publisher, distributor or retailer in the traditional or digital industry. Where first the value chain framework focused on the traditional nature of the gaming industry, this nature gradually changed toward a new digital value chain. Traditional distributors and retailers have lost power and game developers and publishers have gained power, creating new market opportunities for new actors and intermediaries.

The main goal of this research is to understand how a region's business environment must be developed in order to increase the region's international competitiveness in the gaming industry. Utrecht's aim is here to specialize in the gaming sector. Geographers and economists provided insights into how the business environment's supply side is determined in relation to a specific industry and how this is influenced by the presence of clusters and networks, as well as how the character of a region –whether that region is specialized or diversified- is attached to the business environment of a region (e.g. Jacobs 1969; Marshall 1890; Boschma 2005; Visser 2009; Porter 1990; Porter 2008). The supply side consists of indirect location factors – such as innovation, commercial linkages between companies, knowledge and skill base – and direct location factors such as productivity, quality of life and infrastructure. These points are acknowledged in this research and are applied to the gaming industry. Crucial location factors for a supportive business environment in the gaming industry are researched according to the typology of the gaming industry. These main variables are divided into infrastructure, human resources, quality of life, policy interventions, labor wages and real estate costs, demographical factors and investments.

The first step in this research is to determine where Utrecht is positioned in the gaming industry. Which of the most common combinations represented in the typology are suitable to Utrecht? It seems that Utrecht is focused on small digital development game companies that are focused on B2B and B2C market, regardless which type of game they produce. This means that for the purposes of this research, only these factors in the typology apply. Some of the investigated variables are thus not applicable to this case and have been left out. In order to

fulfill this research's aim and to determine how to increase Utrecht's international competitiveness in the gaming industry, a comparison with competing European cities is made. These cities fulfill a basic condition, namely that they focus on small digital game developers. These cities are Amsterdam, Edinburgh, Manchester, Birmingham, Lyon, Dublin, Malmö, Karlsruhe, Düsseldorf and Hamburg.

The second step in this research concerns what Utrecht can learn from comparisons made with the other 10 European cities in the gaming industry. Utrecht ranks in third place, with only Manchester and Lyon achieving a higher score. In comparison with the other investigated cities, Utrecht scores very high on policy interventions, labor wages and real estate costs, demographical factors and infrastructure. The presence of the Dutch Game Garden (an incubator focused on game companies) is an important factor in Utrecht's gaming sector. Due to the presence of this incubator, Utrecht scores high on the categories of incubator facility, game events, presence of a game cluster, cooperation between game companies and government support. However, in the important indicator of game funds and subsidies, Utrecht scores below average. The cities Lyon, Manchester and Birmingham have far more opportunities in game funds and subsidies. This is not only on the national level, but also on the regional level. Utrecht only has one regional game fund, which the municipality of Utrecht and the regional government can definitely increase if they are willing to.

Utrecht achieves an average score on the investment indicator, in which it positions fourth. It scores below average for quality of life. Although Utrecht's authenticity is excellent – it is favored by the presence of canals, a historical center and more – and ranks first in this sub-category, the amount of amenities (for instance hotels, public libraries, cinemas and museums) is much lower than the other cities. Utrecht therefore ranks seventh position for quality of life. Utrecht also ranks quite low for human resources, resting in the fifth position. Utrecht is clearly at a disadvantage since it has only one university (compared for example with Lyon's four universities). Though Utrecht University's quality is high, the amount of game education on offer – and especially advanced game education such as Gametechnology – is below other cities' average. This creates a bottleneck for Utrecht.

8.1 Recommendations

Utrecht has an overall good position in the gaming industry. To strengthen its international position, Utrecht should improve its business environment for the gaming industry by increasing its investments, providing advanced gaming education and improving its quality of life. The investments in Utrecht's gaming industry are average; it can provide more venture capital and R&D investments on the regional level. Most of the data shown relates to the national

level, but there is a very limited availability of venture capital in the Netherlands – and therefore for Utrecht as well. Utrecht can craft a real and unique advantage if it increases its venture capital investments compared to other regions and promotes R&D investment in the gaming industry. The same is true of course for game funds – more of these should be available on a regional level. If Utrecht can begin to achieve this, it will have a unique selling point to attract more game companies into the region.

Although the quality of education is high in Utrecht and the university also has a high-quality Informatics department, the choices for advanced gaming education are limited. Utrecht is at a clear disadvantage due to its small size. The university can choose to tighten its network relations with universities that have a large-scale presence in advanced gaming, such as Manchester University and Dublin University. The government must stimulate this type of network if it wants to extend Utrecht's knowledge in advanced gaming. In the short term, this means that Utrecht University needs to tighten its relationship with the national- and regional-level governments. Fostering international relationships will also immediately promote Utrecht as a city. Utrecht is a student city. 22% of its residents are students – only Lyon has a higher percentage of 25,4%. Unfortunately, Utrecht is not on the map as a vibrant, dynamic city that is full of opportunities. The city remains in the shadow of Amsterdam, the Dutch capital. Amsterdam is far more visibly promoted than Utrecht is. The disadvantage of Utrecht's small size also showed in its ranking for quality of life. Unfortunately, the city cannot do much to change the amount of amenities it holds since it is limited by its size. Utrecht can however do more to promote itself as a student city. Utrecht needs a strong promotional effort to attract not only (international) students, but especially to attract game companies and to better its international position. The same counts for the promotion of venture capital and for R&D investments. The right location factors for the gaming industry are almost all present in Utrecht, but the rest of the world needs to know that.

