Research Article

The Geography of Clusters: The Case of the Video Games Clusters in Montreal and in Los Angeles

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The aim of our research was to examine how clusters appear and develop in the video game sector. We thus did a comparative study of the video games cluster in Montreal and Los Angeles. This paper shows that concentration of human creativity in arts and in technology is a significant economic localization factor, but cross-fertilization of sectors and public policy also contributes to the understanding of the emergence of clusters in certain urban regions. Thus, political and industrial factors offer an explanation as to why clusters emerge and how they evolve, going beyond the purely geographic or economic factors. In LA as in Montreal, the cross-fertilization with film is important. However, in Montreal, it is the public policy contributing to financing jobs in the Multimedia City and the French language that brought Ubisoft to the city; this contributed to make the city well known in the field, creating a "brand" for the city and thus fuelling the cluster development.

1. Introduction

Despite economic globalization, the polarization and concentration of human creativity, innovations, and industrial development in given urban regions persists [1–3]. For the last thirty years, researchers in economic geography have looked at economic and market factors, but more recently, they have analyzed nonmarket factors, from the fields of sociology, public policy, and culture, in order to understand the geography and the variety of clusters in urban regions [4, 5].

In our research, we sought to determine why video games clusters appeared in Montreal and Los Angeles. Two factors dominate in the two zones. In the case of Los Angeles, it is clearly the relation with film and cross-fertilization between the two sectors, while in Montreal, it is the public policy aimed at attracting firms to create the City of Multimedia, as well as cross-fertilization with film. Our paper sheds light on these factors, on the basis of a research conducted in these two main video games clusters in Montreal and Los Angeles. This contributes to the theory in the field, as the specific sources of the clustering process are not often studied in various cities,

as it is often taken for granted that firms tend to cluster and agglomerate for economic reasons or location costs (as is the case in the aeronautics sector, e.g.; cf. [6]). We show that other factors (presence of related sectors, cross-fertilization, and public policy) play an important role.

After our introduction, Section 2 briefly reviews the relevant literature. The methodology and a synthesis of the results are then presented in Sections 3 and 4. The conclusion includes the limitations of the research, as well as some implications for public policy related to clusters.

2. The Literature Review

Since the publication of the *Principles of Economics*, by Alfred Marshall, regional studies have included rich and complementary approaches. However, while economic geography has become a multidisciplinary field of study [7], it often remains dominated by economic and financial factors [8]. The first major centripetal factors are neo-Marshall intraindustrial externalities defined as economies of specialization, labour market economies, and knowledge spillovers. While these elements still dominate, a great number of regional case

studies provide empirical evidence of the role of tacit knowledge and relational dimensions of knowledge development (i.e., [9–12]).

The second major centripetal factors are based on Jacobs's theory [13, 14] of urbanization economies. These are induced from interindustry spillovers originating from cross-fertilization of knowledge, which provide greater sources of innovation to local firms (i.e., [15–17]). However, openness of society as well as relational proximity [18, 19] was found to be a precondition to those spillovers and for cluster development.

Also, there has been some debate in explaining clusters' performance and evolution. Debates go from the relative importance of local and global networks in generating knowledge spillovers, according to an industry's value chain, to the spatial distribution of industries across nations. Inflows of knowledge from global networks with foreign partners, labour, and international acquisitions serve as feeding pipelines of new ideas, competencies, and technological assets for local firms which, in turn, stimulate internal dynamics of clusters and their performance [6, 20]. However, for these spillovers to take place, physical proximity does not appear sufficient and relational proximity between the firms or actors appears necessary [18, 19].

Researchers have started to analyze nonmarket factors and their embedding effects on economic behaviours, by going beyond externalities related to geographic proximity (agglomeration economies). In economic geography and urban studies, the interplay of the agglomeration of institutional infrastructure, government incentives, and their embedding effects acts as incentives for innovative activities. Governance can compensate market imperfections and contribute to industrial development (i.e., [12, 21–24]). Also, a certain number of authors have highlighted elements related to the efficiency of formal and informal relations, as well as facilitation of knowledge spillovers and labor mobility, thus contributing to renewing routines and fostering entrepreneurship. Amongst the main works, some take into account the social context underlying knowledge spillovers (Uzzi, 1996; Gulati and Gargiulo, 1999); the civic traditions related to a social structure of common experiences and background associated with a society (Putnam 1993); the organizational or relational proximities based on the logics of belonging and of similarity [25]; the social capital from networks enabled by institutional initiatives, social and cultural contexts underlying collective learning process [26, 27]; externalities from face-to-face contacts [28], personal networks related to proximity effects [29], and professional and relational proximities (Barthe et al. 2008). These contributions show the importance of shared understandings and shared conventions as explanatory factors of the development of clusters.