A much more extensive and refined research is needed to determine which factors contribute the most to the growth of the gaming industry in European cities. Since a worldwide database on the regional level of city and sector characteristics does not exist, it would be very helpful to visit the cities to broaden future research on this topic. This will help create a more detailed database and will help to more effectively compare various business locations in the gaming industry.

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- De Jong, B. (2012, May 25). Nintendo. (F. v. Egmond, Interviewer)
- De Jong, D. (2012, May 29). Game mania. (F. v. Egmond, Interviewer)
- De Jongh, A. (2012, May 22). Game Oven. (F. v. Egmond, Interviewer)
- Groeneveld, E. (2012, July 3). Ubisoft. (F. v. Egmond, Interviewer)
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- Jansen, A. (2012, May 22) Abbey Games. (F. v. Egmond, Interviewer)
- Moelker, P. (2012, May 22). Booster Media. (F. v. Egmond, Interviewer)
- Nieborg, D. (2012, June 4). University of Amsterdam. (F. v. Egmond, Interviewer)
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APPENDIX A- Sources used for data

RDA'S, TRADE GAME ORGANIZATION, NDA'S AND REMAINDER:

CONTACTPERSONS BY EMAIL (received documents from)		RDA/NDA/TGO/REMAIN SOURCES
Organisation	Name	Organisation
<u>Ireland</u>		AMCHAM Germany
IDA Ireland	Kevin G Conroy	Agentschap.nl
UKIE	Euan Mackenzie	Ardi numerique (Lyon)
<u>France</u>		BUI (bundesverband interaktive unterhaltungssoftware)
Invest in France	Cynthia Odsi	Bundesverband digitale wirtschaft e.v.
	Severine de Carvalho	Business Birmingham
Fmaginove	Emmanuel Rondeau,	Creative.nrw
	Stephanie Spelege	DGA
Invest in France-Spain	Belen Jimenez	Dormund kreativ
ERAI	Julie Alfonsi	Dutch game garden
	Ayumi Kitano	Edinburgh inspiring capital
LYON	Roland Cathebras	Elektronikbranchen
	Julie Berliet	ELSPA
SNJV	Julien Villedieu	Enterprise Ireland
IFA	Belén Jiménez Ruiz	European Commission
<u>Germany</u>		Federation Dutch Creative Industries
Medien	Nadia	G.a.m.e
Kreative	Frank Lemoh	Gamechannel.de
Kreative	Bianca Poppke	Gamecity:hamburg
Kreative	Christof Schreckenberger	Gamedevelopers.ie
Turtle Entertainment	Ibrahim Mazari	Gameforum.de
MFG	Susanne Jehle	German trade and invest
German trade and invest	Julia Oentrich	Iamsterdam
		IDA Ireland
<u>The Netherlands</u>		
DGG	JP	IGDA
	Martine	Imaginove
NFIA	Cedric	International game developers association (IGDA Midland)
PWC	Ilja Linnemeijer	International game developers association (IGDA west UK)
NewZoo	Wybe Schutte	Invest in France
Iamsterdam	Elvira Tromp	Invest in Germany
	Annelies in 't Veld	Invest Skane
		Invest Sweden
<u>The UK</u>		Kreativwirtschaft Baden-Württemberg
NBSO	Damian Willems	Lyon Aderly
Enterprise statistics	Steven White	Invest Utrecht
Marketing Birmingham	Wouter Schuitemaker	Marketing Birmingham
Data Analysis Service	Stuart Guy	Manchester digital
		Mediacityuk
UKIE	Claire Macbeath	Medien.nrw
	Sabine Telesford	MIDAS
<u>Scotland</u>		MFG
Scottish Enterprise	Claire Shanks	Newzoo
<u>Sweden</u>		

Region Skane	Marianne Kipowski Daniel	NFIA Nordic game program
Invest in Sweden	Geetali Chhatwal	NRW.invest gmbh
Invest in Denmark	Camillia Amsko	Scottish development international
	Ditte Rønde Veise	SJNV (syndicat national du jeu video)
COPCAP	Ulrik B. Jørgensen	Swedish computer games industry
	Henrik Søndergaard	The interactive games association of Ireland (IGAI)
Tendsoresund	Brigitte	The Swedish game industry
		TIGA
		UKTI
		Www.gamesindustrie.nl

TAX COMPANIES

<http://www.nvp.nl>

<http://www.bvca.co.uk>

<http://www.afic.asso.fr>

<http://www.ivca.ie>

<http://www.svca.se>

<http://www.bvkap.de>

<http://www.chaussonfinance.com>

STATISTICS

- **EUROSTAT (2009-2010)**

- Accessibility by rail (EU27=100)
- Accessibility by road (EU27=100)
- Annual visitors to museums per resident
- Cinema seats per 1000 habitants
- Cost of a monthly ticket for public transport (for 5-10 km)
- Number of buses (or bus equivalents) operating in the public transport per 1000 pop
- Patent applications to the EPO by priority year at the regional level by IPC sections and classes
- Price apartment
- Price house
- Region and cities
- Regional statistics- region and cities
- Total intramural R&D expenditure (GERD) by sectors of performance and NUTS 2 regions
- Wages and labour costs

- **OECD (2009-2010)**

- OECD Internet speed
- OECD Fixed (wired) broadband subscriptions¹ per 100 inhabitants
- Science and Technology Report: Science Technology and Industry Scoreboard 2011

REMAIN SOURCES (INTERNET LINKS)

- <http://venture-capital-firms.findthebest.com/>
- http://web.archive.org/web/20070522050108/http://www.edinburgh.gov.uk/internet/Environment/Planning_buildings_i_i_/Built_heritage/CEC_conservation_in_edinburgh_
- <http://www.lonelyplanet.com/>

- <http://www.rhinecyclerroute.com/stages/from-basel-to-karlsruhe-through-alsace-and-the-german-vineyards>
- <http://www.thebusinessplace.com/venture-capital-all-countries>
- <http://www1.karlsruhe.de/Stadtraum/Faecher/faecher.en.htm>
- <http://www.cepi.eu/index.php?hl=en>
- <http://www.bouwfondsreim.nl/~media/Files/Publi/0910NLMRRESFR.ashx>
huurprijs ontwikkeling met 5% gemiddeld 2001-2008
- http://www.rent.ie/houses-to-let/renting_dublin/2_beds/
- <http://www.topuniversities.com/student-life/best-student-cities/2012/>
- Computer science laboratory (LIP) <http://www.ens-lyon.fr/LIP>
- <http://hcs.science.uva.nl/>
- <http://research.cs.uu.nl/>
- <http://www.cs.manchester.ac.uk/research/>
- <http://www.cs.vu.nl/en/index.asp>
- <http://www.ed.ac.uk/schools-departments/informatics/research>
- <http://www.gamecitylab.haw-hamburg.de/>
- <http://www.kit.edu/english/search.php>
- <http://www.shanghairanking.com/ARWU2011.html>
- <http://www.timeshighereducation.co.uk/world-university-rankings/2010-2011/europe.html>
- http://www.webometrics.info/top100_europe.asp?country=fr&submit=go
- <http://www.faqs.org/patents/asnl/um>
- <http://www.shanghairanking.com/Ranking-Lab/indicator.jsp?param=ari>

REMAIN INTERNET LISTS

- The Economy of culture in Europe, KEA 2006
- TOMTOM European most congested cities list, 2011
- Ernst and Young real estate assets investment indicator, 2012 (report)

INFORMATION FROM THE UNIVERSITIES:

Birmingham City University	University College Dublin
Claude Bernard University Lyon 1	University Jean Moulin Lyon 3
Ens De Lyon	University Lumière Lyon 2
Haw - University of Applied Science	University Of Amsterdam
Heinrich Heine University	University Of Birmingham
Herriot Wat University	University Of Edingburg
Karlsruhe Institute of Technology	University Of Hamburg
Malmo University	University Of Manchester
Manchester Metropolitan University	University of Utrecht
Technische Universitat Hamburg	Vu University Amsterdam.
Trinity College Dublin	