An evolutionary perspective emerged from the works of Arthur [30] who suggested that random historical events, taking place at the right time and location, attract labour expertise and develop interfirm markets, thus generating increasing returns, which, in turn, explain spatial patterns, hierarchy, and path dependency of industrial urban regions. Boschma and Frenken [31] also mention that routines, path

dependency, and lock-in effects are present in specific local contexts, explaining the selective patterns of distribution of clusters and the variety among them. It was also shown, however, that too much social, institutional, and geographical proximities may generate organizational and regional lock-in effects and thus have negative impacts on the capacity of local firms to innovate [32]. Maskell and Malmberg [33] also observed that a lack of variety combined with spatial and organizational myopia reinforced by local culture and institutional patterns may reinforce a pattern of specialization and generate lock-in effects.

Works by Saxenian [34], Castells [35], and Weiss and Delbecq [36], among others, distinguish Silicon Valley's culture, based on a longstanding tradition of entrepreneurship, venture capital, and spin-off cultures that are closely linked to regional institutions; these works contribute to the explanation of the innovativeness of the region by factors related to geographic and relational proximities. The authors explain why informal relationships, labor mobility, openness and diversity of people, and networking by workers make Silicon Valley a distinctive innovative region in the world. Openness and diversity of people were also put forward by Florida [4] to define the "creative class" in this region. In addition, according to Florida [5], these cultural features make the San Francisco Bay to San Diego regions creative and experimental regions. Through his works on economic geography of context and by focusing on the relationships between institutions and knowledge spillovers, Gertler [26, 27] (2001) showed that spatial proximity also requires cognitive proximity, social affinity, and cultural commonalities in order to be effective. Gertler [27] argues that the geography of tacit knowledge, as a critical component of social learning processes, is essential in the foundations of social contexts and their institutional underpinnings.

In the late 1990s, a major stream of research has emerged, the geography of the cultural economy which examines the relationships between cities and commodification of culture, in other words the production of cultural goods. While the production of cultural goods is not new, cultural industries are the product of a mass culture, nurtured by advanced technology in media and by the sociological structure of the audience, which has changed the demand from the old cultivated elite to cultural and modern audiences or consumers (Adorno, 1991). Thus, popular culture is no longer confined to certain forms such as novels or dance music but has extended to a wide variety of media or artistic expressions (Adorno, 1991). Furthermore, in advanced industrialized nations, cultural industries have become increasingly important in supporting the local economy.

In his book on *Cultural Economy*, Scott [37] discusses the symbiotic relationship between place, commodification of culture, and economy, which gave rise to the so-called cultural economy. He states that the most successful cultural industries are concentrated in large cosmopolitan cities, with a global influence, where the inputs come from agglomeration economies. This economy is related to cultural products' industries, such as publishing, fashion, music, architecture, television, graphic arts, and film. Furthermore, in a book edited by Power and Scott [38], examples of the geography

of cultural industries in smaller cities in Europe and Asia were also found. These show that the success of the video game industry in Japan is linked to the strength and the cross-fertilization between creative industries, such as animated films and cartooning. Krätke (2003) showed that in the context of globalization and of the culturalization of the economy, the major media cities are central nodes of a global industry.

In our research, we set out to test the hypothesis of cross-fertilization; as in our literature review, we found few studies that highlight the role of cross-fertilization between related industries. Despite the richness and the multidisciplinary approaches within economic geography, when it comes to explaining *why* clusters emerge in a selective pattern across regions and *how* they evolve, the role of other industries has not been the object of much attention. Our research led us to confirm this role for the Los Angeles case but showed the role of another factor in the case of Montreal, that of public policy. It is these political and industrial factors that we will highlight here, showing that the genesis of clusters can vary from one zone to another. We also argue that public intervention can be the source of a cluster as was the case in Montreal. This is an important contribution to the literature as it shows that beyond the economic and geographical factors often cited to explain the emergence and development of clusters, it is possible to create clusters with public policy.

3. Methodology

In order to conduct our research on clusters, we chose to analyze the video games clusters in Montreal and in Los Angeles. These cities were chosen for two reasons. First, they have both become major seedbeds of the video games industry in North America, but in two countries, Canada and the USA. Second, the language difference, that is, the French language in Montreal and the English language in Los Angeles, led us to think that the two might have different sources and trajectories, which would make the comparison potentially instructive.