APPENDIX B- Game education

<p>Dublin university</p> <ul style="list-style-type: none"> - FETAC Level 5 - Game Design & Animation - Dorset College, Dublin <p>DCU</p> <ul style="list-style-type: none"> - BSc. in Computer Applications at DCU - BSc. in Multimedia at DCU - MSc. in Multimedia at DCU - DCU – BEng Digital Media Engineering - <u>software engineer</u> - <u>hardware engineer</u> - <u>computer network engineer</u> - computing <p>DIT</p> <ul style="list-style-type: none"> - Honours Degree in Computer Science, DIT - DIT – MA Digital Media Technologies - DIT - MSc Digital Games - IADT – BA Modelmaking, Design and Digital Effects <p>DLIADT</p> <ul style="list-style-type: none"> - National Diploma in Computing (Multimedia) at DLIADT - BSc in Computing (Multimedia) at DLIADT <p>TCD</p> <ul style="list-style-type: none"> - TCD – MSc Interactive Entertainment Technology - TCD – MSc interactive Digital Media - TCD – Structured PhD in Digital Arts and Humanities - TCD – BSc Information Systems - <u>TCD – MSc Computer Science</u> - <u>TCD – BA Computer Science</u> <p>HND</p> <ul style="list-style-type: none"> - HND in Computer Games Design, BCFE - HND in Classical and Computer Animation, BCFE - National College for Art and 	<p>University of Manchester</p> <p><i>computer science courses:</i></p> <ul style="list-style-type: none"> - <u>Computer Science (3 Years) [BSc]</u> - <u>Computer Science (4 Years) [MEng]</u> - Computer Science and Mathematics (3 Years) [BSc] - Computer Science and Mathematics with Industrial Experience (4 Years) [BSc] - Computer Science with Business & Management (3 Years) [BSc] - Computer Science with Business & Management with Industrial Experience (4 Years) [BSc] - Computer Science with Industrial Experience (4 Years) [BSc] - <u>Computer Systems Engineering (3 Years) [BEng]</u> - <u>Computer Systems Engineering (4 Years) [MEng]</u> - Computer Systems Engineering with Industrial Experience (4 Years) [BEng] - Computing for Business Applications (3 years) [BSc] - Computing for Business Applications with Industrial Experience (4 years) [BSc] - Internet Computing (3 years) [BSc] - Internet Computing with Industrial Experience (4 years) [BSc] - Science with an Integrated Foundation Year (4 or 5 Years) - <u>Software Engineering (4 Years) [MEng]</u> - <u>Software Engineering (3 Years) [BSc]</u> - Software Engineering with Industrial Experience (4 Years) [BSc] - ACS: Advanced Web Technologies MSc - ACS: Computer Security MSc - <u>ACS: Computer Systems Engineering MSc</u> - <u>ACS: Data and Knowledge</u> 	<p>University of Edinburgh</p> <ul style="list-style-type: none"> - <u>Computer Science (Informatics)</u> - <u>Computing & Informatics</u> - Design & Digital Media - <u>Informatics</u> - Laboratory for Foundations of Computer Science - <u>Informatics: Centre for Intelligent Systems & their Applications</u> - <u>Informatics: Institute for Language, Cognition & Computation</u> - <u>Informatics: Institute for Adaptive & Neural Computation</u> <p>Napier (highschool)</p> <ul style="list-style-type: none"> - Games Development BSc - Games Development BSc (Hons) - Interactive Systems User Experience MSc - BDes (Hons) Graphic Design - BDes (Hons) Design & Digital Arts - BA (Hons) Communication, Advertising and PR - MA/MDes Design [Digital Arts] - MA/MDes Design [Graphic Design] <p>Herriot-wat</p> <ul style="list-style-type: none"> - Computer Science BSc - <u>G700 Computer Science (Artificial Intelligence) BSc</u> - <u>G440 Computer Science (Games Programming) BSc</u> - <u>G600 Computer Science (Software Engineering) BSc</u> - I100 Computer Systems BSc - G560 Information Systems BSc - G590 Information Systems (Interaction Design) BSc - G501 Information Systems (Internet Systems) BSc - GN52 Information Systems (Management) BSc - <u>G601 Software Engineering MEng</u> 	<p>Birmingham city university</p> <ul style="list-style-type: none"> - Faculty of Technology, Engineering & the Environment - <u>Computer Games Technology - BSc (Hons)</u> - Design and Visualisation - MA - digital arts and performance - design management - visual communication (bsc) - visual communication (msc) - Web Technology - DMT Research Degrees (MPhil PhD) - <u>Computer Science</u> - Computer Networks - Information and Communication Technology <p>University Birmingham</p> <ul style="list-style-type: none"> - faculty engineering and physical sciences - <u>Computer Systems Engineering BEng</u> - <u>Computer Systems Engineering MEng</u> - Computer Systems Engineering with Business Management BEng - Computer Systems Engineering with Business Management MEng - Computer Systems Engineering with Business Management with Industrial Year BEng - Computer Systems Engineering with Business Management with Industrial Year MEng - Computer Systems Engineering with Industrial Year BEng - Computer Systems Engineering with Industrial Year MEng - Computer Science and an Arts Subject Joint Honours BA - <u>Computer Science BSc</u> - Computer Science BSc with a year in industry - Computer Science with Business Management BSc - Computer Science with Business
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<p>Design UCD</p> <ul style="list-style-type: none"> - UCD – MSc Computer Science - UCD – BSc Computer Science 	<p><u>Management MSc</u></p> <ul style="list-style-type: none"> - ACS: Digital Biology MSc - ACS: Multi-Core Computing MSc - ACS: Semantic Technologies MSc - <u>ACS: Software Engineering MSc</u> - <u>Advanced Computer Science and IT Management MSc</u> - <u>Advanced Computer Science MSc</u> - <u>Computer Science Foundation Route to MSc (E-Learning)</u> - <u>Computer Science individual modules</u> <p>Manchester metropolitan university</p> <ul style="list-style-type: none"> - <u>Computer Games Technology computer science</u> - computing - game design and development - media technology - multimedia and web computing - <u>software engineering</u> - web and mobile application development - graphic design - illustration design - three-dimensional design - creative multimedia - <u>Computer Games Technology</u> - digital media and communications - information and communications <i>msc:</i> - <u>advanced computing</u> - computing - digital media computing - information systems - mobile application development 		<p>Management BSc with a year in industry</p> <ul style="list-style-type: none"> - <u>Computer Science/Software Engineering MEng</u> - <u>Computer Science/Software Engineering MEng with a year in industry</u> <p>Birmingham Metropolitan College</p> <ul style="list-style-type: none"> - BTEC Level 3 Diploma/Extended Diploma in Media Games Design - Microsoft and Cisco Academy presents Level 3 Business Technology featuring Game Development <p>South Birmingham college</p> <ul style="list-style-type: none"> - EDEXCEL BTEC Diploma Creative Media Production (Games) Level 2
<p>Karlsruhe Institute of Technology</p> <ul style="list-style-type: none"> - <i>departments of informatica</i> - <u>IPD - Institute for Programme Structures and Data Organisation</u> - <u>ITEC – Institute of Computer Engineering</u> - ITM – Institute of Telematics - Institute for Information Management in Engineering - Lifecycle Engineering Solutions Center 	<p>Lumiere Lyon 1</p> <ul style="list-style-type: none"> - <i>Gamagora: video game university</i> <p>Emile COHL</p> <ul style="list-style-type: none"> - Illustration - Comics - Infography - Multimedia - Animation. <p>Factory, School of images.</p>	<p>Hogeschool voor de Kunsten Utrecht (HKU)</p> <ul style="list-style-type: none"> - Design for Virtual Theatre & Games - Interaction Design - Game Design & Development - Game Art - Professional Master Creative Development (PSAU) <p>University of Utrecht</p>	<p>University of Hamburg</p> <ul style="list-style-type: none"> - faculty of mathematics, informatics and social science - <u>informatics</u> <p>HAW - university of applied science</p> <ul style="list-style-type: none"> - Department of Computer Science - Msc sound, vision, games <p>Techn. University of Hamburg</p> <ul style="list-style-type: none"> - <u>msc (german) Computational</u>