The video games industry is based on creative content and is one of the core industries of the creative economy [4]. A video game (the term "video games" is used to describe electronic games played on consoles, hand-held devices, online, and PCs) is a multimedia product. The multimedia outputs include commercial applications but also educational materials and entertainment products, like video games. Video games are the product of interrelated and complementary competencies from the visual, print, and audio media industries [39].

The empirical research was of an inductive and interpretative nature, based on a grounded theory approach [40, 41]. We relied mostly on qualitative data to capture the richness of the phenomena under study—the genesis and the evolution of clusters—within their natural contexts, in Montreal and in Los Angeles. The sampling method was nonstatistical, purposeful, and theoretically representative. Selection criteria were used to gather an in-depth and global description of the phenomena under study [42, 43]. The

sample of respondent firms was selected from the population of firms operating directly in the development and the editing of video games. Firms had to be located in the urban regions for at least one year. Data was primarily collected through in-depth interviews with company and institutional officials in each urban region. The interviews lasted on average of 2 hours. The interview guide was divided into groups of open and flexible questions [43] related to why, when, and how the clusters emerged and how they evolved. A total of 24 recorded and transcribed interviews were conducted in Montreal and 21 were done in Los Angeles. Data were also collected at International Game Developers Association (IGDA) conferences and at the Electronic Entertainment Exposition (E3).

Content analysis of the verbatim was conducted. First, we undertook a conceptual ordering of the most significant concepts describing the genesis of clusters, the emergence, and the evolution of the clusters. Second, a search for relationships and patterns among concepts was conducted and unfolded in an iterative process of triangulation with secondary data. The next section is devoted to a synthesis of the results.

4. Results

4.1. The Genesis of Clusters of the Video Games Clusters: A Link with the Film Industry in LA and Film and Public Policy in Montreal

4.1.1. The Montreal Story. The video games cluster in Montreal emerged in the early 1990s, within the context of an affirmation of the Quebec Society in politics, the arts, and economics, and particularly an affirmation of the French language and culture, which led to the development of a local television and film scene in the 1950s and to a multimedia production later on. At the regional level, as a geocultural bridge between Europe and North America, Montreal was attractive to the French firm Ubisoft. Not only did Montreal offer low cost rents, it also offered a geographical and relational proximities to the Hollywood entertainment industry, but in a bilingual city, where French was dominant. This factor was important for the establishment of Ubisoft, but the Québec government's financial support to job creation was crucial in attracting the French firm to Montreal, at a time when the city was not yet as well known in the multimedia and gaming sectors [44]. Amongst the main factors of the French culture that contributed to the emergence of the video games industry in Montreal are the National Film Board (NFB), very active in Montreal, especially in French film production and animation, as well as the business leader Daniel Langlois, who created Softimage, based on a very innovative idea for digital animation [45]. The local entrepreneurs as well as the Quebec government, with its financial program to support job creation, are also important factors [46]. Indeed, in the City of Multimedia policy, 25% of the wage bill was paid by the government for each job created, in as much as the firm established itself in the City of Multimedia. Not all firms chose to establish in the City of

Multimedia, as large firms like Ubisoft and Electronic Arts chose to locate outside the City of Multimedia. However, the policy had an important impact in terms of marketing the city of Montreal as an important factor in the multimedia and gaming sectors [44, 46].

The head office of the NFB located in Montreal has been a rich incubator of creative talents and of artistic and technological experimentation in traditional and animated films for decades, as many interviewees mentioned. Its presence in Montreal was key to the development of the gaming industry in Montreal, while the strong presence of national television was important for the multimedia industry in Toronto [46]. In the 1960s, the NFB created an autonomous French production division and an animation studio directed by Pierre Juneau and René Jodoin, respectively. This made it possible for a great number of artists, such as Norman McLaren, René Jodoin, and Daniel Langlois to go forward in the experimentation of new techniques and creativity in digital animation films. In 1986, Softimage was founded by Daniel Langlois and became the first animation software firm; its 3D software became a technical standard among Hollywood movie studios and in other creative applications, such as video games. Softimage became the first incubator firm in computer graphics (CG) from which many local firms emerged, such as Discreet in 1992 and Kaydara in 1993. The NFB and the CG firms were the main factors in building a digital animation culture, which became the seedbed of the video games cluster, in a large part because of spill-over effects.

The arrival of the French anchor firm Ubisoft, in 1997, was also a significant event for the following reasons. The founders of Ubisoft decided to establish a video games studio in Montreal to benefit from a strong digital animation culture and a pool of creative talent but also because of the presence of French or francophone communities in Montreal. Montreal could also be seen as a geocultural bridge between Europe and the Americas. The attraction of Ubisoft is linked to another significant event: the policy instituted by the Quebec government in 1998 which contributed to the wage bill of firms who established themselves in the Multimedia City and a specific financial support to Ubisoft which is at the origin of this policy. While this policy was sometimes criticized at the time and while many thought that firms may have developed without it, it is clear today that this policy represented a symbolic catalyst to attract large international firms to Quebec and to develop the knowledge economy sectors, particularly gaming, multimedia, and also IT. It gave an opportunity to capitalize on the local digital animation culture to further stimulate local entrepreneurship and to attract foreign firms by putting forward the image of a Multimedia City before Montreal had really become one. As mentioned earlier, while all firms did not establish themselves in the Multimedia City, some considering the rents too expensive, the program clearly had an impact in "branding" the city as an important player in the multimedia sector and particularly in the gaming industry ([44, 46] and our interviews).

A last significant factor was the Quebec "entrepreneurial spirit" (Daniel Langlois was clearly part of this culture), as

well as a certain capacity to innovate without substantial financial resources, given the limited francophone market in Québec, as is the case in the film industry [45]. This "*low-cost high-creativity*" culture has come to be looked upon as a cultural specificity and part of the larger affirmation culture of the Quebec society in North America (low cost especially in comparison to the USA but also to Europe). Most of the local entrepreneurs underline the fact that there is a high level of creativity in Montreal, but at a low cost, which offers simultaneously an economic and creative advantage. Also, many highlight the importance of the film and local TV production and the links it has developed with some multimedia firms [45]; this cross-fertilization between the two sectors appears useful to develop creativity in both sectors. With the relations built with the USA and France, the cross-fertilization and the public policy factors largely contributed to a dynamic gaming industry in Montreal and to the emergence of a significant cluster of firms in the city.

4.1.2. The Los Angeles Story. Even if San Francisco was not part of the fieldwork, it bears mentioning that the video games industry emerged first in the San Francisco Bay region, with Silicon Valley at its core. It emerged in the 1970s, from a civilization characterized by heterogeneous immigration waves fed by democratic, progressive, and meritocratic ideologies. It is in this context, as in an incubator, that the video games industry developed through many spinoffs.

The video games industry spread out to the Los Angeles region, in the 1990s, within the Hollywood entertainment industry and particularly its film industry. Los Angeles, and Hollywood at its core, was a place where the film industry and artistic movements developed to create an America that would be different from the one that existed in the early 1900s, [47, chapter 6]. Since then, there have been many movie generations. Along with advanced technology in computer graphics, Hollywood movies multiplied until the Hollywood entertainment culture took shape, in the 2nd half of 1990, with 3D computer graphics movies. There was a shift of interest in the local community toward video games, which were no longer seen as a toy but rather as an entertainment product.

It was in this context that major motion picture studios entered the video games industry, in the 1990s. They did so by creating their own divisions, such as Disney, with its division Disney Interactive/Buena Vista Games in 1994, Fox Interactive in 1996, MGM Interactive, Warner Bros Interactive Entertainment, and Vivendi Universal Games in 2000. While Toronto and Vancouver (in Canada) also feed on Hollywood productions, this is the dominant source of development of the LA gaming industry. According to our interviewees, many LA gaming firms have relations with San Francisco software firms, and this produces interesting cross-fertilization.

As an informant mentioned: "that's kind of where the movie industry is, it's where the studio is, Disneyland was based here. It's kind of a Walt Disney's decision, you know, and the rest of the company is kind of . . . all the divisions are kind of based here, you know, there's some satellites outside here, but for the most part, this is where the business began."

They also grew through acquisitions of local and foreign developers and through video games production based on Hollywood licenses. Over the years, there has also been cross-fertilization of human creativity and technologies within related entertainment industries which gave rise to the video games industry in Los Angeles.

For example, a respondent stated the following: "When people wanted to see the characters in something other than a video or a TV show, they wanted to see the characters in a way you can play with the characters, become the characters, you know, going to the characters' world and do different things, so really that's how things started."

Another respondent mentioned that "Now there's really a blurring of the lines between things like movies and TV and video games, because the appeal for all of them is similar. You know, the video games industry is here to stay, it's definitely growing, I mean, the quality of it has grown significantly, you look at the quality of the systems and the animation quality, the same guys who worked on animation in the movies, usually could be working on animation, computer-generated animation, video games, movies, there's a blurring of the lines."