<p>Karlsruhe</p> <p>staatliche hochschule fur gestaltung</p> <p>medienkunst:digitale medien</p> <p>the ZKM, the Center for Art and Media based in Karlsruhe</p>	<p>ESIA 3D: 3D Infographics/ Animation Institute</p> <p>INP Grenoble: DHET Video Game project manager training</p> <p>Ecole des Beaux Arts -Fine Arts School: Multimédia section</p> <p>CPE lyon electronics- <u>computer science courses</u></p> <p>Epitech Lyon- <u>technology information course</u></p> <p>Ecole ingenieure information</p> <p>University de lyon-ecole centrale-<u>computer science and it</u></p> <p>ENS LYON</p> <ul style="list-style-type: none"> - <u>Computer Science Department (13 courses)</u> - Spécialité Informatique fondamentale - Fundamental Computer Science 	<ul style="list-style-type: none"> - <u>Gametechnologie (Informatica)</u> - Research Master Game & Media Technology - Nieuwe Media & Digitale Cultuur - Hogeschool Utrecht - Game Technology - Grafisch Lyceum Utrecht (GLU) - Gamedesigner (artist) - <u>Gamedeveloper (techniek)</u> 	<p><u>Informatics</u></p> <ul style="list-style-type: none"> - <u>Informatik-Ingenieurwesen</u> - <u>bscComputational Informatics</u> - <u>Informatik-Ingenieurwesen</u>
<p>Dusseldorf H-H</p> <ul style="list-style-type: none"> - Faculty of Mathematics and Natural Science - <u>informatica</u> - <u>computer language</u> - Mediadesign College- hogeschool - msc gamedesign - bsc gamedesign 	<p>Hogeschool van Amsterdam (HvA)</p> <ul style="list-style-type: none"> - <u>Informatica: Game Development (voltijd)</u> <p>Universiteit van Amsterdam (UvA)</p> <ul style="list-style-type: none"> - Media & Cultuur <p>Mediacollege Amsterdam</p> <ul style="list-style-type: none"> - Game Artist <p>QANTM college Amsterdam</p> <ul style="list-style-type: none"> - Game design: Interactive Animation - Minors (2) 	<p>Malmö University</p> <ul style="list-style-type: none"> - <u>Programming Using .NET: Advanced Course</u> - Programming Using .NET: basic Course - Programming Using Visual Basic .NET: Basic Course - The Game - Assembly 	

APPENDIX C- Game funds/subsidies

REGIONAL	NATIONAL
<p>Utrecht</p> <ul style="list-style-type: none"> - Rabo preseed fonds (via Utrecht Inc.) <p>Birmingham</p> <ul style="list-style-type: none"> - Support for Creative Industries in Birmingham - Screen West Midlands - Birmingham City Council - Regional Venture Capital Funds - West Midlands, Innovation Voucher - Arrow Funds (Birmingham) - Merica Technology seed Fund <p>Manchester</p> <ul style="list-style-type: none"> - North West Vision - Game Alliance - ACME - Regional Venture Capital Funds - Manchester, Creative credits (NESTA) - Northwest Business Investment Scheme - New East Manchester New Business Support <p>Lyon</p> <ul style="list-style-type: none"> - Imaginove Funding Programs - Lyon Game / Lyon Info Cité - Gamagora - Guarantee Fund for Regional Industrial Development - Fund regional employment in the Rhone-Alpes FRERA - Rhone-Alpes Creation - Spark Potential and Potential <p>Dublin</p> <ul style="list-style-type: none"> - Invest Northern Ireland: - *Solex scheme - Momentum - Business Innovation Link - Enterprise Northern Ireland Loan Fund <p>Malmo</p> <ul style="list-style-type: none"> - Nordic Game Program - Spelplan-ASGD - VINNOVA - Swedish Agency for Economic and Regional Growth <p>Karlsruhe</p> <ul style="list-style-type: none"> - Dependable Digital content funds - KfW-Gründerkredit-StartGeld und Startfinanzierung 80 	<p>Utrecht/Amsterdam</p> <ul style="list-style-type: none"> - Game fonds - Fonds voor de Creatieve Industrie - Innovatiefonds MKB+ door agentschap NL - De cultuurlening - Kleine ondernemersregeling - Investeringsfondsen voor technostarters en creatieve starters - Microfinanciering - Borgstelling MKB-kredieten (BMKB) - Culture Fund - Technopartner for technostarters - New Media Fund - Social Sectors & ICT program (Serious gaming) - Research & Innovation in Smart Creative Contexts (RISCC) - Centre for Entrepreneurship in the Creative Industry <p>Edinburgh</p> <ul style="list-style-type: none"> - TTOM (Technology Transfer in Optoelectronics and Microelectronics) - SMART:SCOTLAND - RSE Research Awards - RSE Enterprise Fellowships - R&D Plus - Proof of Concept Fund - Pathfinder Grant - Growth Fund - Accelerator Loan - Scotland - Growth Fund - Development Loan - Scotland - Scottish Investment Fund - Scottish Development International <p>Birmingham/Manchester</p> <ul style="list-style-type: none"> - Enterprise management incentives; DTI schemes: <ul style="list-style-type: none"> o Technology Programme: bi-annual competitions for grants from o DTI Grant for R&D (formerly SMART) o DTI grant for investigating an innovative idea o Knowledge Transfer Partnership o Small firms loan guarantee scheme o Early Growth Funds - UKTI has a handful of schemes to assist games companies: <ul style="list-style-type: none"> o The Computer Games Strategy Group o Trade programme budget

<ul style="list-style-type: none"> - Kredite - MFG Filmfoerderung Baden-Wuerttemberg funds the development and production - Bwcon, bwcon Coach & Connect - NewCome - Bürgschaftsbank Baden-Württemberg GmbH - MBG Mittelständische Beteiligungsgesellschaft Baden-Württemberg GmbH - Digital Content Funding - Bürgschaftsprogramm der L-Bank <p>Dusseldorf</p> <ul style="list-style-type: none"> - Kreativwirtschaftsfonds - nrw.bank - Gemeinschaftsaufgabe "Verbesserung der regionalen Wirtschaftsstruktur" (GRW) - Bürgschaft Klassisch - Bürgschaften für die Wirtschaft, die freien Berufe und die Land- und Forstwirtschaft <p>Hamburg</p> <ul style="list-style-type: none"> - Depend gamesfonds - Innovationsstarter Fonds - AV-Gründerzentrum NRW - Games Factory Ruhr - GDI.Ruhr Gründerlabor - Innovationsstarter Hamburg GmbH - Kreditausfallbürgschaften der Bürgschaftsgemeinschaft Hamburg 	<ul style="list-style-type: none"> o Trade Show Access Programme o Export support o Information and Opportunity identification <ul style="list-style-type: none"> - New Deal employment scheme - National Endowment for Science, Technology and the Arts (NESTA) - Skillset - Department for media, culture and sport - RSA (Regional Selective Assistance) - Third Sector Enterprise Fund - Enterprise Investment Scheme - Creative Industries Business Plan <p>Lyon</p> <ul style="list-style-type: none"> - RIAM/ Research & Innovation in Audiovisual & Multimedia - Production grant - OSEO funding - The Centre National Film and Moving Image (CNC) - Multimedia Publishing Support Fund - Relief fund video game - Prototype funde (FAEM) - Fonds video game <p>Dublin</p> <ul style="list-style-type: none"> - Foresight NI - Department of Enterprise, Trade and Investment: - Technology and Software Innovation Centre: - Enterprise Ireland Competitive Start Fund - R&D Fund - Market Entry Assistance - MicroTrade Link Up Funding <p>Malmö</p> <ul style="list-style-type: none"> - The European Regional Development Fund (ERDF) - Nordic council ministers: - *producentforeningen (dk) - *Finnisch game developers association (fn) - Islandic gaming industry - Producentforeningen (no) - Nordic Investment Bank <p>Karlsruhe/ Dusseldorf/Hamburg</p> <ul style="list-style-type: none"> - LfK (Landesanstalt für Kommunikation) funds broadband and internet-related projects - Theseus program - Deutscher Computerspielpreis des Bundes da High-Tech Gründerfonds (HTGF)
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APPENDIX D- Interviews results

Company		Abbey Games	Active world	Game Oven	Game mania	Booster media	Gamania	Game entertainment	Isotx	Nintendo	Ubisoft	
Variables	Structure*	Small DD	Small DD	Small DD	Large BDI	Large DD	Large DP	Large DP	Large DD	Large BDI	Large DD	Large DP
Accessibility by car		1	1	1	1	1	1	1	1	1	1	1
Accessibility by port		0	0	0	2	0	0	0	0	1	0	0
Accessibility by public transport		1	1	2	1	1	1	1	1	1	1	1
Amenities		1	1	1	0	0	1	0	2	0	0	0
Authenticity		1	1	1	0	1	1	1	1	0	0	1
Availability of a game cluster		1	1	1	0	1	0	0	1	0	1	0
Cooperation with government- game companies		1	1	1	0	1	0	0	1	0	1	1
Cooperation with companies-university		0	0	1	0	0	0	0	0	0	1	1
Distance to nearest international airport		1	1	1	1	1	1	2	1	1	1	1
Fixed (wired)-broadband		1	2	1	0	2	2	2	2	0	1	1
Game events		1	1	0	2	0	0	0	1	0	1	1
Game funds/subsidies		2	1	2	0	1	0	0	1	0	0	0
High technology specialism region		0	1	0	0	1	1	1	0	0	0	1
Housing costs		1	1	1	1	1	1	1	1	1	1	1
Incubator facilities		2	2	2	0	1	0	0	0	0	0	0
New IP generation and ownership		0	0	0	0	0	1	1	1	0	0	1
Labor mobility		0	0	0	0	1	1	1	1	0	1	1
Labor wages		1	1	1	1	1	1	1	1	1	1	1
Labour force with tertiary education		0	0	0	0	1	0	0	0	1	1	1
Local data center		0	0	0	0	1	2	1	0	0	1	1
Mobile broadband (3G/4G)		0	0	0	0	0	0	0	0	1	0	0
Multilingualism		0	2	1	0	0	0	2	2	0	2	1
Number of advanced gaming		1	2	1	0	2	0	1	0	0	2	1

Number of companies in the gaming industry	1	1	1	0	1	0	0	1	0	1	0
Number of game education	2	2	2	0	2	0	0	2	0	2	0
Number of game users	1	0	0	1	0	0	0	1	0	0	0
Number of higher education institutions and research facilities	1	2	1	0	2	0	1	1	0	2	1
Penetration of broadband	0	0	0	1	0	0	1	1	0	0	0
R&D investment	0	1	1	0	1	1	0	1	0	1	1
Real estate costs	2	2	2	2	2	0	1	1	0	1	1
Student city	1	1	1	0	1	0	1	2	0	1	1
Tax advantages	1	1	1	1	1	2	2	1	1	2	2
Venture capital	0	1	2	0	1	0	0	0	0	0	0

**DD (digital developer)-DP (digital Publisher)-DDI (digital distributor)- BD (box developer)-BDI (box distributor)-DDI (digital distributor)*