Another interviewee said "We take video games from a lot of the movies, so the fact that we're based here, we can work with the different groups. (…) I like the fact that there's content creation from the companies, so there's a steady scheme of things that we can consider to publish here or innovate from. (…) Basically, when you're in Hollywood and this area, it's basically a creative environment, there's a lot of creative people around. Basically, it's, you know, like New York, you would call it the financial capital, here is kind of the entertainment capital of the world. You know, with the music industry, the movie industry, TV industry, there's a lot of people here that are thinking in creative ways to entertain people."

The film industry is thus related to the emergence and development of the videogame industry in both of these cities, confirming the link between the cross-fertilization of industries and the development of clusters. Beyond possible geographical factors, the agglomeration and cross-fertilization of technology, art, and human creativity in the entertainment industries, and also with the film sector, appear to be crucial factors to explain the emergence and development of the gaming clusters in LA and in Montreal, although the public policy is an essential factor in the Montreal case, alongside cross-fertilization with film.

The Hollywood entertainment culture has attracted video game firms to localize in Los Angeles; for example, Activision moved from Silicon Valley to Los Angeles in 1992. With THQ, which disappeared in 2013, they were the first independent firms to produce video games based on Hollywood licenses. Electronic Arts, based in San Francisco Bay, also established a studio in Los Angeles in 2000 (and came to Montreal later). Microsoft, Konami, and Sony are other examples of firms who have increased their video games activities in Los Angeles in 2003.

Another respondent mentioned: "Bobby, who was the current C.E.O. and Chairman, had the foresight to move the company to Los Angeles and his primary reason for doing

so was because he felt that in the future, video games would be much more aligned with Hollywood. And that a lot of the talents that he would start to see in video games would be from the Hollywood community."

We note the important link with the labour pool, a factor sometimes neglected to explain cluster development or stagnation. In these two cities, the labour pool developed in the film industry of Hollywood and in the NFB animation studios of Montreal was A significant factor. Also, while Los Angeles has a great concentration of universities and technical schools to generate creative talent in the entertainment industries, the creation of the E3 association devoted to the video games industry in 1995 is also an important factor to explain the emergence of the city in the gaming industry and its willingness to maintain a major influence in the global entertainment culture. In Montreal, Cinema schools in the universities, gaming programs at the college level, but the former Ubisoft Campus and the Softimage training sessions have contributed to the dynamism and development of the labour pool.

4.2. The Evolution of the Video Games Clusters. The video games cluster of Montreal has grown considerably, from 400 employees in 1996 (before Ubisoft settled in 1997 and the public funds policy implemented in 1998), to 1000 in 2003, 5,500 in 2009, and to approximately 8000 employees in 2013. Montreal accounts for 80 percent of the industry in the province of Quebec. With Toronto and Vancouver, it is one of the 3 gaming centers in Canada. Montreal has become the biggest cluster per capita in the world after the ones in California and Japan. Toronto and Montreal being the most important. What could have fostered its growth?

According to our interviewees, it is the fact that Montreal is a geocultural bridge between Europe and North America, has a strong digital animation culture (with Softimage and the Multimedia City having branded the city as a "low-cost high-creativity" culture in film as in the multimedia sector, and of course the fact that the government supported the industry with financial incentives). Also, within an increasingly American- and Hollywood-based entertainment culture, Montreal was apparently at the right place, with the right talents to foster the video games cluster. The Multimedia City program, which financed firms to establish themselves in Montreal, did the rest in terms of branding the city. It thus fostered the cluster's growth and transformation over time. All this translated into American acquisitions of local computer graphics and video games firms, in the establishment of several foreign video games firms, from France, the UK, and the USA (such as Gameloft, Microïds, Bug Tracker, Electronic Arts, Eidos, DC Studios, Babel Media, Javaground, Cyanide) in the late 1990s, and in the growing popularity of video games based on Hollywood movies and other foreign licenses. The Montreal firms who took this "Hollywood road," such as Hexacto, Kutoka, A2M now Behavior Interactive, Airborne, and Beenox (from Quebec City) all had the fastest growth among local firms. Behavior is a symbolic case of the positive influence of the Hollywood entertainment culture on the development of the Montreal gaming cluster. Through

global partnerships of video games based on movie licenses, behavior Interactive has become the biggest independent developer in North America. Moreover, as the first and major anchor firm, Ubisoft, known as the "Bombardier of the video games," has generated creative talent through successful video game titles and through the creation of the Ubisoft campus, which contributes to develop competencies in the local labour pool, an extremely important factor for the sector to continue to develop and flourish over the years. Indeed, given the concentration of universities and technical schools in these sectors (IT, image and sound, film, etc.), video game firms were thus able to be fed by creative talent and to operate and innovate at very competitive costs in comparison with the USA and Europe. "The low-cost high-creativity" culture of the gaming and film sector is definitely put forward as the main advantage of Montreal in this field, as was mentioned in many interviews. Over the years, other firms have joined the first anchor firm, as was the case for Electronic Arts (coming from California). There were also acquisitions, for example, the acquisition of Beenox by Activision from LA. Finally, Warner Bros Interactive and THQ from LA, Eidos, from UK, and Square Enix from Japan have created many jobs over recent years. THQ, from LA, also opened a studio in Montreal in 2010, and since the head office filed bankruptcy in 2012, the Montreal studio has been bought by Ubisoft.

A closer investigation into the Montreal's cluster shows that tolerance, and the bilingualism and openness of the Quebec society as well as the quality of urban life and the low cost of rent in Montreal all had a positive impact in attracting and retaining local and foreign creative talent ([48] and our interviews). This apparently plays for various sectors of the so-called "creative economy" and appears to partially corroborate the work of Florida [49], for whom tolerance and openness are features encountered in the Quebec society. According to our interviewees, bilingualism and the low-cost creativity are, however, more important than simple tolerance and openness, which may be necessary or interesting but not sufficient to attract firms to a city.

While Montreal and LA both appear to be able to attract creative people for jobs in the gaming industry, the high costs of living and of rent, the important traffic congestions, and the smog present negative externalities in Los Angeles and thus have a negative impact on attracting foreign talent. Therefore, the interplay of bilingualism and low-cost creativity and the sociopolitical environment (public policy to finance jobs and structural factors such as low rents and relatively low wages in comparison with LA) appear to have played a crucial role in attracting and retaining talent. These factors appear to play in favor of the Montreal cluster for its future growth, and clearly, over recent years, the City of Multimedia has remained attractive to firms, even while the public policy was being phased out. The branding of the city as a Multimedia City, with competent and creative low-cost workers, appears to continue to play as a factor of attraction of firms. The public policy is definitely a second factor in Montreal, beyond the cross-fertilization with the film industry.

LA, however, clearly has the advantage of the proximity to Hollywood studios and counts some 12000 employees in 2012. According to the Entertainment Software Association (ESA), California is the largest employer in the video games industry in the United States, and it accounts for approximately forty percent of total employment industry nationwide. Furthermore, California is the location of the world's largest number of video games editors, and at least five of them are located in Los Angeles: Activision/Vivendi, Electronic Arts, THQ, Buena Vista Games, and Vivendi Universal Games. Obviously, Los Angeles has become a dominant cluster in video games on a global scale, due to the Hollywood entertainment culture and its influence within the global entertainment industry. For example, a respondent mentioned: "We make video games for all types of people. That's the idea behind the licensing blockbusters Hollywood licenses such as (. . .), because we know that there's going to be a global audience that's going to want to play this game."

The reproduction of the Hollywood entertainment culture has become a cultural logic of growth. As another respondent said: "Now it would be a merging group of the Hollywood community that is actually able to cross-over into the video games field, special effects artists, writers, composers. So I think that the local community of Hollywood talent can really help to bring video games to the next level."

Two other respondents add: "We have a lot of conversations with entertainment companies, that is TV production or film production or music artists, about how did that cross over and impact videogames, that's really convenient doing that here in L.A." And:

"You're going to see more and more video games developed in studios here in the L.A. area working with the studios." Some also mention the work with software firms in San Francisco, although many consider their specific relations to be a competitive advantage and do not give too much detail on which firms they work with to develop special effects.

While it is present in the genesis of the cluster in Montreal, the relation between films and video games is much stronger in Los Angeles than in Montreal. Another symbolic event has been the Hollywood video games Summit, which took place in Los Angeles, for the first time in 2006. This may be seen as a cultural logic of growth, in other words, the continuity in an inextricable link between space, power, and fantasy within the Hollywood community [50] and a reproduction of what Scott [51] has observed in the film industry in Hollywood: "the premier center of commercialized culture generally across the entire contemporary world" [51, page 159]. As a respondent has said "I would describe the Los Angeles area of the videogame industry as being healthier than other areas I'm aware of. It's a very creative place, the entertainment industry has existed here for almost a 100 years."

Moreover, the interplay between the Hollywood entertainment culture and the San Francisco Bay's incubator culture has had a significant role in the evolution of the Los Angeles's cluster and vice versa. The symbiosis of both regions and cultures generates a virtuous circle of innovation and creativity, which is not limited to video games. Indeed, content (mostly from Los Angeles) drives entertainment software (from San Francisco and Los Angeles), and entertainment software drives content. Again, the cross-fertilization

hypothesis appears to be confirmed here, with technology and software also playing into the equation.