0= not important, 1= important and 2=very important

EXPERTS: ROMAR BUSCUR (DGG) –DERK VAN WINGERDEN (INVEST UTRECHT)- UBISOFT (EDWIN GROENEVELD) INTERVIEWS

DEMOGRAPHICAL FACTORS	Boxed (pc/console/handheld)	Digital (pc/mobile/online/console/handheld)				INVESTMENTS	Boxed (pc/console/handheld)	Digital (pc/mobile/online/console/handheld)			
Genre games	Entertainment (box) + MMOG games	Serious games		Online/casual games		Genre games	Entertainment (box) + MMOG games	Serious games		Online/casual games	
Market	B2C	B2B		B2C		Market	B2C	B2B		B2C	
Complexity/cost	High	High/Low		Low		Complexity/cost	High	High/Low		Low	
Size	Large	Large	Small	Large	Small	Size	Large	Large	Small	Large	Small
Number of companies in the gaming industry						Venture capital					
Developer	R-D-U	R-D-U	R-D-U	R-D-U	R-D-U	Developer	R-D-U	R-D-U	R-D-U	R-D-U	R-D-U
Publisher						Publisher					
Distribution/Retailer						Distribution/Retailer					
Number of gaming users						R&D support					
Developer						Developer	R-D-U	R-D-U	R-D-U	R-D-U	R-D-U
Publisher						Publisher	U	U		U	
Distribution/Retailer	D-U					Distribution/Retailer					
High technology specialism region						New IP generation and ownership					
Developer	R-D-U	R-D		R-D-U		Developer					
Publisher	D	D-U		D-U		Publisher	R-D-U	R-D-U		R-D-U	
Distribution/Retailer	R-D	D		D		Distribution/Retailer					
Student city											
Developer	U	R-D-U	R-U	R-D-U	R-U						
Publisher		R-U		R-U							
Distribution/Retailer	R										

HUMAN RESOURCES	Boxed	Digital				INFRASTRUCTURE	Boxed	Digital			
Genre	Entertain + MMOG	Serious		Online/casual		Genre games	Entertainment (box) +	Serious games		Online/casual games	
Market	B2C	B2B		B2C		Market	B2C	B2B		B2C	
Complexity/cost	High	High/Low		Low		Complexity/cost	High	High/Low		Low	
Size	Large	Large	Small	Large	Small	Size	Large	Large	Small	Large	Small
Number of higher education institutions and research facilities						Penetration of broadband (subscribers)					
Developer	R-D-U	R-D-U	D-U	R-D-U		Developer	U	U		U	
Publisher	U	U		U		Publisher	U	U		U	
Distribution/Retailer						Distribution/Retailer	U	D		D	
Number of game education						Mobile broadband (3G/4G)					
Developer	R-D-U	R-D-U	R-D-U	R-D-U	R-D-U	Developer					
Publisher						Publisher		U		U	
Distribution/Retailer						Distribution/Retailer		R-D-U		R-D-U	
Number of advanced game education						Local data center					
Developer	R-D-U	R-D-U	R-D-U	R-D-U	R-D-U	Developer	R-D-U	R-D-U		R-D-U	
Publisher	R-D-U	R-D-U		R-D-U		Publisher	D-U	R-D-U		R-D-U	
Distribution/Retailer						Distribution/Retailer	D-U	R-D-U		R-D-U	
Labor force with tertiary education						Wire fire availability					
Developer	R-D-U	R-D-U		R-D-U		Developer	R-D	R-D	D	R-D	D
Publisher	U	U		U		Publisher	D	R-D		R-D	
Distribution/Retailer						Distribution/Retailer					
Cooperation companies and University						Distance to nearest international airport					
Developer	R	R-D-U	R-D-U	R	R	Developer	R-D-U	R-D-U	R-D-U	R-D-U	R-D-U
Publisher	R	R-D-U		R		Publisher	R-D-U	R-D-U		R-D-U	
Distribution/Retailer						Distribution/Retailer	R-D-U	U		U	
Multilingualism						Accessibility by car					

Developer	R-D-U	R-D-U	R-D-U	R-D-U	R-D-U	Developer	R-D-U	R-D-U	R-D-U	R-D-U	R-D-U	
Publisher	U	U		U		Publisher	R-D-U	R-D-U		R-D-U		
Distribution/Retailer						Distribution/Retailer	R-D-U	R-D-U		R-D-U		
Labor mobility						Accessibility by port						
Developer	R-D	R-D		R-D		Developer						
Publisher	R-D	R-D		R-D		Publisher						
Distribution/Retailer						Distribution/Retailer	R-D-U					
Accessibility by public transport												
Developer							R-D-U	R-D-U	R-D-U	R-D-U	R-D-U	R-D-U
Publisher							R-D-U	R-D-U		R-D-U		
Distribution/Retailer							R-D-U	R-D-U		R-D-U		

POLICY INTERVENTIONS	Boxed	Digital				LABOR WAGES/REAL ESTATE COSTS	Boxed	Digital			
Genre games	Entertainment (box) +	Serious games		Online/casual games		Genre games	Entertainment (box) +	Serious games		Online/casual games	
Market	B2C	B2B		B2C		Market	B2C	B2B		B2C	
Complexity/cost	High	High/Low		Low		Complexity/cost	High	High/Low		Low	
Size	Large	Large	Small	Large	Small	Size	Large	Large	Small	Large	Small
Game funds/subsidies						Real estate costs					
Developer	R	R	R-D-U	R	R-D-U	Developer	R-D-U	R-D-U	R-D-U	R-D-U	R-D-U
Publisher						Publisher	R-D-U	R-D-U		R-D-U	
Distribution/Retailer						Distribution/Retailer	R-D-U	R-D-U		R-D-U	
Availability of a game cluster						Housing costs					
Developer	D-U	R-D-U	R-D-U	R-D-U	R-D-U	Developer	R-D-U	R-D-U	R-D-U	R-D-U	R-D-U
Publisher						Publisher	R-D-U	R-D-U		R-D-U	
Distribution/Retailer						Distribution/Retailer	R-D-U	R-D-U		R-D-U	