In the words of a respondent: "It's Hollywood. Movies are created here and TV shows are created here, and a lot of stars are based here. So in terms of content creation, this is really kind of the place on earth where content is created. The Bay area is more like I guess you would say a software incubation area. There's content creation going on there but it's not really like, you know, character-based content is more like unique ways of creating systems, or creating efficiencies, or other innovative technological breakthroughs are going on there."

However, the path of the video games cluster in Los Angeles is not without drawbacks for two reasons.

First, it may face a risk of rigidity and limits to creativity due to its dominant entertainment culture. The business model based on Hollywood licenses generates economies of scope and reduces commercial risks, but an overdependence on licensed content could also limit creativity and innovation in the video games industry, according to some respondents.

As a respondent mentioned: "We try to balance our product portfolio between high-profile Hollywood licenses and original products. And the reason for that is the real upside financially is on these original products, because you don't have to pay a royalty fee, but there's a real risk in developing something that's unknown, because it's harder to establish it as a franchise."

Given this risk of rigidity, Los Angeles' firms may have difficulty to project themselves in future markets represented by technological and cultural ruptures. From an evolutionary economic geography perspective, this cumulative process may take the shape of a path dependency due to a lack of variety, generated by localization economies, and spatial myopia. On the contrary, given the fact that Montreal has its own film and TV industry, as well as a less dependence upon Hollywood film products, this risk of rigidity may be less important in Montreal's cluster and can play in its favour, in addition to its low-cost creativity advantage.

Also, the reproduction of the Hollywood entertainment culture into video games may generate transactions costs among partners, because each industry carries its own culture and therefore its own heuristics and industrial practices in creating value. Thus, as economic geographers observed that agglomeration effects alone don not reduce transaction costs, the cross-fertilization of different industrial cultures may not always do so either.

Finally, the concentration of various forms of creativity in urban environments in art (i.e., designers, sound, and visual effects suppliers) and in technology (i.e., computer graphics), make it possible to develop video games based on Hollywood licenses in Los Angeles and also, to a lesser extent, in Montreal. Indeed, the Hollywood entertainment culture has had a strong influence not only in Los Angeles but also in Montreal for developing video games based on Hollywood licenses, as entertainment products for global audience. Hence, firms in the Montreal region have been involved in the production of over 30 video games based on Hollywood movie licenses and other foreign licenses. This is definitely an important basis to stabilize the industry, while permitting creative projects

with other local actors not only in the film and TV industry but also in the technological arts sector, where Montreal has also become well known, especially with the Société des Arts Technologiques (Technological Arts Society). Figure 1 summarizes some of the elements put forward here.

5. Conclusion

Let us now summarize the main conclusions of our research conducted in LA and in Montreal. Our objective was to understand why clusters emerge in certain urban regions, how they evolve, and to provide insights on the variety of factors that can lead to development of clusters in the same sector but in different regions. Our contribution resides in the determination of whether it is always the same factors that play in the development of the clusters and also if clusters can to a certain extent be created or fostered. Concerning this last question, while a basis or "local milieu" favorable to the gaming cluster development is essential, and the film sector appears to have contributed to this in both Montreal and LA, the Montreal case shows that a cluster can be fostered, if not totally created from scratch. Indeed, some prerequisites are essential, amongst which a good labour pool, which in the Montreal case came partly from the film and animation industries but also from universities and colleges later on.

In the case of LA, the presence of Hollywood appears to be the major factor, with important cross-fertilization between film and gaming. We also highlighted something which has been less frequently observed, that is, the auto-reinforcing synergy between the entrepreneurial culture and technological developments of the San Francisco Bay Area. According to our interviewees, beyond the film and gaming connections, there are also important connections with the software development industry in San Francisco.

In Montreal, beyond the cross-fertilization with film and animation, which is also present, we find interesting economic advantages (low rent, relatively low wages) contributing to the interest for this city but also a very important public policy which served to attract firms to Montreal and give it a place in the multimedia and gaming industry through a branding effect created by the City of Multimedia policy.

In relation to the literature review presented earlier, the various sources and factors of cluster development, we find that our work confirms that of Arthur [30], who suggested that random historical events, taking place at the right time and location, attract labour expertise and interfirm markets, thus generating locational increasing returns. This can be related to the development of gaming after the film industry and important cross-fertilization between the two sectors. Boschma and Frenken [31] also mention that routines, path dependency, and lock-in effects are present in specific contexts, explaining the selective patterns of distribution of clusters and the variety among them. Our research confirms the importance of routines (in the film and animation industries), their transfer to another sector (gaming) in the context of path dependency, and also the risks of lock-in effects, particularly in the case of LA, given its tight relation and dependency on the Hollywood film industry.
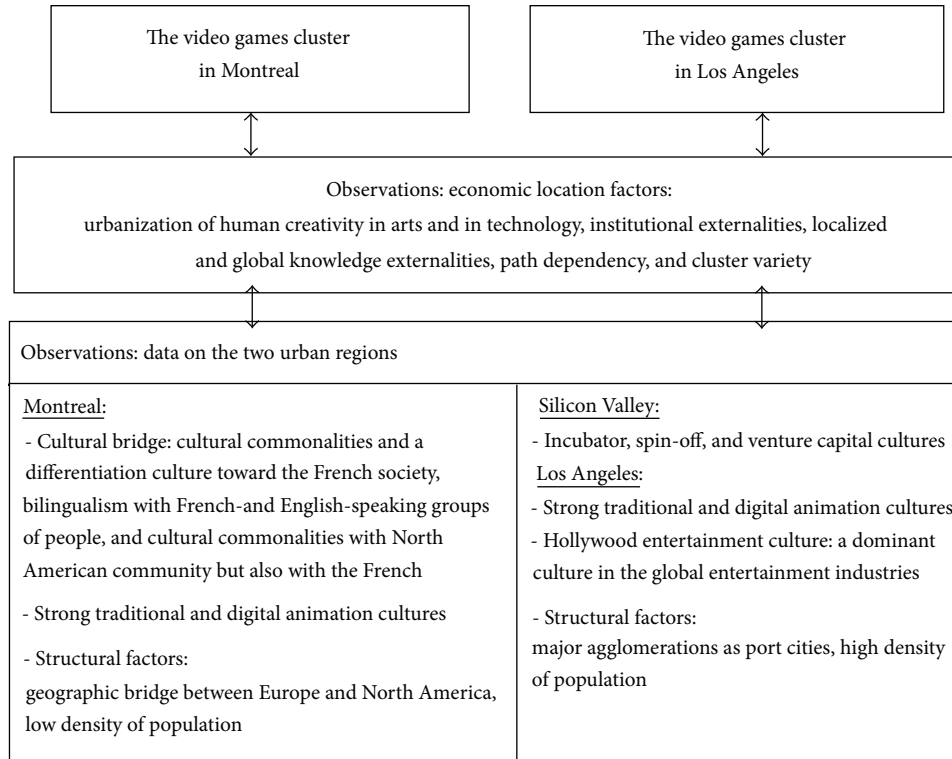
FIGURE 1: Synthesis of the geography of the video games clusters.

As mentioned earlier, we did a good number of interviews with various actors in both clusters, based on theoretical representativeness for qualitative research [42, 43], but could not conduct in-depth interviews of all actors of the local industry. Despite these limitations, this research identified important sources of cluster development and showed that to a certain extent, it is possible to create a cluster if favorable factors are present, thus highlighting the role that public policy can play in cluster emergence and development.

This research thus has interesting public policy implications. First, concerning the evolution and possible path dependency of clusters, which may generate lockin due to technological trajectories, initiatives from intermediate bodies in order to enhance the openness of clusters through access to global pipelines of information and knowledge may contribute to generate inflow of foreign knowledge carried by individuals with different values, competencies, and industrial practices. Second, a cross-fertilization perspective of the geography of clusters, as a whole, suggests that it may be important not to limit exchanges within the clusters but to try to create cross-cluster exchanges. At the present, most cluster policies, including that of Montreal, tend to separate clusters on arbitrary criteria. For example, in the Montreal cluster policy, animation is with the film and audiovisual cluster, while gaming is with multimedia and IT. Our research indicates that it might be better to have gaming with film and animation. In any case, our results lead to a proposition for more open clusters and more cross-cluster exchanges in order to foster cross-fertilization, as was the case with the film sector historically. The LA case suggests some interest
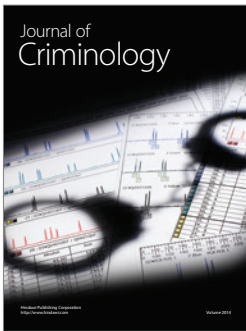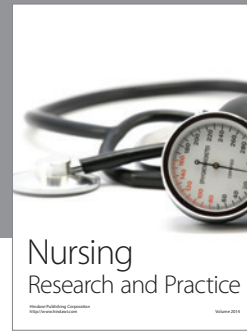
for exchanges with software firms, but the film and animation industries also appear very rich in sources of innovation for the gaming sector.

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