Cooperation government and gaming industry						Labor wages					
Developer	R-D-U	R-D-U	R-D-U	R-D-U	R-D-U	Developer	R-D-U	R-D-U	R-D-U	R-D-U	R-D-U
Publisher						Publisher	R-D-U	R-D-U		R-D-U	
Distribution/Retailer						Distribution/Retailer	R-D-U	R-D-U		R-D-U	
Tax advantages											
Developer	R-D-U	R-U	R-U	R-U	R-U	QUALITY OF LIFE	Boxed	Digital			
Publisher	R-D-U	R-D-U		R-D-U		Amenities					
Distribution/Retailer	U	U		U		Developer	R-D	R-D	R-D-U	R-D	R-D-U
Incubator facilities						Publisher					
Developer			R-D-U		R-D-U	Distribution/Retailer	R-D				
Publisher						Authenticity					
Distribution/Retailer						Developer	R-D	R-D-U	R-D-U	R	R
Game events						Publisher	D	D-U			
Developer	R-D-U	R-D-U	R-D-U	R-D-U	R-D-U	Distribution/Retailer					
Publisher	R-D-U			R-D-U							
Distribution/Retailer	R-D-U	R-D-U		R-D-U							

These interviews are with three experts that provided comments on all the actors in the gaming industry.

APPENDIX E- Example robustness

Example 1) Correct proportioned weighting factor (investment example)

Region	Utrecht	Noord-Holland	Lothian	West Midlands	Greater Manchester	Rhône-Alpes	Dublin	Skane	BW	North Rhine-Westphalia	Hamburg
City	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Infrastructure	2,67	4	-2,83	-0,455	1,08	-0,58	-0,455	0,205	-0,25	3,42	1,42
Human resources	1.5	-4.68	3	1	12	9	4.16	-6.16	-6.5	-9.5	-3.34
Quality of life	-0,28	1,36	0,93	-0,78	0,17	0,64	0,14	-1,5	-0,86	-1,43	0,86
Labor wages and real estate costs	0,835	-0,5	-2	-0,67	-1	0,5	4,17	-1	4,05	-2,17	-1,17
Policy interventions	4	0,142	-4	1,93	2,33	0,987	-5,77	-4	-1	-3	3
Investment	0	0.005	0	-0.495	0.005	-0.005	0	1.5	-0.995	-0.995	-0.995
Demographical factors	2	0	2	-1	1	2	0	-3	-2	-3	0
TOTAL POINTS	<u>10,367</u>	<u>0,032</u>	<u>-3,7</u>	<u>-0,47</u>	<u>15,25</u>	<u>12,542</u>	<u>2,245</u>	<u>-13,698</u>	<u>-7,867</u>	<u>-16,458</u>	<u>-0,225</u>
OVERALL RANK	3	5	8	7	1	2	4	10	9	11	6

Example 2) Disproportioned weighting factor (*6)

INVESTMENT	Utrecht	Noord-Holland	Lothian	West Midlands	Greater Manchester	Rhône-Alpes	Dublin	Skane	BW	North Rhine-Westphalia	Hamburg
R&D	0	-1	0	0	0,5	1	0	0	-0,5	-0,5	-0,5
Venture capital 1) 2)	0	1.005 4	0	-0.495 -1.98	-0.495 -1.98	-1.005 -4	0	1.5 6	-0.495 -1.98	-0.495 -1.98	-0.495 -1.98
TOTAL POINTS	0	0.005 3	0	-0.495 -1.98	0.005 -1.48	-0.005 -3	0	1.5 7.5	-0.995 -2.48	-0.995 -2.48	-0.995 -2.48

Region	Utrecht	Noord-Holland	Lothian	West Midlands	Greater Manchester	Rhône-Alpes	Dublin	Skane	BW	North Rhine-Westphalia	Hamburg
City	UTR	AMS	EDI	BIR	MAN	LYON	DUB	MAL	KARL	DUS	HAM
Infrastructure	2,67	4	-2,83	-0,455	1,08	-0,58	-0,455	0,205	-0,25	3,42	1,42
Human resources	1.5	-4.68	3	1	12	9	4.16	-6.16	-6.5	-9.5	-3.34
Quality of life	-0,28	1,36	0,93	-0,78	0,17	0,64	0,14	-1,5	-0,86	-1,43	0,86
Labor wages and real estate costs	0,835	-0,5	-2	-0,67	-1	0,5	4,17	-1	4,05	-2,17	-1,17
Policy interventions	4	0,142	-4	1,93	2,33	0,987	-5,77	-4	-1	-3	3
Investment	0	0.005 3	0	-0.495 -1.98	0.005 -1.48	-0.005 -3	0	1.5 7.5	-0.995 -2.48	-0.995 -2.48	-0.995 -2.48
Demographical factors	2	0	2	-1	1	2	0	-3	-2	-3	0
TOTAL POINTS	<u>10,367</u>	<u>0,032</u>	<u>-3,7</u>	<u>-0,47</u>	<u>15,25</u>	<u>12,542</u>	<u>2,245</u>	<u>-13,698</u>	<u>-7,867</u>	<u>-16,458</u>	<u>-0,225</u>
	<u>9,225</u>	<u>8,002</u>	<u>-2,9</u>	<u>-1,955</u>	<u>14,1</u>	<u>9,547</u>	<u>-1,915</u>	<u>-1,795</u>	<u>-2,54</u>	<u>-8,66</u>	<u>1,63</u>
OVERALL RANK 1)	3	5	8	7	1	2	4	10	9	11	6
OVERALL RANK 2	3	4	10	8	1	2	7	6	9	11	5

A higher weighting factor heavily influences on the difference between the total points and therefore on the overall rank of the cities.